



The Global Green Finance Index 3



March 2019



We are pleased to present the third edition of the Global Green Finance Index (GGFI 3).

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 professional assessments.

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, Benoît Lallemand, Professor Michael Mainelli, and Simon Mills would like to thank Bikash Kharel, Mark Yeandle, and the rest of the Z/Yen and Finance Watch teams for their contributions with research, modelling, and ideas.



Foreword

Financial markets today face a lot of uncertainty: Brexit, trade wars, new technologies, unstable emerging markets...but also, one certainty: climate change. And climate change is impacting the financial industry at every level: from trillions of stranded assets to the systemic risks climate change poses to financial stability. It is impacting every industry segment, and much quicker than previously thought. Yet green finance is far from being mainstream.

But finance is going in the right direction, with support coming from a new generation of investors who care about their impact, from institutional investors who are increasing their sustainable investment strategies, as well as initiatives from policymakers and regulators who are themselves looking beyond financial risk, with the creation of a network of central banks and regulators on greening the financial system.

Writing from Luxembourg, “working together” comes easily and naturally: situated in the heart of Europe and experiencing open borders is a daily occurrence. The same can be said for our financial centre: working internationally is the norm. With this spirit, Luxembourg is helping to drive both the European agenda and the local industry in sustainable finance, with a clear vision of what role we can play to further develop sustainable finance locally, as well as internationally. As a founding member of the UN’s Financial Centres For Sustainability (FC4S), we are keen to work together with other financial centres to ensure that we learn from one another, and in this same spirit we support the Global Green Finance Index (GGFI).

What the GGFI does is provide the sustainable finance industry and policymakers with deep insights, clarity, and understanding on an international level on what works and what does not. This information allows us to assess, measure, and grow our financial centres’ sustainable finance activities. The GGFI contributes to encouraging others to learn best practices. Finally, the index also acts as a driver to a “race to the top” for the various players in finance. Yet we should remember, we are not really competing: we all need to play on the same team to combat climate change.

The shift towards green and sustainable investments is global, and we in Luxembourg are proud and eager to be a part of it. We hope that the GGFI continues to provide clarity, insights, and examples of what financial centres can do to make a positive and lasting difference to our planet, and that this index continues to act as a catalyst in mainstreaming sustainable finance globally, across all financial centres.



Nicolas Mackel,
Chief Executive Officer
Luxembourg For Finance



Preface

Finance is changing. But despite some genuine policy momentum and private sector commitments, we are nowhere near the pace and scale of change that we need.

The Intergovernmental Panel on Climate Change (IPCC) has just warned us we have 12 years to avoid climate breakdown. And climate change is only a start. As we continue to deplete our stock of natural capital and the services it provides, we are crossing one planetary boundary after the other, endangering the safe operating space for humanity.

The drivers for interest in green finance are complex. In part, they are driven by a realisation that the Sustainable Development Goals (SDGs) have a material impact on longer-term risk, particularly for investors with a long-term investment horizon. There is also a recognition that the 2008 financial crisis should have prompted a deeper reflection on the purpose of financial systems. Despite some structural changes, there is still a fear that unsustainable debt levels and deflation of a potential carbon bubble could deal the world's economy another hammer blow.

Green finance can be defined as any financial instrument or financial services activity which results in positive change for the environment and society over the long term (sustainability). The most basic “greenness” criterion of a company or project is that it contributes to reducing the emission of Greenhouse Gases.

The GGFI is aimed at measuring green finance and leading to an understanding of the range of factors, whether policy or regulation-driven, or market-led, which encourage growth and improvement in green finance.

It is notable that a number of the leading centres in the GGFI are smaller, less developed financial centres that have developed a niche market in green finance and lead the way. We hope that larger markets will follow that lead and ensure that sustainability makes an impact on a broader scale.

While encouraging more and better green finance is key, we don't want to lose sight of the bigger picture. That is why the GGFI survey asks respondents to rate both the quality and depth of green finance. It matters if a green finance offering makes up a significant element of the financial business of a centre, or whether it is superficial; if standards are being upheld or undermined; or if a green financial centre is also a hub for a much larger amount of fossil fuel financing.

In this edition of the GGFI, we have added new datasets about ‘green’ and ‘brown’ financing, which are detailed in the annex and online. Analysing these with the GGFI survey responses reveals some interesting patterns: some financial centres still finance a vast amount of fossil fuel activity; some of these financial centres are also green leaders; those that host large fossil fuel companies do not – so far – appear to suffer worse perceptions of green finance quality and depth. The latter contradiction only calls for more engagement of centres and policymakers on data.

In a special supplement on fossil fuel disinvestment we identify financial centres with a high fossil fuel exposure. What will happen to those centres if fossil fuel asset valuations collapse? And what impact for global financial stability?

A poll of green finance professionals found 80% in favour of policy action to support disinvestment, from regulatory disincentives to carbon pricing and disclosure. They confirm the finding from GGFI2 that the policy framework is the main driver of the uptake of green finance.

So what lessons can we draw about how to encourage the further greening of finance?

First, for policy-makers and regulators, your actions to promote sustainability in financial systems make a difference. Many of the leading centres in the index are in countries that have taken a lead on policy and regulation.

Second, for financial centres themselves, there is room in green finance systems to develop a market specialism and to attract new and different business to your centre.

Third, for non-governmental organisations and activists, the GGFI points to the continuing need to press for disinvestment in discussions on the use of assets managed on our behalf; and to aim to extend further the understanding that finance must be aimed at sustainable goals.

I hope this edition of GGFI will be a spur to action and provide data and ideas for those working on green finance – in finance, policy and civil society - to see where the opportunities lie to accelerate the switch we need to meet the IPCC's deadline. If we can't make finance help the fight against climate change, how will we get it ready to support the more complex restoration and conservation of biodiversity ahead of the Conference of the Parties to the Convention on Biological Diversity 15 in 2020 in China?



Benoît Lallemand
Secretary General
Finance Watch



Summary And Headlines

Welcome to the third edition of the Global Green Finance Index (GGFI 3). The GGFI is based on a worldwide survey of finance professionals' assessments on the quality and depth of green finance offerings across 110 international financial centres, combined with measurable factors or 'instrumental factors'.

The assessments were combined with 131 Instrumental factors (126 in GGFI 2) 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.

The online survey is at <http://greenfinanceindex.net/survey>. Please take a moment to fill it in if you have not already done so: the survey runs continuously and is sampled for each edition of the GGFI.

The 63 centres listed in GGFI 3 are those which received a minimum of 18 assessments from survey respondents. Assessments of respondents' home centres were excluded from the data, in order to avoid home centre bias. For comparison, GGFI 2 collected survey data on the same 110 financial centres, of which 59 received sufficient responses to be included.

There were four new entrants to the index. Melbourne, which entered highest, ranks 19th on depth and 17th for quality. Other new entrants were Liechtenstein, Rio De Janeiro, and Bermuda.

We received 4,097 ratings from 646 individual respondents in the period up to 31 January 2019 – a 20% increase in responses compared with GGFI 2. The profile of these respondents can be found in Appendix 3. The survey is sampled every six months in order to generate further editions of the index.

Our intention is that the GGFI 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.

In addition to the creation of the index, we have worked with colleagues at the Climate Bonds Initiative and Corporate Knights to create datasets which compare activity in green bonds, and other climate-related finance, including levels of fossil-fuel finance. Further details are in Appendix 5.

The GGFI team has also been working on a number of case studies focusing on leading regional centres in the index. We will be publishing these over the next few months.

Index Results

- Amsterdam retained its leading position in the depth index, with Zürich rising seven places to second equal with Copenhagen. Luxembourg, London, and Paris all fell back slightly but remain in the top seven globally;
- London and Paris retained their positions as first and second in the quality index, with Amsterdam third and Hamburg rising four places to take fourth position. Copenhagen dropped four places in the quality index from third to seventh;
- A number of centres moved more than five places in the indices. Zürich, Geneva, Toronto, Guangzhou, Edinburgh, Calgary, and Guernsey rose more than five places in the depth index; while Casablanca, Montréal, Guernsey, and the Isle of Man rose more than five places for quality;
- Perceptions of the prevalence of green finance are still ahead of market reality, with the average assessment for depth of green finance at 386 out of 1,000. There are signs of slower growth in some green finance markets, for example the issuance of Green Bonds slowed significantly in 2018, although this is forecast to pick up in 2019, as demand still outstrips supply¹.

Leading Centres

- Leading Centres in the index continued to be rated higher for the quality of their green finance than for depth. This may indicate the scale of transition facing larger centres that retain legacy investments in fossil fuel industries;
- On depth, Hamburg entered the top ten, displacing Shanghai; while for quality, Munich entered the top ten and San Francisco fell one place to 11th;
- The ratings given to the top five centres for both depth and quality improved, although for London, the rate of increase slowed considerably on the depth measure, allowing other centres to overtake;
- The leading centres stretched their lead, with average ratings across the index increasing 26 points for depth and 38 points for quality compared with GGFI 1. At the lower end of the table, the lowest rating dropped 18 points for depth and 19 points for quality compared with GGFI 1;
- As in previous editions of the GGFI, narrow margins separate centres at top of the tables. There is fluidity in the ranking of leading centres. Among the top five centres the spread of ratings is 19 for depth (12 in GGFI 2) and 33 for quality (41 in GGFI 2).

¹ https://www.moody's.com/research/Moodys-Green-bond-market-poised-to-hit-200-billion-in--PBC_1159526?showPdf=true

Western Europe

- Western Europe continues to improve its ratings across depth and quality. All ten of the top centres for quality are from Western Europe and eight out of ten for depth;
- Swiss centres improved strongly. Zürich rose seven places to second equal in the depth index while Geneva rose nine places to 15th equal. On quality, Zürich rose from seventh to fifth and Geneva up from 14th to tenth;
- Hamburg, Zürich and Geneva have all improved their ratings and rankings across depth and quality;
- Liechtenstein entered the index for the first time.

North America

- San Francisco retained its leading place for quality in North America, although it dropped one place to 11th place overall as Western European centres consolidated their position. Montréal again took first place in the region for depth, retaining its eighth position overall and improving its rating by 14 points;
- Canadian centres appear to be outperforming the USA both in depth and quality. All four Canadian centres received increased ratings. By contrast, all USA centres dropped in the rankings for quality and depth, with the exception of Washington DC and New York, which both rose one place in the depth index.

Asia/Pacific

- Asia/Pacific Centres overall fell back in the rankings for both depth and quality, although their ratings generally improved for depth;
- Within the region, Australian centres are challenging Chinese dominance. Sydney, and new entrant Melbourne, performed strongly, taking the top two positions in the region for quality. Shanghai held on to its top position for depth in the region, although it fell four places overall.

Middle East & Africa

- Casablanca consolidated its reputation as a regional leader, rising three places in the overall rankings for depth and 13 places overall for quality – the most significant improvement of any centre in the index;
- Dubai's rating and rankings fell back in both quality and depth, both overall and in the region. Its ratings may reflect a readjustment following the significant improvements in ratings it made in GGFI 2.

Latin America & The Caribbean

- São Paulo retained its leading position in the region, though fell slightly overall;
- Other centres in the region all fell in the rankings for quality and depth, with Mexico City suffering the largest fall in depth and quality in the region for both rank and ratings;
- Rio De Janeiro and Bermuda joined the index for the first time.

Eastern Europe & Central Asia

- Prague consolidated its position as the regional leader, although its quality ranking has fallen nine places as it has been overtaken by other centres;
- Overall, centres in the region have fallen back, other than Prague and Moscow, which each gained one place in the depth index. Moscow's rating rose 17 points for depth.

Relationship With Instrumental Factor Scores

- There continues to be a closer correlation between the instrumental factor data drawn from composite factors, for example the Global Innovation Index or the Quality of Living City Rankings, than factors relating directly to green finance. This may indicate that leadership on quality of life issues is an enabling factor for the growth of green finance. Business environment factors appear to have a strong correlation to the depth ranking;
- Among green finance market data, the highest correlation with perception was with the sustainability performance of a financial centre's listed companies. The financial centres that tend to perform well on this measure are those whose companies have more clean revenue than their industry peers, including fossil fuel companies in transition;
- Green finance perception had little or no correlation with Greenhouse Gas (GHG) emissions or with the volumes of 'clean' or 'dirty' revenues of the companies listed in a given location, suggesting a disconnect between the growth of a centre's green finance and the level of its fossil fuel activities and carbon bubble exposure;
- In GGFI 3, green bonds and climate-aligned bonds had slightly more impact on the ratings than in previous GGFI editions but remain less significant overall than other sustainable finance indicators. The highest correlation in this group was with green bonds by listing venue. Measures such as country of risk/issuer and type of certification were less significant.

The Carbon Bubble

We have included a focus section on disinvestment in this edition of the GGFI. This uses existing data along with the new data sets that we have developed with our partners to draw conclusions on the potential impact of disinvestment from fossil fuels on financial centres with high revenues drawn from large oil and gas companies.

Areas Of Interest, Areas With Most Impact On Sustainability, And Drivers

We asked respondents which areas of green finance were of most interest; which areas would have most impact on Sustainability; and which factors are driving the uptake of green finance:

- Renewable energy investment, green bonds, and sustainable infrastructure finance remained the three areas identified as both most interesting and with most impact. This has been a consistent finding in all three editions of the GGFI;
- The drivers of green finance are consistently identified as:
 - ♦ The policy and regulatory framework, followed by mandatory disclosure and tax incentives;
 - ♦ Demand from investors, and public awareness.

Conclusions

As noted above, we have worked with partners to generate new data sets on climate-relevant finance, including fossil-fuel financing. Taking the index and new data together, the conclusions we reach at this stage are as follows:

- Stable policy frameworks focused on disclosure, risk, and incentives appear to be critical to enhancing perceptions of the depth and quality of green finance. The continued strong performance of Western European centres, and the gap opening between Canada and the US in the index, underline this point;
- The ‘large centre effect’ (where long-established centres with a history of fossil-fuel financing tend to fare relatively worse for depth than quality) continues, as can be seen from the further decline in the ranking of London and Paris in the depth index, despite them retaining the top positions for quality;
- There are significant revenue risks for financial centres associated with future deflation of the carbon bubble. Some centres are more exposed to these risks than others, and there is no correlation between the ratings centres receive in the GGFI and carbon risk exposure;

- There is a disconnect between GGFI rankings and fossil fuel financing activity. The financial centres with the highest volumes of disclosed GHG emissions (scope 1 and 2) based on companies listed in their stock exchanges are New York, Moscow, Paris, Shanghai, London, Frankfurt, Milan, Tokyo, Madrid, and São Paulo. These centres are spread throughout the index rankings;
- 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. For example:
 - ♦ Casablanca has set clear targets and policy objectives for the expansion of its green finance sector, has a clear ambition to become a hub for green finance in Africa, and was a founder member of Financial Centres for Sustainability;
 - ♦ In Amsterdam, partnership between central government and the financial services sector has resulted in a range of project and programmes designed to enhance resilience and cut emissions while the Government of the Netherlands and the Dutch National Bank continue to lead international collaboration for action on climate change in developing economies.
- The index results also appear to show that there is a premium to be gained from demonstrating leadership in particular sectors or products, for example, Luxembourg on green bonds, London in relation to insurance, or ESG equity in Hamburg.

"Not every asset manager shifts out of every fossil fuel immediately. There has been a focus on getting out of the highest carbon fuels like coal with coal mines even limiting their coal output. We have also seen a shift away from corporations that are unable to diversify into zero carbon fuels, which was a part of the reason driving Norway's Government's recent proposal to divest from oil exploration companies."

Yossi Cadan, 350.Org Global Campaigner on Divestment

GGFI 3 Ranks And Ratings

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

Centre	GGFI 3		GGFI 2		Change in Rank		Change in Rating	
	Rank	Rating	Rank	Rating				
Amsterdam	1	461	1	435	▶	0	▲	26
Zürich	2=	448	9	415	▲	7	▲	33
Copenhagen	2=	448	2	433	▶	0	▲	15
Luxembourg	4	444	3	432	▼	-1	▲	12
London	5=	442	3	432	▼	-2	▲	10
Stockholm	5=	442	5	423	▶	0	▲	19
Paris	7	435	5	423	▼	-2	▲	12
Montréal	8	431	8	417	▶	0	▲	14
Vancouver	9	429	10	412	▲	1	▲	17
Hamburg	10	424	12	410	▲	2	▲	14
Shanghai	11	420	7	420	▼	-4	▶	0
Beijing	12	418	13	409	▲	1	▲	9
Sydney	13=	417	18	403	▲	5	▲	14
Casablanca	13=	417	16	407	▲	3	▲	10
Shenzhen	15=	412	19	401	▲	4	▲	11
Geneva	15=	412	24	393	▲	9	▲	19
Brussels	17=	410	14	408	▼	-3	▲	2
Toronto	17=	410	23	395	▲	6	▲	15
Melbourne	19	409	New	New	New		New	
Seoul	20=	407	14	408	▼	-6	▼	-1
Munich	20=	407	17	405	▼	-3	▲	2
Guangzhou	22	405	31	381	▲	9	▲	24
Singapore	23	404	21	398	▼	-2	▲	6
San Francisco	24	402	11	411	▼	-13	▼	-9
Jersey	25=	399	25	388	▶	0	▲	11
Frankfurt	25=	399	21	398	▼	-4	▲	1
Edinburgh	27=	393	37	374	▲	10	▲	19
Vienna	27=	393	25	388	▼	-2	▲	5
Los Angeles	29	392	19	401	▼	-10	▼	-9
Madrid	30	389	29	382	▼	-1	▲	7
Washington DC	31=	385	32	380	▲	1	▲	5
Hong Kong	31=	385	35	375	▲	4	▲	10

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

Centre	GGFI 3		GGFI 2		Change in Rank		Change in Rating	
	Rank	Rating	Rank	Rating				
Dublin	33	384	28	383	▼	-5	▲	1
Tokyo	34	382	29	382	▼	-5	▶	0
Milan	35=	380	27	386	▼	-8	▼	-6
Boston	35=	380	34	376	▼	-1	▲	4
Rome	37	379	35	375	▼	-2	▲	4
New York	38=	376	39	372	▲	1	▲	4
Calgary	38=	376	49	356	▲	11	▲	20
Isle of Man	40	374	38	373	▼	-2	▲	1
Mauritius	41	372	42	367	▲	1	▲	5
Cape Town	42	371	40	370	▼	-2	▲	1
Prague	43	369	44	364	▲	1	▲	5
Malta	44=	367	46	362	▲	2	▲	5
Guernsey	44=	367	50	351	▲	6	▲	16
São Paulo	46	366	43	366	▼	-3	▶	0
Chicago	47	358	41	368	▼	-6	▼	-10
Liechtenstein	48	357	New	New	New		New	
Dubai	49	353	33	377	▼	-16	▼	-24
Warsaw	50	352	46	362	▼	-4	▼	-10
Johannesburg	51	350	52	339	▲	1	▲	11
Abu Dhabi	52	349	44	364	▼	-8	▼	-15
British Virgin Islands	53=	345	51	347	▼	-2	▼	-2
Mexico City	53=	345	48	360	▼	-5	▼	-15
Rio de Janeiro	55	344	New	New	New		New	
Cayman Islands	56=	341	52	339	▼	-4	▲	2
Moscow	56=	341	58	324	▲	2	▲	17
Kuala Lumpur	58	335	55	330	▼	-3	▲	5
Bangkok	59	332	57	328	▼	-2	▲	4
Istanbul	60	329	56	329	▼	-4	▶	0
Bermuda	61	326	New	New	New		New	
New Delhi	62	322	59	307	▼	-3	▲	15
Mumbai	63	315	54	337	▼	-9	▼	-22

Table 2 | Ranks And Ratings Of Green Finance Quality

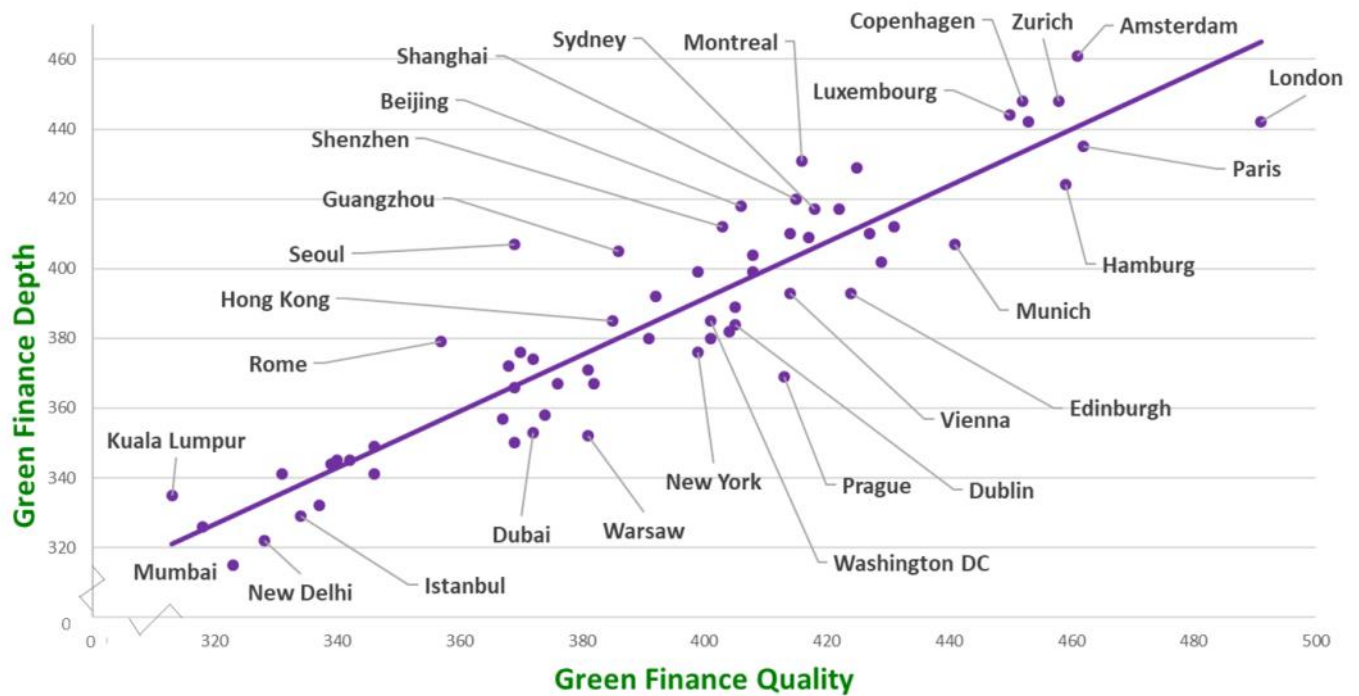
Centre	GGFI 3		GGFI 2		Change		Change in	
	Rank	Rating	Rank	Rating	in Rank		Rating	
London	1	491	1	481	▶ 0	▲	10	
Paris	2	462	2	454	▶ 0	▲	8	
Amsterdam	3	461	3	441	▶ 0	▲	20	
Hamburg	4	459	8	431	▲ 4	▲	28	
Zürich	5	458	7	433	▲ 2	▲	25	
Stockholm	6	453	5	440	▼ -1	▲	13	
Copenhagen	7	452	3	441	▼ -4	▲	11	
Luxembourg	8	450	6	434	▼ -2	▲	16	
Munich	9	441	9	425	▶ 0	▲	16	
Geneva	10	431	14	414	▲ 4	▲	17	
San Francisco	11	429	10	424	▼ -1	▲	5	
Brussels	12	427	12	422	▶ 0	▲	5	
Vancouver	13	425	16	412	▲ 3	▲	13	
Edinburgh	14	424	14	414	▶ 0	▲	10	
Casablanca	15	422	28	400	▲ 13	▲	22	
Sydney	16	418	18	408	▲ 2	▲	10	
Melbourne	17	417	New	New	New		New	
Montréal	18	416	27	401	▲ 9	▲	15	
Shanghai	19	415	11	423	▼ -8	▼	-8	
Vienna	20=	414	22	405	▲ 2	▲	9	
Toronto	20=	414	24	402	▲ 4	▲	12	
Prague	22	413	13	415	▼ -9	▼	-2	
Singapore	23=	408	23	404	▶ 0	▲	4	
Frankfurt	23=	408	18	408	▼ -5	▶	0	
Beijing	25	406	17	411	▼ -8	▼	-5	
Madrid	26=	405	29	398	▲ 3	▲	7	
Dublin	26=	405	32	394	▲ 6	▲	11	
Tokyo	28	404	18	408	▼ -10	▼	-4	
Shenzhen	29	403	24	402	▼ -5	▲	1	
Washington DC	30=	401	24	402	▼ -6	▼	-1	
Milan	30=	401	29	398	▼ -1	▲	3	
Jersey	32=	399	34	391	▲ 2	▲	8	

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

Centre	GGFI 3		GGFI 2		Change		Change in	
	Rank	Rating	Rank	Rating	in Rank		Rating	
New York	32	399	29	398	▼	-3	▲	1
Los Angeles	34	392	21	406	▼	-13	▼	-14
Boston	35	391	33	392	▼	-2	▼	-1
Guangzhou	36	386	41	370	▲	5	▲	16
Hong Kong	37	385	39	382	▲	2	▲	3
Guernsey	38	382	45	366	▲	7	▲	16
Warsaw	39	381	35	386	▼	-4	▼	-5
Cape Town	39	381	44	367	▲	5	▲	14
Malta	41	376	45	366	▲	4	▲	10
Chicago	42	374	36	384	▼	-6	▼	-10
Isle of Man	43	372	50	354	▲	7	▲	18
Dubai	43	372	38	383	▼	-5	▼	-11
Calgary	45	370	49	360	▲	4	▲	10
Sao Paulo	46	369	40	371	▼	-6	▼	-2
Johannesburg	46	369	47	364	▲	1	▲	5
Seoul	46	369	42	368	▼	-4	▲	1
Mauritius	49	368	36	384	▼	-13	▼	-16
Liechtenstein	50	367	New	New	New		New	
Rome	51	357	42	368	▼	-9	▼	-11
Abu Dhabi	52	346	53	350	▲	1	▼	-4
Cayman Islands	52	346	52	351	▶	0	▼	-5
British Virgin Islands	54	342	51	353	▼	-3	▼	-11
Mexico City	55	340	47	364	▼	-8	▼	-24
Rio de Janeiro	56	339	New	New	New		New	
Bangkok	57	337	55	339	▼	-2	▼	-2
Istanbul	58	334	54	341	▼	-4	▼	-7
Moscow	59	331	57	331	▼	-2	▶	0
New Delhi	60	328	58	329	▼	-2	▼	-1
Mumbai	61	323	55	339	▼	-6	▼	-16
Bermuda	62	318	New	New	New		New	
Kuala Lumpur	63	313	59	315	▼	-4	▼	-2

Chart 1 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 1 | Relationship Between Ratings Of Depth And Quality



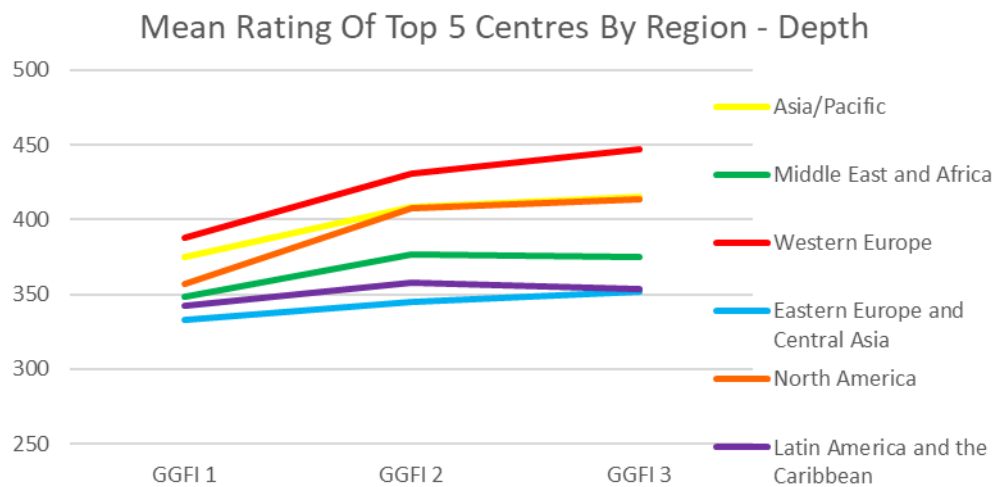
“It is critical that we see rapid convergence towards agreed standards and definitions so that everyone is talking the same language on investment.”

Head of Global Affairs, Engineering & Design Company, London

Regional Performance

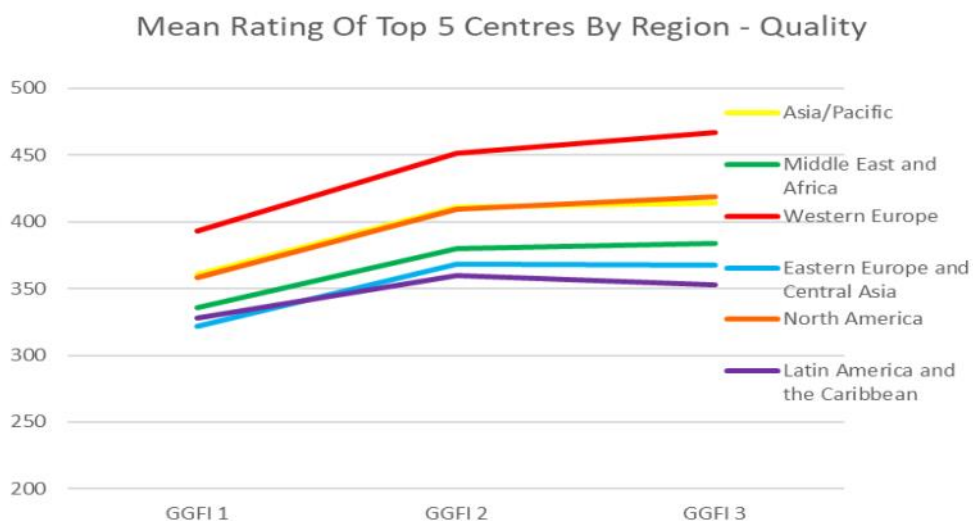
The top five centres in each region on average increased their ratings between GGFI 1 and GGFI 2 for depth. However, the average rating fell slightly for Latin America & The Caribbean and the Middle East & Africa between GGFI 2 and GGFI 3. Some of this is accounted for by new centres entering the index with a lower rating than those that already featured.

Chart 2 | Average Ratings For Depth Of The Top Five Centres In Each Region



A similar picture is shown for the quality measure, with the rate of increase slowing or turning to a reduction between GGFI 2 and GGFI 3.

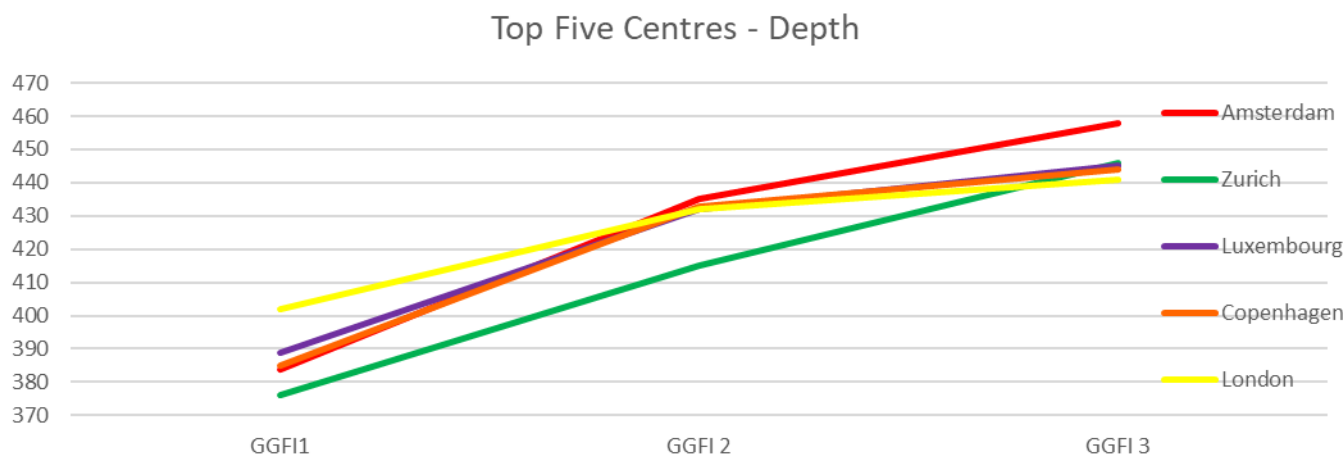
Chart 3 | Average Ratings For Quality Of The Top Five Centres In Each Region



Top Five Centres

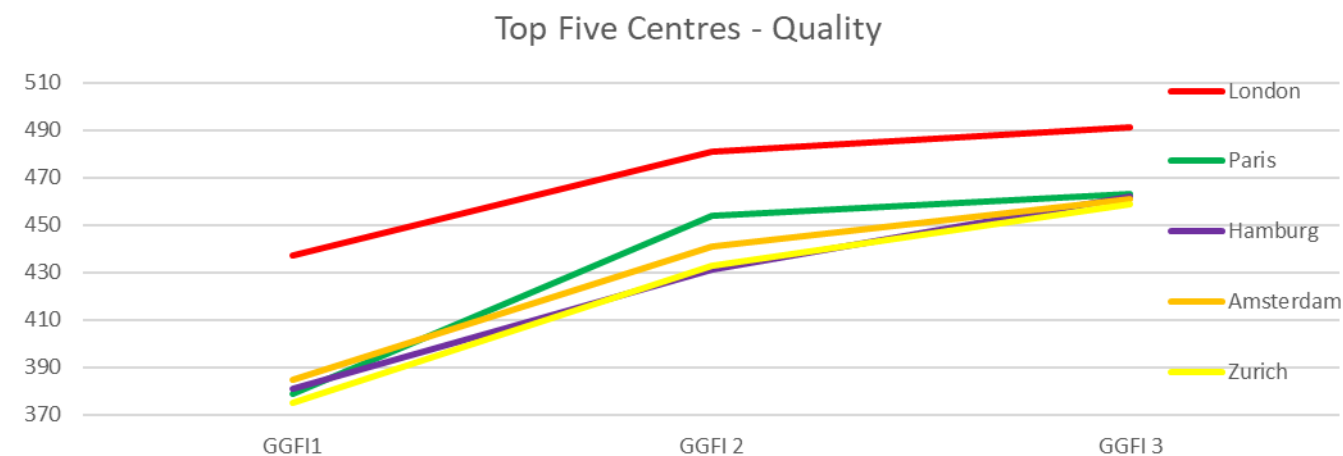
The top five centres in the index for depth improved their ratings in each edition of the GGFI. Zürich has enjoyed the strongest improvement across the three editions of the GGFI.

