The Global Green Finance Index 5

1 Amsterdam
2 Luxembourg
3 Copenhagen
4 Zurich
5 Stockholm
6 London
7 Paris
8 Hamburg
9 Montreal
10 Geneva

10 Vienna
9 Geneva
8 Hamburg
7 Paris
6 Luxembourg
5 Copenhagen
4 Stockholm
3 Zurich
2 Amsterdam
1 London

March 2020

Sustainable Futures

MAVA
FONDATION POUR LA NATURE

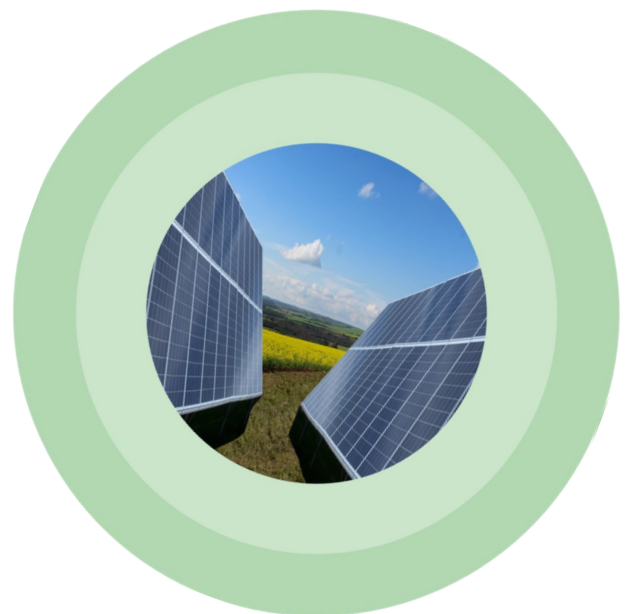We are pleased to present the fifth edition of the Global Green Finance Index (GGFI 5).

The GGFI has been developed jointly by Z/Yen, as part of its Long Finance Initiative. 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.

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.

Contents

Foreword From The Green Finance Institute

Green finance is the application of science to financial decision making. The scientific consensus tells us that average global temperatures are rising and the data informs us that climate hazards are intensifying.

The laws of physics, not only underpin these increasingly observable changes in our climate, but by extension provide the very foundations of global economic stability.

Unlike previous economic trends or cycles, the inviolable nature of the physics of climate change means that whilst there remains some uncertainty about how exactly we embed science into our business, finance, regulatory and policy decision making, decarbonising our global economy is an imperative and is ultimately inevitable.

Successfully reallocating capital towards the opportunities presented by this economic transformation requires an understanding of the technologies and the societal behaviours that are rapidly replacing existing systems. The transition is complex, requiring the mobilisation of global capital towards local solutions. Closer collaboration across disciplines and between broader groups of stakeholders than has historically been the case will become the norm to co-design local legislative frameworks and co-create the financial mechanisms needed to achieve a step change in climate-aligned financial flows.

At the Green Finance Institute, we are positioned, as the principal interface between the public and private sectors with regards to green finance in the UK, with a mandate to mobilise capital towards a decarbonised and resilient economy. An independent company, seed funded by the UK Government and City of London Corporation, our work brings together global experts from industry, finance, academia, civil society and government in coalitions that focus on identifying the barriers to green investment in the real economy and designing innovative financial mechanisms, combining both public and private finance to create viable investment opportunities and unlock financial flows.

Our work builds on the proud tradition of green financial innovation in London and is dependent on both domestic and international collaboration. It is therefore my pleasure to introduce this fifth edition of the Global Green Finance Index (GGFI), providing as it does a global perspective on the progress of local financial centres. Whilst the index fosters a spirit of competition it also encourages us all to learn from each other's best practices, as we accelerate our efforts to transform our financial markets and the broader economies they serve in order to meet the imperative of a zero-carbon world.

Dr Rhian-Mari Thomas OBE
Chief Executive Officer,
Green Finance Institute

Foreword From The International Institute Of Green Finance

As the role of sustainability is gradually becoming mainstream in the field of finance, an increasingly broad range of stakeholders of the financial system are actively engaging. From NGOs, impact funds, and green project developers being the most active just 10 years ago, we are today seeing commitments from the largest financial institutions, stock and bond exchanges, and national governments. With the trend being present across the globe, we are increasingly seeing a race to the top between financial centers to attract an ever expanding group of sustainability conscious investors and issuers.

As a direct way to measure, compare, and learn from best practices, the Global Green Finance Index is a benchmark publication of great relevance to a broad audience across the globe. The publication plays a critical piece in the puzzle on developing green finance, with its unique focus on financial centers and its tailored methodology to measure performance. With greater amounts of data available for such analysis it will be possible to make increasingly accurate assessment and better draw out key lessons from current experience. It is exactly this content of the Global Green Finance Index that can be used from the perspective of each financial center and ultimately support green finance at a global scale.

From a Chinese perspective, we are pleased to see strong representation from the key Chinese financial centers of Shanghai, Beijing, Shenzhen, Guangzhou, and Hong Kong. While green finance is a rather new concept in the Chinese context, through strong political commitment and a top-down governance model, China made substantial progress in greening its financial system and creating global top tier green financial centers. From this outset, we expect the Chinese green financial centers to continue to improve performance on both depth and quality for a number of reasons. In 2020, China will implement increasingly harmonized green finance standards, which have differed between regulators and financial tools in the past. China is simultaneously in the process of launching more green finance policies. Such stable and uniform standards as well as polices forms a solid basis for developing designated green financial instruments, which are expected to proliferate in the coming years. Furthermore, as China gradually opens its capital account, closer integration with global financial markets adds to the scale, transaction amounts, and ultimately the quality of its green financial system. Such efforts includes a stock-connect to London, allowing foreign ownership of asset management companies, and facilitating access for foreign institutional investors.

As a Beijing-based green finance think-tank it is encouraging to see greater cooperation between China and the rest of the world on green finance. As financial centers play a critical role in such international coordination, it is important that their performance and potential is closely analyzed. I am consequently confident that the Global Green Finance Index series will develop into an increasingly anticipated publication in the years to come.

Wang Yao
Director General,
International Institute of Green Finance, Central University of
Finance and Economics
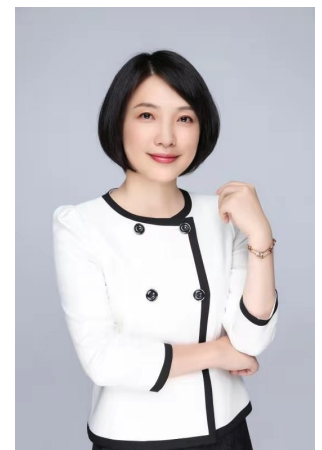
Summary And Headlines

Overview

Welcome to the fifth edition of the Global Green Finance Index (GGFI 5). The GGFI is based on a worldwide survey of finance professionals' assessments on the quality and depth of green finance offerings in financial centres. The online survey is at http://greenfinanceindex.net/survey. Please take a moment to take the survey if you have not recently done so: the survey runs continuously and is sampled for each edition of the GGFI.