Chart 4 | The Top Five Centres For Depth Over Time



On the quality index, Hamburg and Zürich achieved the fastest improvement in ratings between GGFI 2 and 3, although each of the top five centres has continued to improve its rating over time.

Chart 5 | The Top Five Centres For Quality Over Time

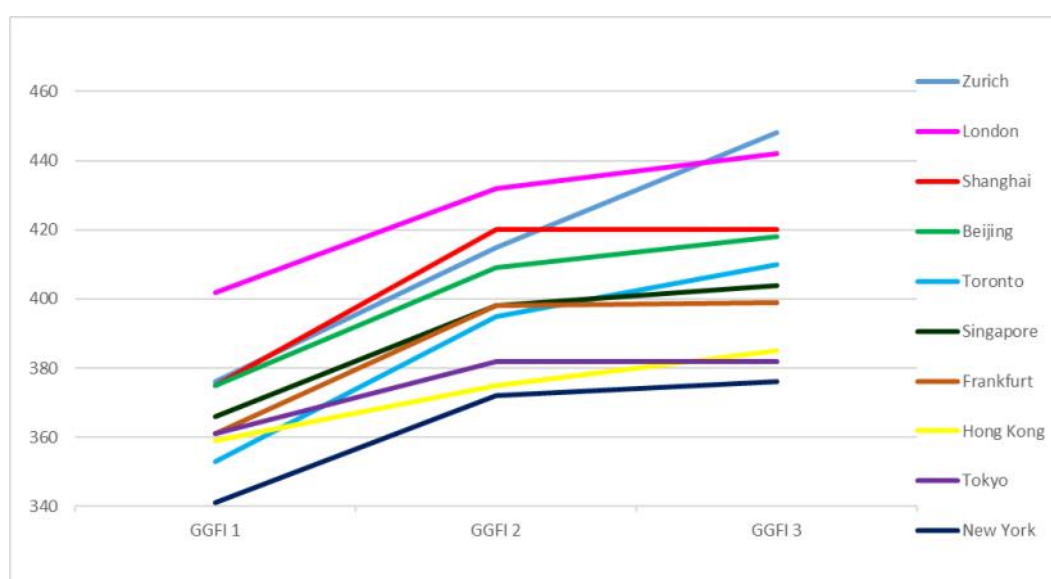


Leading Financial Centres

It is notable that some leading financial centres perform less well than expected in the GGFI. The [Global Financial Centres Index](#) has been measuring financial centre competitiveness for over ten years. The charts below show the leading ten centres in the current 25th edition of the Global Financial Centres Index and their ratings in the GGFI for depth and quality.

On the depth measure, Zurich and London lead the ratings in this group for the GGFI, with Shanghai and Beijing in a second group. Toronto, Singapore, and Frankfurt outperform New York, Hong Kong, and Tokyo, which take first, third and sixth place in the overall rankings in the Global Financial Centres Index.

Chart 6 | Leading Financial Centres - Ratings of Depth in the GGFI Over Time

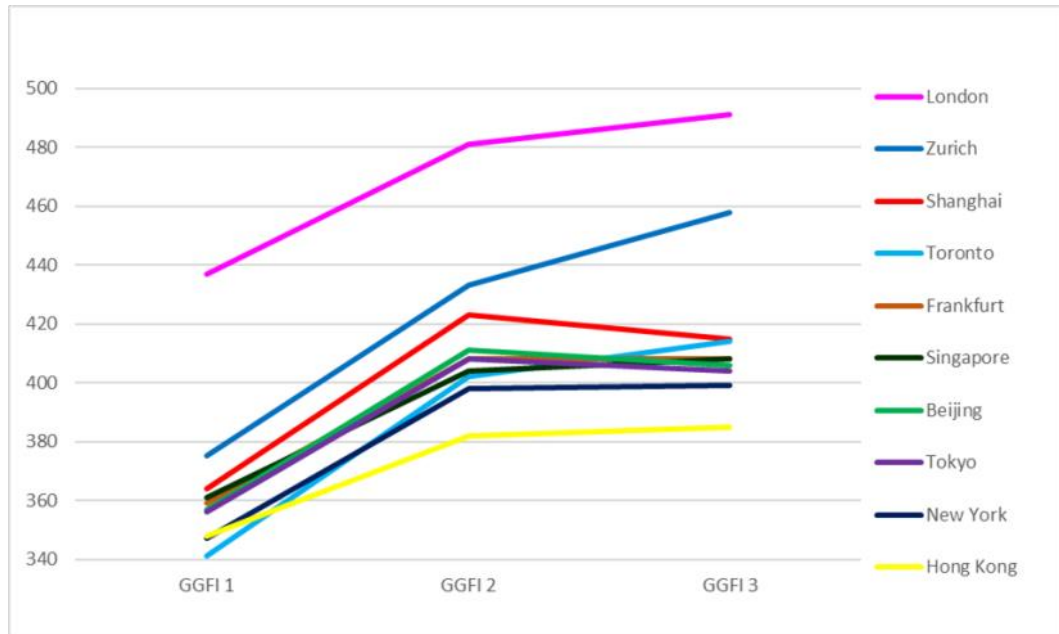


“Taxation has the potential to be a game changer but governments seem reluctant to act.”

Sustainable Finance Lead, Banking, London

Turning to quality, a similar picture emerges as on quality, with London and Zurich leading the ratings in the GGFI, with other leading centres in the Global Financial Centres Index some way behind.

Chart 7 | Leading Financial Centres - Ratings Of Quality In The GGFI Over Time



A further way to display the comparison between the GGFI and the most recent edition of the Global Financial Centres Index (GFCI 25) is to compare the centres which rank in the top ten in each index. The colours in the table below indicate the ranking in the indices.

Table 3 | Leading Financial Centres - Ratings of Quality In The GGFI Over Time

Centre	GGFI 3 Depth Ranking	GGFI 3 Quality Ranking	GFCI 25 Ranking
New York	38	32	1
London	5	1	2
Hong Kong	31	37	3
Singapore	23	23	4
Shanghai	11	19	5
Tokyo	34	28	6
Toronto	17	20	7
Zurich	2	5	8
Beijing	12	25	9
Frankfurt	25	23	10
Montreal	8	18	18
Vancouver	9	13	19
Paris	7	2	27
Geneva	15	10	28
Luxembourg	4	8	30
Amsterdam	1	3	41
Munich	20	9	43
Hamburg	10	4	50
Stockholm	5	6	55
Copenhagen	2	7	76

GGFI 3 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 4 shows the centres that were mentioned ten or more times. The only change in the list from GGFI 2 is the inclusion of Beijing. Despite being identified as being likely to become more significant, the centres other than New York and Beijing fell in the depth rankings, although generally their ratings improved. On quality, Paris, Singapore, and London retained their positions and increased their ratings, while Frankfurt, New York, Shanghai, and Beijing fell in the rankings.

Expected Change In Centres

We asked respondents 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 8 overleaf.

Forty-five out of 63 centres in the index were expected to improve or significantly improve by over half of the respondents who rated them. Sixteen centres were rated as expected to improve by over 70% of respondents. This continues to reflect an optimistic picture of change in financial centres' green finance offerings. Copenhagen, Paris, London, Zürich, Montréal,

Luxembourg, Shanghai, Beijing, Malta, San Francisco, Frankfurt, Amsterdam, Jersey, Los Angeles, Toronto, and Johannesburg were each cited as likely to improve significantly by 20% or more of those who rated them.

Centres which were judged by more than 10% of respondents to be likely to decline in performance over the next two to three years were: Calgary, Malta, Washington DC, Melbourne, Chicago, Prague, Moscow, Mexico City, Boston, São Paulo, Liechtenstein, Cayman Islands, and Bermuda.

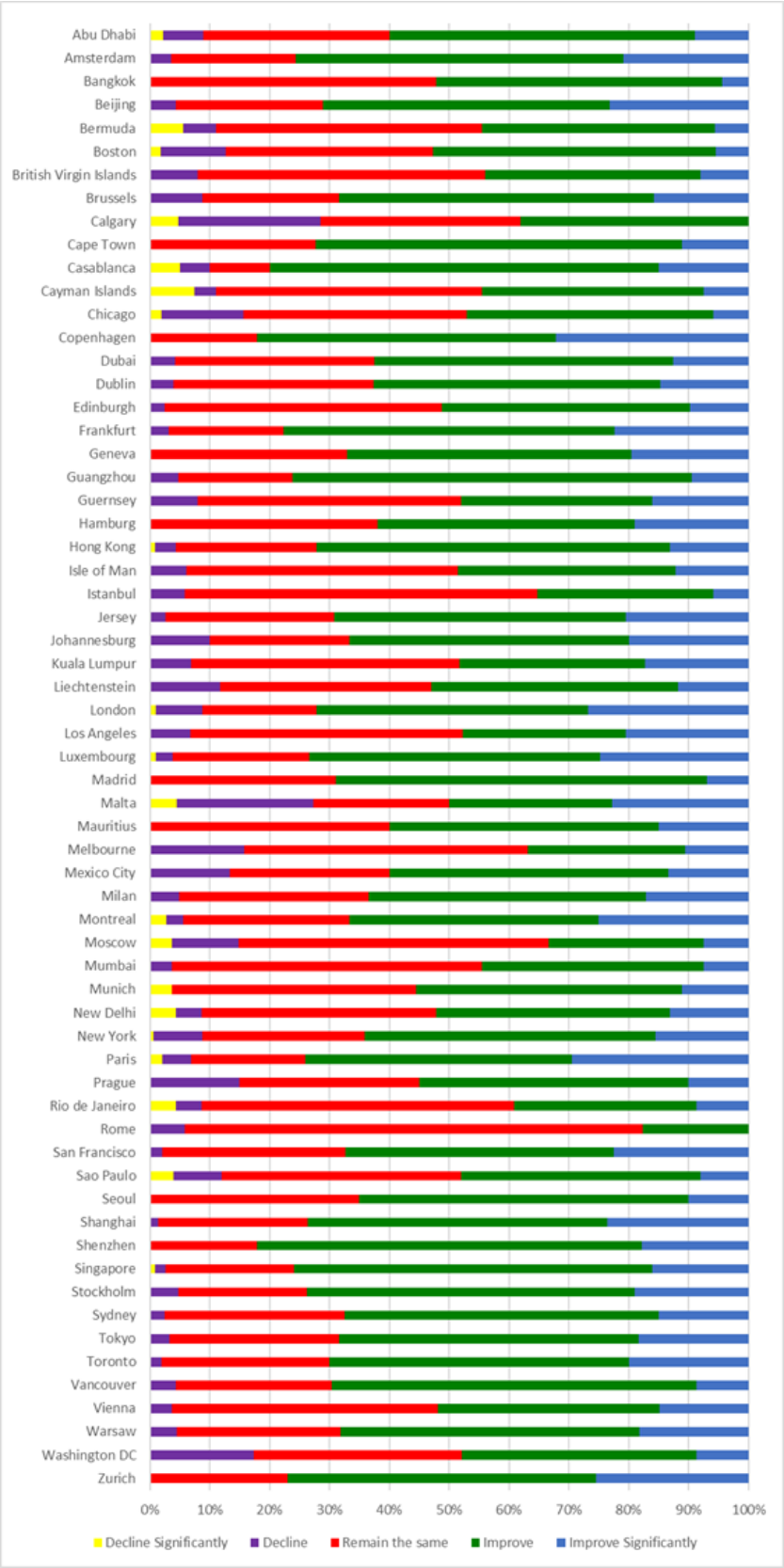
Table 4 | Centres That Will Become More Significant

Centre	Number Of Mentions
Paris	26
Frankfurt	19
Singapore	15
Shanghai	14
New York	14
London	11
Beijing	10

“Favourable tax regimes on real green investment initiatives would help push money into the sector.”

Managing Partner, Private Equity, Spain

Chart 8 | Expected Change In Green Finance Offering



Instrumental Factors

GGFI 3 is created using 131 instrumental factors which relate to a range of aspects of competitiveness, including sustainability measures.

Table 5 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 5 | Top Ten Instrumental Factors By R Squared Correlation

Depth	R Squared	Quality	R Squared
Global Innovation Index	0.557	Quality Of Living City Rankings	0.592
Networked Society City Index	0.516	Networked Society City Index	0.569
World Talent Rankings	0.487	Sustainable Cities Index	0.566
Best Countries For Business	0.470	Legatum Prosperity Index	0.559
Water Quality	0.465	Global Innovation Index	0.523
Quality Of Living City Rankings	0.460	Global Enabling Trade Report	0.507
Sustainable Cities Index	0.447	Environmental Performance Index	0.506
Global Enabling Trade Report	0.443	IESE Cities In Motion Index	0.503
Legatum Prosperity Index	0.435	Best Countries For Business	0.501
Logistics Performance Index	0.429	Sustainable Economic Development	0.494

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 6. Composite measures of quality of life are highly correlated, as is a new measure, Financial Centre Corporate Sustainability Performance.

Table 6 | Top Ten Sustainability Instrumental Factors By R Squared Correlation

Depth	R Squared	Quality	R Squared
Water Quality	0.465	Quality Of Living City Rankings	0.592
Quality Of Living City Rankings	0.460	Sustainable Cities Index	0.566
Sustainable Cities Index	0.447	Environmental Performance Index	0.506
IESE Cities In Motion Index	0.405	IESE Cities In Motion Index	0.503
Global Sustainable Competitiveness Index	0.401	Sustainable Economic Development	0.494
Environmental Performance Index	0.390	Water Quality	0.472
Financial Centre Corporate Sustainability Performance	0.384	Financial Centre Corporate Sustainability Performance	0.453
Sustainable Economic Development	0.351	Quality Of Life Index	0.417
Quality Of Life Index	0.322	Global Sustainable Competitiveness Index	0.406
Energy Sustainability Index	0.282	Energy Sustainability Index	0.376

Finally, we have selected a range of factors which focus on cities and competitiveness. These measures again do not show a strong correlation, with the highest R Squared focused on composite measures of competitiveness.

Table 7 | City Competitiveness Instrumental Factors By R Squared Correlation

Depth		Quality	
Instrumental Factor	R Squared	Instrumental Factor	R Squared
Networked Society City Index	0.516	Networked Society City Index	0.569
Financial Centre Corporate Sustainability Performance	0.384	Financial Centre Corporate Sustainability Performance	0.453
<i>Global Financial Centres Index*</i>	0.276	Innovation Cities Global Index	0.267
Innovation Cities Global Index	0.250	Global Cities Index	0.221
Lloyd's City Risk Index 2015-2025	0.192	<i>Global Financial Centres Index*</i>	0.201
Global Cities Index	0.140	Lloyd's City Risk Index 2015-2025	0.190
Stock Exchanges With A Green Bond Segment (Y/N)	0.041	Stock Exchanges With A Green Bond Segment (Y/N)	0.072
Sustainable Stock Exchanges (Y/N)	0.027	Financial Centre Sustainability Disclosure	0.039
Financial Centre Sustainability Disclosure	0.023	Sustainable Stock Exchanges (Y/N)	0.030

** The Global Financial Centres Index is not currently used as an instrumental factor in the GGFI. The correlation is nonetheless of interest.*

When all instrumental factors are taken into account, it is apparent that the factors that are prevalent in 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.

When the analysis is restricted to instrumental factors with a focus on sustainability, water quality ranks highly, along with a range of composite indices, which aim to measure sustainability performance across a range of social, economic and environmental factors.

“A welcoming immigration system that attracts the best and brightest is critical. The experts in this field are relatively small and people want to be where the action is.”

Global Head of Resilience and Sustainability, Insurance, London

Index Ranking For Sustainability

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 8. The plus and minus figures show the difference between the main index and the index using only sustainability factors.

Table 8 | Top 15 Centres Using All Factors And Only Sustainability Factors

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

"The new edition of the GGFI touches on the very important, yet not fully understood, topic of centres' intrinsic relation with fossil fuels. By underscoring how much some of the largest centres rely on fossil fuel revenues - and the inherent risks of this unchecked exposure - Finance Watch builds a strong case for investors to go beyond the realm of voluntary divestment announcements and be proactive in the face of fossil fuels' threat to their financial stability."

Carla Santos Skandier, The Democracy Collaborative

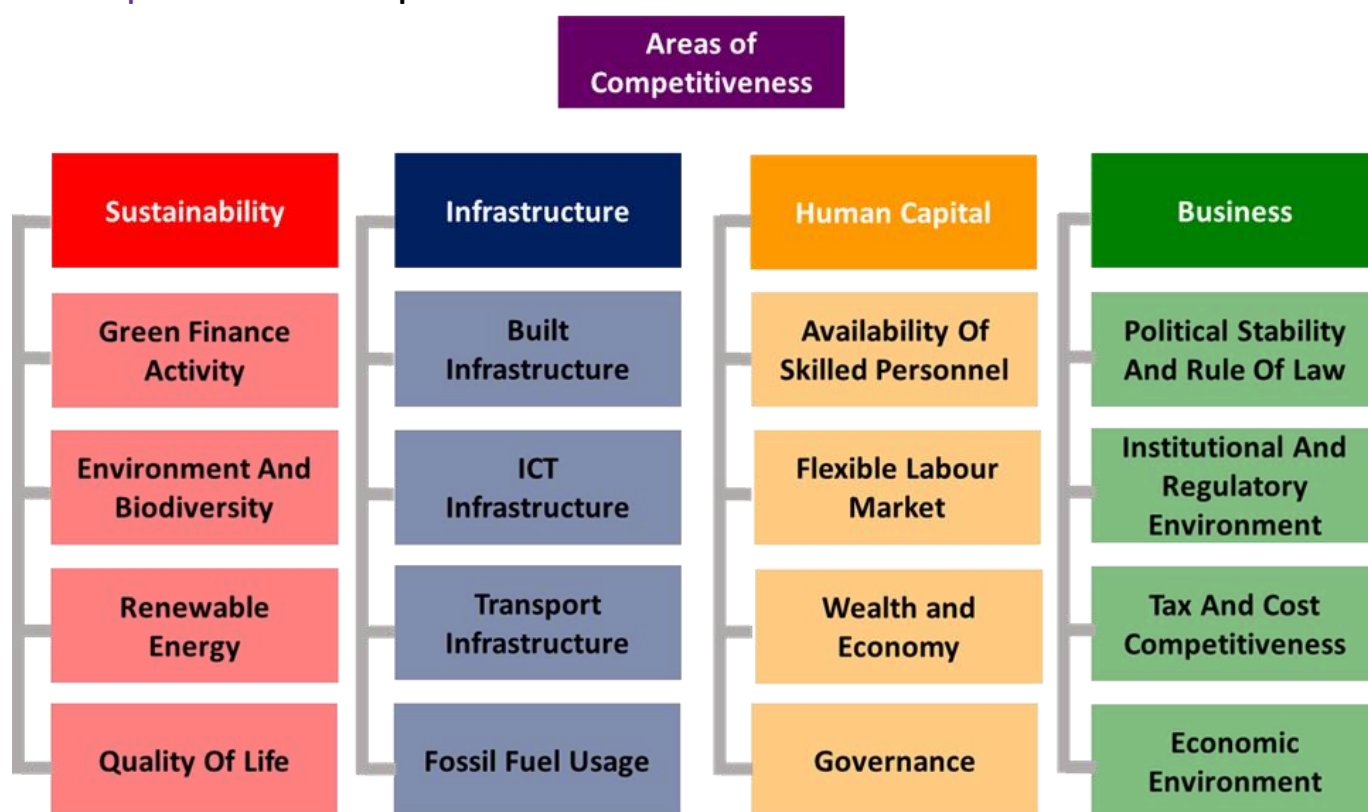
Areas Of Competitiveness

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

- Sustainability
- Infrastructure
- Human Capital
- Business

These areas and the instrumental factor themes which comprise each area are shown in chart 9.

Chart 9 | GGFI Areas Of Competitiveness



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 9 and 10.

Table 9 | Top 15 Centres For Depth By Areas Of Competitiveness

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

Table 10 | Top 15 Centres For Quality By Areas Of Competitiveness

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

Regulatory Factors

Two of the new instrumental factors in this edition look at data on policy and regulation: "Financial Centres Green Alignment - non-regulatory actors" and "Financial Centres Green Alignment - regulators and stock exchanges". These measures look at the mandates and leadership of regulators and policy makers in each centre, such as central banks and regulators for banking, insurance, pension and securities markets.

The dataset includes an analysis of whether regulators' mandates give them responsibility to act on sustainable development, climate, environment, or low-carbon activities, and then whether their actions have brought transformative change or made only minor adjustments in areas such as disclosure, fiduciary responsibilities, sustainable taxonomy, labelling, climate stress-testing, green bond standards, and beneficiaries preferences. Financial centres are scored in each area, their scores added up and then ranked against other financial centres.

The methodology is quite mechanistic, for example the scoring is a simple 'yes or no' and does not account for the impact of each policy area or the size of the market. It does, however, provide a perspective on which centres are moving forwards and which are not.

The centres that did best on this assessment were Brazil, China, France, Indonesia, Netherlands, Singapore, Thailand, and the United Kingdom.

The centres that did worst - sometimes exhibiting no mandate or leadership signals at all - included Israel, Poland, Russia, South Korea, Spain, Turkey, and the United States.

Interestingly, although this list of best performers includes some of the most pro-active green financial centres, there is little overall statistical correlation between the Financial Centre Green Alignment scores and the perception rankings for green finance quality and depth as shown in the GGFI rankings. This could indicate a deeper interplay between instrumental factors, as policy leadership may be undermined by perceptions of ineffective implementation, conflicting political goals (for example, on energy prices), a lack of visibility, or overshadowing by other climate or socio-economic factors.

Commentary On Factors

“Initiatives such as the Green Assets Wallet in a Paris/Stockholm collaboration help to link Green with FinTech,”

Project Manager, Asset Management, Paris

We asked respondents to the GGFI survey to comment on aspects of competitiveness that have a relationship with the development of green finance. Table 11 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 progress should be faster. Action taken by central banks was noted as important and respondents mentioned the EU Action Plan On Sustainable Finance, Article 173 in France and the Task Force On Climate Disclosure as significant. Many respondents favoured mandatory disclosure. There was also significant support for carbon pricing, and the need for the commercial sector to set high standards themselves.

There was strong support for tax incentives to subsidise green investments, and for tax penalties to address the externalities of fossil fuels. A number of respondents mentioned a carbon tax.

Those commenting on skills generally supported more specialist training and qualifications in green finance. Several people said that training was lagging behind demand and that spreading knowledge and expertise into general financial services was important. A lack of skills was limiting the market, with only a few respondents suggesting that education was not a strong factor. The growth of Environmental, Social and Governance (ESG) approaches needs to be backed up by the skills to use this analysis to affect materiality judgements.

Other factors mentioned included the importance of investment driving the change, the development of climate-resilience bonds to spread risk, the withdrawal of destructive subsidies, a lack of audit expertise, and the role of FinTech linked to ESG.

Table 11 | Commentary On Areas Of Competitiveness

Area Of Competitiveness	Number Of Mentions	Main Themes
Regulatory Environment	219	<ul style="list-style-type: none"> • Support for regulatory measures to drive the development of green finance • Mandatory disclosure generally supported
Taxation	165	<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	199	<ul style="list-style-type: none"> • Support for more training and qualifications • Lack of skills may limit the market

Connectivity

One factor where 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 10 and 11 use New York and San Francisco as examples to contrast the different levels of connectivity that the two centres enjoy.

New York has connections to a wider variety of centres, and has received more assessments from those centres than San Francisco. In relation to general competitiveness, a broader spread of connectivity appears to be an advantage. For the GGFI, this seems to be less significant, with San Francisco outperforming New York on both depth and quality.

Chart 10 | GGFI 3 Connectivity - New York

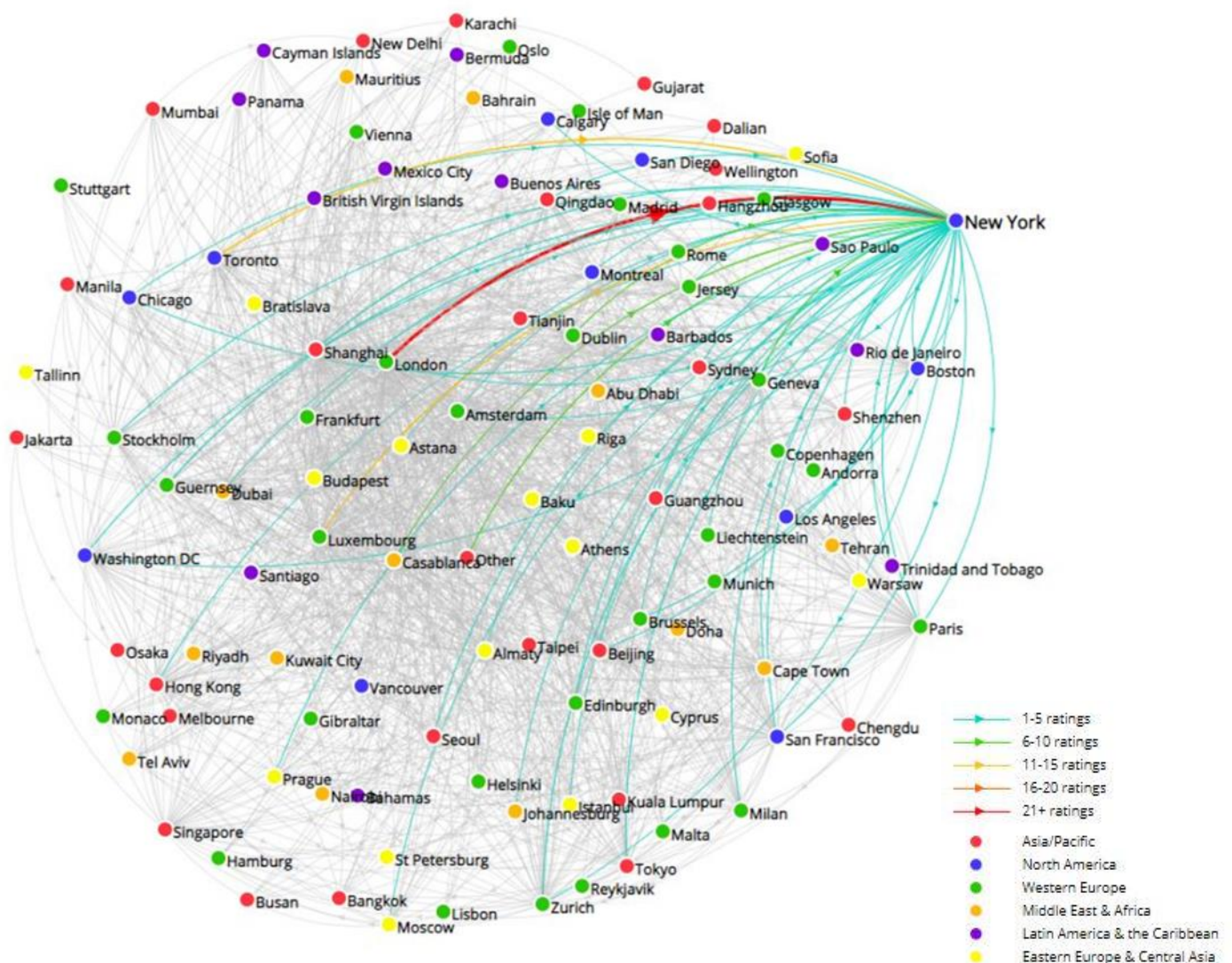
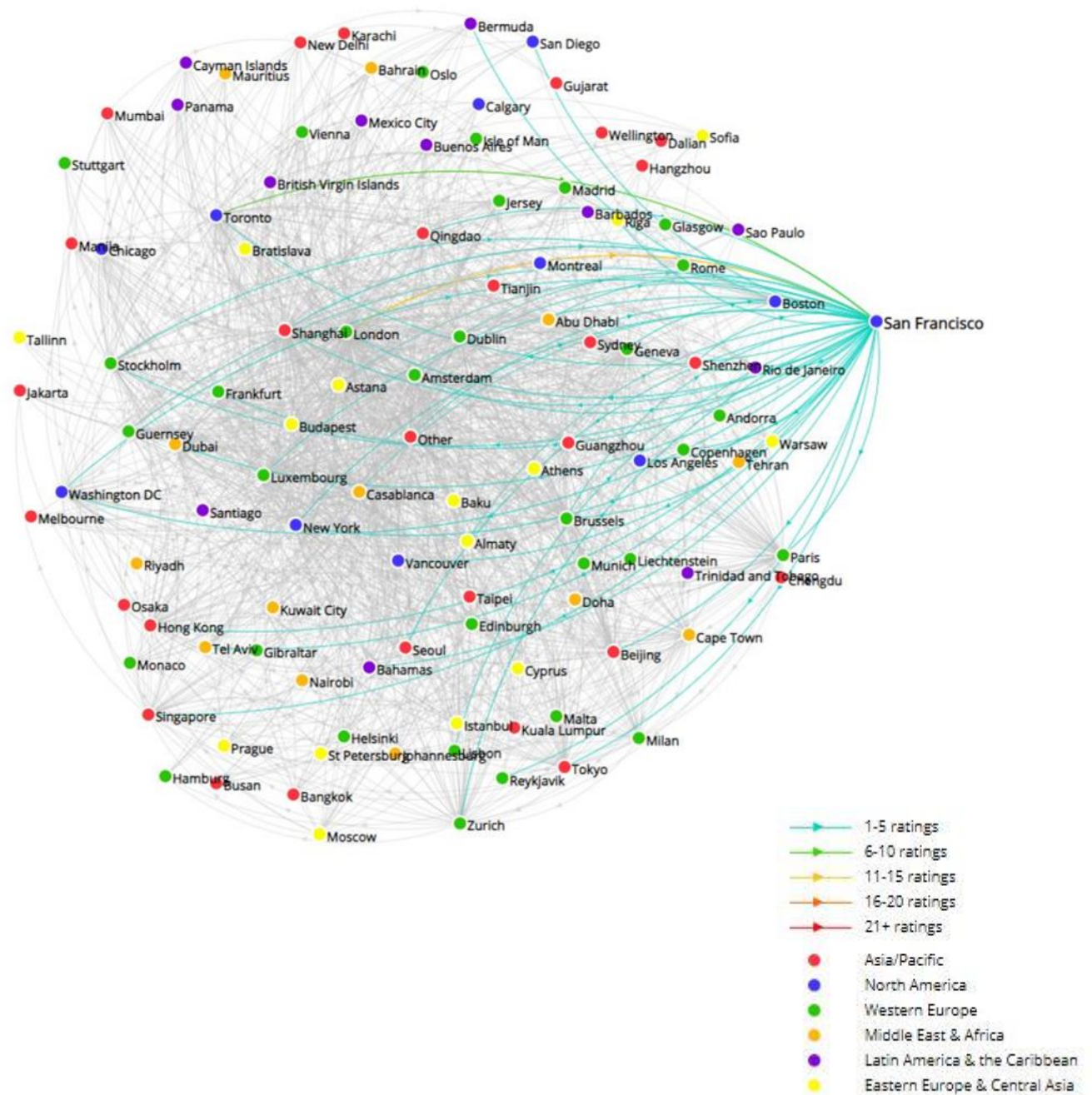


Chart 11 | GGFI 3 Connectivity - San Francisco



“The regulatory environment in China is getting tight regarding ESG, especially Environment.”

Analyst, ESG and SRI Consultancy, Beijing

Another view of connectivity is to look at the number of assessments received by centres and the number of centres that provided assessments. Table 12 shows the relationship between these factors for the centres receiving the highest number of assessments.

Table 12 | Relationship Between Number And Spread Of Assessments For Top Fifteen Centres Ranked On The Number Of Assessments They Received

Centre	Number Of Assessments	Number Of Centres Providing Assessments
London	197	37
New York	186	41
Paris	148	29
Frankfurt	129	27
Zürich	124	27
Hong Kong	118	28
Singapore	113	28
Luxembourg	109	28
Amsterdam	89	28
Geneva	82	27
Dublin	77	17
Dubai	73	25
Shanghai	72	28
Beijing	70	23
Tokyo	61	21

Assessments of the home centre of respondents are excluded from the data as there is the possibility of home centre bias. This bias can be positive or negative when compared with assessments from other centres, but on average home centre assessments are higher than assessments from other centres.

“There is a current shortage of skilled ESG specialists.”

Partner, Accountancy, Luxembourg

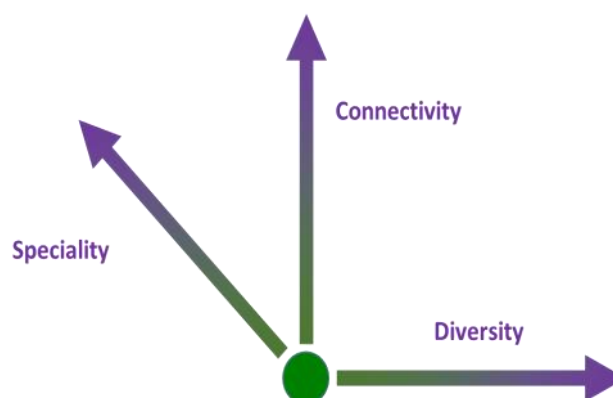
Financial Centre Profiles

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).

We classify centres as follows:

- Assessments provided by more than 23 other centres: Global;
- Assessments provided by between 10 and 23 other centres: International;
- Assessments provided by less than 10 other centres: Local



'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 13 and 14, '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 63 centres in GGFI 3 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.

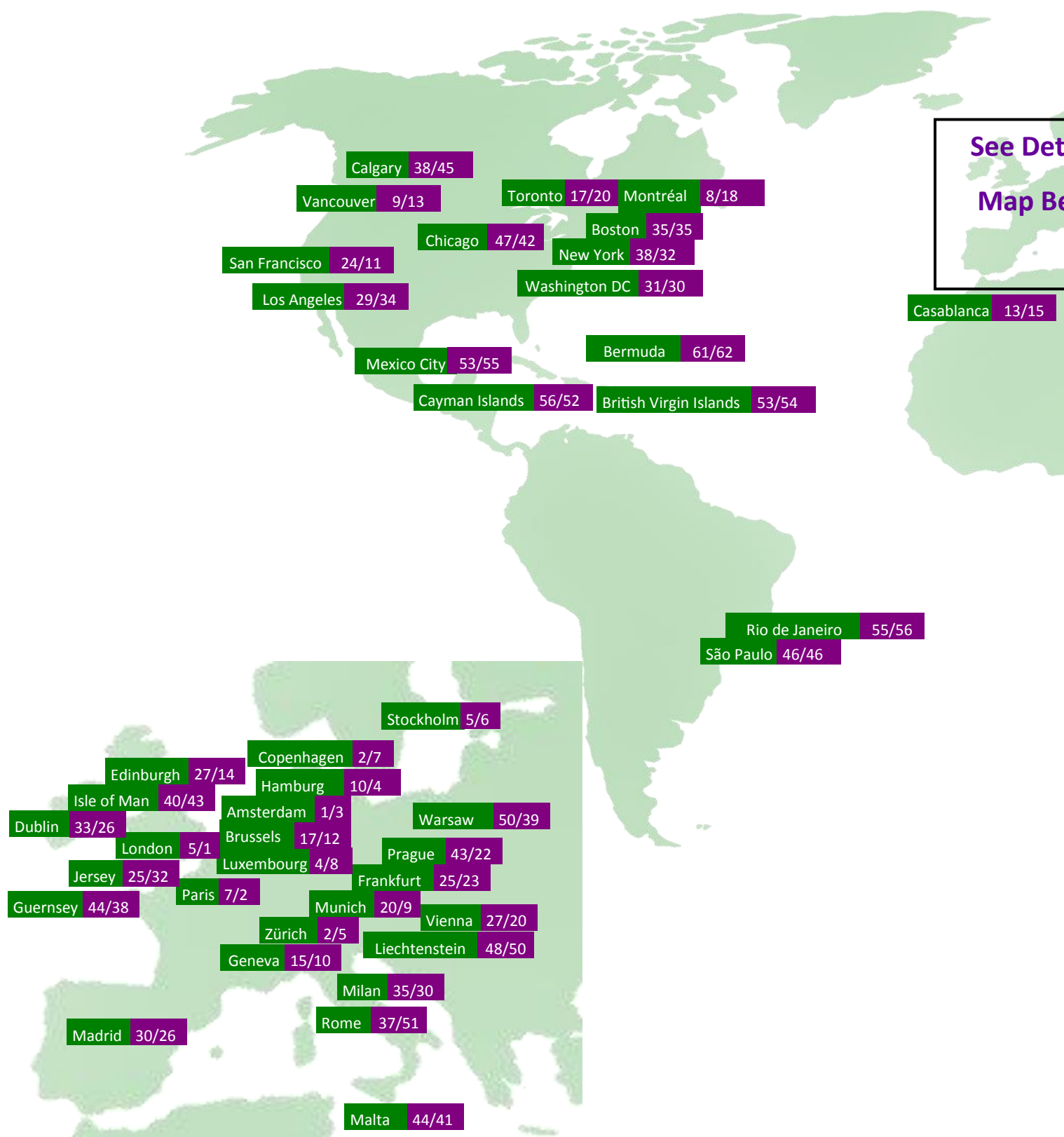
Table 13 | Financial Centre Profiling - Depth

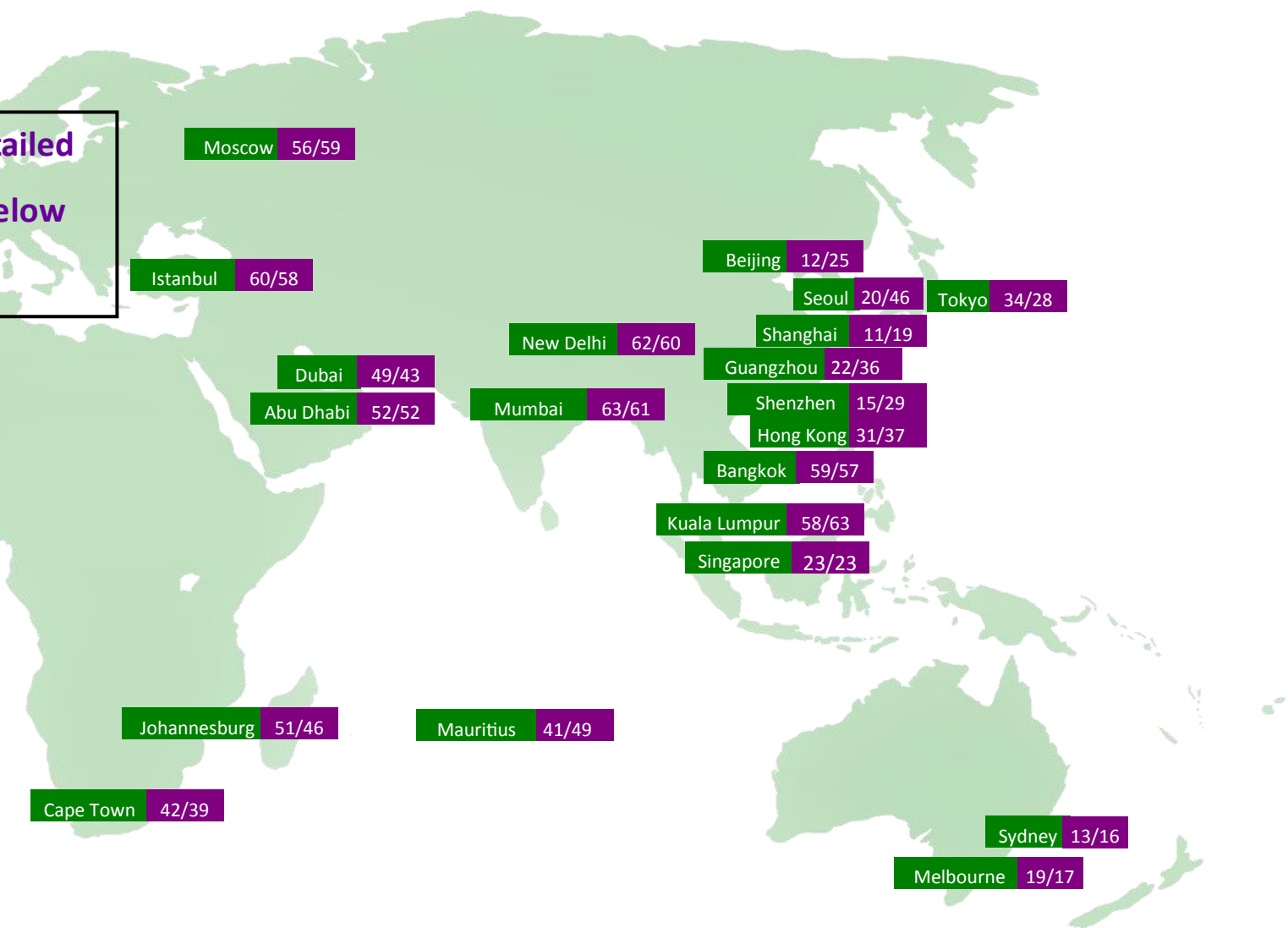
	Broad and Deep	Relatively Broad	Relatively Deep	Emerging
	Global Leaders	Global Diversified	Global Specialists	Global Contenders
Global	Amsterdam	Frankfurt	Luxembourg	
	London		Shanghai	
	Paris		Casablanca*	
	Dublin		Geneva*	
	New York*		Hong Kong*	
International	Zürich*	San Francisco*	Beijing	Cape Town*
	Stockholm*	Washington DC	Shenzhen	Guernsey
	Brussels	Chicago	Singapore	
	Seoul*		Jersey	
	Toronto*		Edinburgh*	
	Los Angeles		Liechtenstein (new)	
	Madrid*		Abu Dhabi*	
	Tokyo		Istanbul*	
	Boston*			
	Milan			
	Established Players	Local Diversified	Local Specialists	Evolving Centres
	Copenhagen*	Vienna	Guangzhou*	Johannesburg
	Montréal	Calgary*	Isle of Man	British Virgin Islands*
Local	Vancouver	Warsaw	Mauritius	Rio de Janeiro (new)
	Hamburg		Malta	Cayman Islands*
	Sydney		Prague*	Bermuda (new)
	Melbourne (new)		São Paulo *	New Delhi*
	Munich*		Mexico City*	Mumbai
	Rome		Moscow*	
			Kuala Lumpur*	
			Bangkok*	
	Note: An asterisk denotes centres that have changed their classification since GGFI 2			

Table 14 | Financial Centre Profiling - Quality

	Broad and Deep	Relatively Broad	Relatively Deep	Emerging
	Global Leaders	Global Diversified	Global Specialists	Global Contenders
Global	Amsterdam	Frankfurt	Luxembourg*	Shanghai*
	London		Casablanca*	
	Paris		Geneva	
	Dublin*		Hong Kong*	
	New York*		Dubai	
International	Established International	International Diversified	International Specialists	International Contenders
	Zürich*	Los Angeles*	Beijing	
	Stockholm*	Boston*	Shenzhen	
	Brussels*	Milan	Singapore*	
	Seoul*	Chicago	Jersey	
	Toronto*		Edinburgh*	
	San Francisco		Cape Town	
	Madrid		Guernsey	
	Washington DC*		Liechtenstein (new)	
	Tokyo		Abu Dhabi*	
			Istanbul*	
	Established Players	Local Diversified	Local Specialists	Evolving Centres
	Copenhagen*	Vancouver*	Guangzhou	São Paulo
	Montréal	Sydney	Isle of Man	Johannesburg*
Local	Hamburg	Melbourne (new)	Mauritius	British Virgin Islands*
	Munich	Rome	Malta	Mexico City*
	Vienna*	Calgary*	Prague*	Rio de Janeiro (new)
	Warsaw		Cayman Islands	Kuala Lumpur
			Moscow	Bermuda (new)
			Bangkok	New Delhi*
				Mumbai*
	Note: An asterisk denotes centres that have changed their classification since GGFI 2			

The GGFI 3 World - Centres In The Index





The numbers beside each centre indicate the rankings first for depth and second for quality in GGFI 3.

An interactive map showing the data for each centre is at <https://www.longfinance.net/programmes/financial-centre-futures/global-green-finance-index/ggfi3-explore-data/ggfi3-map/>

Focus On Disinvestment: Value And Values In A Warming World

A paradox of green finance is that many of the financial centres near the top of the GGFI table are also leading centres for 'brown' finance. Centres that have long cultivated the financing of oil and gas companies now face questions about whether and how best to support those companies as they transition to more sustainable business models.

This section explores the concept of a 'carbon bubble' - the concept that the valuation of companies dependent on fossil-fuel-based energy production is currently inflated, because investors are failing to take into account the stock market valuation implications of climate change. We examine some initial data that reveal which financial centres are most exposed to risks associated with a potential bursting of the carbon bubble or its on-going inflation, look at how fossil fuel disinvestment may catalyse these risks, and report survey findings that show enthusiasm for policymakers to support fossil fuel disinvestment with various policy tools.

Introduction

The use of investment decisions to support social causes has a long and proud history. From the stance taken on the abolition of slavery by the Society of Friends² in the 18th and 19th Centuries, through "Campaign GM"³ which forced the General Motors Company to take an active stance on social responsibility in the 1970s³, to the Methodist Church's leadership role on socially responsible investment⁴, and the rise of sharia finance in the 1990s and early 21st century⁵, investors have sought to use their power for good.

However, as the UN Secretary General stated in 2018, "Climate change is the defining issue of our time – and we are at a defining moment. We face a direct existential threat"⁶.

In the face of this threat, disinvestment has gained a new significance, and there is evidence that the fossil fuel disinvestment campaign may become the largest and most effective campaign of its type, with a lasting impact on the financial services sector.

2 Freeman M, 2013 *Quakers, Business, and Philanthropy*, The Oxford Handbook Of Quaker Studies (Angell S & Dandelion B eds), Oxford University Press

3 Schwartz D, 1971 *Proxy Power and Social Goals--How Campaign GM Succeeded* St. John's Law Review

4 UMC 1992 *Investment Ethics, Book of Resolutions* <http://www.umc.org/what-we-believe/investment-ethics1>

5 Osbourne H 2013 *Islamic Finance – The Lowdown On Sharia-Compliant Money*, The Guardian <https://www.theguardian.com/money/2013/oct/29/islamic-finance-sharia-compliant-money-interest>

6 UN Secretary General 2018 <https://www.un.org/sg/en/content/sg/statement/2018-09-10/secretary-generals-remarks-climate-change-delivered>

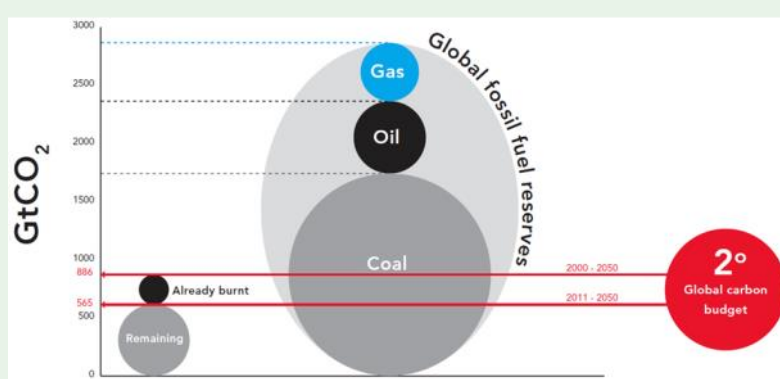
Spotting The Carbon Bubble

In 2006, the Long Finance team questioned the sense of having fossil fuel assets on balance sheets at full value. Some straightforward calculations at that time, not taking account of fracking or shale gas, showed that burning the total fuel reserves then shown as assets on the balance sheets of listed companies, would result in CO₂ levels in the atmosphere around 1,200 parts per million (ppm). This is well above any 2 degree scenario which at the time projected that CO₂ levels would need to be restricted to around 450 ppm⁷.

In 2011, Carbon Tracker, a London-based financial services think tank, published 'Unburnable Carbon'⁸. This ground-breaking piece of research calculated that all proven fossil fuel reserves owned by governments, and public and private companies were equivalent to 2,795 gigatonnes of CO₂. The report noted that if the world was to meet the objective of keeping global warming below 2°C, the total amount of CO₂ which could be released globally could not exceed 565 gigatonnes for the 40 years to 2050 – a fifth of this 'carbon budget'.

The market valuation of fossil fuel company stocks is tied to their reserves. If 80% of these reserves have to remain in the ground, the value of their stocks will require readjustment. With some of the world's leading stock exchanges having a significant fraction of their market capitalisation connected to fossil fuels, this raised the spectre of an unsustainable carbon bubble and trillions of dollars-worth of fossil fuel assets becoming 'stranded'. At a stroke, the issue of disinvestment from fossil fuels was no longer the preserve of concerned green activists, but a significant consideration for fund managers everywhere.

Figure 1: Global 2°C Carbon Budget Vs Fossil Fuel Reserves CO₂ Emissions Potential



Source: Carbon Tracker Initiative 2011⁸

⁷ Long Finance 2006 *Burn It All* <https://www.zyen.com/research/our-research/sustainability/carbon-burn-it-all/>

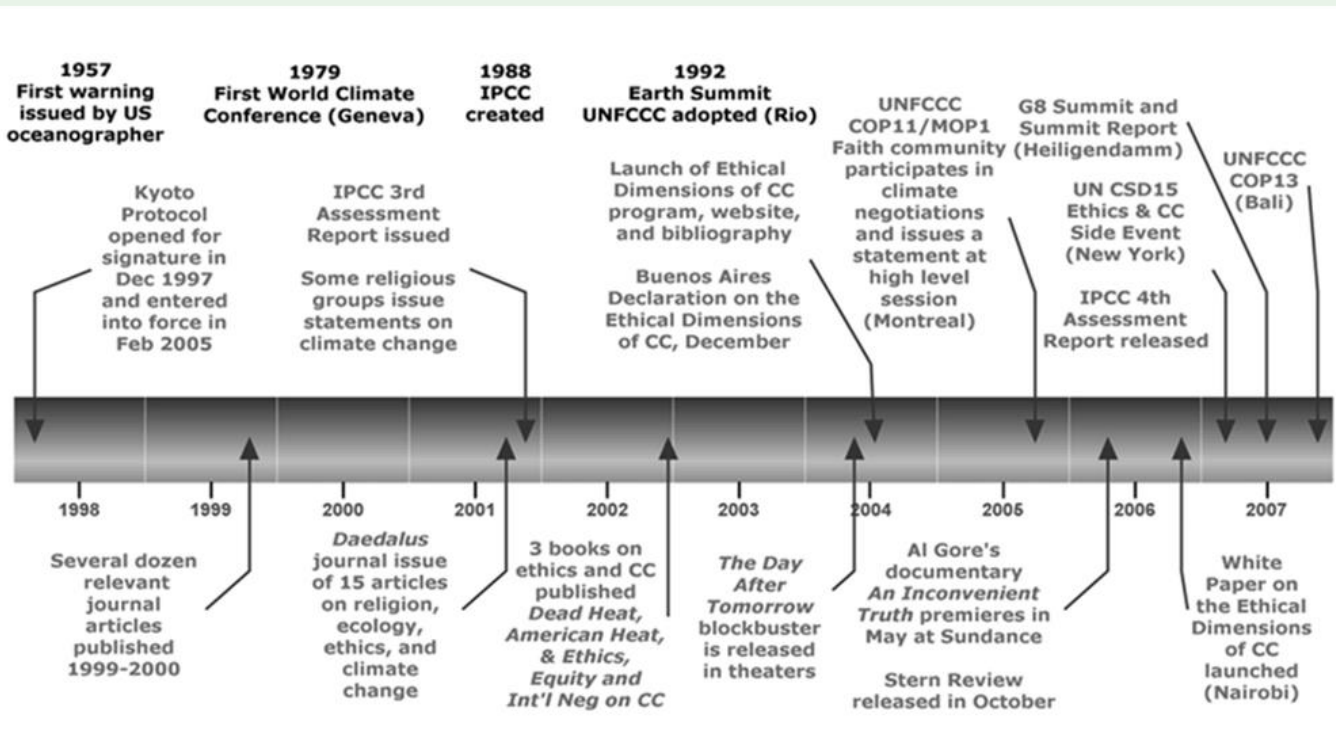
⁸ Leaton J 2011 *Unburnable Carbon – Are the world's financial markets carrying a carbon bubble?* <https://www.longfinance.net/programmes/sustainable-futures/london-accord/reports/unburnable-carbon-are-the-worlds-financial-markets-carrying-a-carbon-bubble/>

A Slow Burn

Carbon Tracker's intervention came at a propitious moment for NGOs and pressure groups seeking traction on their long-running campaigns to reduce carbon emissions and tackle global warming. Between 1957 and 2007, momentum had begun to build for decisive action on climate change, and the United Nations Framework Convention on Climate Change conferences (COPs), designed to build on the 1997 Kyoto protocol, were beginning to make real progress.

However, following the 2008 global financial crisis, the winds of international politics changed and progress stalled. COP15 in Copenhagen was widely judged to have failed and, despite a steady cascade of scientific evidence showing that the world was getting warmer, progress on international action seemed in a state of paralysis. Politicians were reluctant to commit to any course of action which could be seen to add to the costs of industries in decline and a financial services sector still digesting the barrage of legislation designed to curb the excesses that led to the crash.

Figure 2: Milestones Relevant To International Climate Ethics 1957-2008



Source: Posas, P. 2007⁹

⁹ Posas, P. 2007 *Roles of religion and ethics in addressing climate change*. Ethics in Science and Environmental Politics. 7

Beginning as a protest movement on US university campuses in 2011, social momentum for disinvestment began to gather pace following the publication of an article by Bill McKibben in Rolling Stone Magazine¹⁰, which popularised Carbon Trackers' work and which was widely read and distributed.

Supported by the NGO, 350.org, pressure from students and academic staff initially convinced a number of small liberal arts colleges to divest from fossil fuels. Larger academic institutions began to follow suit. In 2013, the Board of Supervisors of the San Francisco Employees' Retirement Scheme (SFERS) unanimously agreed a resolution to support disinvestment¹¹, (although a disinvestment strategy for the \$25.5 billion fund was only approved in October 2018¹²).

This was just the beginning. Today, more than 1,000 institutional investors with \$8 trillion in assets have committed to divest from fossil fuels. These include Norway's recent announcement to exclude oil exploration and production companies from its huge \$1 trillion the Government Pension Fund¹⁴, and complete disinvestment by the Republic of Ireland, which became the world's first country to sell off its investments in fossil fuel companies held by the €8 billion Irish national investment fund¹⁵. New York City mayor, Bill De Blasio, has moved to withdraw \$5 billion in carbon-based energy investments from the city's pension funds, and teamed up with London Mayor Sadiq Khan in September 2018 to call on other cities to divest their pension funds from fossil fuels, working through the C40 Climate Leadership Group¹⁶. Over the past year, several major banks, including the World Bank Group (WBG), have also made high-profile decisions to stop financing new fossil fuel projects.

10 McKibben B. 2012, *Global Warming's Terrifying New Math* Rolling Stone, August 2nd 2012 <https://www.rollingstone.com/politics/politics-news/global-warmings-terrifying-new-math-188550/>

11 <https://350.org/san-francisco-board-supervisors-unanimously-pass-resolution-urging-fossil-fuel/>

12 Diamond R 2018 Exclusive: San Francisco Pension System Approves Divestment of Five Fossil Fuel Companies Chief Investment Officer <https://www.ai-cio.com/news/exclusive-san-francisco-pension-system-approves-divestment-five-fossil-fuel-companies/>

13 <https://www.divestinvest.org/> ; Arabella Advisors 2018 *The Global Fossil Fuel Divestment and Clean Energy Investment Movement* <https://www.arabellaadvisors.com/wp-content/uploads/2018/09/Global-Divestment-Report-2018.pdf>

14 <https://www.regjeringen.no/en/aktuelt/excludes-exploration-and-production-companies-from-the-government-pension-fund-global/id2631707/>

15 *The Guardian* 2018 Ireland becomes world's first country to divest from fossil fuels <https://www.theguardian.com/environment/2018/jul/12/ireland-becomes-worlds-first-country-to-divest-from-fossil-fuels>

16 <https://www.theguardian.com/commentisfree/2018/sep/10/london-new-york-cities-divest-fossil-fuels-bill-de-blasio-sadiq-khan>

Divest or engage?

While institutional investors mostly accept the urgency of climate change, many have opted not to divest but to try engaging with the management of fossil fuel companies, most notably through Climate Action 100+, a initiative by investors with \$30 trillion in assets, including Allianz, CalPERS, Caisse des Dépôts, HSBC Global Asset Management, M&G, PGGM, Skandia and many others, that pushes for change using voting rights and shareholder resolutions.

The group has obtained some high-profile commitments on climate change from Shell, Total, Glencore and others, although they only go so far. Glencore, for example, still plans to open new coal mining sites¹⁷, and Shell still plans to invest more than \$20 billion a year in hydrocarbon projects - and only \$1 to 2 billion in its low-carbon business¹⁸.

Some Climate Action 100+ investors have sought to combine engagement and divestment, treating them as complementary approaches. For example, the Church of England agreed in 2018 that its investment bodies could continue to engage with fossil fuel companies but should divest from any that are not on track to be Paris compliant by 2023¹⁹. The Norwegian government opted to divest only from pure Exploration & Production oil companies, while keeping its stakes in much larger integrated oil majors such as Shell and BP, which it hopes will drive renewable energy investment in future. The approach means selling \$8bn worth of E&P stocks rather than Norway's entire oil holding of \$37bn and has attracted some criticism²⁰.

Fossil Fuel Companies Under Pressure

Analysts are finding that the threat of stranded assets is not the only issue bedevilling fossil fuel companies. It now looks as though fossil fuel companies may be facing a perfect storm, as values, technology and value begin to align:

- Electric vehicles are beginning to take a substantial bite out of fossil fuel demand, particularly in China, where consumer demand for electric vehicles is soaring²¹;
- The price of renewables technology has fallen precipitously²² in the last few years, and on-shore wind and solar energy generation are now cheaper than some coal and gas plants in the United States²³.

17 <https://www.theguardian.com/business/2019/feb/21/glencore-pressured-to-withdraw-from-new-coalmines-to-prove-climate-change-commitment>

18 <https://www.theguardian.com/business/2018/dec/26/shell-says-it-wants-to-double-green-energy-investment>

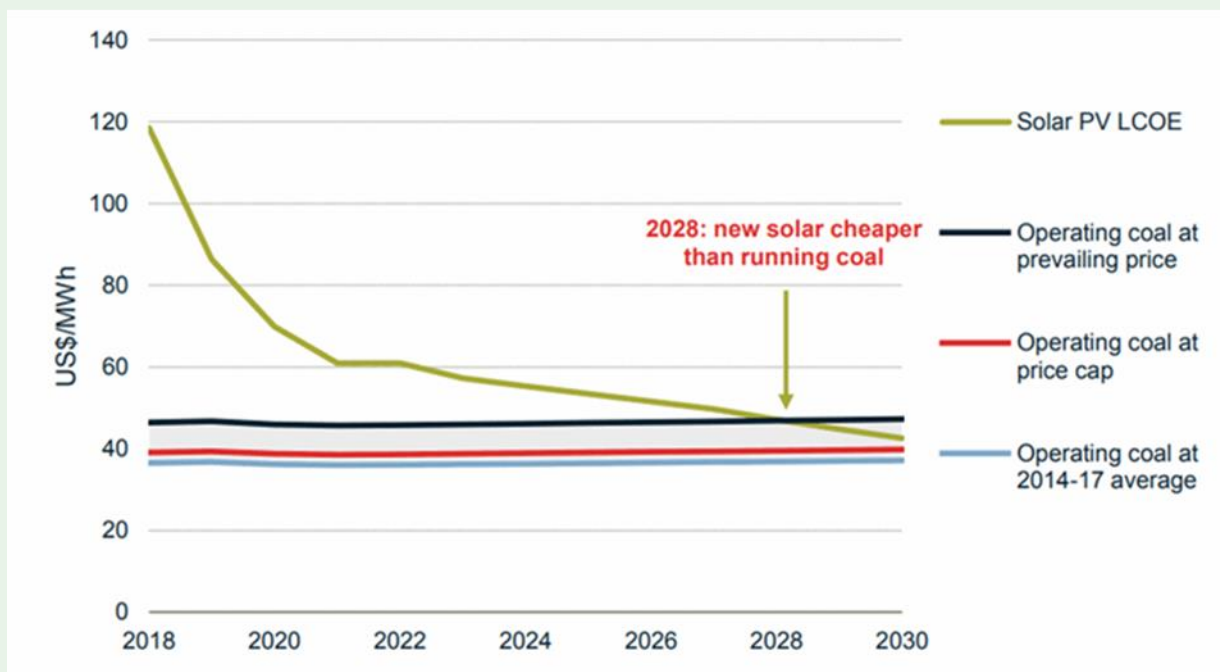
19 <https://www.churchofengland.org/more/media-centre/news/national-investing-bodies-approach-climate-change-affirmed-general-synod>

20 <https://www.bloomberg.com/opinion/articles/2019-03-08/norway-s-sovereign-wealth-fund-oil-divestment-descends-into-farce>

21 Domm P 2018 *Electric vehicles: The little industry that could take a bite out of oil demand* CNBC <https://www.cnbc.com/2018/02/28/soon-electric-vehicles-could-cause-an-oil-crisis-.html>

22 IRENA 2018 Renewable Power Generation Costs in 2017 https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Jan/IRENA_2017_Power_Costs_2018.pdf

23 USA Today 2018 *Energy costs: Renewables close in on fossil fuels, challenging on price* <https://eu.usatoday.com/story/money/energy/2018/04/04/energy-costs-renewables-close-fossil-fuels-challenging-price/485210002/>

Figure 3: The Changing Costs Of Renewable Energy

Source: Bloomberg New Energy Finance – New Energy Outlook 2018

Fossil fuel companies are beginning to wake up to the threat that divestment may hold: climate change featured prominently in Shell's 2017 annual report and sustainability report, where the oil and gas major acknowledged that, along with other climate-related risks, fossil fuel divestment could materially affect the price of Shell's shares and its ability to access equity capital markets²⁴.

Little Impact So Far On Oil And Gas Share Prices or Capex

Shareholders have not yet suffered, according to a 2018 study that found little price impact from eleven divestment announcements on oil and gas shares. The study noted that the divesting entities are typically small and that, so long as oil and gas companies remain profitable, they can attract other investors²⁵. However, these conditions could change in future, as they did with coal, and the study ended before the Norwegian Government Pension Fund's 8 March 2019 announcement, when the shares of companies affected fell around 3%.

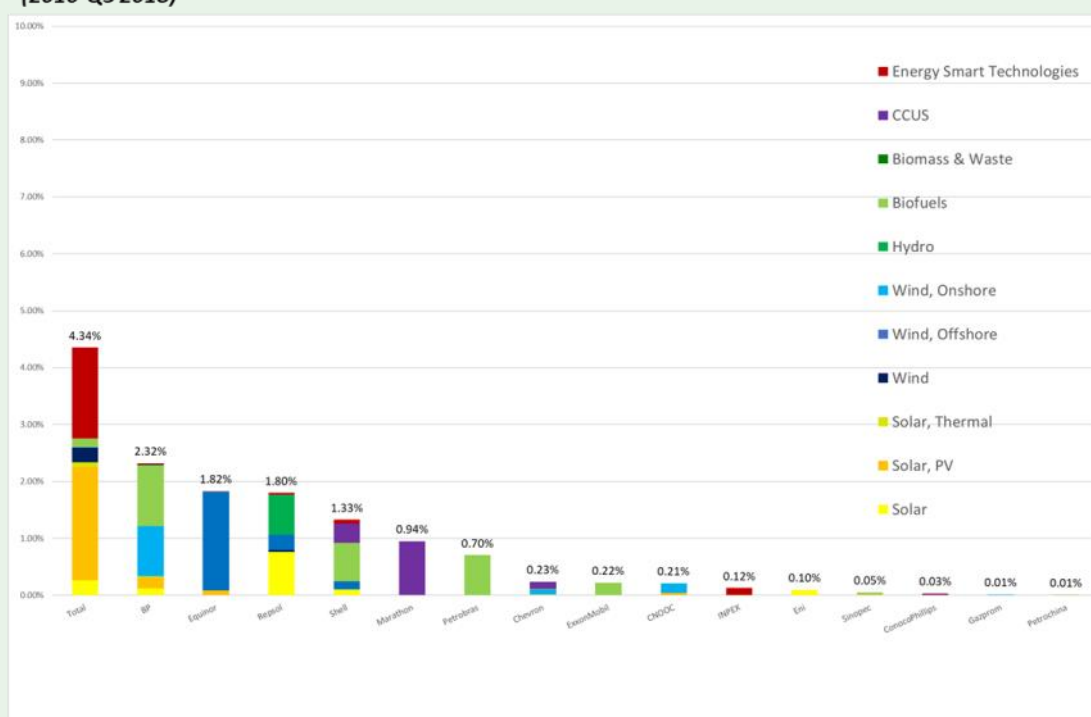
²⁴ <https://reports.shell.com/annual-report/2017/strategic-report/strategy-business-and-market-overview/strategy-and-outlook.php>

²⁵ Pollin R and Hansen T 2018 *Economics and Climate Justice Activism: Assessing the Fossil Fuel Divestment Movement* <https://www.peri.umass.edu/economists/robert-pollin/item/1076-economics-and-climate-justice-activism-assessing-the-fossil-fuel-divestment-movement>

This relative lack of share price impact may help to explain why transition plans within the oil and gas sector as a whole have been so disappointing. The world's top 24 publicly-listed oil and gas companies spent *only* 1.3% of their combined \$260 billion capital expenditure on low carbon energy in 2018²⁶.

Even Norway's Equinor, the oil and gas company judged by CDP as most business-ready for a low carbon transition, plans to devote only 15 to 20% of its capital expenditure on low carbon energy by 2030 while Shell, which has the biggest plans for low carbon investment in its peer group at \$1 to 2 billion a year, will continue allocating most of its \$25 to \$30 billion capital expenditure budget to hydrocarbons²⁷.

Figure 4: Oil Majors' Disclosed Low-Carbon Investment As A Proportion Of Total Capital Expenditure (2010-Q3 2018)



Includes Asset Finance, M&A and Venture Capital spend.