We include in this edition of the GGFI a supplement on green finance in China, prepared with the assistance of the International Institute Of Green Finance at the Central University Of Finance And Economics in Beijing.   The supplement charts current progress and issues around the development of green finance in China.   Key developments include that:

- The last few years have seen explosive growth in the uptake of green finance in China. Great strides have been made in the wholesale adoption of green bonds and green loans as well as innovation in green fintech and the adoption of mandatory environmental reporting.
- The risk of stranded assets in Chinese markets is a topic that has received increasing attention in the last couple of years. One 2017 report by Oxford University estimated that stranded assets in coal alone could amount to between 4.1% and 9.5% of China's GDP.
- Green bonds made up only 0.54% of China's RMB 45.1 trillion bonds market in 2019. China recognises that it needs to speed up its gains in this field to finance an increasingly ambitious climate and environmental agenda.

Index Results

- There is growing confidence in the development of green finance across all regions. Ratings of green finance rose in almost all centres for both depth and quality. All centres received a higher rating for depth than in GGFI 4; and all but five centres received a higher rating in quality.
- Western Europe continues to lead the world's centres in green finance depth and quality, taking nine of the top ten places in depth and the top 12 places in quality. This reflects the continuing work being undertaken by European financial institutions, central banks, regulators, and the European Union to embed sustainability in their regulatory work.
- The Asia/Pacific region has again fallen back slightly in this edition.
- Amsterdam retained its leading position in the depth index, with Luxembourg still in second place.
- London retained its position as first in the quality index, albeit with a smaller margin than before, with Amsterdam only 6 rating points behind. The leading centres in Western Europe are catching up with London's ratings for quality.
- Several centres moved more than five places in the indices. Vienna is up 16 places in the depth index and nine in the quality index. Brussels, Malta, and Cayman Islands are also up more than five places for depth. Guangzhou, Guernsey, and Kuala Lumpur rose more than five places for quality.

Commentary

The evidence in this report suggests that larger, well-established centres are not generally those which are rated highly as green financial centres. For example, Singapore, which consistently ranks in the top five centres in the Global Financial Centres Index, and which has recently launched a green investments programme and has taken action on stimulating green investment and lending, ranks 27th for depth and 21st for quality in GGFI 5.

The green bond market has continued to dominate the field of green finance, a trend set to continue as a result of the EU's issuance of its taxonomy for sustainable activities. This is likely to fuel the number of sub-regional agencies considering the establishment of 'green development banks' structured to issue green bonds to fund Net-Zero development.

Green gilts are becoming increasingly popular with issuances from Poland, France, Belgium, Ireland, and the Netherlands. The German Federal Finance agency has announced its plans to issue a green bond in 2020. Unfortunately, despite calls to do so the UK has yet to signal its intention to move in this direction, which may go some way towards explaining why London has continued its slide in the depth rankings despite its high reputation for quality.

The continuing improvement in ratings for both depth and quality in the latest index suggests that respondents to our survey are confident that green finance is improving across the world's financial centres. moving more towards the mainstream. Possible reasons include:
- The action being taken by regulators to stimulate green finance activity and require more transparency and disclosure.
- Work such as that of the European Union Technical Expert Group On Sustainable Finance and UNEP to develop taxonomies and standards in green finance.
- The view that more finance is falling into the green category or that there is a hope expressed that it should do so.
- Growing awareness of green finance.

International Financial Centres are beginning to find their voice in leading the debate on both the climate crisis and the delivery of the UN sustainable development goals. Inclusive finance is a particular topic attracting attention due to its close alignment with the development of fintech.

Leading Centres
- On depth, the leading nine centres all stayed in the top group, with some minor adjustments in placing. Vienna and Geneva moved into the top ten, on equal ratings. Vancouver dropped from 10th to 17th place.
- On quality, Vienna moved into the top ten and Geneva regained its lead over Brussels to take it into 9th place. Munich has fallen to 11th position. London's lead in the quality index has reduced from 52 points in GGFI 1 to 6 in GGFI 5, with Amsterdam and Zürich both able to overtake its rating in the next six months.
- Narrow margins continue to separate centres at top of the tables. Among the top ten centres the spread of ratings is 44 out of 1,000 for depth (47 in GGFI 4) and also 44 for quality (53 in GGFI 4).

Western Europe

- Western Europe continues to improve its ratings across depth and quality, with all centres receiving improved ratings for both depth and quality.
- Vienna rose 16 places for depth and nine places for quality to enter the top ten on both measures.
- Hamburg fell back slightly on both measures, while Geneva gained ground.
- Hamburg, Munich, Edinburgh, and Lichtenstein fell in the rankings for both depth and quality.
- Oslo entered the index for the first time, ranking 12th for depth and 13th for quality.

North America

- Montréal again took first place in the region for depth, retaining at ninth position overall, but fell six places to 19th in the quality measure. San Francisco was again the leading centre for quality in North America, although it dropped two places overall to 13th. It increased its ranking by one place to 16th in the depth index.
- Vancouver, Boston, and Calgary fell in the rankings for both depth and quality, while Los Angeles improved its position on both measures.
- Canadian centres continue to outperform the USA both in depth and quality.

Asia/Pacific

- Asia/Pacific centres overall fell back in the rankings for both depth and quality, even though ratings improved overall, meaning that other centres improved their performance at a faster rate.
- Sydney has taken the lead in the region in both depth and quality, with Beijing second for depth and Singapore second for quality.
- Shanghai, Guangzhou, and Melbourne fell more than five ranking places since GGFI 4 for depth. For quality, Guangzhou improved its ranking place 13 places, and Kuala Lumpur was up six places, while Melbourne dropped 13 places.

Middle East & Africa

- Casablanca maintained its position as the leading centre in the region, although its overall ranking dropped as Western European centres continued to move forwards. Tel Aviv is in second place in the region on both measures.
- Centres in the region generally lost ground in the quality index.
- Doha entered the GGFI for the first time.

Latin America & The Caribbean

- São Paulo retained its leading position in the region, although its rank dropped slightly in both depth and quality as new centres entered the index. Cayman Islands took second place in the region for depth and quality
- Rio de Janeiro and Bermuda fell in the rankings for both depth and quality.

Eastern Europe & Central Asia

- Prague continued to lead the region, and rose eight places to 32nd for depth, while falling ten places to 32nd for quality.
- Warsaw and Moscow fell in both the depth and quality rankings.

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

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 five editions of the GGFI.
- Natural capital valuation is mentioned least often both in terms of interest and impact, despite recent reports from the United Nations and the Intergovernmental Platform On Biodiversity And Ecosystem Services highlighting the severe risks to society resulting from the destruction of biodiversity.
- The drivers of green finance are consistently identified as:
  - ➤ the policy and regulatory framework, followed by mandatory disclosure, and tax incentives; and
  - ➤ demand from investors, and public awareness of climate change.

GGFI 5

GGFI 5 was compiled using 135 instrumental factors. These quantitative measures are provided by third parties including the World Bank, The Economist Intelligence Unit, the OECD, and the United Nations. Details can be found in Appendix 5.