Note: No disclosed investment for Anadarko, Apache, Hess, Noble Energy, Occidental, OMV, Rosneft and Woodside

Source: CDP, company reports, BNEF

26 <https://www.cdp.net/en/articles/investor/european-oil-majors-spending-up-to-7-on-low-carbon-but-wider-industry-needs-to-step-up>

27 Carbon Disclosure Project, 'Beyond the cycle', 12 Nov 2018 ; Reuters 2018 *Big Oil Spent 1 Percent On Green Energy In 2018* <https://www.reuters.com/article/us-oil-renewables/big-oil-spent-1-percent-on-green-energy-in-2018-idUSKCN1NH004>

Low carbon investment has been even lower among oil majors in China, Russia, and the US (see figure 4), perhaps reflecting local factors. Given the changing mood among international investors, the most surprising aspect of the chart is how little low-carbon investment has taken place among all oil companies.

A Risk For Financial Centres

The share of fossil fuels in global energy supply investment increased slightly to 59% in 2017, according to the International Energy Agency²⁸. Global subsidies for fossil fuels were still around 6.5% of GDP in 2015²⁹, three times the 1 to 2% of world GDP that Lord Stern estimated would be needed to avert climate catastrophe³⁰.

The longer such hydrocarbon investment continues, the more fossil fuel companies will be exposed to losses if their assets cannot be exploited commercially due to technological progress in renewable energy, policy interventions designed to limit climate change, or the physical impacts of climate change. The global financial exposure of such stranded assets has been estimated in the range \$1 to 4 trillion on the basis of the technological trajectory alone, with Russia, the US or Canada among the countries most at risk³¹.

This potential destruction of value is bound to impact on financial centres with a large exposure to fossil fuel sectors. Just over ten years ago, the energy sector accounted for around 16% of the Standard and Poor's 500 market capitalization; by 2018 that figure had fallen to around 6%³². A similar fall in value among oil and gas companies could have knock-on effects in some financial centres.

28 IEA 2018 World Energy Investment 2018 <https://webstore.iea.org/download/direct/1242?fileName=WEI2018.pdf>

29 Coady *et al* 2017 *How Large Are Global Fossil Fuel Subsidies?* World Development Volume 91, March 2017, Pages 11-27 Elsevier

30 The Stern Review estimated these costs at 1% of world GDP, later revised to 2% <https://www.theguardian.com/environment/2008/jun/26/climatechange.scienceofclimatechange>

31 Mercure, J., Pollitt, H., Vinuales, J., Edwards, N., Holden, P., Chewpreecha, U., Salas, P., et al. (2018). Macroeconomic impact of stranded fossil-fuel assets. *Nature Climate Change* <https://doi.org/10.1038/s41558-018-0182-1>

32 Carbon Tracker 2018 *IEEFA Update: Oil And Gas Industry Caught In A Capex Conundrum* <https://www.carbontracker.org/ieefa-update-oil-and-gas-industry-caught-in-a-capex-conundrum/>

Which Financial Centres Are Most At Risk From A Carbon Bubble?

Disclaimer: This section is based on an initial analysis of selected data sources. Variations in the definitions used and in the availability and quality of data mean that further analysis is possible and could add to the conclusions. The analysis here is illustrative only and should not be used for investment purposes.

According to available data on the revenue of companies listed in a given financial centre, in some financial centres a significant fraction of their listed companies' revenues comes from fossil fuels.

Table 1: Percentage of Listed Companies' Revenues Derived From Fossil Fuels³³

Financial Centre	Percentage of Revenue Derived From Fossil Fuels	Ranking in GGFI 3	
		Depth	Quality
Moscow	58%	56	59
Bangkok	36%	59	57
Warsaw	33%	50	39
Amsterdam	32%	1	3
Bombay	23%	63	61
London	21%	5	1
Shanghai	18%	11	19
Istanbul	18%	60	58
Vienna	17%	27	20
Toronto	16%	17	20

Source: Corporate Knights / Finance Watch

The GGFI centres hosting the highest percentage of corporate revenues from fossil fuels, as a share of all the revenues reported by companies listed there, is shown in Table A. It is notable that the list includes centres from the top and the bottom of the GGFI rankings, suggesting that perception of green finance is not currently affected by a centre's exposure to fossil fuel revenues.

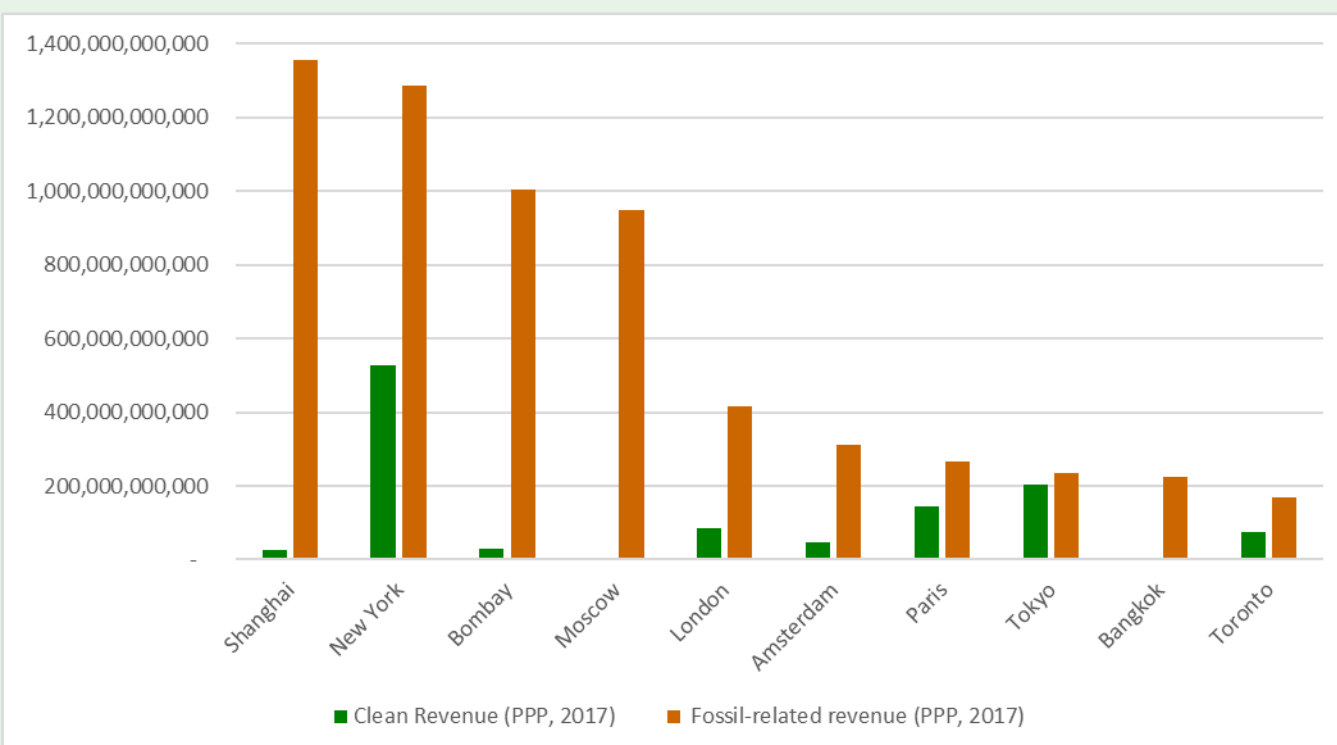
Much of this fossil fuel revenue often comes from a handful of companies; Gazprom, Rosneft, and Lukoil in Moscow; PTT in Bangkok; PKN Orlen in Warsaw; Royal Dutch Shell in Amsterdam; KOC Holding in Istanbul; and OMV in Vienna. Each account for more than 10% of total corporate revenue

³³ Based on Corporate Knights data series "Financial centre corporate sustainability performance". Includes uranium mining. Fossil fuel revenues are the sum of total 2017 revenues from large companies (revenue \$>1bn) in eight Corporate Knights Industry Codes: Coal and uranium mining; Fossil fuel exploration and production; Integrated oil and gas; LPG, Propane and Other Distributors; Midstream Energy; Natural Gas Utilities; Petroleum Refineries; Support activities for oil and gas.

reported on their exchanges. BP and Glencore in London, and Sinopec and Petrochina in Shanghai each account for between 7 and 9%. In Bombay and Toronto, by contrast, the exposure is more thinly spread over a larger number of smaller fossil fuel companies.

Figure 5 shows which financial centres have the highest dollar amount of fossil fuel-related revenues. The large numbers for fossil fuel revenues raise commercial and environmental concerns, even if they are a small percentage of total revenue. The data also highlight the extent by which fossil fuel revenues dwarf ‘clean’ revenues.

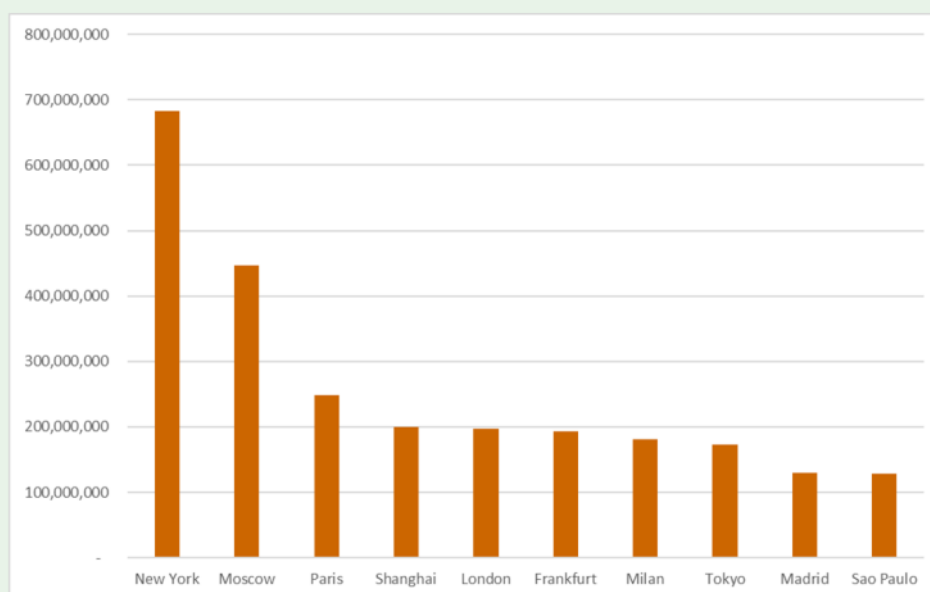
Figure 5: Fossil-Fuel Related vs Clean Company Revenues, By Primary Listing Location³⁴



Source: Corporate Knights

Figure 6 looks at financial centres according to the scope 1 and 2 Greenhouse Gas (GHG) emissions disclosed by the large companies listed on their exchanges. If data on scope 3 (indirect) emissions were available, it would change the picture again, given that most oil and gas products are used downstream for energy production by other entities.

³⁴ Based on Corporate Knights data series “Financial centre clean to fossil-fuel related revenue”, where ‘clean’ is the sum of 2017 revenues from large companies (revenue \$>1bn) listed in a given financial centre ascribed to activities in the CK Clean Revenue Taxonomy, and ‘fossil-related’ is the sum of revenues ascribed to activities in the FactSet Economy = Energy group, excluding renewables and uranium. NB the definitions for fossil fuel revenue used in Table A and Figure 5 are not the same.

Figure 6: Disclosed GHG Emissions Of Companies, By Primary Listing Location (Scope 1 + 2)³⁵

Source: Corporate Knights

For centres with a large historical involvement in fossil fuels, the speed of transition may be a more useful measure. Table B compares lending for clean vs brown (i.e. fossil fuel) energy projects.

Unfortunately, disclosure around bank lending by the industry sector remains extremely poor and the following table may say more about disclosure practices than about the underlying activity. This data was not included in the GGFI Instrumental Factors but is presented here for interest.

Table B: Comparison of Green and Brown Lending USDm, 2014-2018³⁶

Centre	Brown \$m	Centre	Clean \$m
Tokyo	22,851	Tokyo	31,066
New York	7,740	Paris	21,078
Shanghai	7,714	Frankfurt	16,748
Paris	6,436	Madrid	14,153
London	6,154	New York	14,039
Frankfurt	6,121	London	10,523
Toronto	1,632	Toronto	6,014
Amsterdam	1,590	Amsterdam	4,714
Singapore	1,529	Milan	3,764
Riyadh	1,494	Sydney	2,904

Source: Corporate Knights

³⁵ Based on Corporate Knights data series “Financial centre carbon intensity”.

³⁶ Based on Corporate Knights data series “Financial Institutions Conventional to New Energy Finance Score”, which includes new loans arranged over 2014-2018 for new energy (renewable sources excl. hydro) and for conventional (oil, natural gas and coal), taken from company disclosures and industry sources. Syndicated loans are allocated proportionately among participating banks.

According to the data underlying table B, the top 10 financial institutions providing financing for brown energy projects, based on available disclosures, were:

Table C: Top 10 Institutions Financing Brown Energy

Financial Institution	Brown Energy Financing (US\$ Millions)
Mitsubishi UFJ Financial	9,510
Sumitomo	7,072
Industrial & Commercial Bank of China Ltd	6,619
Mizuho Financial	4,857
Deutsche Bank	3,092
KfW	2,587
HSBC	2,586
BNP Paribas	2,576
Credit Agricole	2,071
General Electric	1,592

Source: Corporate Knights

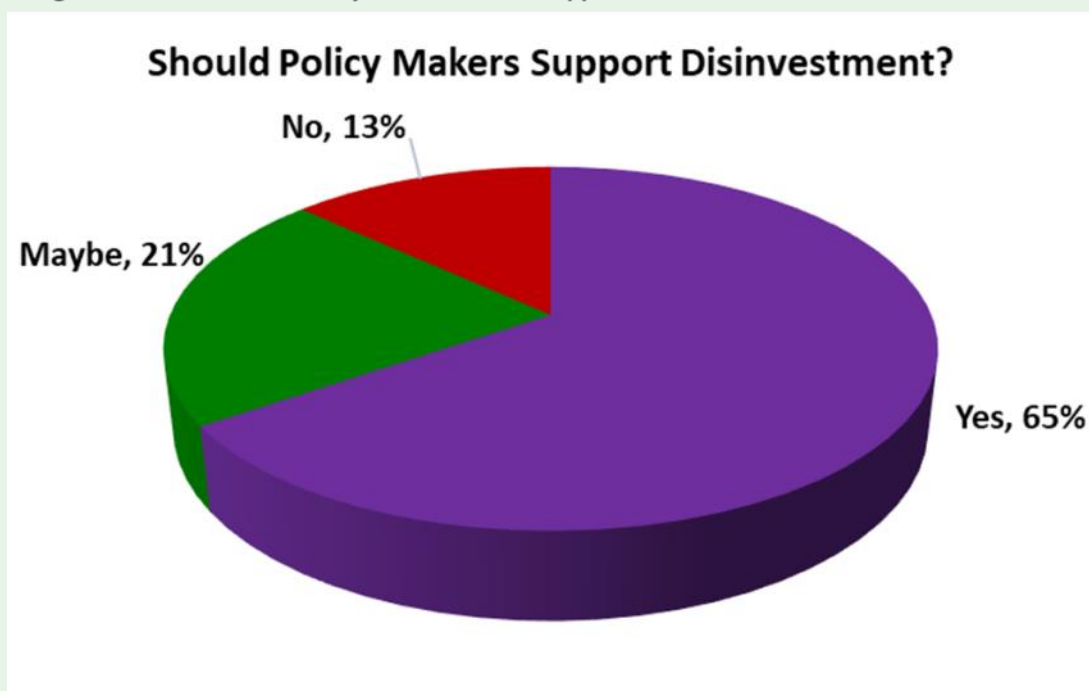
The data in this section also make an interesting contrast to the GGFI rankings. In some cases, the centres perceived as having high quality and depth of green finance are also the ones with the highest fossil revenue or GHG emissions.

What GGFI Respondents Think

So, should more be done to encourage deflation of the carbon bubble, taking account of the fact that many stock exchanges have a high proportion of their total investment value tied up in carbon-related investment?

For the third edition of the Global Green Finance Index, a supplementary question was included in the questionnaire in association with Client Earth (www.clientearth.org), the international non-profit environmental law organisation, asking respondents for their views on divestment. The results of this consultation, based on the responses of the 182 individuals who chose to answer, are summarised in figure 7. While the sample size is small, there is a clear preference for policy intervention in favour of fossil fuel divestment.

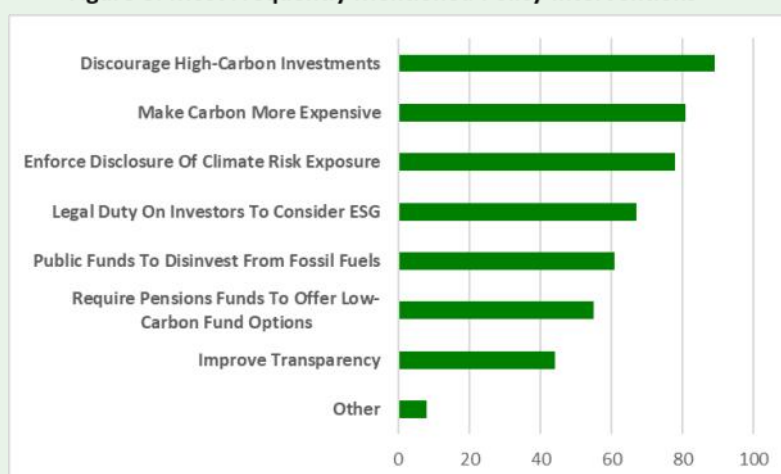
Figure 7: Do You Think Policymakers Should Support Disinvestment From Fossil Fuels?



Individuals who chose to answer 'yes', or 'maybe' were then asked to consider which policy measures they thought would be effective in their jurisdiction in supporting disinvestment. The results are illustrated in figure 8.

The active discouragement of high carbon investment and carbon pricing were the most popular choices, and the mandatory disclosure of climate risk came a close third. This was reflected in several of the free text comments associated with this section of the questionnaire, with particular note made of the role that fossil fuels have to play in transitioning to a low carbon economy.

Figure 8: Most Frequently Mentioned Policy Interventions



Getting Warmer

Whilst the divestment movement remains small, relative to total funds managed, the issue of divestment is likely to remain a hot topic for some time to come, with the ongoing work on the IPCC's next synthesis report, and high hopes for COP 25 in Chile this year and COP 26, which London and Italy are bidding to host in 2020.

Recent research by the Grantham Institute seems to indicate that portfolios do not suffer harm to long-term returns by divesting from fossil fuels³⁷, which may indicate that the momentum to divest will continue, especially if the financial impacts of climate change on broader investment portfolios are considered.

The European Securities and Markets Authority has been asked by the European Commission to review how to incorporate Environmental, Social and Governance (ESG) issues into the Undertakings for Collective Investment and Transferable Securities Directive and Alternative Investment Fund Managers Directive. This is likely to focus the attention of European fund managers on climate risks. If fiduciary or legal duties with respect to ESG issues are strengthened in these and other ways, and stakeholder pressure is increasing from other quarters, including from central banks in the Network For Greening The Financial System (NGFS), fund managers may find that the divestment option becomes more compelling.

While the survey on divestment is only a small sample, central banks and policymakers should take note of the message it sends: if the trickle of divestment becomes a flood, steps may have to be taken to manage the world's carbon bubble so it does not burst or get even bigger.



37 Grantham J 2018 *The mythical peril of divesting from fossil fuels* <http://www.lse.ac.uk/GranthamInstitute/news/the-mythical-peril-of-divesting-from-fossil-fuels/>

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.

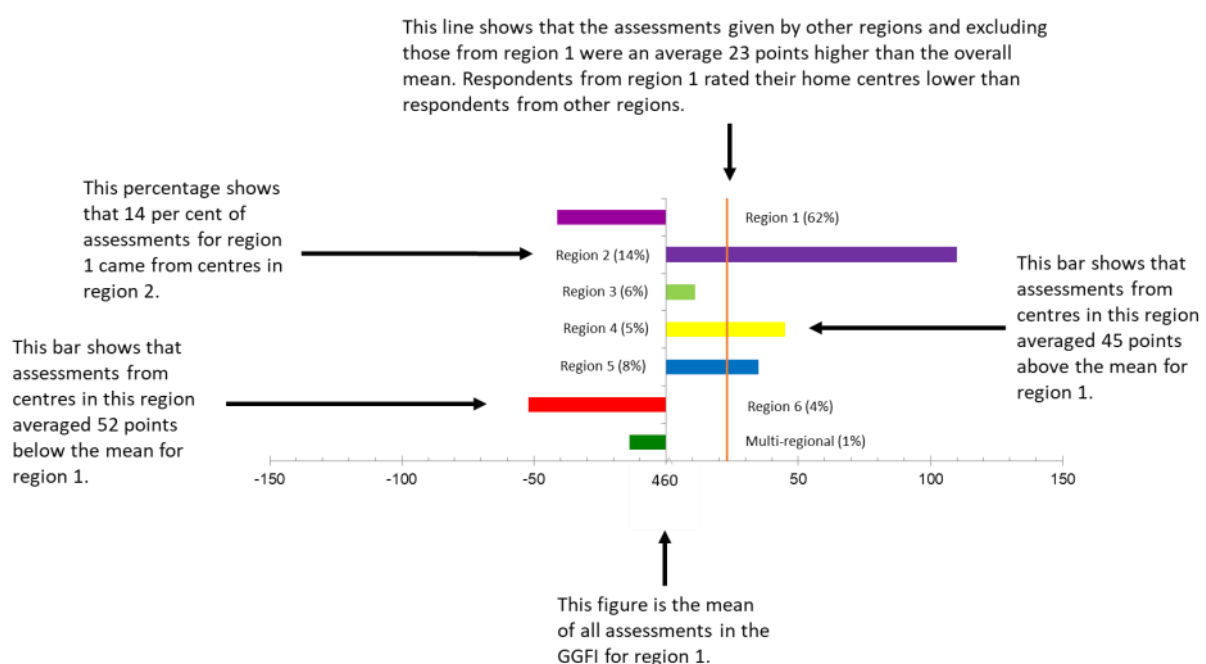
We display this analysis in charts, either for a region or an individual centre. These charts show:

- 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 12 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 12 | Example: Assessments Compared With The Mean For A Region



North America

- Ten North American centres feature in the GGFI, with Canadian centres continuing to outperform US centres;
- It is interesting to note that Canada, along with the EU and China, has shown leadership in responding to the Paris Climate agreement, while the US has indicated its intention to pull out of the agreement. In addition, a challenging domestic policy environment for both renewables and pollution-abatement technology in the US may have influenced the ratings;
- Montréal is top in the region for depth, while San Francisco takes top position for quality;
- 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 15 | North America Centres In GGFI 3

Depth GGFI 3			Quality GGFI 3		
Centre	Rank	Rating	Centre	Rank	Rating
Montréal	8	431	San Francisco	11	429
Vancouver	9	429	Vancouver	13	425
Toronto	17=	410	Montréal	18	416
San Francisco	24	402	Toronto	20=	414
Los Angeles	29	392	Washington DC	30=	401
Washington DC	31=	385	New York	32=	399
Boston	35=	380	Los Angeles	34	392
New York	38=	376	Boston	35	391
Calgary	38=	376	Chicago	42	374
Chicago	47	358	Calgary	45	370

Chart 13 | North American Regional Assessments For Depth – Difference From The Mean

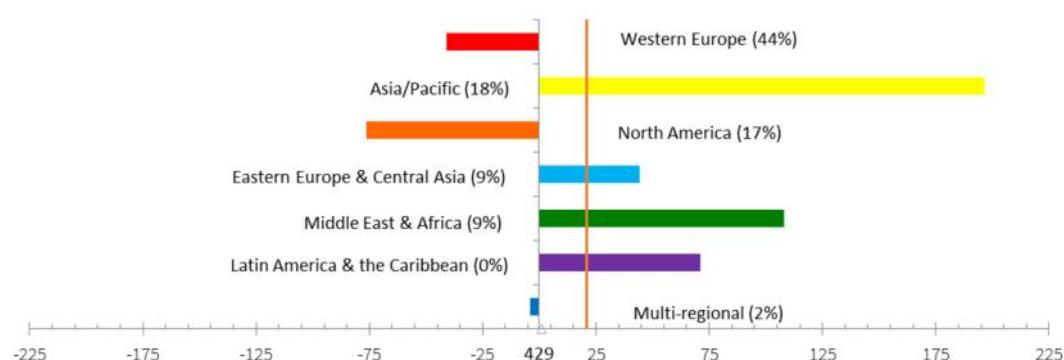


Chart 14 | North American Regional Assessments For Quality – Difference From The Mean

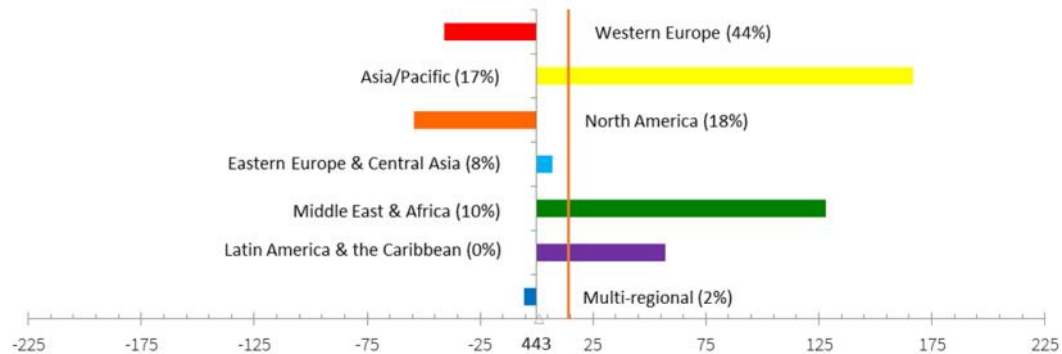


Chart 15 | Regional Assessments For Depth For Montréal – Difference From The Mean

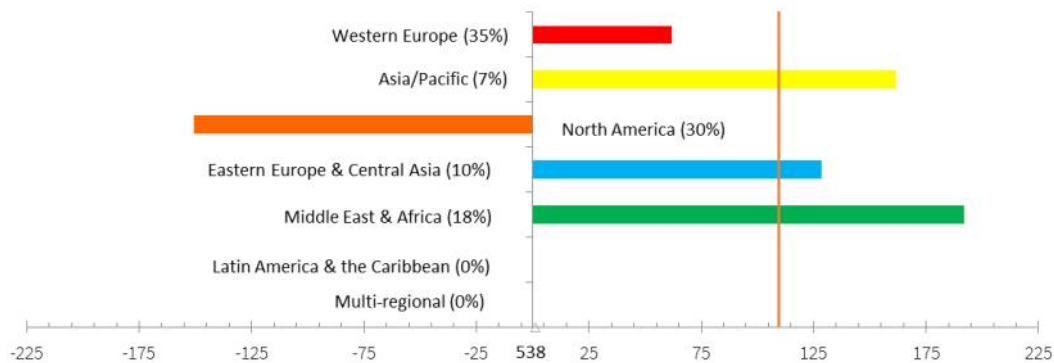
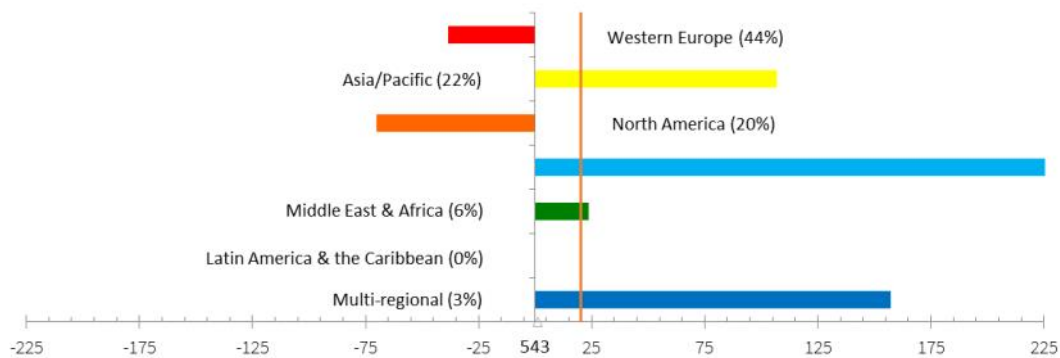


Chart 16 | Regional Assessments For Quality For San Francisco – Difference From The Mean



Middle East & Africa

- Casablanca retained its position as the leading centre in the Middle East & Africa, gaining three places in the rankings for depth, and 13 for quality;
- Dubai fell in the rankings for both depth and quality with Abu Dhabi also being overtaken by other centres on depth;
- Respondents from Asia/Pacific, Eastern Europe & Central Asia, and the Middle East & Africa scored cities in the region higher than the average, with other regions rating cities in the region lower than average;
- Doha, Tel Aviv, and Nairobi received just under the minimum number of assessments required for inclusion in the index.

Table 16 | Middle Eastern & African Centres In GGFI 3

Centre	Depth GGFI 3		Centre	Quality GGFI 3	
	Rank	Rating		Rank	Rating
Casablanca	13=	417	Casablanca	15	422
Mauritius	41	372	Cape Town	39=	381
Cape Town	42	371	Dubai	43=	372
Dubai	49	353	Johannesburg	46=	369
Johannesburg	51	350	Mauritius	49	368
Abu Dhabi	52	349	Abu Dhabi	52=	346

Chart 17 | Middle East & Africa Regional Assessments For Depth – Difference From The Mean

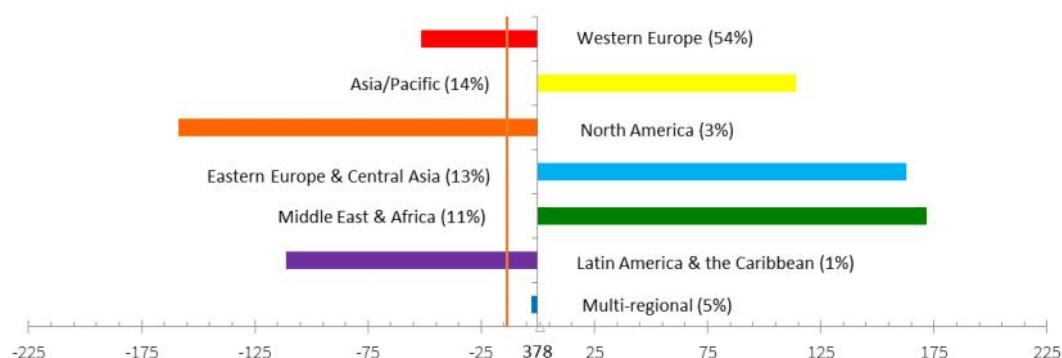


Chart 18 | Middle East & Africa Regional Assessments For Quality – Difference From The Mean

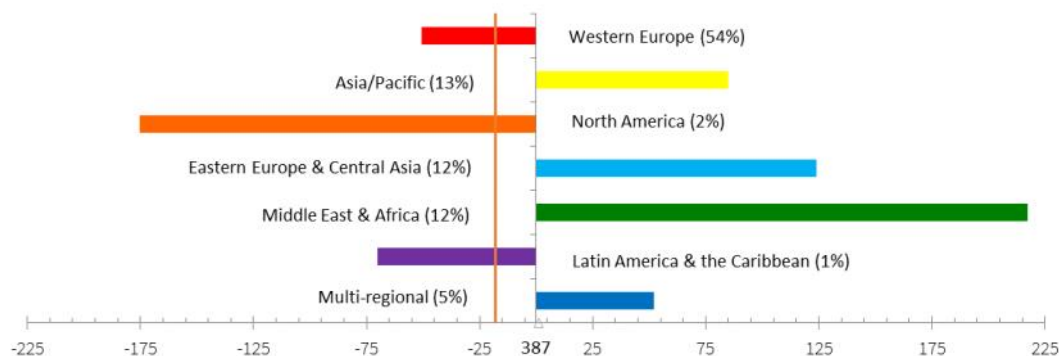


Chart 19 | Regional Assessments For Depth For Casablanca – Difference From The Mean

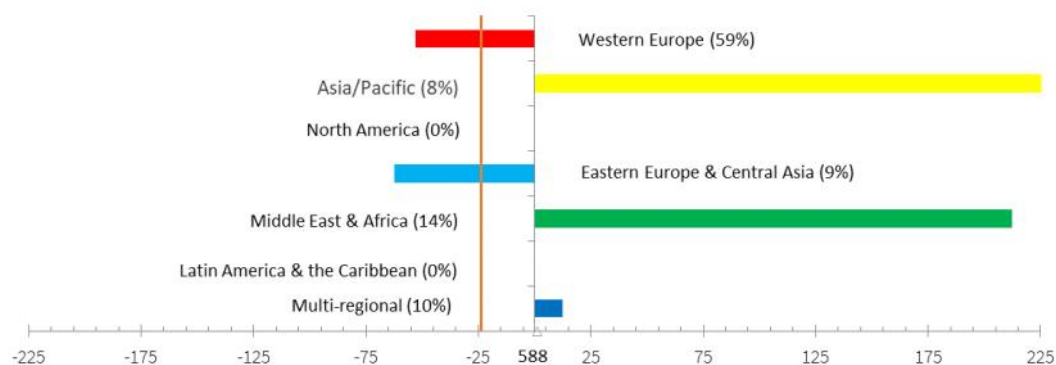
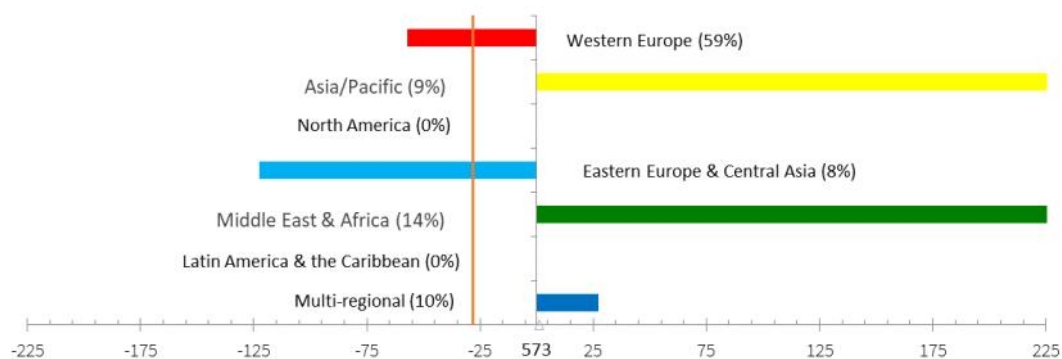


Chart 20 | Regional Assessments For Quality For Casablanca – Difference From The Mean



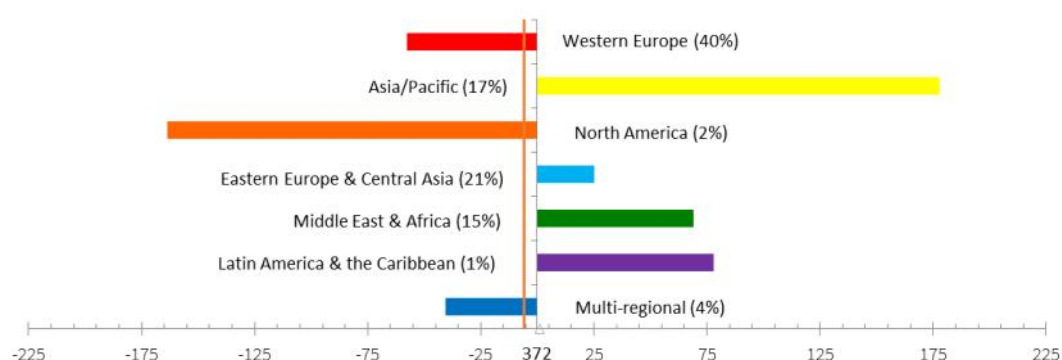
Eastern Europe & Central Asia

- Prague consolidated its position as the leading centre for depth and quality in the region; improving one position for depth but falling slightly in the rankings for quality;
- There were only minor changes in the rankings for other centres in the region;
- Ratings given by Western European and North American respondents were below the average for the region.

Table 17 | Eastern European & Central Asian Centres In GGFI 3

Centre	Depth GGFI 3		Centre	Quality GGFI 3	
	Rank	Rating		Rank	Rating
Prague	43	369	Prague	22	413
Warsaw	50	352	Warsaw	39=	381
Moscow	56=	341	Istanbul	58	334
Istanbul	60	329	Moscow	59	331

Chart 21 | Eastern European & Central Asian Regional Assessments For Depth – Difference From The Mean



“The bureau for CPD of Astana International Finance Centre are training green finance experts in partnership with the Climate Bonds Initiative.”

Senior Manager, Financial Development, Astana

Chart 22 | Eastern European & Central Asian Regional Assessments For Quality – Difference From The Mean

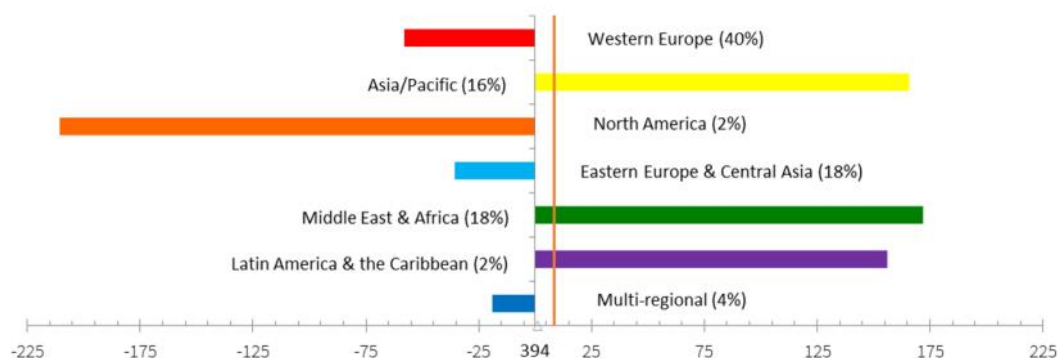


Chart 23 | Regional Assessments For Prague For Depth – Difference From The Mean

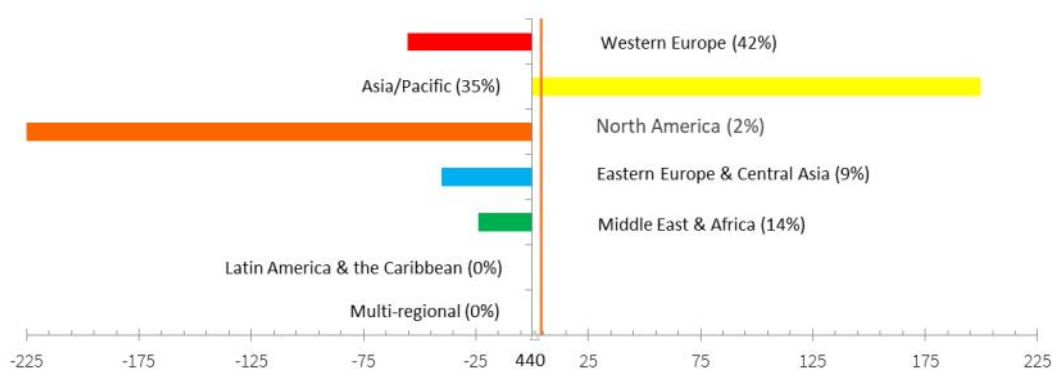
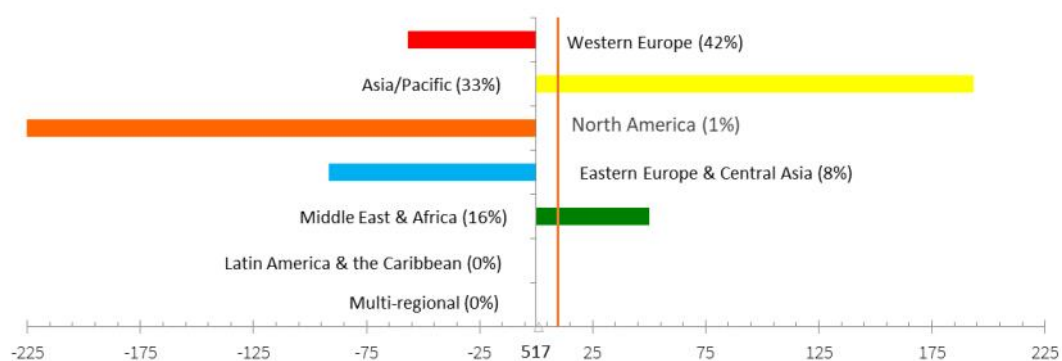


Chart 24 | Regional Assessments For Prague For Quality – Difference From The Mean



Western Europe

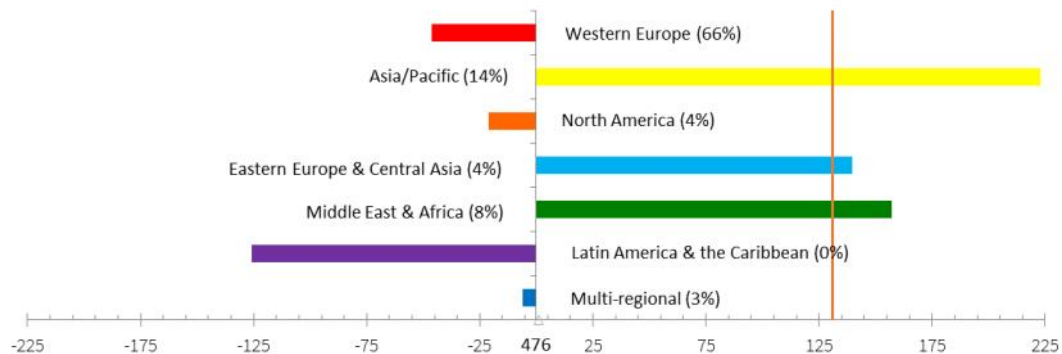
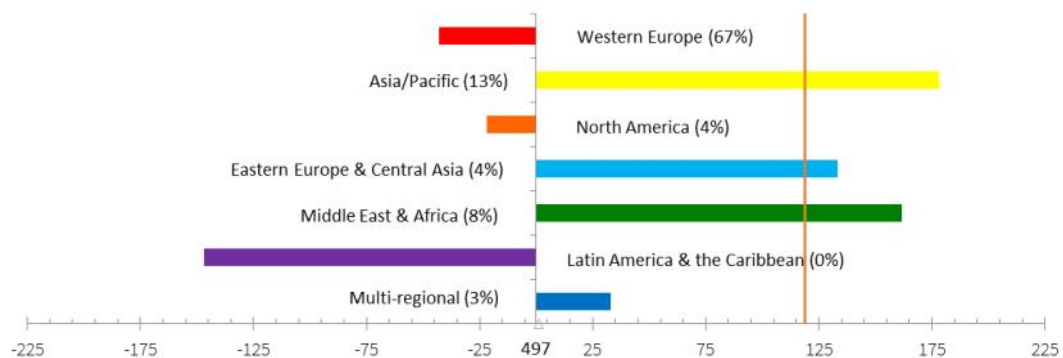
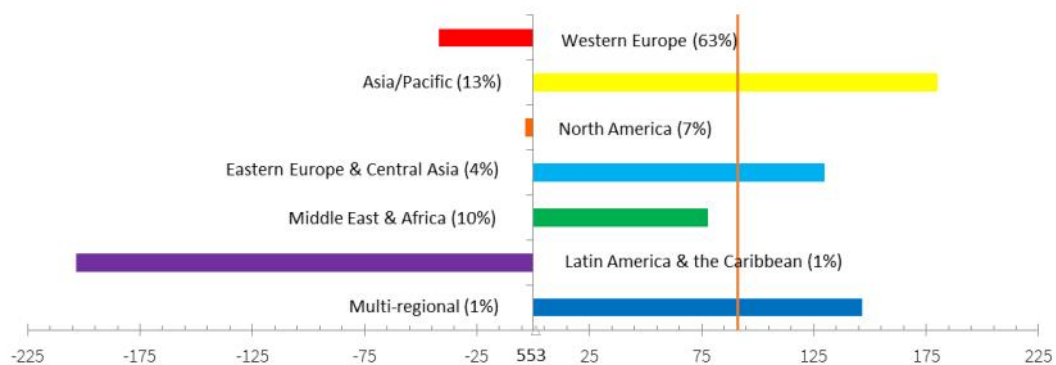
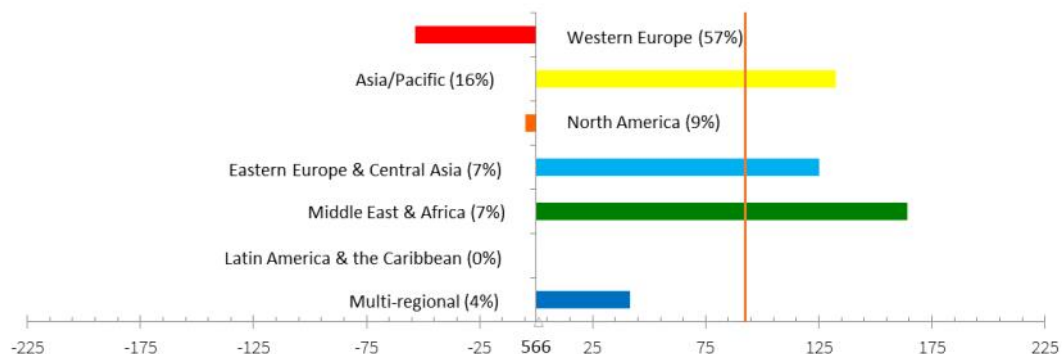
- Western European centres continue to perform well, with eight of the top ten ranked centres for depth and all ten for quality;
- Amsterdam retained its leading place in the depth index, with Zürich joining Copenhagen in equal second place, rising seven places in the rankings;
- In the quality index, London and Paris remain at the top of the table, with Hamburg and Zürich moving into the top five;
- Within German centres, Frankfurt was beaten by Hamburg and Munich on both depth and quality;
- Liechtenstein joins the index for the first time;
- Assessments from Western Europe, Latin America & The Caribbean, and North America were below the average, while assessments from other regions were above the mean;
- Gibraltar, Athens, and Glasgow were close to entering the index, based on the number of assessments they received.

Table 18 | Western European Top 10 Centres In GGFI 3

Depth GGFI 3			Quality GGFI 3		
Centre	Rank	Rating	Centre	Rank	Rating
Amsterdam	1	461	London	1	491
Zürich	2=	448	Paris	2	462
Copenhagen	2=	448	Amsterdam	3	461
Luxembourg	4	444	Hamburg	4	459
London	5=	442	Zürich	5	458
Stockholm	5=	442	Stockholm	6	453
Paris	7	435	Copenhagen	7	452
Hamburg	10	424	Luxembourg	8	450
Geneva	15=	412	Munich	9	441
Brussels	17=	410	Geneva	10	431

“The Action Plan on sustainable growth of the EU Commission will have a major influence, especially the development of a common taxonomy.”

Group Sustainability Manger, Banking, Liechtenstein

Chart 25 | Western Europe Regional Assessments For Depth – Difference From The Mean

Chart 26 | Western Europe Regional Assessments For Quality – Difference From The Mean

Chart 27 | Regional Assessments For Amsterdam For Depth – Difference From The Mean

Chart 28 | Regional Assessments For London For Quality – Difference From The Mean


Latin America & The Caribbean

- São Paulo continued to lead the region for both depth and quality;
- The ranking of all centres in the region generally fell compared with GGFI 2 as other regions performed better;
- Rio de Janeiro and Bermuda joined the index for the first time;
- Assessments from North America and Western Europe were lower than average. Assessments from Latin America & The Caribbean were the closer to the average for any home region;
- Panama received just under the number of assessments required for inclusion in the index.

Table 19 | Latin American & Caribbean Centres In GGFI 3

Centre	Depth GGFI 3		Centre	Quality GGFI 3	
	Rank	Rating		Rank	Rating
São Paulo	46	366	São Paulo	46=	369
British Virgin Islands	53=	345	Cayman Islands	52=	346
Mexico City	53=	345	British Virgin Islands	54	342
Rio de Janeiro	55	344	Mexico City	55	340
Cayman Islands	56=	341	Rio de Janeiro	56	339
Bermuda	61	326	Bermuda	62	318

Chart 29 | Latin American & Caribbean Regional Assessments For Depth – Difference From The Mean

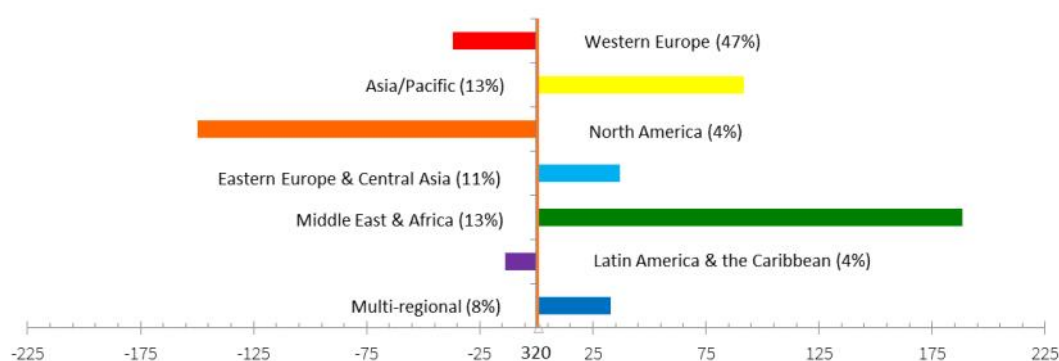
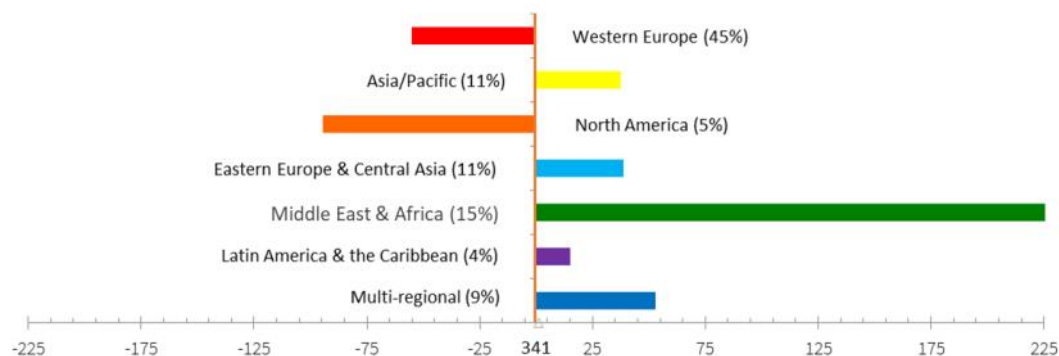
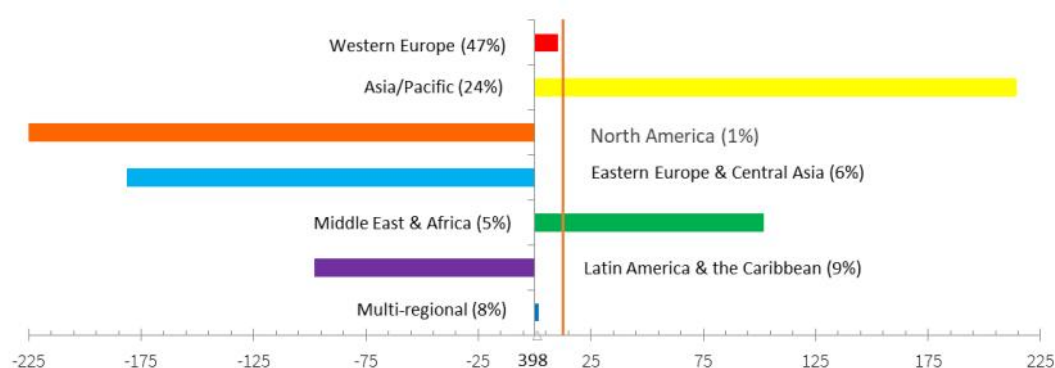
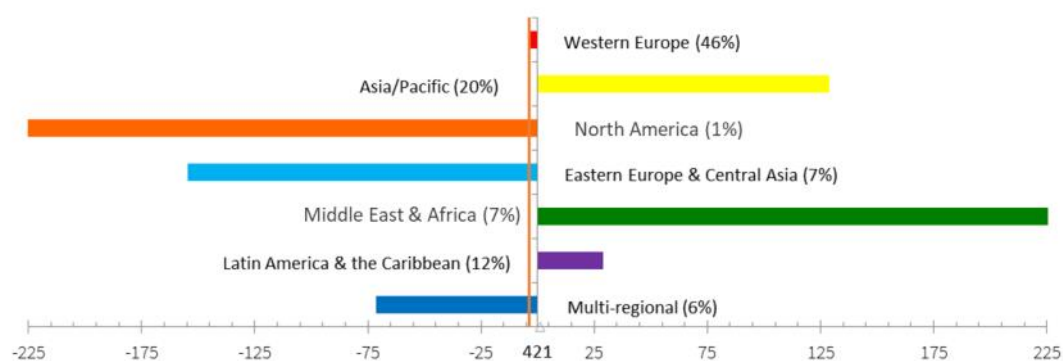


Chart 30 | Latin America & The Caribbean Regional Assessments For Quality – Difference From The Mean

Chart 31 | Regional Assessments For São Paulo For Depth – Difference From The Mean

Chart 32 | Regional Assessments For São Paulo For Quality – Difference From The Mean


Asia/Pacific

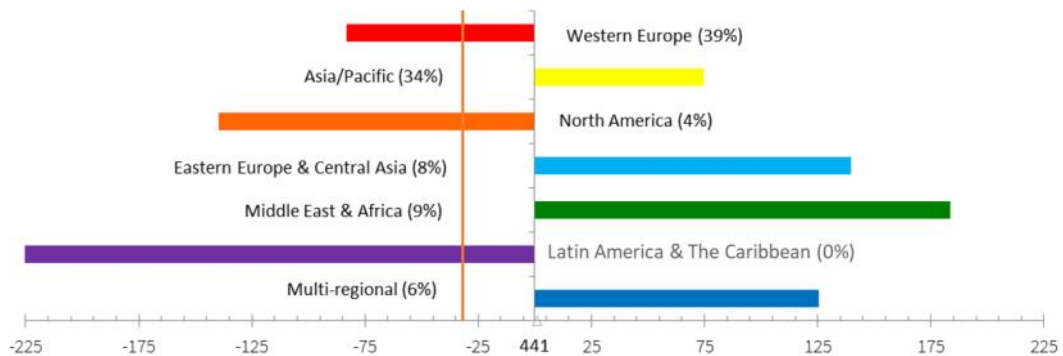
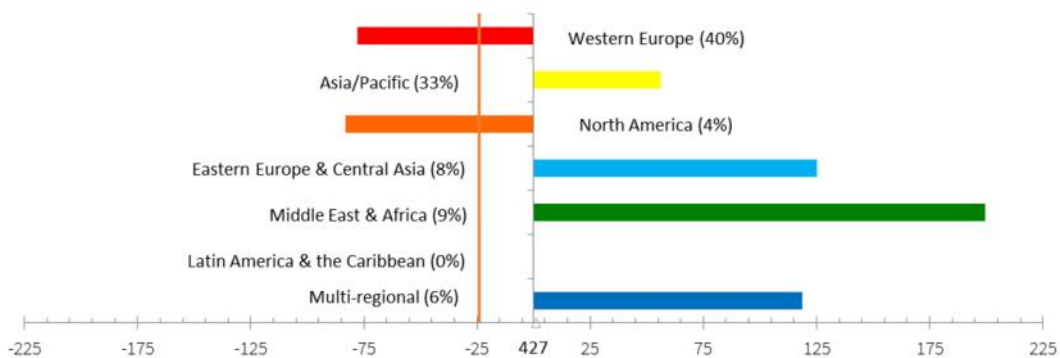
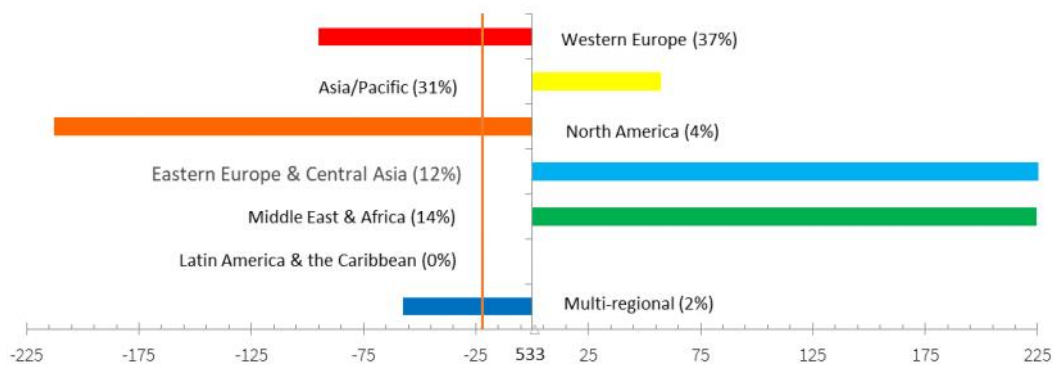
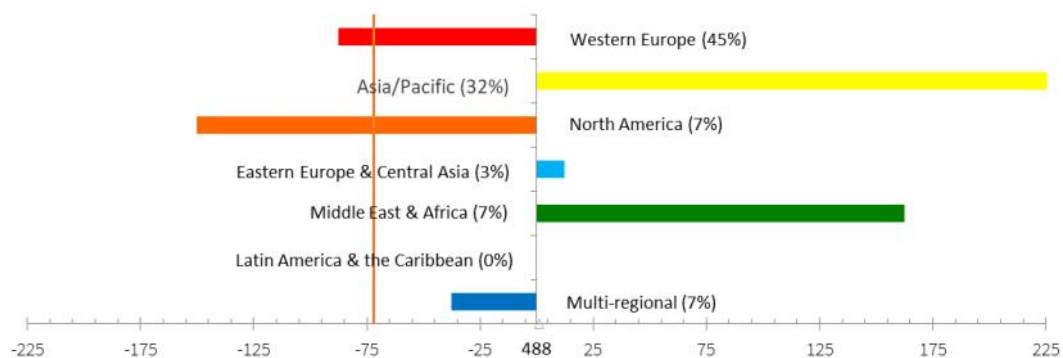
- Shanghai retained its leading position in the region for depth, although Sydney overtook Shanghai to take first place in the quality index;
- Melbourne entered the index for the first time, coming second in the region for quality and fifth for depth;
- Seoul fell in both the depth and quality rankings, although its ratings remained reasonably stable, suggesting that other centres have overtaken its position;
- Shanghai and Beijing fell eight places in the quality rankings and again were overtaken by other centres;
- Guangzhou rose overall in both rankings, coming seventh for depth and eighth for quality in the region;
- Assessments from Western Europe and North America were lower for the region than those from other parts of the world;
- Jakarta and Manila received almost sufficient assessments to be included in the index.

Table 20 | Asia/Pacific Top 10 Centres In GGFI 3

Depth GGFI 3			Quality GGFI 3		
Centre	Rank	Rating	Centre	Rank	Rating
Shanghai	11	420	Sydney	16	418
Beijing	12	418	Melbourne	17	417
Sydney	13=	417	Shanghai	19	415
Shenzhen	15=	412	Singapore	23=	408
Melbourne	19	409	Beijing	25	406
Seoul	20=	407	Tokyo	28	404
Guangzhou	22	405	Shenzhen	29	403
Singapore	23	404	Guangzhou	36	386
Hong Kong	31=	385	Hong Kong	37	385
Tokyo	34	382	Seoul	46=	369

“In terms of regulation in Asia/Pacific, Japan is most successful. Korea, Singapore and Taiwan are catching up quickly.”

Head of ESG and Sustainable Investing, Asset Management Firm, Hong Kong

Chart 33 | Asia/Pacific Regional Assessments For Depth – Difference From The Mean**Chart 34 | Asia/Pacific Regional Assessments For Quality – Difference From The Mean****Chart 35 | Regional Assessments For Shanghai For Depth – Difference From The Mean****Chart 36 | Regional Assessments For Sydney 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 seven centres that appear in the top five of the rankings for both depth and quality, charts 37 and 38 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 Hamburg, Amsterdam, Stockholm, and Luxembourg for depth than those from larger organisations. Amsterdam, Stockholm, and Brussels scored higher in relation to larger organisations.

Similarly, those in smaller organisations rated Amsterdam, Stockholm, Hamburg, and London higher for quality. Brussels, Amsterdam, Stockholm, and London received higher quality scores from those in larger organisations.

Chart 37 | Average Assessments By Respondents' Organisation Size: Depth

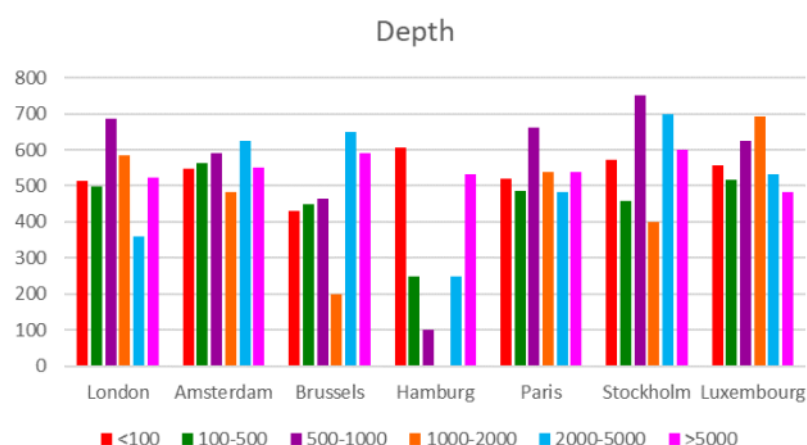
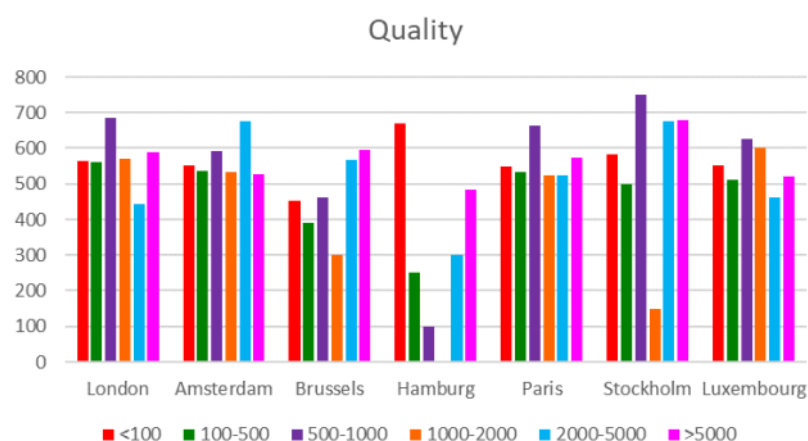


Chart 38 | Average Assessments By Respondents' Organisation Size: Quality



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 39 and 40 contrast the 'spread' or variance of the individual assessments given to each of the centres in GGFI 3, 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.

There is greater unpredictability both in variance of ratings and sensitivity to instrumental factors for the depth measure than for quality. Unpredictability on depth has increased since GGFI 2, while the reverse is the case for the quality measure.

Chart 39 | Stability In Depth Assessments And Instrumental Factors

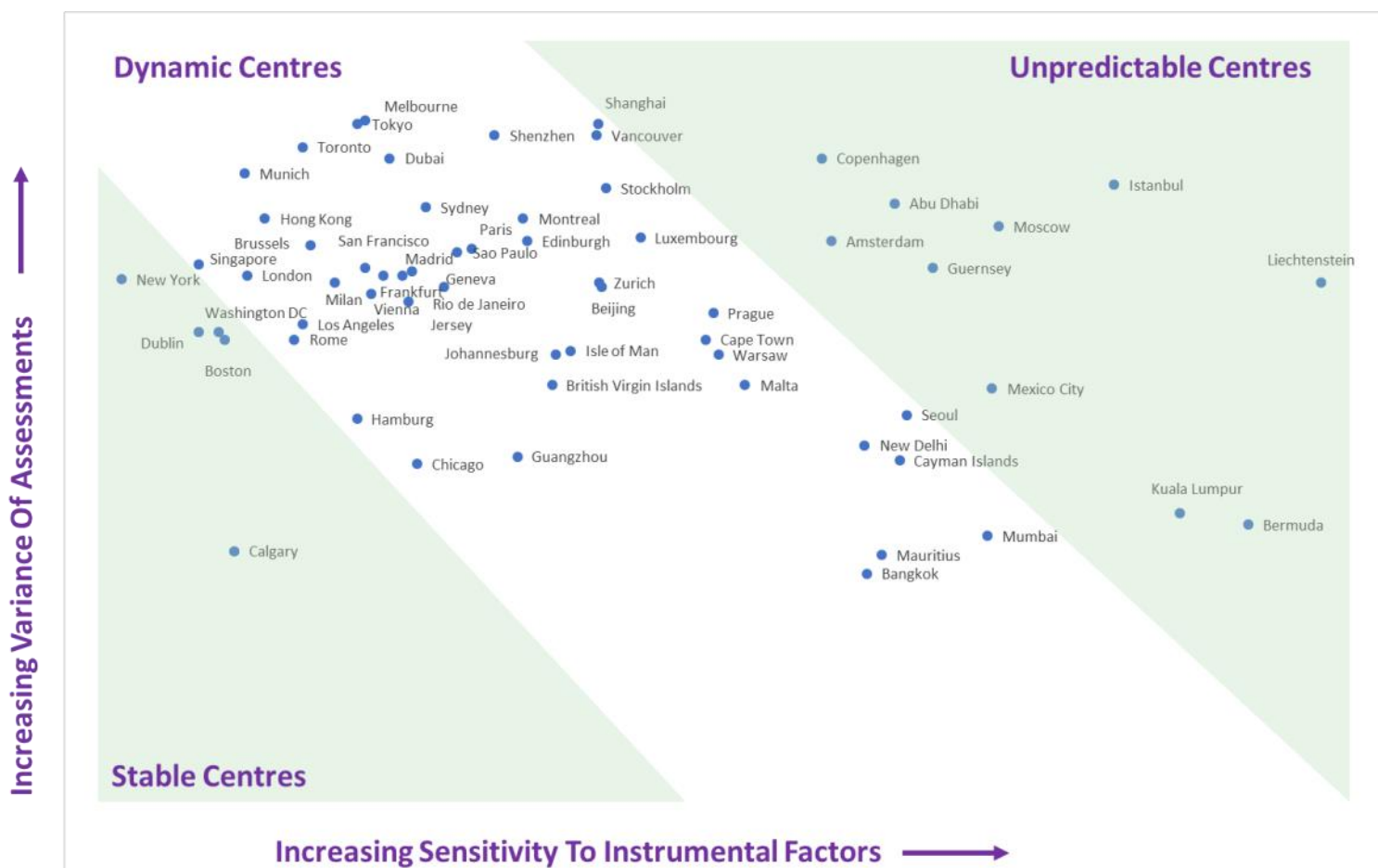
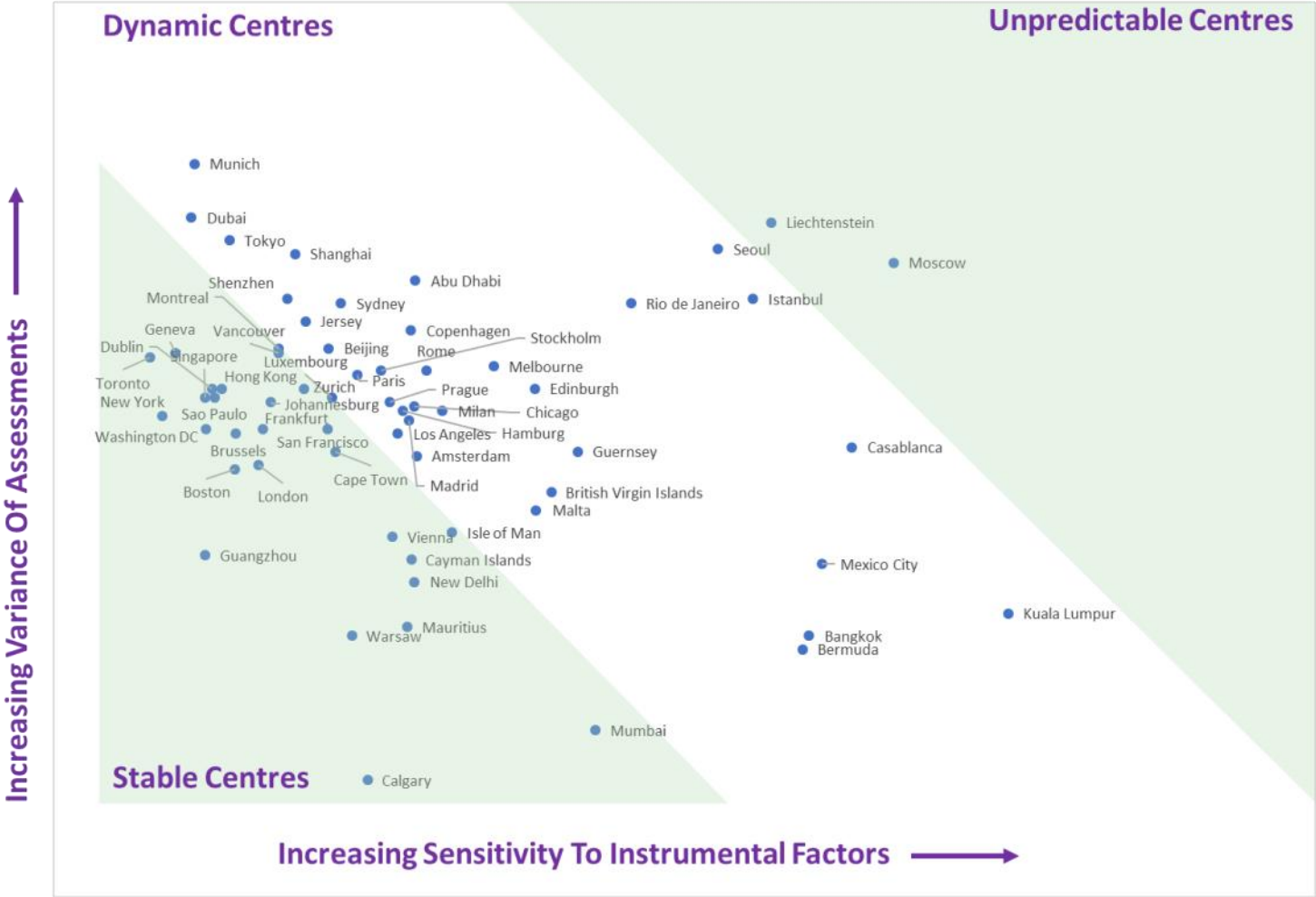


Chart 40 | Stability In Quality Assessments And Instrumental Factors



“Opportunity for more regulator-recognised green funds - need to develop the regulatory regimes/policies of regulators across the globe.”