The instrumental factors were combined with 4,290 financial centre assessments provided by respondents to the GGFI online questionnaire. A breakdown of the 717 respondents is shown in Appendix 3. Further details of the methodology behind GGFI 5 are in Appendix 4.

We researched 120 financial centres for this edition of the index. The 67 centres listed in GGFI 5 are those which received a minimum of 20 assessments from survey respondents. Assessments of respondents' home centres were excluded from the data, in order to avoid home centre bias. For comparison, GGFI 4 collected survey data on 114 financial centres, of which 64 received enough responses to be included.
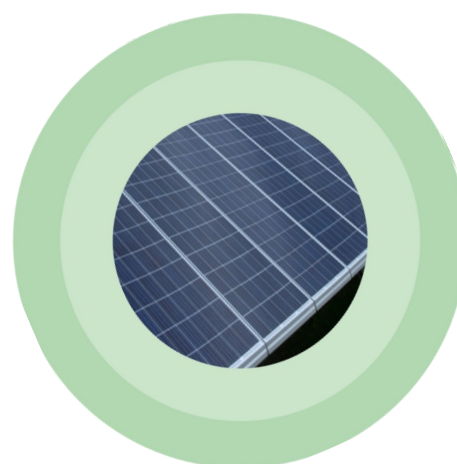
GGFI 5 Ranks And Ratings

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

Centre	GGFI 5		GGFI 4		Change In Rank		Change In Rating	
	Rank	Rating	Rank	Rating				
Amsterdam	1	496	1	471	▶	0	▲	25
Luxembourg	2	488	2	459	▶	0	▲	29
Copenhagen	3	484	3	455	▶	0	▲	29
Zürich	4	483	5	452	▲	1	▲	31
Stockholm	5	474	4	453	▼	-1	▲	21
London	6	470	6	447	▶	0	▲	23
Paris	7	460	7=	440	▶	0	▲	20
Hamburg	8	456	7=	440	▼	-1	▲	16
Montréal	9	454	9	437	▶	0	▲	17
Geneva	10=	452	15=	419	▲	5	▲	33
Vienna	10=	452	26=	406	▲	16	▲	46
Oslo	12	447	New	New	New		New	
Brussels	13	445	20	414	▲	7	▲	31
Toronto	14=	444	13=	420	▼	-1	▲	24
Sydney	14=	444	15=	419	▲	1	▲	25
San Francisco	16	442	17=	416	▲	1	▲	26
Vancouver	17	441	10	424	▼	-7	▲	17
Munich	18=	439	11=	422	▼	-7	▲	17
Casablanca	18=	439	13=	420	▼	-5	▲	19
Beijing	20	437	19	415	▼	-1	▲	22
Shanghai	21=	436	11=	422	▼	-10	▲	14
Frankfurt	21=	436	26=	406	▲	5	▲	30
Shenzhen	23	434	21=	413	▼	-2	▲	21
Guangzhou	24	432	17=	416	▼	-7	▲	16
Seoul	25=	431	21=	413	▼	-4	▲	18
Jersey	25=	431	21=	413	▼	-4	▲	18
Singapore	27	430	24	412	▼	-3	▲	18
Edinburgh	28=	429	26=	406	▼	-2	▲	23
Los Angeles	28=	429	29	405	▲	1	▲	24
Tel Aviv	30	428	30	401	▶	0	▲	27
Melbourne	31	427	25	411	▼	-6	▲	16
Washington DC	32	415	33	397	▲	1	▲	18
Tokyo	33	414	32	399	▼	-1	▲	15

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

Centre	GGFI 5		GGFI 4		Change In Rank		Change In Rating	
	Rank	Rating	Rank	Rating				
Rome	34=	410	31	400	▼	-3	▲	10
Malta	34=	410	44=	375	▲	10	▲	35
Hong Kong	36=	409	35	392	▼	-1	▲	17
Prague	36=	409	44=	375	▲	8	▲	34
Dublin	38	408	38	388	▶	0	▲	20
Milan	39	407	39	387	▶	0	▲	20
Boston	40=	406	34	393	▼	-6	▲	13
Madrid	40=	406	40	385	▶	0	▲	21
Mauritius	42	405	43	376	▲	1	▲	29
Calgary	43	399	36	391	▼	-7	▲	8
New York	44	395	41	381	▼	-3	▲	14
Cape Town	45	393	48	367	▲	3	▲	26
Isle of Man	46	392	37	390	▼	-9	▲	2
Chicago	47	391	42	379	▼	-5	▲	12
São Paulo	48=	390	46	374	▼	-2	▲	16
Guernsey	48=	390	47	371	▼	-1	▲	19
Cayman Islands	48=	390	54	356	▲	6	▲	34
Dubai	51	386	52	360	▲	1	▲	26
Doha	52	382	New	New	New		New	
Abu Dhabi	53	381	49=	362	▼	-4	▲	19
Moscow	54	380	51	361	▼	-3	▲	19
Warsaw	55	379	53	359	▼	-2	▲	20
Liechtenstein	56=	377	49=	362	▼	-7	▲	15
Kuala Lumpur	56=	377	55=	353	▼	-1	▲	24
Istanbul	58	376	57	350	▼	-1	▲	26
Johannesburg	59	374	58=	349	▼	-1	▲	25
Mexico City	60	373	58=	349	▼	-2	▲	24
British Virgin Islands	61	371	61	335	▶	0	▲	36
Rio de Janeiro	62	366	55=	353	▼	-7	▲	13
Bermuda	63	356	60	336	▼	-3	▲	20
Bangkok	64	353	64	332	▶	0	▲	21
Jakarta	65	352	New	New	New		New	
Mumbai	66	349	62	334	▼	-4	▲	15
New Delhi	67	340	63	333	▼	-4	▲	7

Table 2 | Ranks And Ratings Of Green Finance Quality

Centre	GGFI 5		GGFI 4		Change In Rank		Change In Rating	
	Rank	Rating	Rank	Rating				
London	1	516	1	497	▶	0	▲	19
Amsterdam	2	510	2	479	▶	0	▲	31
Zürich	3	507	5	473	▲	2	▲	34
Stockholm	4	496	7=	465	▲	3	▲	31
Copenhagen	5	491	6	466	▲	1	▲	25
Luxembourg	6	489	7=	465	▲	1	▲	24
Paris	7	487	3	477	▼	-4	▲	10
Hamburg	8	477	4	476	▼	-4	▲	1
Geneva	9	476	11=	443	▲	2	▲	33
Vienna	10	472	19	428	▲	9	▲	44
Munich	11	471	9	458	▼	-2	▲	13
Brussels	12	467	10	444	▼	-2	▲	23
San Francisco	13=	466	11=	443	▼	-2	▲	23
Oslo	13=	466	New	New	New		New	
Sydney	15	457	17=	432	▲	2	▲	25
Edinburgh	16	456	15=	433	▼	-1	▲	23
Vancouver	17=	455	14	435	▼	-3	▲	20
Toronto	17=	455	20	426	▲	3	▲	29
Montréal	19	453	13	438	▼	-6	▲	15
Frankfurt	20	452	22=	420	▲	2	▲	32
Singapore	21	451	21	424	▶	0	▲	27
Casablanca	22	446	17=	432	▼	-5	▲	14
Tokyo	23	445	24	419	▲	1	▲	26
Madrid	24	444	25=	418	▲	1	▲	26
Beijing	25	443	25=	418	▶	0	▲	25
Guangzhou	26	441	39	400	▲	13	▲	41
Tel Aviv	27	439	25=	418	▼	-2	▲	21
Melbourne	28=	438	15=	433	▼	-13	▲	5
New York	28=	438	29	416	▲	1	▲	22
Los Angeles	30	437	33=	408	▲	3	▲	29
Jersey	31	435	35=	406	▲	4	▲	29
Prague	32=	433	22=	420	▼	-10	▲	13
Washington DC	32=	433	30	415	▼	-2	▲	18