Director and NED, Wealth Managers, London

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, including new entrant Melbourne. A similar range of centres feature for quality, but with Amsterdam and Zurich replacing Guangzhou and Melbourne in the top 15. Copenhagen and Stockholm both have a high reputational advantage for depth and quality.

Table 21 | Top 15 Centres – Reputational Advantage For Depth In GGFI 3

Centre	Weighted Average Assessment	GGFI 3 Rating	Reputational Advantage
Casablanca	516	417	99
Copenhagen	508	448	60
Montréal	481	431	50
Shanghai	466	420	46
Stockholm	487	442	45
Istanbul	374	329	45
Beijing	462	418	44
Hamburg	466	424	42
San Francisco	444	402	42
Guangzhou	445	405	40
Los Angeles	427	392	35
Melbourne	438	409	29
Prague	393	369	24
Amsterdam	478	461	17
Sydney	434	417	17

Table 22 | Top 15 Centres – Reputational Advantage For Quality In GGFI 3

Centre	Weighted Average Assessment	GGFI 3 Rating	Reputational Advantage
Casablanca	500	422	78
Copenhagen	505	452	53
Stockholm	506	453	53
San Francisco	475	429	46
Montréal	461	416	45
Prague	457	413	44
Shanghai	458	415	43
Beijing	444	406	38
Hamburg	497	459	38
Istanbul	367	334	33
Los Angeles	420	392	28
Zürich	477	458	19
Amsterdam	478	461	17
Paris	475	462	13
Liechtenstein	378	367	11

Tables 23 and 24 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 23 | Bottom 15 Centres – Reputational Disadvantage For Depth In GGFI 3

Centre	Weighted Average Assessment	GGFI 3 Rating	Reputational Advantage
Mexico City	292	345	-53
Cape Town	314	371	-57
Dublin	319	384	-65
Mumbai	246	315	-69
Guernsey	296	367	-71
Bangkok	260	332	-72
Bermuda	253	326	-73
Johannesburg	272	350	-78
Jersey	320	399	-79
Cayman Islands	257	341	-84
British Virgin Islands	260	345	-85
Isle of Man	282	374	-92
Malta	270	367	-97
New Delhi	218	322	-104
Calgary	213	376	-163

Table 24 | Bottom 15 Centres – Reputational Disadvantage For Quality In GGFI 3

Centre	Weighted Average Assessment	GGFI 3 Rating	Reputational Advantage
Johannesburg	310	369	-59
Rome	295	357	-62
Vienna	351	414	-63
Cape Town	316	381	-65
Cayman Islands	274	346	-72
Guernsey	309	382	-73
Bangkok	263	337	-74
Dublin	327	405	-78
Bermuda	231	318	-87
British Virgin Islands	255	342	-87
Malta	287	376	-89
Isle of Man	282	372	-90
Mumbai	219	323	-104
New Delhi	208	328	-120
Calgary	236	370	-134

“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

Industry Sectors

We can conduct an analysis of the differing assessments provided by respondents working in relevant industry sectors by building the index separately using the responses provided only from those industries. This creates separate sub-indices for the Professional Services, Knowledge (incorporating universities and NGOs), Banking, Investment, and Policy & Public Finance sectors. Tables 25 and 26 show the top 15 centres in these industry sectors for depth and quality.

For depth, London and Paris perform well on these sub-indices, above their ranking in the general index. Amsterdam as the leader in the general depth index does not feature in the top 15 for knowledge or policy & public finance, suggesting that the ratings it receives in these areas are considerably lower than from those working in professional services, banking and investment.

Table 25 | GGFI 3 Industry Sector Sub-Indices - Depth

Rank	Professional Services	Knowledge	Banking	Investment	Policy & Public Finance
1	London	Paris	London	Amsterdam	Paris
2	Zürich	Casablanca	Hong Kong	Stockholm	Shanghai
3	Luxembourg	Liechtenstein	Amsterdam	Montréal	Beijing
4	Shanghai	Boston	Beijing	Copenhagen	Zürich
5	Amsterdam	London	Luxembourg	Hamburg	Shenzhen
6	Stockholm	Zürich	Zürich	Toronto	Guangzhou
7	San Francisco	San Francisco	Shenzhen	Munich	Luxembourg
8	Paris	Frankfurt	Singapore	Paris	Seoul
9	Shenzhen	Shanghai	Toronto	Brussels	London
10	Casablanca	Beijing	Paris	Milan	Singapore
11	Copenhagen	Stockholm	Sydney	Sydney	Stockholm
12	Tokyo	Copenhagen	Copenhagen	London	Geneva
13	Vienna	Hamburg	Washington DC	Rome	Madrid
14	Sydney	Bermuda	Guangzhou	Melbourne	Mauritius
15	Los Angeles	Shenzhen	Frankfurt	Madrid	Brussels

In the quality index, London achieves four of the top five rankings in the industry sub-indices, confirming a broad spread of consistency in its ranking.

Table 26 | GGFI 3 Industry Sector Sub-Indices - Quality

Rank	Professional Services	Knowledge	Banking	Investment	Policy & Public Service
1	London	London	London	London	Paris
2	Paris	Paris	Luxembourg	Amsterdam	London
3	Zürich	Zürich	Amsterdam	Stockholm	Zürich
4	Shenzhen	Luxembourg	New York	Hamburg	Luxembourg
5	Shanghai	San Francisco	Paris	Zürich	Geneva
6	Jersey	Guangzhou	Beijing	Brussels	Beijing
7	Guernsey	Dublin	Shenzhen	Edinburgh	Stockholm
8	Luxembourg	Beijing	Sydney	Copenhagen	Copenhagen
9	Casablanca	Geneva	Zürich	Munich	Seoul
10	Amsterdam	Edinburgh	Hong Kong	Paris	Hamburg
11	Sydney	Shenzhen	Washington DC	Montréal	Shanghai
12	Copenhagen	Boston	Frankfurt	Luxembourg	Guangzhou
13	Seoul	Stockholm	Brussels	Vienna	San Francisco
14	Frankfurt	São Paulo	Toronto	Geneva	Malta
15	Guangzhou	Melbourne	Singapore	Toronto	Shenzhen

“Moving too slowly albeit in the right direction. The initiatives on green finance are positive but why not regulate the problems at source - i.e. put a meaningful price/tax on carbon.”

Chief Sustainability Officer, Private Equity Investment Manager, London

GGFI 3 Interest, Impact, And Drivers of Green Finance

Alongside the ratings of depth and quality in the GGFI questionnaire, we ask additional questions about the development of green finance, covering:

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

Areas Of Interest In Green Finance And Areas With The Most Impact

We asked respondents to identify the four areas of green finance which they considered most interesting; and the four areas of green finance that they consider have most impact on sustainability. The results are shown in Charts 41 and 42.

For both interest and impact, the three areas most frequently cited were:

- Sustainable Infrastructure Finance;
- Green Bonds;
- Renewable Energy Investment.

These three areas have featured as the most frequently mentioned for both interest and impact in all three editions of the GGFI so far.

Chart 41 | Most Interesting Areas Of Green Finance

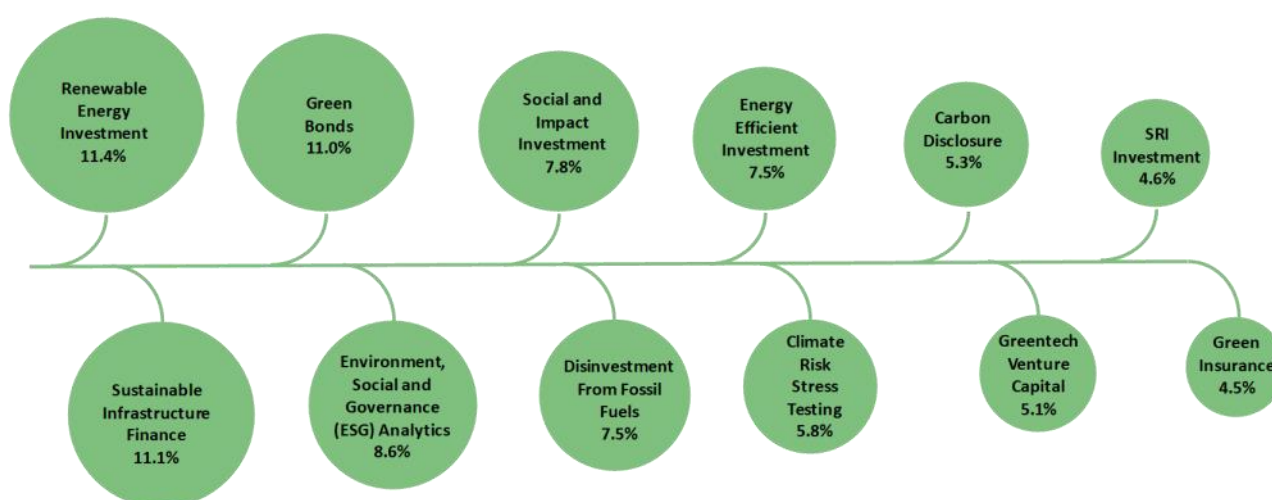
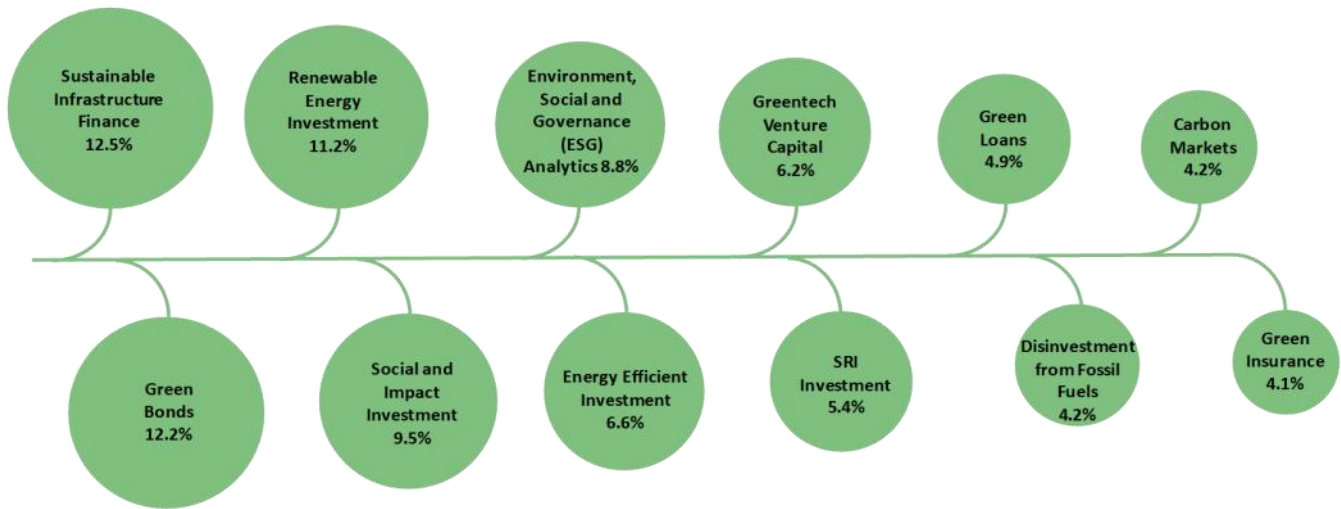


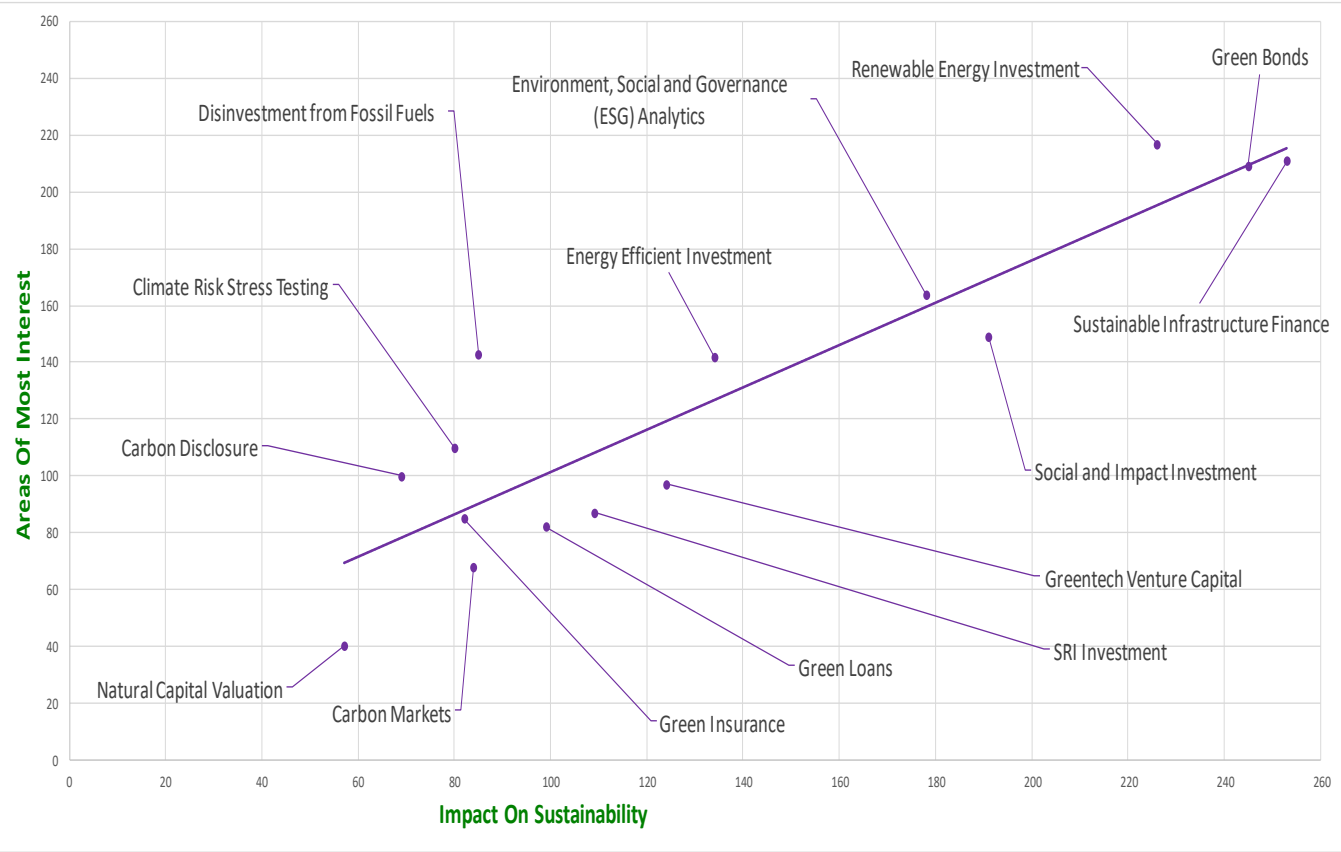
Chart 42 | Green Finance Activities With Most Impact On Sustainability



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 43. Disinvestment from Fossil Fuels stands out as further from the trendline, indicating that disinvestment is seen as having greater impact than the interest shown in it.

Chart 43 | Relationship Between Areas Of Interest And Impact



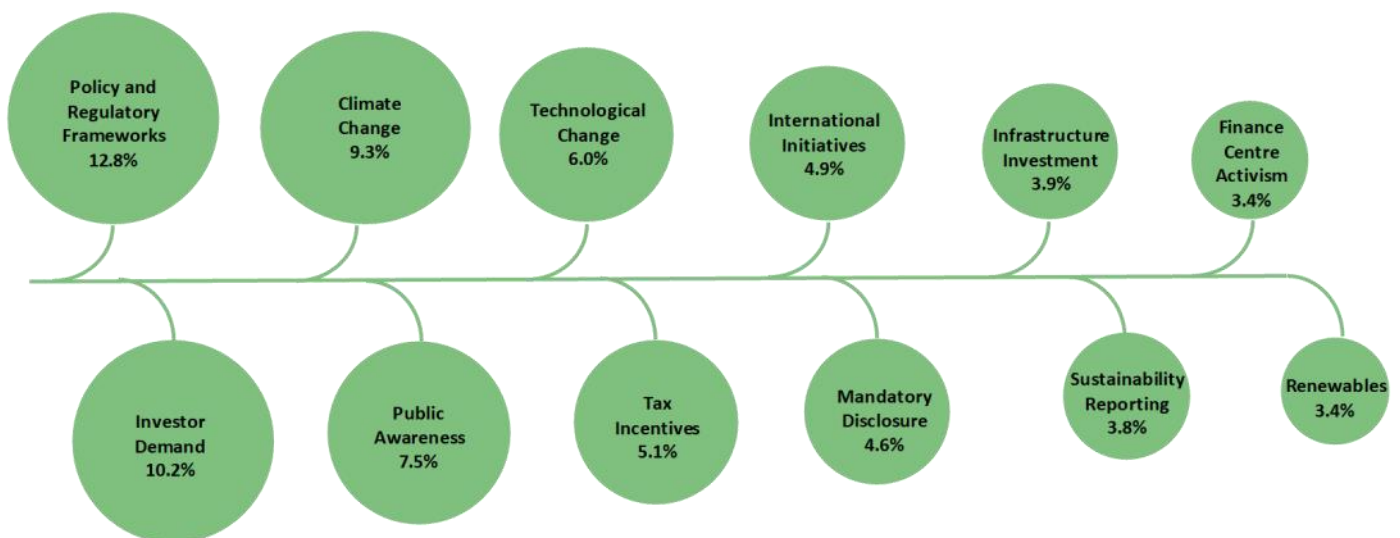
Drivers Of Green Finance

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 44 below. The top drivers identified were:

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

These top four factors have been consistent in all three editions of the GGFI.

Chart 44 | Leading Drivers Of Green Finance



"I feel that a carbon tax is essential and probably the most effective way of moving towards sustainability."

President, Conservation NGO, Boston

Notes

Appendix 1: Assessment Details

Table 27 | Details Of Assessments Of Green Finance Depth By Centre

Centre	GGFI 3 Rank	GGFI 3 Rating	Assessments		
			Number	Average	St. Dev
Amsterdam	1	461	89	553	257
Zürich	2=	448	124	529	246
Copenhagen	2=	448	29	590	279
Luxembourg	4	444	109	539	258
London	5=	442	197	510	248
Stockholm	5=	442	42	567	271
Paris	7	435	148	517	255
Montréal	8	431	38	538	263
Vancouver	9	429	23	435	285
Hamburg	10	424	21	538	210
Shanghai	11	420	72	533	288
Beijing	12	418	70	536	245
Sydney	13=	417	40	503	266
Casablanca	13=	417	20	588	209
Shenzhen	15=	412	29	488	285
Geneva	15=	412	82	470	248
Brussels	17=	410	58	474	256
Toronto	17=	410	50	468	282
Melbourne	19	409	19	503	289
Seoul	20=	407	21	440	211
Munich	20=	407	27	463	275
Guangzhou	22	405	21	507	200
Singapore	23	404	113	465	251
San Francisco	24	402	49	509	250
Jersey	25=	399	40	386	245
Frankfurt	25=	399	129	451	248
Edinburgh	27=	393	41	451	257
Vienna	27=	393	28	407	243
Los Angeles	29	392	44	483	235
Madrid	30	389	30	438	249
Hong Kong	31=	385	118	419	263
Washington DC	31=	385	47	414	233

Centre	GGFI 3	GGFI 3 Rating	Assessments		
			Number	Average	St. Dev
Dublin	33	384	77	380	233
Tokyo	34	382	61	421	288
Boston	35=	380	55	418	231
Milan	35=	380	43	424	246
Rome	37	379	18	403	231
New York	38=	376	186	408	247
Calgary	38=	376	21	250	175
Isle of Man	40	374	33	338	228
Mauritius	41	372	20	370	174
Cape Town	42	371	18	367	231
Prague	43	369	21	440	238
Malta	44=	367	22	300	219
Guernsey	44=	367	26	342	250
São Paulo	46	366	26	398	254
Chicago	47	358	51	358	198
Liechtenstein	48	357	18	411	246
Dubai	49	353	73	381	279
Warsaw	50	352	22	339	227
Johannesburg	51	350	31	310	227
Abu Dhabi	52	349	46	345	267
British Virgin Islands	53=	345	25	286	219
Mexico City	53=	345	31	331	218
Rio de Janeiro	55	344	23	365	241
Cayman Islands	56=	341	27	289	199
Moscow	56=	341	27	335	261
Kuala Lumpur	58	335	29	359	185
Bangkok	59	332	23	298	169
Istanbul	60	329	17	432	272
Bermuda	61	326	18	281	182
New Delhi	62	322	23	261	203
Mumbai	63	315	27	281	179

Table 28 | Details Of Assessments Of Green Finance Quality By Centre

Centre	GGFI 3 Rank	GGFI 3 Rating	Assessments		
			Number	Average	St. Dev
London	1	491	197	566	236
Paris	2	462	148	554	256
Amsterdam	3	461	89	553	238
Hamburg	4	459	21	579	248
Zürich	5	458	124	551	253
Stockholm	6	453	42	589	257
Copenhagen	7	452	29	586	266
Luxembourg	8	450	109	537	251
Munich	9	441	27	494	303
Geneva	10	431	82	504	261
San Francisco	11	429	49	543	244
Brussels	12	427	58	477	243
Vancouver	13	425	23	435	261
Edinburgh	14	424	41	460	253
Casablanca	15	422	20	573	240
Sydney	16	418	40	488	272
Melbourne	17	417	19	476	258
Montréal	18	416	38	513	262
Shanghai	19	415	72	522	283
Vienna	20=	414	28	411	220
Toronto	20=	414	50	451	260
Prague	22	413	21	517	250
Singapore	23=	408	113	468	251
Frankfurt	23=	408	129	457	244
Beijing	25	406	70	514	262
Madrid	26=	405	30	435	246
Dublin	26=	405	77	389	253
Tokyo	28	404	61	435	286
Shenzhen	29	403	29	464	273
Washington DC	30=	401	47	438	244
Milan	30=	401	43	463	248
Jersey	32=	399	40	428	268

Centre	GGFI 3	GGFI 3 Rating	Assessments		
			Numbe	Averag	St. Dev
New York	32=	399	186	444	247
Los Angeles	34	392	44	474	243
Boston	35	391	55	407	235
Guangzhou	36	386	21	443	216
Hong Kong	37	385	118	407	253
Guernsey	38	382	26	358	239
Warsaw	39=	381	22	361	198
Cape Town	39=	381	18	367	239
Malta	41	376	22	318	226
Chicago	42	374	51	363	249
Isle of Man	43=	372	33	338	221
Dubai	43=	372	73	387	291
Calgary	45	370	21	274	166
São Paulo	46=	369	26	421	251
Johannesburg	46=	369	31	356	250
Seoul	46=	369	21	412	284
Mauritius	49	368	20	383	200
Liechtenstein	50	367	18	431	290
Rome	51	357	18	356	257
Abu Dhabi	52=	346	46	364	277
Cayman Islands	52=	346	27	309	215
British Virgin Islands	54	342	25	282	230
Mexico City	55	340	31	331	214
Rio de Janeiro	56	339	23	367	272
Bangkok	57	337	23	307	198
Istanbul	58	334	17	424	273
Moscow	59	331	27	335	281
New Delhi	60	328	23	248	210
Mumbai	61	323	27	250	177
Bermuda	62	318	18	258	195
Kuala Lumpur	63	313	29	333	203

Appendix 2: Interest, Impact, And Drivers Details

Table 29 | Interesting Areas Of Green Finance

Area Of Green Finance	Number Of Mentions	Percentage Of Total Mentions
Natural Capital Valuation	72	3.0
Carbon Markets	101	4.1
Green Loans	116	4.8
Green Insurance	91	3.7
SRI Investment	130	5.3
Greentech Venture Capital	154	6.3
Carbon Disclosure	79	3.2
Climate Risk Stress Testing	105	4.3
Energy Efficient Investment	169	6.9
Disinvestment from Fossil Fuels	104	4.3
Social and Impact Investment	237	9.7
Environment, Social and Governance (ESG) Analytics	220	9.0
Green Bonds	292	12.0
Sustainable Infrastructure Finance	303	12.4
Renewable Energy Investment	267	10.9
Totals	2,440	100.0

Table 30 | Areas Of Green Finance With Most Impact On Sustainability

Area Of Green Finance	Number Of Mentions	Percentage Of Total Mentions
Natural Capital Valuation	47	2.1
Carbon Disclosure	118	5.2
Climate Risk Stress Testing	129	5.7
Green Insurance	100	4.4
Carbon Markets	85	3.8
Disinvestment from Fossil Fuels	170	7.5
Green Loans	100	4.4
SRI Investment	102	4.5
Greentech Venture Capital	115	5.1
Energy Efficient Investment	160	7.1
Environment, Social and Governance (ESG) Analytics	192	8.5
Social and Impact Investment	182	8.1
Renewable Energy Investment	254	11.3
Green Bonds	248	11.0
Sustainable Infrastructure Finance	254	11.3
Totals	2,256	100.0

Table 31 | Drivers Of Green Finance

Driver	Number Of Mentions	Percentage Of Total Mentions
Loss of Biodiversity	15	0.6
Food Security	17	0.7
Water Quality	26	1.1
Insurance Industry Research	34	1.5
Voluntary Standards	35	1.5
Air Quality	49	2.1
Academic Research	54	2.3
Industry Activism	65	2.8
Non-financial Reporting	67	2.9
Energy Efficiency	67	2.9
Finance Centre Activism	71	3.0
Renewables	73	3.1
Risk Management Frameworks	75	3.2
NGO Activism	75	3.2
Infrastructure Investment	88	3.8
Sustainability Reporting	99	4.2
Tax Incentives	113	4.8
International Initiatives	114	4.9
Mandatory Disclosure	120	5.1
Technological Change	133	5.7
Public Awareness	178	7.6
Climate Change	223	9.5
Investor Demand	239	10.2
Policy and Regulatory Frameworks	310	13.2
Totals	2,340	100.0

Appendix 3: Respondents' Details

Table 32 | Respondents By Industry Sector

Industry Sector	Number Of Respondents
Banking	78
Debt Capital Market	42
Equity Capital Markets	27
Insurance	10
Investment	80
Knowledge	118
Local Green Initiatives	17
Other	44
Policy and Public Finance	61
Professional Services	162
Trading	7
Total	646

Table 33 | Respondents By Region

Region	Number Of Respondents
Western Europe	416
Asia Pacific	65
North America	51
Middle East and Africa	35
Eastern Europe and Central Asia	43
Latin America and the Caribbean	11
Other	25
Total	646

Table 34 | Respondents By Engagement In Green Finance

a. All Respondents

Engagement In Green Finance	Number Of Respondents
Working on Green Finance (All)	342
Interested in Green Finance	260
Other/Not Given	44
Total	646

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 Green Finance	53
Working Part-time On Green Finance	92
Interested in Green Finance	83
Other/not given	22
Total	250

Table 35 | Respondents By Size Of Organisation

Size Of Organisation	Number Of Respondents
<100	329
100-500	91
500-1000	24
1000-2000	29
2000-5000	41
>5000	102
Other/not given	30
Total	646

Table 37 | Respondents By Age

Age Band	Number Of Respondents
18-30	115
30-45	210
45-60	217
60+	77
Other/not given	27
Total	646

Table 36 | Respondents By Gender

Gender	Number Of Respondents
Female	220
Male	397
Other	1
Prefer not to say/not given	28
Total	646

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 131 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 6.

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 18 in GGFI 3. 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.

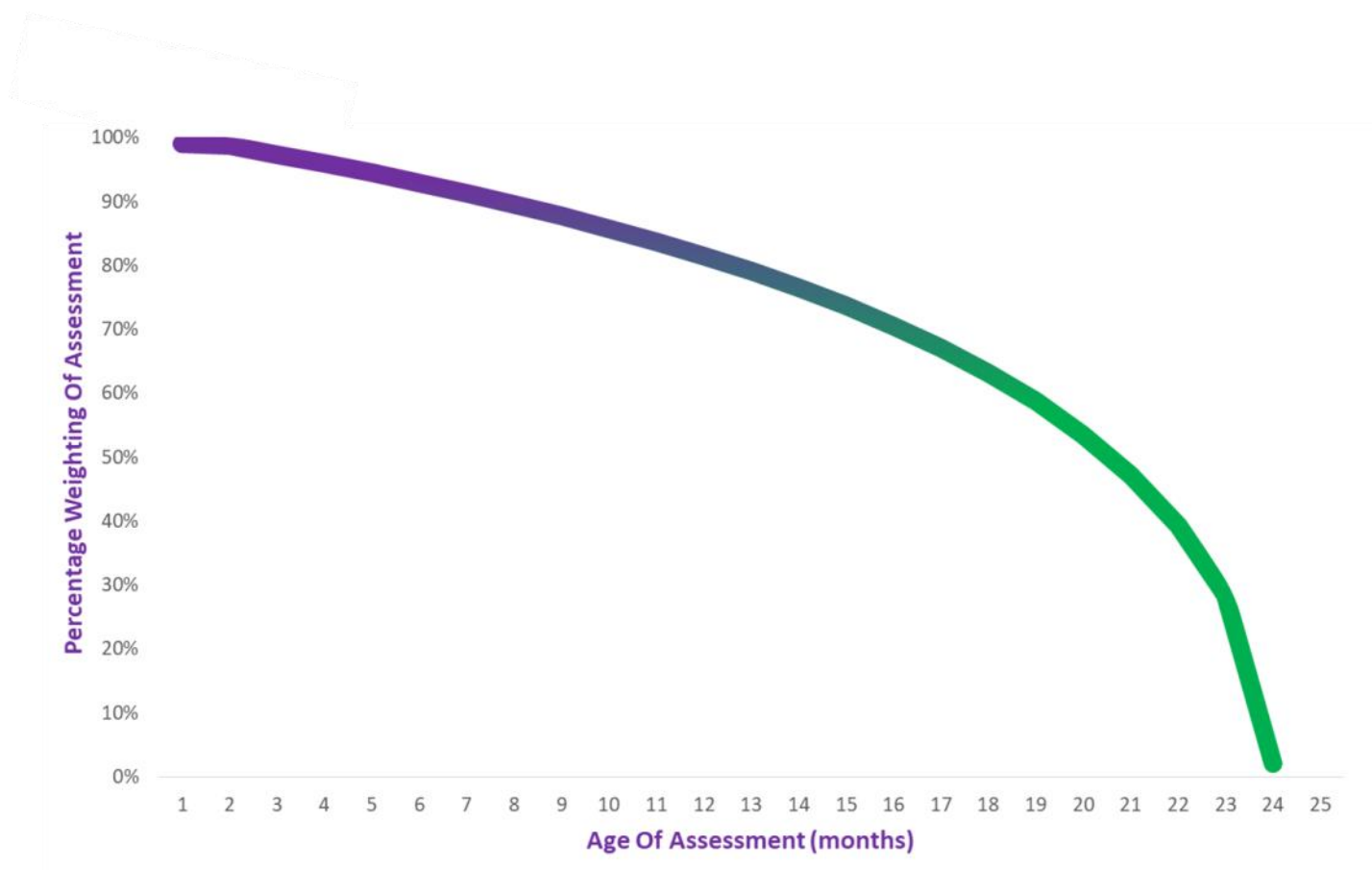
Financial Centre Assessments

Financial centre assessments are collected via an online questionnaire which will run continuously and which is at greenfinanceindex.net/survey/. 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 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 45 - this recognises that older ratings, while still valid, are less likely to be up-to-date.