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

Centre	GGFI 5		GGFI 4		Change In Rank		Change In Rating	
	Rank	Rating	Rank	Rating				
Shanghai	34	431	28	417	▼	-6	▲	14
Shenzhen	35	425	31=	412	▼	-4	▲	13
Malta	36	424	38	401	▲	2	▲	23
Milan	37	421	31=	412	▼	-6	▲	9
Hong Kong	38=	420	40	399	▲	2	▲	21
Guernsey	38=	420	44=	388	▲	6	▲	32
Boston	40	419	35=	406	▼	-5	▲	13
Dublin	41=	418	33=	408	▼	-8	▲	10
Chicago	41=	418	41	393	▶	0	▲	25
Seoul	43	416	44=	388	▲	1	▲	28
Isle of Man	44	407	46=	387	▲	2	▲	20
Cape Town	45	406	46=	387	▲	1	▲	19
São Paulo	46	400	43	390	▼	-3	▲	10
Rome	47	399	50=	378	▲	3	▲	21
Kuala Lumpur	48	398	54	359	▲	6	▲	39
Calgary	49	395	37	404	▼	-12	▼	-9
Cayman Islands	50	394	50=	378	▶	0	▲	16
Liechtenstein	51	392	42	392	▼	-9	▶	0
Mauritius	52	391	49	379	▼	-3	▲	12
Doha	53	390	New	New	New		New	
British Virgin Islands	54	386	57	357	▲	3	▲	29
Warsaw	55=	382	48	386	▼	-7	▼	-4
Dubai	55=	382	53	372	▼	-2	▲	10
Istanbul	57	380	58	354	▲	1	▲	26
Abu Dhabi	58=	373	55=	358	▼	-3	▲	15
Mexico City	58=	373	59	351	▲	1	▲	22
Mumbai	58=	373	60	349	▲	2	▲	24
Rio de Janeiro	61	370	55=	358	▼	-6	▲	12
Bangkok	62	368	61	348	▼	-1	▲	20
Johannesburg	63	367	50=	378	▼	-13	▼	-11
Bermuda	64	359	63	342	▼	-1	▲	17
Moscow	65	356	62	346	▼	-3	▲	10
Jakarta	66	346	New	New	New		New	
New Delhi	67	331	64	334	▼	-3	▼	-3

Depth And Quality

Chart 1 shows the relationship between ratings of depth and quality in the index and shows the generally close correlation between the assessments of each factor by respondents, though it also shows that some major, long-established financial centres such as New York, London, and Paris score higher for quality than depth; while for more specialist centres such as Amsterdam, Luxembourg, and Copenhagen the reverse is true.

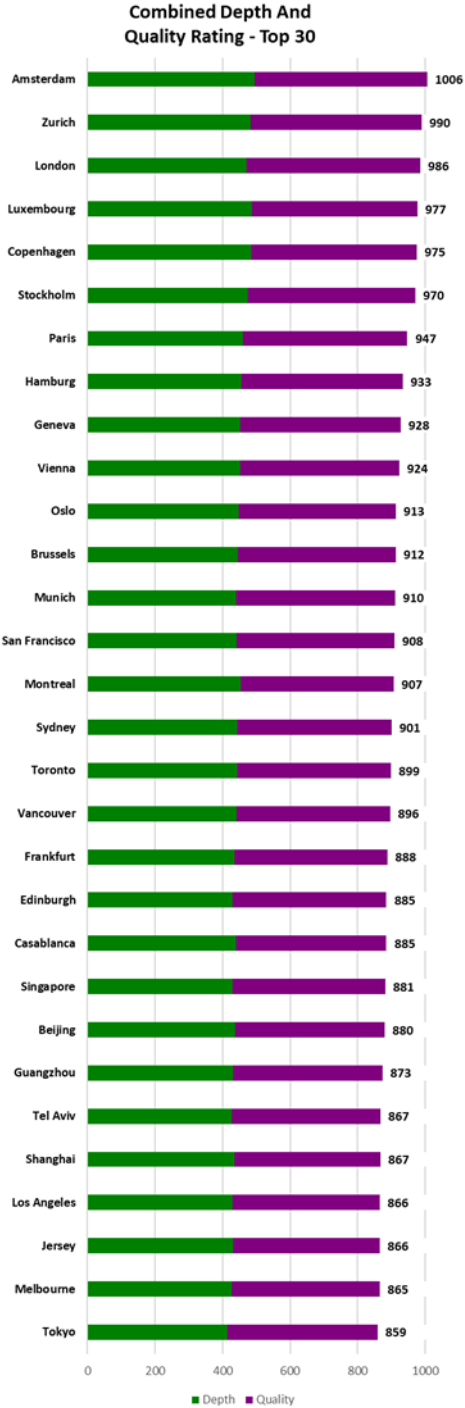**Chart 1 | Relationship Between Ratings Of Depth And Quality**
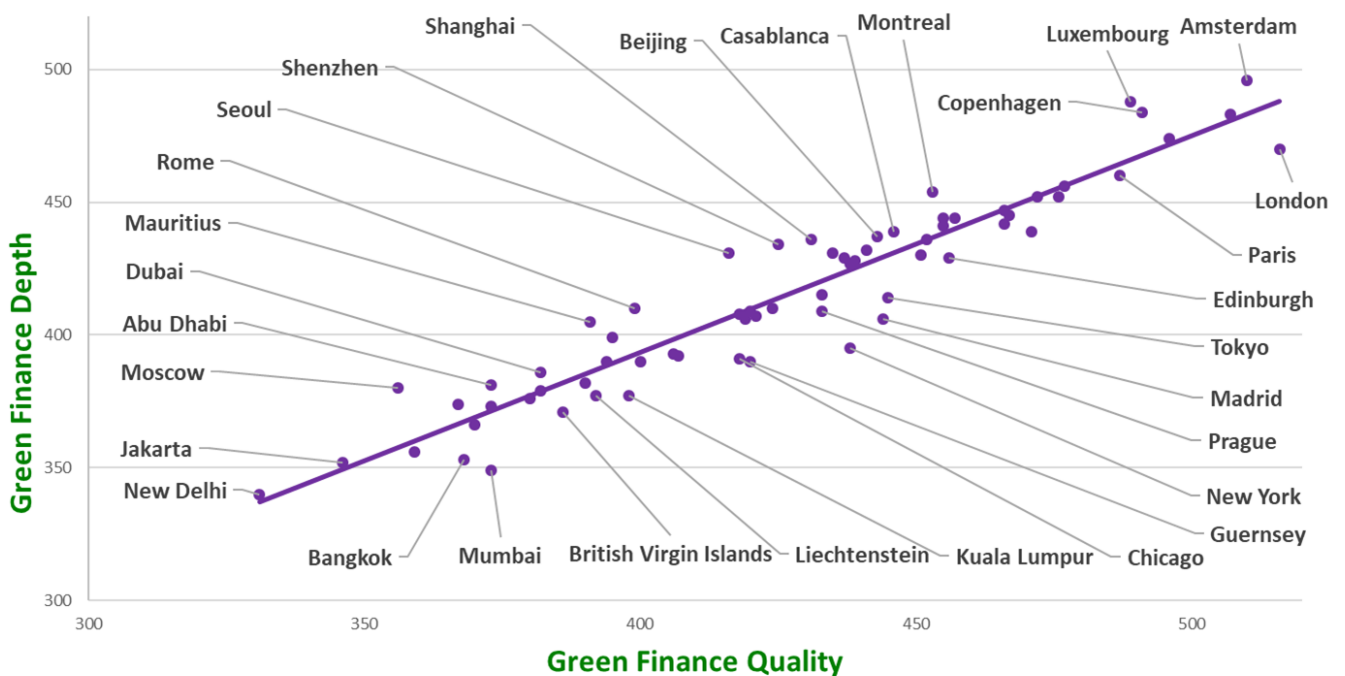
> *"High profile public and private sector leadership - in the latter, amongst individual & collective enterprises - is beginning to drive ever faster the green finance agenda, partly in response to a fast-rising awareness of the consequences - not just the causes - of, e.g., climate change.*
> *This trend will accelerate."*

Vice Chairman, Banking, London

Chart 2 | Combined Depth And Quality Ratings

Combined Depth And Quality Rating - Top 30

Centre	Rating
Amsterdam	1006
Zurich	990
London	986
Luxembourg	977
Copenhagen	975
Stockholm	970
Paris	947
Hamburg	933
Geneva	928
Vienna	924
Oslo	913
Brussels	912
Munich	910
San Francisco	908
Montreal	907
Sydney	901
Toronto	899
Vancouver	896
Frankfurt	888
Edinburgh	885
Casablanca	885
Singapore	881
Beijing	880
Guangzhou	873
Tel Aviv	867
Shanghai	867
Los Angeles	866
Jersey	866
Melbourne	865
Tokyo	859

■ Depth ■ Quality

We can also look at the overall ratings if we combine centres' scores for depth and quality. The results are shown in Chart 2.

Zürich comes second on this analysis, demonstrating consistency across depth and quality, while other leading centres may need to pay attention to the depth of their green finance offering to improve their overall ranking.

"Our view is that there is a need to build an international consensus on Climate Action, of which Green Finance is a crucial element. However if Climate Action is seen solely as an investment opportunity, then there is something seriously missing. We need to be able to capture the social and global responsibility of companies, e.g., through such an index. We believe this will be reflected in a company's share price and hence the value is captured in this way."

**President, Trade Association, Dublin**

Regional Performance

The top five centres in each region on average increased their ratings between GGFI 1 and GGFI 5 for depth. The leading North American centres, led by Canadian centres, overtook Asia/Pacific centres. The average for leading centres in Latin America & The Caribbean and in the Middle East & Africa have recovered after a dip in ratings in GGFI 3.

Chart 3 | Average Ratings For Depth Of The Top Five Centres In Each Region
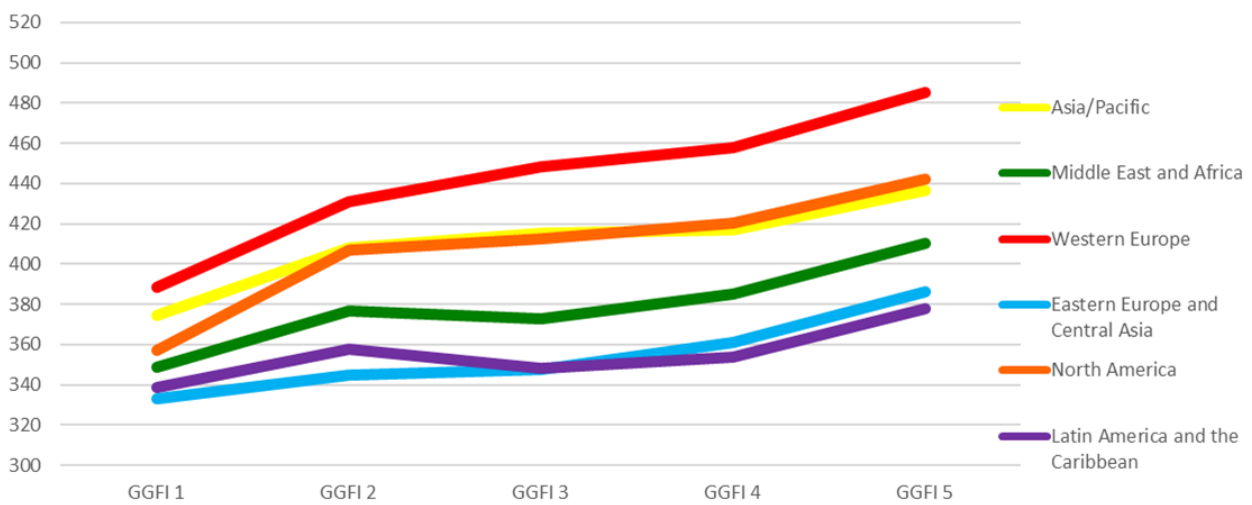
A similar picture is shown for the quality measure, with improvements in all regions between GGFI 4 and GGFI 5.
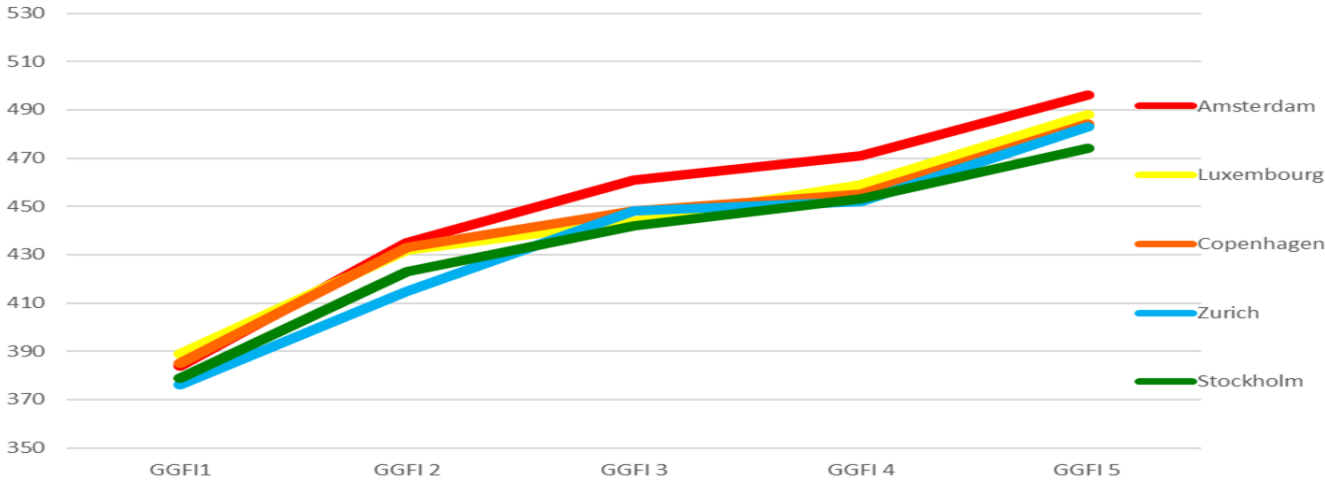
Chart 4 | Average Ratings For Quality Of The Top Five Centres In Each Region
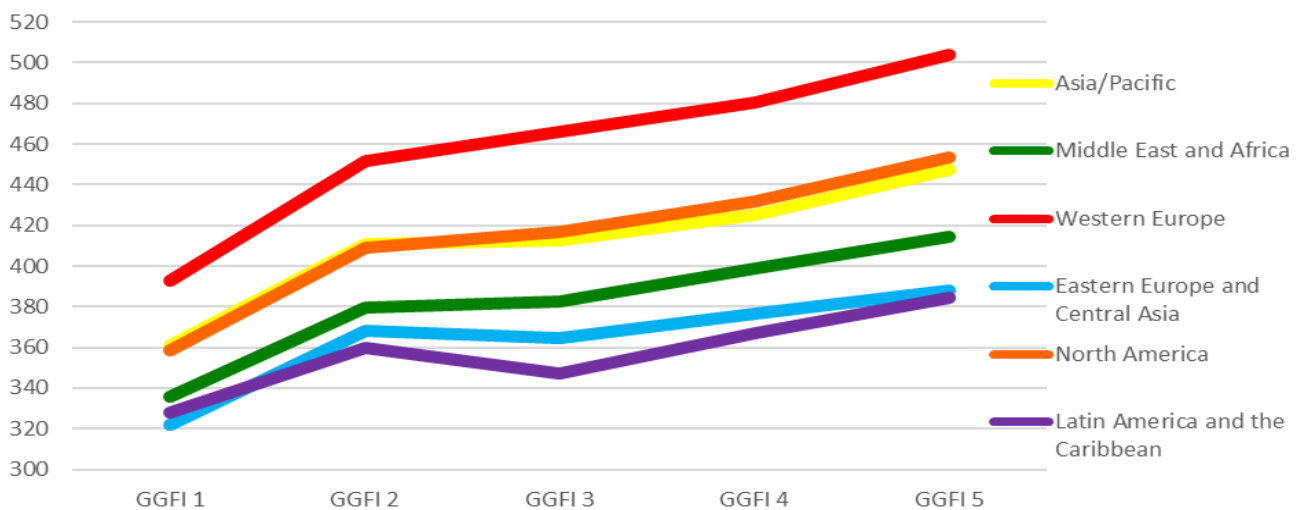
Top Five Centres