Chart 45 | 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;
- 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?

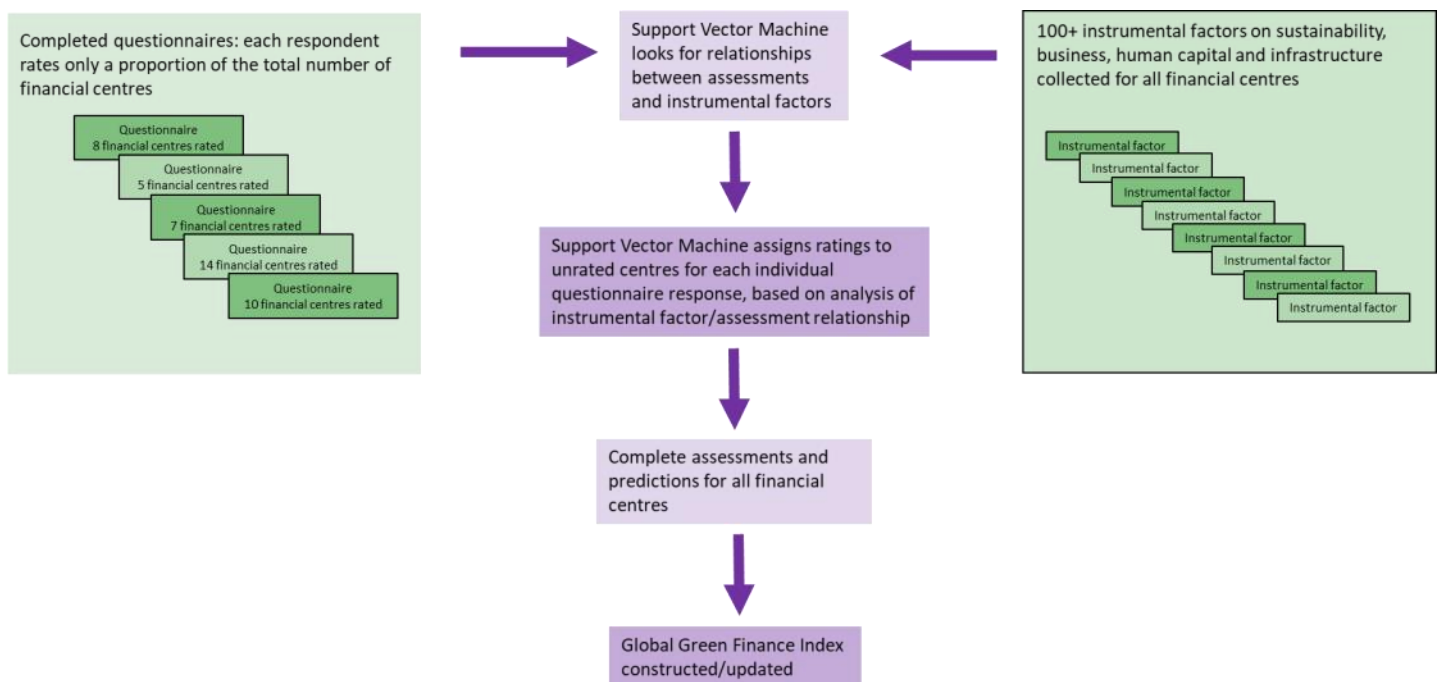
Or

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 46 below.

Chart 46 | The GGFI Process



Appendix 5: Data Annex

For GGFI 3, Finance Watch commissioned financial market data from Corporate Knights and Climate Bonds Initiative to supplement the existing Instrumental Factors. These are summarised in the tables in this annex.

General notes

Level: this denotes whether the data is supplied at city or country level. If country level, the same score will be used for all centres in that country. Country-based factors will be avoided if city level factors are available.

Provider: this refers to the organisation that collated the dataset. Underlying data sources are specified in the Instrumental Factor notes below.

Unit: Currency amounts including revenue and bond amounts are converted into US\$ purchasing power parity. Percentage rankings are calculated against other financial centres in the data series.

R squared: these numbers indicate the level of correlation between an Instrumental Factor and the GGFI rankings for depth and quality, where 1 is fully correlated and 0 is not at all correlated. A higher number suggests a greater chance that the activity described in the data could influence the perception of a financial centre's green finance depth or quality, and vice versa.

Table 38 | Sum Of GHG Emissions

Sum Of GHG Emissions	
City	Level: City Provider: CK Updated: 12 February 2019 Unit: Tonnes CO2 equivalent
Amsterdam	14,975,852
Brussels	2,692,945
Copenhagen	5,616,278
Frankfurt	193,801,183
Helsinki	33,553,129
London	196,956,321
Madrid	129,460,976
Milan	180,810,330
Moscow	447,118,797
Oslo	31,318,762
Paris	247,942,359
Stockholm	18,368,751
Vienna	13,665,478
Zurich	13,119,421
New York	683,431,998
Toronto	125,802,903
Hong Kong	118,368,801
Mumbai	51,183,774
Seoul	84,149,330
Shanghai	200,216,660
Singapore	4,197,750
Sydney	45,334,500
Tokyo	172,701,243
Johannesburg	25,452,945
Sao Paulo	128,969,346
Bangkok	66,673,408
Jakarta	32,624,796
Kuala Lumpur	7,913,904
Manila	5,998,619
Taipei	45,591,396
Mexico City	75,015,926
Istanbul	18,236,757
Tel Aviv	1,406,093
Santiago	6,749,747
<i>R Squared depth</i>	<i>0.001</i>
<i>R Squared quality</i>	<i>0.001</i>

Sum Of GHG Emissions: Notes

These data show the disclosed GHG emissions for all the large companies listed in each financial centre, providing a snapshot of where carbon emissions are being financed in equity terms (for a chart of the top ten, see figure 6 on page 46). Carbon data consists of scope 1 and scope 2 GHGs (CO2 equivalent) data in tonnes as reported publicly by publicly-listed corporations of revenue USD 1 billion or more that report both 2017 GHGs (scope 1+2) and revenue. Non-reporting companies are not included in this analysis. The GHG (2017) is summed for each stock exchange city.

The actual amount of GHG emissions that can be traced back to each listing venue is likely to be higher than in this data series because only disclosing companies are included and the data exclude Scope 3 (indirect) emissions, which are significant for fossil fuel companies. Scope 3 emissions include the carbon emitted when fossil fuel products are consumed.

Sources: “Financial Centre Carbon Intensity”, Bloomberg, CDP (via Bloomberg) and Thomson Reuters

Table 39 | Fossil-Related And Clean Revenue of Large Companies Listed In Financial Centres

City	Fossil-Related Revenue Of Large Companies Listed In Financial Centre	Clean Revenue Of Large Companies Listed In Financial Centre
	Level: City	
	Provider: CK	
	Updated: 12 February 2019	
Unit: 2017 USD PPP		
Amsterdam	312,497,197,838	47,355,312,621
Athens	16,189,917,749	2,135,728,352
Brussels	-	21,227,866,692
Copenhagen	10,004,588,221	24,085,589,802
Dublin	-	4,881,877,256
Frankfurt	74,946,323,090	162,236,563,192
Helsinki	8,755,581,040	36,482,022,888
Lisbon	27,506,456,125	6,304,013,875
London	416,707,341,699	85,681,540,827
Madrid	72,911,725,647	33,025,290,702
Milan	154,603,405,128	46,226,289,938
Moscow	949,832,497,201	3,696,778,789
Oslo	60,775,009,991	1,654,220,069
Paris	264,718,101,675	143,576,811,598
Stockholm	1,996,999,936	21,016,635,034
Vienna	28,981,752,026	6,922,495,853
Warsaw	86,698,364,197	3,324,855,765
Zurich	1,634,929	54,942,512,096
New York	1,285,980,333,433	527,621,148,530
Toronto	168,352,259,685	73,039,864,537
Hong Kong	118,857,854,330	69,637,453,256
Mumbai	1,003,951,317,581	28,607,758,331
Seoul	148,072,268,941	36,212,650,755
Shanghai	1,354,104,840,637	26,409,740,962
Singapore	24,108,340,441	15,044,589,051
Sydney	64,533,970,356	3,315,563,834
Tokyo	236,256,564,444	203,568,415,553
Wellington	3,231,723,266	1,091,701,845
Johannesburg	16,381,569,383	172,837,174
Sao Paulo	168,299,984,312	44,044,587,048
Doha	10,554,179,850	-
Bangkok	225,055,797,182	416,655,495
Jakarta	15,512,154,170	1,436,733,431
Kuala Lumpur	44,097,047,512	6,234,966,603
Manila	78,191,744,773	2,661,468,425
Taipei	26,437,751,500	56,343,542,507
Buenos Aires	23,523,766,671	-
Shenzhen	52,049,259,503	24,334,524,195
Mexico City	1,550,297,990	917,971,962
Istanbul	92,607,072,661	943,077,895
Abu Dhabi	4,597,801,477	-
Tel Aviv	8,832,461,474	4,759,675
Santiago	21,333,379,521	4,346,683,726
Nairobi	3,186,810,554	-
Casablanca	24,399,659	4,431,789
Kuwait City	4,391,582,666	840,930,911
Karachi	73,901,030,359	-
R Squared depth	0.000	0.029
R Squared quality	0.000	0.056

Fossil-Related And Clean Revenue Of Large Companies Listed In Financial Centres: Notes

These two metrics measure the 'clean' and 'dirty' (or fossil fuel-related) revenues reported by the large companies listed in a given financial centre. On average for all financial centres, dirty revenue is 4.2x higher than clean revenue, although the ratio varies by centre, for example: Stockholm has 11x more clean than dirty, Paris has nearly twice as much dirty as clean, London has 5x more dirty than clean. For a table of the ten financial centres with the highest dirty revenue in dollar terms, see figure 5 on p 45.

Fossil-related revenue is calculated as the sum of thermal coal revenues, thermal coal mining and oil & gas-related revenues for publicly-listed corporations with annual revenues of USD 1 billion and above by primary listing location.

The sum of clean revenues for publicly-listed corporations with annual revenues of USD 1 billion by primary listing is obtained by multiplying companies' 2017 revenue by the clean revenue percentage, as determined by Corporate Knights using the CK Clean Revenue Taxonomy and other methodologies. This captures revenue from all goods and services which have clear environmental and, in some cases, social benefits and includes revenue from clean transition, low-carbon economy and circular economy revenue segments.

These data show that some of the strongest performing green financial centres also have a far bigger legacy of fossil-fuel financing. Despite this, the low R squared numbers suggest that up to now this has had little impact on the perception of those financial centres as green. It also suggests that civil society's disinvestment efforts could have the highest impact if focused on certain financial centres.

Sources: "Financial centre clean to fossil-fuel related revenue", BNEF, Thomson Reuters, FactSet, CK Research, <https://www.corporateknights.com/voices/ck-staff/clean-revenue-taxonomy-definition-15422903/>

Table 40 | Financial Centre Carbon Intensity

Financial Centre Carbon Intensity	
City	Level: City
	Provider: CK
	Updated: 12 February 2019
	Unit: % Rank
Amsterdam	0.94
Brussels	0.88
Copenhagen	0.06
Frankfurt	0.82
Helsinki	0.24
London	0.62
Madrid	0.41
Milan	0.38
Oslo	0.15
Paris	0.71
Stockholm	0.65
Vienna	0.27
Zurich	1.00
New York	0.53
Toronto	0.21
Hong Kong	0.59
Mumbai	0.09
Seoul	0.91
Shanghai	0.56
Singapore	0.85
Sydney	0.50
Tokyo	0.77
Johannesburg	0.74
Sao Paulo	0.35
Bangkok	0.47
Jakarta	0.03
Kuala Lumpur	0.32
Manila	0.68
Taipei	0.30
Mexico City	0.44
Istanbul	0.80
Tel Aviv	0.97
Santiago	0.18
<i>R Squared depth</i>	<i>0.124</i>
<i>R Squared quality</i>	<i>0.096</i>

Financial Centre Carbon Intensity: Notes

An assessment of how much carbon is emitted during business operations per unit of revenue of publicly-listed corporations of revenue USD 1 billion and above that report both 2017 GHGs (scope 1+2) and revenue. The ratio between summed GHGs and summed revenues for qualifying companies on each exchange is used to produce a carbon intensity score for each stock exchange city. These are then percent ranked to produce a score between 1 for the highest ranked city in the sample and 0 for the lowest. As with GHG emissions above, this does not include Scope 3 emissions.

The data can be reversed to show the economic efficiency of carbon emissions, in terms of how much revenue is reported by companies in each financial centre for each tonne of GHG emitted. On this measure, the top five and bottom five would be:

Revenue reported (USD) per tonne CO2 equivalent

Top 5	Zurich	31,282
	Tel Aviv	24,327
	Amsterdam	22,897
	Brussels	19,997
	Singapore	11,666
Bottom 5	Oslo	2,675
	Bombay	2,544
	Santiago	2,517
	Jakarta	1,431
	Moscow	1,275

Table 41 | Financial Centre Sustainability Disclosure

Financial Centre Sustainability Disclosure	
Level: City	
Provider: CK	
Updated: 12 February 2019	
Unit: % score	
City	
Amsterdam	0.83
Athens	0.75
Brussels	0.66
Copenhagen	0.82
Dublin	0.50
Frankfurt	0.77
Helsinki	0.94
Lisbon	0.90
London	0.69
Madrid	0.89
Milan	0.78
Moscow	0.62
Oslo	0.77
Paris	0.88
Stockholm	0.85
Vienna	0.67
Warsaw	0.51
Zurich	0.81
New York	0.33
Toronto	0.66
Dubai	0.32
Hong Kong	0.46
Mumbai	0.26
Seoul	0.48
Shanghai	0.34
Singapore	0.50
Sydney	0.59
Tokyo	0.29
Wellington	0.29
Johannesburg	0.59
Sao Paulo	0.66
Doha	0.21
Bangkok	0.64
Jakarta	0.36
Kuala Lumpur	0.52
Manila	0.39
Taipei	0.40
Buenos Aires	0.25
Shenzhen	0.26
Mexico City	0.58
Istanbul	0.56
Abu Dhabi	0.51
Tel Aviv	0.31
Santiago	0.48
Nairobi	0.07
Casablanca	0.30
Kuwait City	0.27
Karachi	0.16
<i>R Squared depth</i>	<i>0.023</i>
<i>R Squared quality</i>	<i>0.039</i>

Financial Centre Sustainability Disclosure: Notes

These data measure the extent of sustainability disclosure by publicly-listed companies of revenue USD 1 billion and above across eight first generation indicators: energy, GHG emissions, water, waste, air pollutants, employee turnover, employee injury/fatalities, and total employee pay. Each financial centre's score reflects an average of the % ranked disclosure scores for each metric.

This metric reflects only whether disclosure is made, not the content of that disclosure, and it has little correlation with GGFI rankings. It makes an interesting comparison with the corporate sustainability performance measure, below, which looks at the actual content of sustainability disclosures in a broad range of areas and is more closely correlated with GGFI perception rankings.

The top scoring centres for sustainability performance all have good disclosure levels, while centres that do less well on sustainability performance only sometime have good disclosure, suggesting that good disclosure may be a pre-condition of good corporate sustainability performance. It could be interesting to look further at why some centres have low disclosure or good disclosure but poor performance.

Sources: "Financial Centre Sustainability Disclosure", Bloomberg, Thomson Reuters, CDP (via Bloomberg), FactSet, CK Research (primary data)

Table 42 | Financial Centre Corporate Sustainability Performance

Financial Centre Corporate Sustainability Performance	
City	Level: City Provider: CK Updated: 12 February 2019 Unit: % score
Amsterdam	0.31
Athens	0.23
Brussels	0.25
Copenhagen	0.42
Dublin	0.28
Frankfurt	0.41
Helsinki	0.53
Lisbon	0.26
London	0.29
Madrid	0.30
Milan	0.25
Moscow	0.13
Oslo	0.27
Paris	0.39
Stockholm	0.35
Vienna	0.17
Warsaw	0.25
Zurich	0.28
New York	0.20
Toronto	0.36
Dubai	0.10
Hong Kong	0.23
Mumbai	0.11
Seoul	0.26
Shanghai	0.17
Singapore	0.20
Sydney	0.29
Tokyo	0.25
Wellington	0.14
Johannesburg	0.18
Sao Paulo	0.29
Doha	0.23

Financial Centre Corporate Sustainability Performance Continued...	
City	Level: City Provider: CK Updated: 12 February 2019 Unit: % score
Bangkok	0.18
Jakarta	0.15
Kuala Lumpur	0.20
Manila	0.13
Taipei	0.19
Buenos Aires	0.08
Shenzhen	0.19
Mexico City	0.14
Istanbul	0.11
Abu Dhabi	0.18
Tel Aviv	0.14
Santiago	0.06
Nairobi	0.14
Casablanca	0.13
Kuwait City	0.17
Karachi	0.02
<i>R Squared depth</i>	<i>0.384</i>
<i>R Squared quality</i>	<i>0.453</i>

Financial Centre Corporate Sustainability Performance: Notes

This measure tracks the content of disclosures including those above. It is a blended score of the sustainability performance of the companies that are publicly-listed in a given financial centre, following the CK Global 100 sustainability ranking methodology. The model tracks 21 performance metrics, with a 50% weighting given to clean revenue and the rest shared between the other metrics, including energy and carbon productivities, waste and water productivities, percentage tax paid, CEO-average worker pay ratio, and female representation on board of directors, among others, resulting in a % CK score for each company. The scores are then weighted for each company based on its 2017 revenue as a share of total revenue for the companies in that financial centre and summed to give a % score for the financial centre as a whole.

The measure tends to favour smaller centres with large companies that perform well on sustainability metrics in relation to industry peers, especially on clean revenue. For example, in the highest scoring centre, Helsinki, the largest three companies Nokia, Nordea, and Neste account for a third of total revenue and received an average CK score of 70%, reflecting that each company performs well on sustainability measures relative to its industry peers. A similar effect can be seen with Copenhagen, Stockholm and Amsterdam, which all performed well in the GGFI. Among larger, more diverse centres, Frankfurt, Paris, Toronto also stood out. It is important to note that this measure tracks relative, not absolute, performance.

This composite measure had the highest correlation with GGFI rankings from all the Instrumental Factors in this group, with an R squared of 0.38 for depth and 0.45 for quality. Given the high weighting for clean revenue, it could be that the amount of clean revenue reported in a financial centre has some bearing on perceptions of a centre's green finance performance.

Sources: "Financial centre corporate sustainability performance", for further details see <https://www.corporateknights.com/reports/2019-global-100/2019-global-100-methodology-15353681/>

Table 43 | Financial Centres Green Alignment - Regulators And Stock Exchanges/Non-Regulatory Actors

City	Financial Centres Green Alignment - Regulators And Stock Exchanges	Financial Centres Green Alignment - Non-Regulatory Actors	City	Financial Centres Green Alignment - Regulators And Stock Exchanges Continued...	Financial Centres Green Alignment - Non-Regulatory Actors Continued...
	Level: Country Provider: CK	Level: Country Provider: CK		Level: Country Provider: CK	Level: Country Provider: CK
	Updated: 12 Unit: % rank	Updated: 12 Unit: % rank		Updated: 12 February 2019 Unit: % rank	Updated: 12 February 2019 Unit: % rank
Amsterdam	0.63	0.82	Jakarta	0.67	0.82
Brussels	0.17	0.15	Kuala Lumpur	0.46	0.55
Copenhagen	0.18	0.15	Manila	0.40	0.82
Edinburgh	0.66	0.55	Rio de Janeiro	0.29	0.82
Frankfurt	0.18	0.42	Shenzhen	0.47	1.00
Geneva	0.26	0.15	Mexico City	0.26	0.15
Helsinki	0.22	0.15	Istanbul	0.22	-
London	0.66	0.55	Calgary	0.29	0.55
Milan	0.38	0.15	Tianjin	0.47	1.00
Moscow	0.09	-	New Delhi	0.29	0.55
Oslo	0.18	0.42	Santiago	0.34	0.42
Paris	0.47	0.97	Busan	-	0.15
Rome	0.38	0.15	Guangzhou	0.47	1.00
Stockholm	0.46	0.55	Los Angeles	0.13	0.55
Zurich	0.26	0.15	Dalian	0.47	1.00
Boston	0.13	0.55	Qingdao	0.47	1.00
Chicago	0.13	0.55	Cape Town	0.51	0.15
Montreal	0.29	0.55	Hamburg	0.18	0.42
New York	0.13	0.55	Gujarat	0.29	0.55
San Francisco	0.13	0.55	Hangzhou	0.47	1.00
Toronto	0.29	0.55	Chengdu	0.47	1.00
Vancouver	0.29	0.55	Stuttgart	0.18	0.42
Washington DC	0.13	0.55	San Diego	0.13	0.55
Beijing	0.47	1.00	<i>R Squared depth</i>	<i>0.010</i>	<i>0.015</i>
Hong Kong	0.21	0.42	<i>R Squared quality</i>	<i>0.001</i>	<i>0.005</i>
Melbourne	0.38	0.55			
Mumbai	0.29	0.55			
Seoul	-	0.15			
Shanghai	0.47	1.00			
Singapore	0.60	0.82			
Sydney	0.38	0.55			
Tokyo	0.25	0.55			
Johannesburg	0.51	0.15			
Sao Paulo	0.29	0.82			
Osaka	0.25	0.55			
Munich	0.18	0.42			
Glasgow	0.66	0.55			
St Petersburg	0.09	-			
Bangkok	0.53	0.55			

Financial Centres Green Alignment - Regulators And Stock Exchanges/Financial Centres Green Alignment - Non-Regulatory Actors: Notes

These two metrics look at the mandates and leadership of regulators and policymakers in each centre, such as central banks and regulators for banking, insurance, pension and securities markets. The dataset includes an analysis of whether regulators' mandates give them responsibility to act on sustainable development, climate, environment, or low-carbon activities, and whether their actions target transformative change or only minor adjustments, in areas including disclosure, fiduciary responsibilities, sustainable taxonomy, labelling, climate stress-testing, green bond standards, and beneficiaries' sustainability preferences. Financial centres are scored in each area, their scores added and then % ranked against other financial centres.

The measure does not account for the impact of each policy area or the size of the market. Data are provided at country level and therefore entered for each financial centre in that country. The centres that did best on this assessment were in Brazil, China, France, Indonesia, Netherlands, Singapore, Thailand, and the United Kingdom. The centres that did worst - sometimes exhibiting no mandate or leadership signals at all - included those in Israel, Poland, Russia, South Korea, Spain, Turkey, and the United States.

The R squared numbers show surprisingly little correlation with perception rankings. This could indicate a deeper interplay between instrumental factors, for example if policy leadership in centres that did poorly in the GGFI is undermined by perceptions of ineffective implementation, conflicting political goals (on energy prices for example), a lack of visibility around policy and regulatory leadership, or the impact on perception of other climate or socio-economic factors.

Sources: "Financial system signals", CK Research

Table 44 | Sustainable Stock Exchanges (Y/N)

Sustainable Stock Exchanges (Y/N)	
City	Level: City Provider: UN SSE Initiative Updated: 7 January 2019 Unit: Y/N
Amsterdam	Y
Athens	Y
Brussels	Y
Copenhagen	Y
Frankfurt	Y
Helsinki	Y
Lisbon	Y
London	Y
Luxembourg	Y
Madrid	Y
Milan	Y
Oslo	Y
Paris	Y
Stockholm	Y
Warsaw	Y
New York	Y
Toronto	Y
Dubai	Y
Hong Kong	Y
Melbourne	Y
Mumbai	Y
Seoul	Y
Shanghai	Y
Singapore	Y
Sydney	Y
Tokyo	Y
Wellington	Y
Johannesburg	Y
Sao Paulo	Y
Doha	Y
Tallinn	Y
Bangkok	Y
Kuala Lumpur	Y
Rio de Janeiro	Y
Buenos Aires	Y
Mauritius	Y
Shenzhen	Y
Mexico City	Y
Istanbul	Y
Riyadh	Y
Reykjavik	Y
Panama	Y
Almaty	Y
Riga	Y
New Delhi	Y
Santiago	Y
Nairobi	Y
Casablanca	Y
Kuwait City	Y
Astana	Y
<i>R Squared depth</i>	<i>0.027</i>
<i>R Squared quality</i>	<i>0.030</i>

Sustainable Stock Exchanges: Notes

A list indicating which GGFI financial centres hosts one of the 95 venues included in the UN Sustainable Stock Exchange Initiative. The list is included in this annex for comparison with the list of Stock Exchanges with a Green Bond Segment.

Source: SSE Initiative

Table 45 | Stock Exchanges With A Green Bond Segment

Stock Exchanges With A Green Bond Segment	
City	Level: City Provider: CBI Updated: 10 July 2018 Unit: Y/N
Helsinki	Y
London	Y
Luxembourg	Y
Milan	Y
Oslo	Y
Stockholm	Y
Vienna	Y
Shanghai	Y
Tokyo	Y
Johannesburg	Y
Taipei	Y
Mexico City	Y
Santiago	Y
<i>R Squared depth</i>	<i>0.041</i>
<i>R Squared quality</i>	<i>0.072</i>

Stock Exchanges With A Green Bond Segment: Notes

A list indicating of whether financial centres hosting a stock exchange with a green bond segment. Apart from Taipei and Vienna, all the exchanges with green bond segments are also UN Sustainable Stock Exchanges.

Source: Climate Bonds Initiative

Table 46 | GRESB Green Real Estate And Infrastructure Investment Score

GRESB Green Real Estate And Infrastructure Investment Score	
Level: Country	
Provider: CK	
Updated: 12 February 2019	
Unit: % rank	
City	
Amsterdam	0.58
Athens	0.45
Brussels	0.29
Copenhagen	0.90
Dublin	0.26
Frankfurt	0.97
Helsinki	0.19
Lisbon	0.06
London	0.48
Madrid	0.94
Milan	0.71
Moscow	0.03
Oslo	0.52
Paris	0.42
Stockholm	0.77
Vienna	0.23
Warsaw	0.13
New York	0.32
Toronto	0.10
Hong Kong	0.65
Seoul	0.39
Shanghai	0.55
Singapore	0.87
Sydney	0.81
Tokyo	0.35
Wellington	0.74
Johannesburg	0.61
Sao Paulo	0.16
Bangkok	0.68
Kuala Lumpur	1.00
<i>R Squared depth</i>	<i>0.071</i>
<i>R Squared quality</i>	<i>0.013</i>

GRESB Green Real Estate And Infrastructure Investment Score: Notes

A per-city assessment of the energy intensities of real estate assets owned or managed by GRESB members for which energy consumption was reported to GRESB's database. A score for each city is calculated based on the energy intensity in kWh/m² of the relevant assets within the city's administrative boundary. Cities are % ranked.

Source: "Buildings Intensity Score", GRESB

Table 47 | Labelled Green Bonds Outstanding By Country Of Issuer

Labelled Green Bonds Outstanding By Country Of Issuer	
City	Level: Country Provider: CBI Updated: 12 February 2019 Unit: USD
Amsterdam	20,818,868,477
Brussels	6,303,488,000
Copenhagen	3,437,675,000
Dublin	3,469,892,000
Frankfurt	31,360,267,004
Geneva	1,065,805,972
Helsinki	1,357,238,500
Lisbon	695,100,000
London	7,279,015,248
Luxembourg	1,265,585,000
Madrid	15,630,119,401
Milan	7,340,425,867
Oslo	5,942,619,558
Paris	55,050,198,897
Rome	7,340,425,867
Stockholm	16,745,486,356
Vienna	1,698,012,900
Warsaw	2,177,300,000
Zurich	1,065,805,972
Boston	111,166,862,177
Chicago	111,166,862,177
Montreal	10,345,798,725
New York	111,166,862,177
San Francisco	111,166,862,177
Toronto	10,345,798,725
Vancouver	10,345,798,725
Washington DC	111,166,862,177
Beijing	76,074,414,963
Dubai	587,000,000
Hong Kong	3,900,956,000
Melbourne	8,583,210,120
Mumbai	7,175,888,420
Seoul	3,327,028,904
Shanghai	76,074,414,963
Singapore	1,763,088,073
Sydney	8,583,210,120
Tokyo	9,338,503,199
Wellington	1,359,076,400
Johannesburg	975,950,160
Sao Paulo	4,367,046,369
Osaka	9,338,503,199
Munich	31,360,267,004
Glasgow	7,279,015,248
Tallinn	55,755,000
Bangkok	213,000,000
Jakarta	1,975,000,000
Kuala Lumpur	978,650,117

Labelled Green Bonds Outstanding By Country Of Issuer Continued...	
City	Level: Country Provider: CBI Updated: 12 February 2019 Unit: USD
Manila	225,737,900
Taipei	942,206,480
Rio de Janeiro	4,367,046,369
Buenos Aires	510,000,000
Shenzhen	76,074,414,963
Mexico City	1,025,700,000
Reykjavik	233,210,000
Abu Dhabi	587,000,000
Calgary	10,345,798,725
Riga	137,069,500
Tianjin	76,074,414,963
New Delhi	7,175,888,420
Santiago	566,791,100
Busan	3,327,028,904
Guangzhou	76,074,414,963
Casablanca	355,831,000
Dalian	76,074,414,963
Qingdao	76,074,414,963
Cape Town	975,950,160
Hamburg	31,360,267,004
Gujarat	7,175,888,420
Hangzhou	76,074,414,963
Chengdu	76,074,414,963
Stuttgart	31,360,267,004
San Diego	111,166,862,177
<i>R Squared depth</i>	<i>0.005</i>
<i>R Squared quality</i>	<i>0.000</i>

Labelled Green Bonds Outstanding By Country Of Issuer: Notes

The US dollar amount of labelled green bonds outstanding to 31 December 2018, by country of risk, meaning the country of issuer or the country of collateral if the bond is secured. The data are provided at country level and therefore the same score is entered for each financial centre in that country, which will overstate the issuance for some financial centres.

Source: "CBI - Country of risk_Climate aligned & Labelled green bonds", CBI

Table 48 | Labelled Green Bonds Outstanding By Listing Location

Labelled Green Bonds Outstanding By Listing Location	
Level: City	
Provider: CBI	
Updated: 12 February 2019	
City	Unit: USD
Amsterdam	5,993,241,783
Brussels	3,394,517,756
Copenhagen	58,330,000
Dublin	8,538,431,938
Frankfurt	40,188,754,659
London	25,048,708,098
Luxembourg	70,129,991,747
Madrid	340,560,000
Milan	14,083,788,913
Oslo	2,139,674,415
Paris	29,012,555,647
Stockholm	8,784,933,423
Vienna	1,186,106,233
Zurich	9,067,768,604
New York	5,935,418,750
Dubai	625,000,000
Hong Kong	6,749,894,727
Mumbai	540,170,520
Seoul	276,913,704
Shanghai	8,096,227,838
Singapore	11,213,397,367
Sydney	843,256,667
Tokyo	379,120,000
Wellington	492,405,400
Jersey	204,000,000
Johannesburg	371,377,528
Sao Paulo	183,655,122
Munich	4,275,432,541
Jakarta	50,000,000
Taipei	1,478,886,480
Buenos Aires	236,666,667
Shenzhen	636,830,651
Mexico City	447,080,000
Reykjavik	33,210,000
Riga	137,069,500
Hamburg	185,993,930
Stuttgart	22,671,774,475
<i>R Squared depth</i>	<i>0.135</i>
<i>R Squared quality</i>	<i>0.114</i>

Labelled Green Bonds Outstanding By Listing Location: Notes

The US dollar amount of labelled green bonds outstanding to 31 December 2018, by listing location. Green bonds identified only as listed on EURONEXT are allocated to Amsterdam, Brussels, Lisbon, London and in proportion to the volume of individual green bond issuance on each venue. A similar split is applied to green bonds identified as All German SE, which are allocated between Berlin, Dusseldorf, Frankfurt, Hamburg, Munich, and Stuttgart in proportion to each venue's individual bond issuance. The data exclude green bonds listed on digital platforms ExtraMOT and MarketAxess, over-the-counter bonds, China FX and China Interbank bonds, and bonds for which information is not available.

The R squared numbers suggest that listing location may have slightly more impact on perception of green finance quality and depth than country of issuer.

Source: "CBI - Stock Exchange", CBI

Table 49 | Total Number Of Labelled Green Bonds By Listing Location

Total Number Of Labelled Green Bonds By Listing Location	
City	Unit: Number of Deals
Amsterdam	18
Brussels	2
Copenhagen	1
Dublin	27
Frankfurt	194
London	102
Luxembourg	334
Madrid	1
Milan	62
Oslo	21
Paris	52
Stockholm	125
Vienna	5
Zurich	71
New York	19
Dubai	1
Hong Kong	23
Mumbai	9
Seoul	1
Shanghai	47
Singapore	38
Sydney	5
Tokyo	2
Wellington	4
Jersey	1
Johannesburg	4
Sao Paulo	5
Munich	22
Jakarta	1
Taipei	15
Buenos Aires	4
Shenzhen	7
Mexico City	4
Reykjavik	1
Riga	3
Hamburg	1
Stuttgart	111
<i>R Squared depth</i>	<i>0.138</i>
<i>R Squared quality</i>	<i>0.103</i>

Total Number Of Labelled Green Bonds By Listing Location: Notes

This records the number of labelled green bond deals outstanding in each financial centre to 31 December 2018, according to listing venue, regardless of size.