The top five centres in the index for depth improved their ratings in GGFI 5 after a levelling off in GGFI 4.

Chart 5 | The Top Five Centres For Depth Over Time

On the quality index, the top five centres have continued the improvement in their ratings, although the rate of increase for London has been slower than for the other leading centres. London is at risk of being overtaken by other centres over the next six months if this pattern continues.

Chart 6 | The Top Five Centres For Quality Over Time
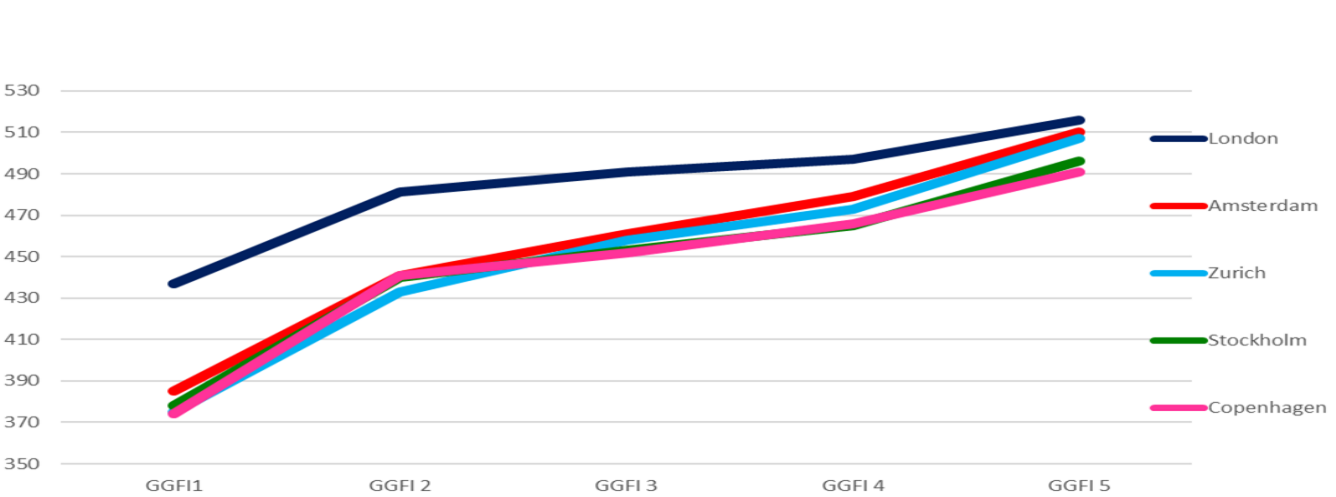
Leading Financial Centres

It is notable that some leading financial centres perform less well than expected in the GGFI. The Global Financial Centres Index (GFCI) has been measuring financial centre competitiveness since 2007.

We can compare the centres which rank in the top 20 in the GFCI with their performance in the GGFI. The colours in Table 3 indicate the ranking in the indices. This shows a clear disconnect between the highest performing centres in the GFCI and performance on green finance in the GGFI. Only London features in the top ten in each index.

Historically, green finance has not been a leading factor in overall competitiveness as measured by the GFCI; and the legacy is that many of the leading centres in the GFCI are not as yet leading the way on green finance. This is changing and will need to do so if the Sustainable Development Goals are to be met.

Table 3 | Leading Financial Centres - Comparison of GGFI And GFCI Rankings

Centre	Green Finance Depth	Green Finance Quality	Financial Centre Competitiveness
New York	44	28	1
London	6	1	2
Hong Kong	36	38	3
Singapore	27	21	4
Shanghai	21	34	5
Tokyo	33	23	6
Beijing	20	25	7
Dubai	51	55	8
Shenzhen	23	35	9
Sydney	14	15	10
Toronto	14	17	11
San Francisco	16	13	12
Los Angeles	28	30	13
Zürich	4	3	14
Frankfurt	21	20	15
Chicago	47	41	16
Paris	7	7	17
Boston	40	40	18
Melbourne	31	28	19
Montréal	9	19	20
Source	**GGFI 5 Depth Rank**	**GGFI 5 Quality Rank**	**GFCI 26 Rank**

A further way to display the comparison between the GGFI and the GFCI is to examine that ratings for green finance depth and quality of the leading centres in the GFCI. The charts below show the leading ten centres in the current 26th edition of the Global Financial Centres Index and their ratings in the GGFI for depth and quality.

On the depth measure, London lead the ratings in this group for the GGFI, with Sydney, Beijing, Shanghai, Shenzhen, and Singapore in a second group.

Chart 7 | **Leading Financial Centres - Ratings Of Depth In The GGFI Over Time**
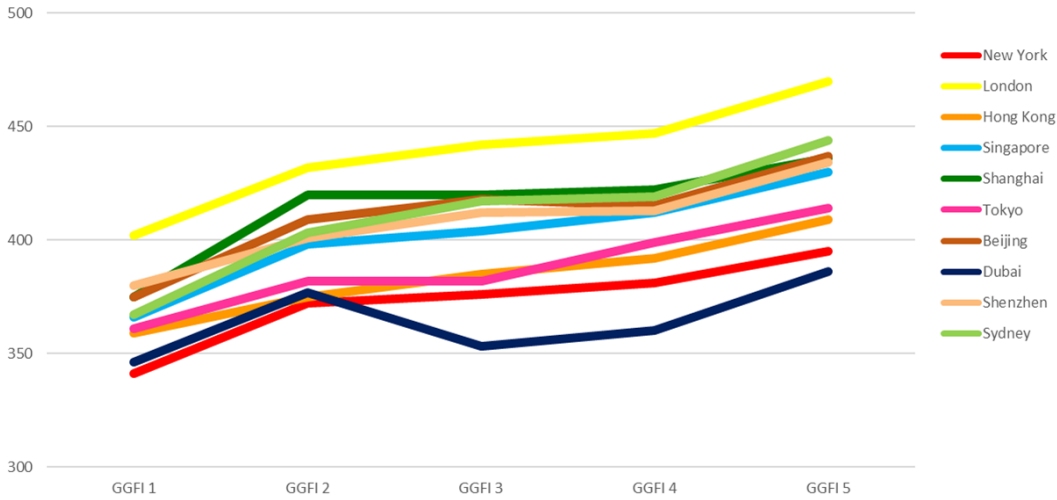
Turning to quality, a similar picture emerges as on quality, with London leading the ratings in the GGFI, with other leading centres in the Global Financial Centres Index some way behind.

Chart 8 | **Leading Financial Centres - Ratings Of Quality In The GGFI Over Time**
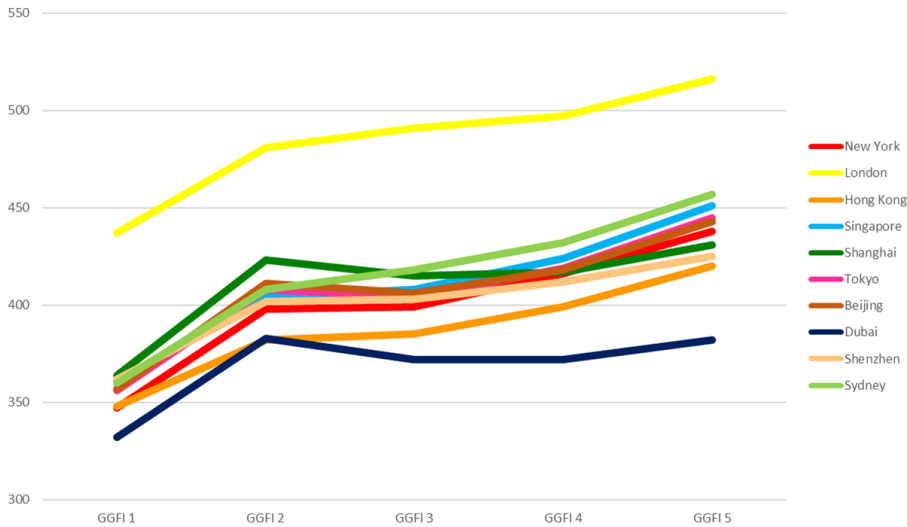
GGFI 5 Further Analysis

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. Despite being identified as being likely to become more significant, with the exception of Frankfurt, the centres listed all stayed static or fell in the depth rankings in GGFI 5. On quality, London retained its first position in the GGFI for quality and Singapore retained its 21st position. Frankfurt and New York rose in the rankings. Paris fell four places, while Shanghai was down six places in the quality rankings.

Expected Change In Centres

As another way of measuring future movement, 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. This question produced a slightly different answer than the one above, and is perhaps more reliable due to a larger sample size. The results are displayed in Chart 9.

Forty-eight out of 67 centres in the index were expected to improve or significantly improve by over half of the respondents who rated them. Twelve centres were rated as expected to improve by 75% or more respondents: Amsterdam, Beijing, Casablanca, Copenhagen, Frankfurt, Jersey, Luxembourg, Madrid, Oslo, Singapore, Stockholm, and Zürich. Copenhagen and Zürich led the group of centres expected to improve significantly.

Table 4 | Centres That Will Become More Significant

Centre	Number of Mentions
Paris	25
Frankfurt	17
New York	15
Shanghai	15
Singapore	15
London	13