Source: "CBI - Stock Exchange", CBI

Table 50 | Ratio Labelled Green Bonds To Total Debt Securities Outstanding By Issuer Location

Ratio Labelled Green Bonds To Total Debt Securities By Issuer Location	
City	Unit %
Level: Country Provider: CBI/CK Updated: 12 February 2019	
Amsterdam	1.0%
Brussels	0.9%
Copenhagen	0.4%
Dublin	0.4%
Edinburgh	0.1%
Frankfurt	0.9%
Geneva	0.2%
Helsinki	0.5%
Lisbon	0.2%
London	0.1%
Luxembourg	0.1%
Madrid	0.8%
Milan	0.2%
Oslo	1.3%
Paris	1.2%
Rome	0.2%
Stockholm	2.2%
Vienna	0.3%
Warsaw	0.7%
Zurich	0.2%
Boston	0.3%
Chicago	0.3%
Montreal	0.4%
New York	0.3%
San Francisco	0.3%
Toronto	0.4%
Vancouver	0.4%
Washington DC	0.3%
Beijing	0.6%
Dubai	0.4%
Hong Kong	0.8%
Melbourne	0.4%
Mumbai	0.8%
Seoul	1.8%
Shanghai	0.6%
Singapore	0.4%
Sydney	0.4%
Tokyo	0.1%
Wellington	1.7%
Johannesburg	0.4%
Sao Paulo	0.2%
Osaka	0.1%
Munich	0.9%
Glasgow	0.1%
Tallinn	1.9%
Bangkok	0.1%
Jakarta	0.6%
Kuala Lumpur	0.3%
Manila	0.2%
Taipei	0.2%
Rio de Janeiro	0.2%

Ratio Labelled Green Bonds To Total Debt Securities By Issuer Location	
Continued...	
City	Unit %
Level: Country Provider: CBI/CK Updated: 12 February 2019	
Buenos Aires	0.4%
Shenzhen	0.6%
Mexico City	0.1%
Reykjavik	0.6%
Abu Dhabi	0.4%
Calgary	0.4%
Riga	1.2%
Tianjin	0.6%
New Delhi	0.8%
Santiago	0.2%
Busan	1.8%
Guangzhou	0.6%
Casablanca	5.1%
Los Angeles	0.3%
Dalian	0.6%
Qingdao	0.6%
Cape Town	0.4%
Hamburg	0.9%
Gujarat	0.8%
Hangzhou	0.6%
Chengdu	0.6%
Stuttgart	0.9%
San Diego	0.3%
<i>R Squared depth</i>	<i>0.096</i>
<i>R Squared quality</i>	<i>0.057</i>

Ratio Labelled Green Bonds To Total Debt Securities By Issuer Location: Notes

This is the ratio of labelled green bonds outstanding as of 31 December 2018 as measured by country of risk, i.e. the issuer's location or the location of the collateral if secured, versus the total debt securities outstanding by residence and sector of issuer as at 30 Jun 2018, both in USD. On average, 0.45% of total debt securities outstanding were labelled as green bonds. The proportion of a centre's debt securities labelled as green bonds has a slightly higher correlation with GGFI green finance perception than the same data for climate-aligned bonds.

Source: "Financial Centre Green and Climate-aligned Bonds score", CBI data processed by CK Research, BIS

Table 51 | Labelled Green Bonds By Listing Location: % Certified Climate Bond, % Externally Reviewed (Excluding CCB), % Not-Externally-Reviewed

	Labelled Green Bonds By Listing Location % Certified Climate Bond	Labelled Green Bonds By Listing Location % Externally Reviewed (excl CCB)	Labelled Green Bonds By Listing Location % Not-Externally-Reviewed
City	Level: City Provider: CBI Updated: 12 February 2019 Unit: %		
Amsterdam	37.6%	59.1%	3.4%
Brussels	17.1%	82.9%	-
Copenhagen	-	100.0%	-
Dublin	-	100.0%	-
Frankfurt	8.7%	78.7%	12.6%
London	16.2%	80.2%	3.5%
Luxembourg	6.1%	90.5%	3.4%
Madrid	-	100.0%	-
Milan	-	98.1%	1.9%
Oslo	-	100.0%	-
Paris	18.6%	78.5%	2.9%
Stockholm	-	100.0%	-
Vienna	-	100.0%	-
Zurich	3.0%	92.7%	4.3%
New York	-	16.2%	83.8%
Dubai	-	100.0%	-
Hong Kong	25.9%	63.7%	10.4%
Melbourne	-	-	-
Mumbai	28.1%	19.1%	52.8%
Seoul	-	100.0%	-
Shanghai	-	71.5%	28.5%
Singapore	22.3%	66.1%	11.6%
Sydney	69.5%	30.5%	-
Tokyo	-	100.0%	-
Wellington	100.0%	-	-
Jersey	-	-	100.0%
Johannesburg	20.8%	42.5%	36.7%
Sao Paulo	100.0%	-	-
Munich	12.1%	85.1%	2.9%
Jakarta	-	100.0%	-
Taipei	-	71.7%	28.3%
Buenos Aires	-	100.0%	-
Shenzhen	-	53.9%	46.1%
Mexico City	-	100.0%	-
Reykjavik	-	100.0%	-
Riga	-	100.0%	-
Hamburg	50.1%	47.0%	2.9%
Stuttgart	21.5%	73.0%	5.5%
<i>R Squared depth</i>	<i>0.023</i>	<i>0.017</i>	<i>0.038</i>
<i>R Squared quality</i>	<i>0.006</i>	<i>0.010</i>	<i>0.048</i>

Labelled Green Bonds By Listing Location % Certified Climate Bond**Labelled Green Bonds By Listing Location % Externally Reviewed (excl Certified Climate Bond)****Labelled Green Bonds By Location % Not-Externally-Reviewed:****Notes**

These three data series look at how labelled green bonds are certified. It shows the proportion of the total labelled green bonds outstanding to 31 December 2018 by listing location that is either certified by the Climate Bonds Initiative (Certified Climate Bond), otherwise externally reviewed (for example, by a ratings agency), or not externally reviewed at all. The low R Squared numbers suggest that certification has less impact on green finance perception than the number and size of green bonds listed in a financial centre.

Source: "CBI - Stock Exchange", CBI

Table 52 | Climate-Aligned Bonds Outstanding By Country Of Issuer

Climate-Aligned Bonds Outstanding By Country Of Issuer	
City	Level: Country Provider: CBI Updated: 12 February 2019 Unit: USD
Brussels	2,307,305,550
Copenhagen	6,240,859,596
Frankfurt	25,549,064,325
Geneva	15,673,568,307
Helsinki	7,651,113,406
Lisbon	3,353,511,009
London	92,373,559,033
Luxembourg	280,950,000
Madrid	5,001,786,752
Milan	6,001,779,636
Moscow	26,970,235,766
Oslo	12,198,441,350
Paris	131,636,405,994
Prague	1,193,196,400
Rome	6,001,779,636
Stockholm	5,585,194,533
Vienna	20,995,108,388
Warsaw	48,659,280
Zurich	15,673,568,307
Boston	98,554,572,599
Chicago	98,554,572,599
Montreal	34,370,604,617
New York	98,554,572,599
San Francisco	98,554,572,599
Toronto	34,370,604,617
Vancouver	34,370,604,617
Washington DC	98,554,572,599
Beijing	224,032,327,434
Hong Kong	4,220,060,712
Melbourne	2,857,952,500
Mumbai	22,918,956,634
Seoul	24,823,877,750
Shanghai	224,032,327,434
Singapore	819,125,177
Sydney	2,857,952,500
Tokyo	11,940,457,440
Wellington	985,441,000
Johannesburg	179,245,073
Sao Paulo	7,141,656,993
Osaka	11,940,457,440
Munich	25,549,064,325
Glasgow	92,373,559,033
St Petersburg	26,970,235,766
Bangkok	3,371,964,746
Jakarta	470,378,975
Kuala Lumpur	5,176,932,625
Manila	404,565,000
Taipei	372,348,642
Rio de Janeiro	7,141,656,993
Buenos Aires	70,933,182
Shenzhen	224,032,327,434
Mexico City	248,920,441
Reykjavik	527,033,300
Calgary	34,370,604,617
Tel Aviv	95,812,597
Almaty	1,137,477,000

Climate-Aligned Bonds Outstanding By Country Of Issuer Continued...	
City	Level: Country Provider: CBI Updated: 12 February 2019 Unit: USD
Tianjin	224,032,327,434
New Delhi	22,918,956,634
Santiago	394,961,451
Busan	24,823,877,750
Guangzhou	224,032,327,434
Nairobi	29,925,000
Sofia	12,760,250
Casablanca	138,237,596
Dalian	224,032,327,434
Qingdao	224,032,327,434
Cape Town	179,245,073
Hamburg	25,549,064,325
Gujarat	22,918,956,634
Hangzhou	224,032,327,434
Chengdu	224,032,327,434
Astana	1,137,477,000
Stuttgart	25,549,064,325
San Diego	98,554,572,599
<i>R Squared depth</i>	<i>0.026</i>
<i>R Squared quality</i>	<i>0.000</i>

Climate-Aligned Bonds Outstanding by Country of Issuer: Notes

This measures the US dollar amount of climate-aligned bonds (strongly aligned and fully aligned) outstanding to 30 June 2018, by country of risk, meaning the country of issuer or the country of collateral if the bond is secured. Climate-aligned bonds are defined by CBI as bonds from issuers that derive > 95% (fully-aligned) or 75-95% (strongly-aligned) of their revenues from 'green' business lines: low carbon transport, clean energy, sustainable water and wastewater management, low carbon buildings and built environment, sustainable forestry and agriculture, as well as waste management and recycling. To avoid double counting, labelled green bonds issued by climate-aligned issuers are excluded from this data and are counted under labelled green bonds, above. The data are provided at country level and therefore the same score is entered for each financial centre in that country, which will overstate the issuance for some financial centres.

Source: "CBI - Country of risk_Climate aligned & Labelled green bonds", CBI

Table 53 | Ratio Climate-Aligned Bonds To Total Debt Securities By Issuer Location

Ratio Climate-Aligned Bonds To Total Debt Securities By Issuer Location	
Level: Country	
Provider: CBI/CK	
Updated: 12 February 2019	
City	Unit: %
Brussels	0.3%
Copenhagen	0.8%
Edinburgh	1.6%
Frankfurt	0.7%
Geneva	3.5%
Helsinki	2.6%
Lisbon	1.1%
London	1.6%
Luxembourg	0.0%
Madrid	0.3%
Milan	0.2%
Moscow	5.6%
Oslo	2.7%
Paris	2.9%
Prague	0.5%
Rome	0.2%
Stockholm	0.7%
Vienna	4.1%
Warsaw	0.0%
Zurich	3.5%
Boston	0.2%
Chicago	0.2%
Montreal	1.5%
New York	0.2%
San Francisco	0.2%
Toronto	1.5%
Vancouver	1.5%
Washington DC	0.2%
Beijing	1.8%
Hong Kong	0.9%
Melbourne	0.1%
Mumbai	2.6%
Seoul	13.1%
Shanghai	1.8%
Singapore	0.2%
Sydney	0.1%
Tokyo	0.1%
Wellington	1.2%
Johannesburg	0.1%
Sao Paulo	0.3%
Osaka	0.1%
Munich	0.7%
Glasgow	1.6%
St Petersburg	5.6%
Bangkok	0.9%
Jakarta	0.1%
Kuala Lumpur	1.3%
Manila	0.3%
Taipei	0.1%
Rio de Janeiro	0.3%
Buenos Aires	0.1%
Shenzhen	1.8%
Mexico City	0.0%
Reykjavik	1.4%
Calgary	1.5%
Tel Aviv	0.3%

Ratio Climate-Aligned Bonds To Total Debt Securities By Issuer Location	
Continued...	
Level: Country	
Provider: CBI/CK	
Updated: 12 February 2019	
City	Unit: %
Almaty	3.9%
Tianjin	1.8%
New Delhi	2.6%
Santiago	0.2%
Busan	13.1%
Guangzhou	1.8%
Nairobi	0.6%
Sofia	0.1%
Casablanca	2.0%
Los Angeles	0.2%
Dalian	1.8%
Qingdao	1.8%
Cape Town	0.1%
Hamburg	0.7%
Gujarat	2.6%
Hangzhou	1.8%
Chengdu	1.8%
Astana	3.9%
Stuttgart	0.7%
San Diego	0.2%
<i>R Squared depth</i>	<i>0.000</i>
<i>R Squared quality</i>	<i>0.008</i>

Ratio Climate-Aligned Bonds To Total Debt Securities By Issuer Location: Notes

This is the ratio of climate-aligned bonds (both fully and strongly aligned) outstanding as of 30 June 2018 as measured by country of risk i.e. the issuer's location or the location of the collateral if secured, versus the total debt securities outstanding by residence and sector of issuer as at 30 Jun 2018, both in USD. On average, 0.76% of total debt securities outstanding were classed as climate-aligned bonds.

Source: "Financial Centre Green and Climate-aligned Bonds score", CBI data processed by CK Research, BIS

Appendix 6: Instrumental Factors

Table 54 | Sustainability Instrumental Factor Correlation With Depth Ratings - Highest 15 Factors

Instrumental Factors	R-squared
Water Quality	0.465
Quality of Living City Rankings	0.460
Sustainable Cities Index	0.447
IESE Cities In Motion Index	0.405
Global Sustainable Competitiveness Index	0.401
Environmental Performance Index	0.390
Financial Centre Corporate Sustainability Performance	0.384
Sustainable Economic Development	0.351
Quality Of Life Index	0.322
Energy Sustainability Index	0.282
Shares Of Wind And Solar In Electricity Production	0.246
Air Quality Data	0.216
Share Of Renewables In Electricity Production	0.156
Total Number Of Labelled Green Bonds Issued To December 2018	0.138
Total Issuance Of Labelled green Bonds To December 2018, USDm	0.135

Table 55 | Sustainability Instrumental Factor Correlation With Quality Ratings - Highest 15 Factors

Instrumental Factors	R-squared
Quality Of Living City Rankings	0.592
Sustainable Cities Index	0.566
Environmental Performance Index	0.506
IESE Cities In Motion Index	0.503
Sustainable Economic Development	0.494
Water Quality	0.472
Financial Centre Corporate Sustainability Performance	0.453
Quality Of Life Index	0.417
Global Sustainable Competitiveness Index	0.406
Energy Sustainability Index	0.376
Shares of Wind And Solar In Electricity Production	0.313
Air Quality Data	0.254
City Commitment To Carbon Reduction (Cooperative Action)	0.147
Buildings Energy Efficiency Policies Database (Y/N)	0.117
Total Issuance Of Labelled Green Bonds To December 2018, USDm	0.114

Table 56 | Sustainability Factors

Instrumental Factor	Source	Website	Updated
Air Quality Data	WHO	http://www.who.int/airpollution/data/cities/en/	N
Average Precipitation In Depth (mm Per Year)	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	N
Buildings Energy Efficiency Policies Database (Y/N)	IEA	https://www.iea.org/beep/	Y
Certified Climate Bonds Issued To December 2018, % Of Centre Total	CBI	https://www.finance-watch.org/publication/global-green-finance-index-3/	Y
City Commitment To Carbon Reduction (Cooperative Action)	UNFCCC	http://climateaction.unfccc.int/views/stakeholders.html?type=cities	Y
City Commitment To Carbon Reduction (Individual Action)	UNFCCC	http://climateaction.unfccc.int/views/stakeholders.html?type=cities	Y
Climate-Aligned Bonds Outstanding by Country Of Issuer	CBI	https://www.finance-watch.org/publication/global-green-finance-index-3/	Y
CO2 Emissions Per Capita	World Bank	https://data.worldbank.org/indicator/EN.ATM.CO2E.PC	N
Energy Intensity Of GDP	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	Y
Energy Sustainability Index	World Energy Council	https://trilemma.worldenergy.org/	Y
Environmental Performance Index	Yale University	https://epi.envirocenter.yale.edu/epi-topline	N
Externally-Reviewed (excl CCB) Labelled Green Bonds Issued To December 2018, % of centre total	CBI	https://www.finance-watch.org/publication/global-green-finance-index-3/	Y
Financial Centre Carbon Intensity	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	Y
Financial Centre Clean To Fossil-Fuel Related Revenue (Clean Revenue)	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	New
Financial Centre Clean To Fossil-Fuel Related Revenue (Dirty Revenue)	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	New
Financial Centre Corporate Sustainability Performance	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	New
Financial Centre Sustainability Disclosure	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	Y
Financial Centres Green Alignment - Non-Regulatory Actors	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	New
Financial Centres Green Alignment - Regulators And Stock Exchanges	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	New
Forestry Area	World Bank	http://databank.worldbank.org/data/reports.aspx?source=2&series=AG.LND.FRST.ZS&country=	N
Global Sustainable Competitiveness Index	Solability	http://solability.com/the-global-sustainable-competitiveness-index/the-index	N
GRESB Green Real Estate And Infrastructure Investment Score	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	Y
IESE Cities In Motion Index	IESE	http://citiesinmotion.iese.edu/indicecim/?lang=en	N
Labelled Green Bonds Issued By Country Of Issuer	CBI	https://www.finance-watch.org/publication/global-green-finance-index-3/	New
Not-Externally-Reviewed Labelled Green Bonds Issued To December 2018, % of centre total	CBI	https://www.finance-watch.org/publication/global-green-finance-index-3/	Y

Table 56 (continued) | Sustainability Factors

Instrumental Factor	Source	Website	Updated
Protected Land Area % Of Land Area	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=2&series=ER.LND.PTLD.ZS&country=	Y
Quality of Life Index	Numbeo	http://www.numbeo.com/quality-of-life/rankings.jsp	Y
Quality of Living City Rankings	Mercer	https://www.mercer.com/newsroom/2018-quality-of-living-survey.html	Y
Ratio Climate-Aligned Bonds To Total Debt Securities By Issuer Location	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	New
Ratio Labelled Green Bonds To Total Debt Securities By Issuer Location	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	New
Share Of Renewables In Electricity Production	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	Y
Shares Of Wind And Solar In Electricity Production	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	Y
Stock Exchanges With A Green Bond Segment (Y/N)	CBI	https://www.climatebonds.net/green-bond-segments-stock-exchanges	N
Sum Of GHG Emissions	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	New
Sustainable Cities Index	Arcadis	https://www.arcadis.com/en/global/our-perspectives/sustainable-cities-index-2018/citizen-centric-cities/	Y
Sustainable Economic Development	Boston Consulting Group	https://www.bcg.com/en-gb/publications/2018/seda-striking-balance-between-well-being-growth.aspx	Y
Sustainable Stock Exchanges (Y/N)	UN Sustainable Stock Exchange Initiative	http://www.sseinitiative.org/sse-partner-exchanges/list-of-partner-exchanges/	Y
Total Issuance Of Labelled Green Bonds To December 2018, USDm	CBI	https://www.finance-watch.org/publication/global-green-finance-index-3/	Y
Total Number Of Labelled Green Bonds Issued To December 2018	CBI	https://www.finance-watch.org/publication/global-green-finance-index-3/	Y
Water Quality	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	N

Table 57 | Human Capital Factors

Instrumental Factor	Source	Website	Updated
Citizens Domestic Purchasing Power	UBS	https://www.ubs.com/microsites/prices-earnings/en/	N
Corruption Perception Index	Transparency International	http://www.transparency.org/policy_research/surveys_indices/cpi	N
Cost of Living City Rankings	Mercer	https://www.mercer.com/newsroom/cost-of-living-2018.html	N
Crime Index	Numbeo	http://www.numbeo.com/crime/rankings.jsp#	Y
Educational Attainment	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	N
Employees Working Very Long Hours	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	N
GDP Per Person Employed	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	Y
Global Cities Index	AT Kearney	https://www.atkearney.com/2018-global-cities-report	N
Global Innovation Index	INSEAD	http://www.globalinnovationindex.org/content.aspx?page=GII-Home	Y
Global Intellectual Property Index	Taylor Wessing	http://www.taylorwessing.com/ipindex/	N
Global Peace Index	Institute for Economics & Peace	http://www.visionofhumanity.org/	N
Global Skills Index	Hays	http://www.hays-index.com/	Y
Global Terrorism Index	Institute for Economics & Peace	http://www.visionofhumanity.org/	Y
Good Country Index	Good Country Party	https://www.goodcountryindex.org/results	N
Government Effectiveness	The World Bank	http://info.worldbank.org/governance/wgi/index.aspx#home	Y
Graduates In Social Science, Business And Law (As % Of Total Graduates)	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=Education%20Statistics	N
Gross Tertiary Graduation Ratio	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=Education%20Statistics	N
Health Care Index	Numbeo	http://www.numbeo.com/health-care/rankings.jsp	Y
Homicide Rates	UN Office of Drugs & Crime	https://dataunodc.un.org/crime/	Y
Household Net Adjusted Disposable Income	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	N
Household Net Financial Wealth	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	N
Human Development Index	UN Development Programme	http://hdr.undp.org/en/2018-update/download	Y
Human Freedom Index	Cato Institute	https://www.cato.org/human-freedom-index	Y
ICT Development Index	United Nations	http://www.itu.int/net4/ITU-D/idi/2017/index.html	N
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	N
Innovation Cities Global Index	2ThinkNow Innovation Cities	https://www.innovation-cities.com/innovation-cities-index-2018-global/	Y

Table 57 (continued) | Human Capital Factors

Instrumental Factor	Source	Website	Updated
Legatum Prosperity Index	Legatum Institute	http://www.prosperity.com/#!/ranking	Y
Life Expectancy	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	N
Linguistic Diversity	Ethnologue	http://www.ethnologue.com/statistics/country	N
Lloyd's City Risk Index 2015-2025	Lloyd's	https://cityriskindex.lloyds.com/about/	N
Number Of High Net Worth Individuals	Capgemini	https://www.worldwealthreport.com/	N
Number Of International Association Meetings	World Economic Forum	http://reports.weforum.org/travel-and-tourism-competitiveness-report-2017/	Y
OECD Country Risk Classification	OECD	http://www.oecd.org/tad/xcred/crc.htm	N
Open Data Barometer	World Wide Web Foundation	https://opendatabarometer.org/4thedition/	N
Open Government	World Justice Project	http://worldjusticeproject.org/rule-of-law-index	N
Passport Index	Henley Partners	https://www.henleyglobal.com/henley-passport-index/	Y
Personal Tax Rates	OECD	http://www.oecd.org/tax/tax-policy/tax-database.htm	N
Political Stability And Absence Of Violence/Terrorism	The World Bank	http://info.worldbank.org/governance/wgi/index.aspx#home	Y
Press Freedom Index	Reporters Without Borders (RSF)	http://en.rsf.org/	N
Prime International Residential Index	Knight Frank	http://www.knightfrank.com/wealthreport	N
Regulatory Quality	The World Bank	http://info.worldbank.org/governance/wgi/index.aspx#home	Y
Tax As Percentage Of GDP	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	N
Top Tourism Destinations	Euromonitor	https://go.euromonitor.com/white-paper-travel-2018-100-cities.html	Y
Wage Comparison Index	UBS	https://www.ubs.com/microsites/prices-earnings/en/	N
World Talent Rankings	IMD	https://www.imd.org/wcc/world-competitiveness-center-rankings/talent-rankings-2018/	Y

Table 58 | Business Factors

Instrumental Factor	Source	Website	Updated
Best Countries For Business	Forbes	http://www.forbes.com/best-countries-for-business/list/#tab:overall	Y
Bilateral Tax Information Exchange Agreements	OECD	http://www.eoi-tax.org/jurisdictions/LT#agreements	Y
Broad Stock Index Levels	The World Federation of Stock Exchanges	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports	Y
Business Environment Rankings	EIU	http://www.eiu.com/public/thankyou_download.aspx?activity=download&campaignid=bizenviro2014	N
Business Process Outsourcing Location Index	Cushman & Wakefield	http://www.cushmanwakefield.com/en/research-and-insight/2016/business-process-outsourcing-location-index-2016/	N
Capitalisation Of Stock Exchanges	The World Federation of Stock Exchanges	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports	Y
Common Law Countries	CIA	https://www.cia.gov/library/publications/the-world-factbook/fields/2100.html	N
Corporate Tax Rates	PWC	http://www.doingbusiness.org/reports/thematic-reports/paying-taxes/	N
Domestic Credit Provided By Banking Sector (% Of GDP)	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	N
Ease Of Doing Business Index	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=doing-business	Y
Economic Performance Index	The Brookings Institution	https://www.brookings.edu/research/global-metro-monitor-2018/#rank	New
External Positions Of Central Banks As A Share Of GDP	The Bank for International Settlements	http://www.bis.org/statistics/annex_map.htm	Y
FDI Confidence Index	AT Kearney	https://www.atkearney.com/foreign-direct-investment-confidence-index	N
FDI Inward Stock (In Million Dollars)	UNCTAD	http://unctad.org/en/Pages/DIAE/World%20Investment%20Report/Annex-Tables.aspx	N
Financial Secrecy Index	Tax Justice Network	http://www.financialsecrecyindex.com/	N
Foreign Direct Investment Inflows	UNCTAD	http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?Reportid=96740	Y
Global Connectedness Index	DHL	http://www.dhl.com/en/about_us/logistics_insights/studies_research/global_connectedness_index/global_connectedness_index.html	N
Global Enabling Trade Report	World Economic Forum	https://www.weforum.org/focus/global-enabling-trade-report-2016	N
Global Services Location	AT Kearney	https://www.atkearney.com/digital-transformation/gsl	N
Government Debt As % Of GDP	CIA	https://www.cia.gov/library/publications/the-world-factbook/rankorder/2186rank.html	Y
Net External Positions Of Banks	The Bank for International Settlements	http://www.bis.org/statistics/annex_map.htm	Y
Office Occupancy Cost	CBRE Research	https://www.cbre.com/research-and-reports/Global-Prime-Office-Occupancy-Costs-June-2018	N
Open Budget Survey	International Budget Partnership	http://survey.internationalbudget.org/#download	N

Table 58 (continued) | Business Factors

Instrumental Factor	Source	Website	Updated
Operational Risk Rating	EIU	http://www.viewswire.com/index.asp?layout=homePubTypeRK	Y
Percentage Of Firms Using Banks To Finance Investment	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	N
Real Interest Rate	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	Y
Total Net Assets Of Regulated Open-End Funds	Investment Company Institute	http://www.icifactbook.org/	N
Value Of Bond Trading	The World Federation of Stock Exchanges	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports	Y
Value Of Share Trading	The World Federation of Stock Exchanges	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports	Y
Volume Of Share Trading	The World Federation of Stock Exchanges	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports	Y
World Competitiveness Scoreboard	IMD	https://www.imd.org/wcc/world-competitiveness-center-rankings/world-competitiveness-ranking-2018/	N

Table 59 | Infrastructure Factors

Instrumental Factor	Source	Website	Updated
Crude Oil Input To Refineries	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	Y
Global Competitiveness Index	World Economic Forum	http://reports.weforum.org/global-competitiveness-report-2018/competitiveness-rankings/	Y
INRIX Traffic Scorecard	INRIX	http://inrix.com/scorecard/	Y
JLL Real Estate Transparency Index	Jones Lang LaSalle	http://greti.jll.com/greti/rankings	N
Liner Shipping Connectivity Index	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	N
Logistics Performance Index	The World Bank	http://lpi.worldbank.org/international/global	Y
Metro Network Length	Metro Bits	http://mic-ro.com/metro/table.html	N
Networked Readiness Index	World Economic Forum	http://reports.weforum.org/global-information-technology-report-2016/	N
Networked Society City Index	Ericsson	https://www.ericsson.com/res/docs/2016/2016-networked-society-city-index.pdf	N
Quality Of Domestic Transport Network	World Economic Forum	https://www.weforum.org/reports/the-travel-tourism-competitiveness-report-2017	N
Quality Of Roads	World Economic Forum	https://www.weforum.org/reports/the-travel-tourism-competitiveness-report-2017	N
Railways Per Land Area	CIA	https://www.cia.gov/library/publications/the-world-factbook/rankorder/2121rank.html	Y
Roadways Per Land Area	CIA	https://www.cia.gov/library/publications/the-world-factbook/rankorder/2085rank.html	N
Telecommunication Infrastructure Index	United Nations	https://publicadministration.un.org/egovkb/en-us/Data-Center	Y
TomTom Traffic Index	TomTom	https://www.tomtom.com/en_gb/trafficindex/list?citySize=LARGE&continent=ALL&country=ALL	N

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Since 2009, Busan Metropolitan City has been developing a financial hub specialising in maritime finance and derivatives. With its strategic location in the center of the southeast economic block of Korea and the crossroads of a global logistics route, Busan envisions growing into an international financial city in Northeast Asia. Following the successful launch of the 63-story Busan International Finance Center in 2014, the second phase development of the Busan Financial Hub will be completed in 2018 and is expected to provide world-class business infrastructure for financial institutions.

BIFC offers an attractive incentive package to global financial leaders and cooperation network of Busan Metropolitan City, Busan International Financial City Promotion Center, and Financial Hub Korea will support you to identify opportunities in Busan, one of the fastest developing cities in Asia.

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Casablanca Finance City is an African financial and business hub located at the crossroads of continents. Recognized as the leading financial center in Africa, and partner of the largest financial centers in the world, CFC has built a strong and thriving community of members across four major categories: financial companies, regional headquarters of multinationals, service providers and holdings.

CFC offers its members an attractive value proposition and a premium "Doing Business" support that fosters the deployment of their activities in Africa. Driven by the ambition to cater to its community, CFC is committed to promoting its members expertise across the continent, while enabling fruitful business and partnership synergies through its networking platform.

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Based in Shenzhen, Guangdong Province China Development Institute (CDI) is a market oriented, non-governmental think tank which was founded in 1989 on approval from the Chinese State Council. CDI was designated as one of the 25 China Top Think Tanks in 2015. CDI is committed to providing proactive, innovative and practical research and consultation for China's central and local governments and businesses at home and abroad. Its research and consultation is centered on macro strategy, regional economy, urbanization, industrial development and policies, business strategy and investment decision-making.

CDI has been exploring to improve its mechanism and operation models which are beneficial to development of non-governmental think tank. With leadership of its Board of Directors, CDI is in the charge of its President. There are more than 140 employees in CDI, 70% of them are researchers.

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The AIFC is the new destination for business offering ample opportunity for growth. AIFC is the unrivalled financial centre in the region to facilitate an access to world class capital markets and asset management industry. It also promotes financial technology and drives the development of niche markets such as Islamic and green finance in the region.

Located at the heart of Eurasia, AIFC provides unprecedented conditions and opportunities for its participants and investors: legal system based on the principles of the English law, independent regulatory framework consistent with internationally recognised standards, no corporate tax regime, depth and breadth in financial services and instruments' offering, simplified visa and labour regimes, English as a working language. Astana strives to become the gateway to the Eurasian Economic Union and has already been dubbed "The Buckle on the Belt"—key regional financial services hub for the Belt and Road.

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Seoul is a rising star among the financial cities of the world. It is already one of the top 10 cities in the world based on various indices, and it has many more opportunities to offer as a financial hub and great growth potential. Seoul believe global financial companies are our true partners for growth. There are many incentives provided to global financial companies that enter into Seoul, such as the financial incentives provided when moving into IFC, so that we can all jointly work towards the growth and development of the financial market.

It is sure that Seoul will become a top star of global financial hubs in the near future! Pay close attention to Seoul's potentials and pre-emptively gain a foothold in the Seoul financial hub. Seoul is the gateway to Northeast Asia and the world.

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Since the establishment of the International Financial Services Centre (IFSC) in Ireland in 1987, Ireland's IFS sector has experienced rapid growth to become a truly nationwide industry with a mix of indigenous and international firms specialising in sub-sectors such as asset management and investment management, aviation finance, banking, fintech and payments, and insurance and reinsurance.

IFS Ireland takes a public-private partnership approach to promoting Ireland as being at the vanguard of financial services due to our English speaking, common law, pro-enterprise environment which is underpinned by membership of the European Union (EU) and the Single Market, a strong and independent regulator and readily available talent thanks to our world-class education system.

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Dubai International Financial Centre

Dubai International Financial Centre (DIFC) is one of the world's most advanced financial centres, and the leading financial hub for the Middle East, Africa and South Asia (MEASA), which comprises 72 countries with an approximate population of 3 billion and a nominal GDP of US\$ 7.7 trillion.

DIFC is home to an internationally recognised, independent regulator and a proven judicial system with an English common law framework, as well as the region's largest financial ecosystem of more than 22,000 professionals working across over 2,000 active registered companies

The Centre's vision is to drive the future of finance. Today, it offers one of the region's most comprehensive FinTech and venture capital environments, including cost-effective licensing solutions, fit-for-purpose regulation, innovative accelerator programmes, and funding for growth-stage start-ups.

www.difc.ae



Finance Montréal's mandate is to promote Montréal as a world-class financial hub and foster cooperation among its member institutions to accelerate the industry's growth. With renowned research capacities in artificial intelligence and a booming fintech sector, Montréal offers an experienced, diversified and innovative pool of talent as well as a stable, low cost and dynamic business environment.

For financial institutions searching for an ideal location to set up an intelligent service centre and operationalize their digital transformation, Finance Montréal can advise on the advantageous tax incentives aimed at facilitating the establishment and development of financial services corporations in the city.

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www.finance-watch.org

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.

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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 timeframe is roughly 100 years.



www.greenfinanceindex.net

Financial Centre Futures is a programme within the Long Finance initiative that initiates discussion on the changing landscape of global finance, seeking to explore how finance might work in the future. Financial Centre Futures comprises the Global Green Finance Index and other research publications that explore major changes to the way we will live and work in the financial system of the future.