The centres with the worst outlook, with more than 15 per cent of respondents who rated them judging that their green finance would decline or decline significantly, include Calgary, Malta, Washington DC, Mexico City, and Chicago.
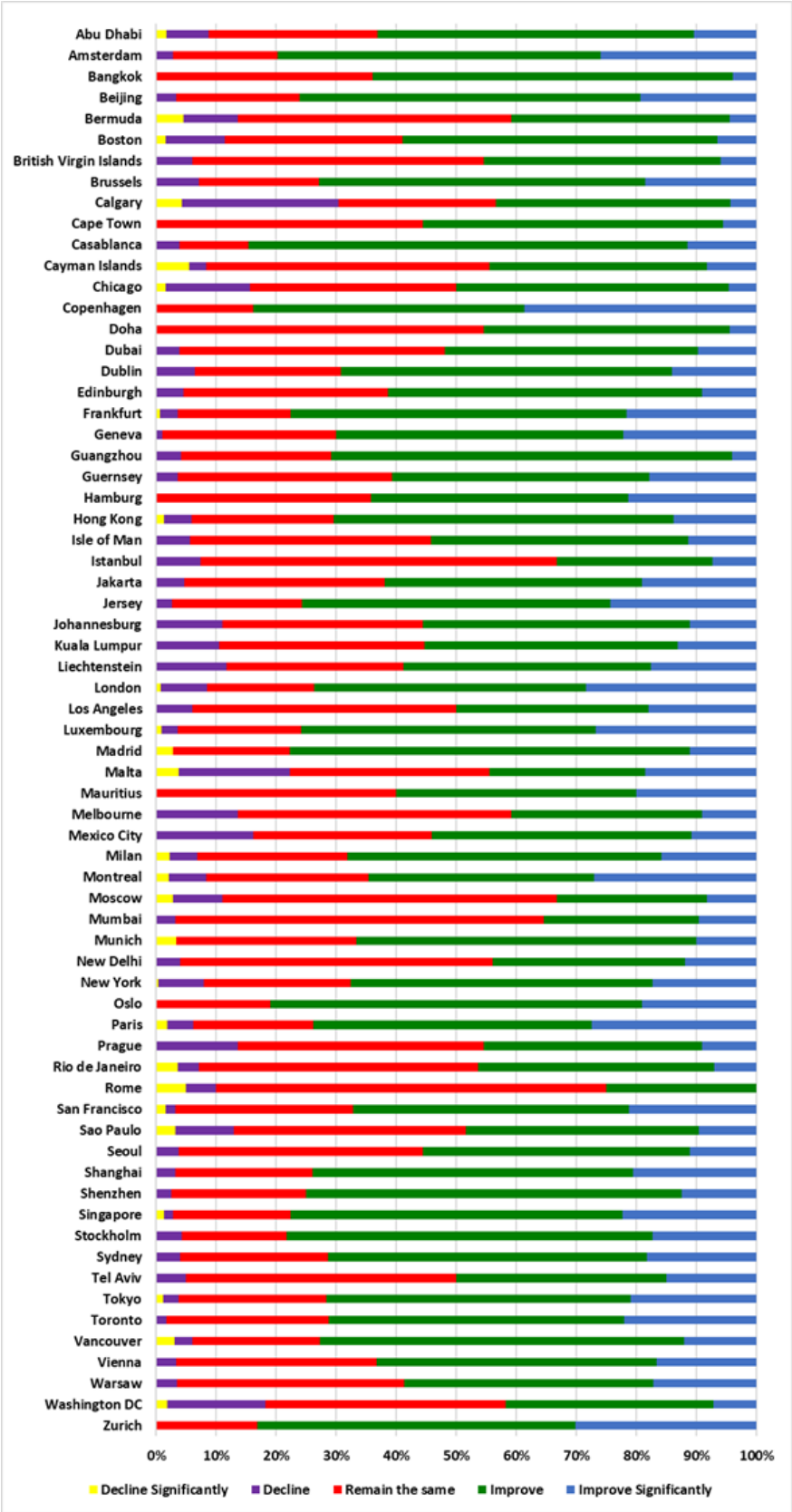
"Our universities need to catch up and develop programmes of learning where green finance is central, not a marginal issue."

Director, Consultancy, Edinburgh

Chart 9 | Expected Change In Green Finance Offering

Instrumental Factors

GGFI 5 is created using 135 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. The correlation between the GGFI and a number of well-established indices has increased over time.

Those factors with the highest correlation tend to be composite indices that reflect a city's approach to sustainability. Such metrics describe the local environment in which financial sector workers are operating, and the alignment of economic policies with the inclusive and green economic outcomes prioritised in the UN's Sustainable Development Goals.

Table 5 | Top Ten Instrumental Factors By R Squared Correlation

Depth	R Squared	Quality	R Squared
Sustainable Cities Index	0.544	Sustainable Cities Index	0.606
Networked Society City Index	0.514	Networked Society City Index	0.587
Quality of Living City Rankings	0.510	Quality of Living City Rankings	0.587
World Talent Rankings	0.504	Global Innovation Index	0.579
Global Innovation Index	0.499	IESE Cities In Motion Index	0.569
Legatum Prosperity Index	0.480	Legatum Prosperity Index	0.564
Water Quality	0.478	World Talent Rankings	0.545
Environmental Performance Index	0.469	Environmental Performance Index	0.540
IESE Cities In Motion Index	0.461	Global Enabling Trade Report	0.536
Global Enabling Trade Report	0.451	Water Quality	0.525

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. 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.

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

Depth	R Squared	Quality	R Squared
Sustainable Cities Index	0.544	Sustainable Cities Index	0.606
Quality of Living City Rankings	0.510	Quality of Living City Rankings	0.587
Water Quality	0.478	IESE Cities In Motion Index	0.569
Environmental Performance Index	0.469	Environmental Performance Index	0.540
IESE Cities In Motion Index	0.461	Water Quality	0.525
Sustainable Economic Development	0.423	Sustainable Economic Development	0.481
World Energy Trilemma Index	0.402	World Energy Trilemma Index	0.474
Financial Centre Corporate Sustainability Performance	0.400	Financial Centre Corporate Sustainability Performance	0.436
Quality of Life Index	0.368	Global Sustainable Competitiveness Index	0.391
Global Sustainable Competitiveness Index	0.359	Quality of Life Index	0.375

The instrumental factors that have the closest correlation with the index results overall and in terms of sustainability measures are:

- the Arcadis Sustainable Cities Index: this index ranks 100 global cities on three dimensions of sustainability: people, planet, and profit. These represent social, environmental, and economic sustainability and offer an indicative picture of the health and wealth of cities for the present and the future;
- the Mercer Quality Of Living City Rankings: this index ranks cities taking account of a range of factors including political, economic, environmental, personal safety, health, education, transportation, and public service factors;
- the Yale Environmental Performance Index: this measure ranks 180 countries on 24 performance indicators across ten issue categories, covering environmental health; and ecosystem vitality. These metrics provide a gauge at a national scale of how close countries are to established environmental policy goals;
- the OECD Water Quality Index: based on a regular survey of people's views on the water quality where they live and work;
- the IMD World Talent Rankings: based on countries' performance in three main categories — investment and development, appeal, and readiness: taking account of education, cost of living, apprenticeships, workplace training, language skills, quality of life, remuneration, and tax rates; and
- the Ericsson Networked Society City Index: this index ranks cities based on ICT maturity and their performance in sustainable urban development.

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

Where only sustainability factors are included in the analysis, Zürich, Oslo, Frankfurt, Toronto, and Munich score higher for both depth and quality. By contrast, centres such as Amsterdam, Stockholm, and Hamburg score lower on both measures.

Table 7 | **Top 15 Centres Using All Factors And Only Sustainability Factors**

|	All Factors		Sustainability Factors	
Rank	Depth	Quality	Depth	Quality
1	Amsterdam	London	Zürich (+3)	London
2	Luxembourg	Amsterdam	Luxembourg	Zürich (+1)
3	Copenhagen	Zürich	Copenhagen	Amsterdam (-1)
4	Zürich	Stockholm	Amsterdam (-3)	Copenhagen (+1)
5	Stockholm	Copenhagen	London (+1)	Luxembourg (+1)
6	London	Luxembourg	Paris (+1)	Paris (+1)
7	Paris	Paris	Stockholm (-2)	Oslo (+6)
8	Hamburg	Hamburg	Vienna (+2)	Geneva (+1)
9	Montréal	Geneva	Oslo (+3)	Frankfurt (+11)
10	Geneva	Vienna	Geneva	Munich (+1)
11	Vienna (10=)	Munich	Frankfurt (+10)	Stockholm (-7)
12	Oslo	Brussels	Toronto (+2)	Hamburg (-4)
13	Brussels	San Francisco	Montréal (-4)	Vienna (-3)
14	Toronto	Oslo (13=)	Hamburg (-6)	Vancouver (+3)
15	Sydney (14=)	Sydney	Munich (+3)	Toronto (+2)

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 10.

Chart 10 | GGFI Areas Of Competitiveness
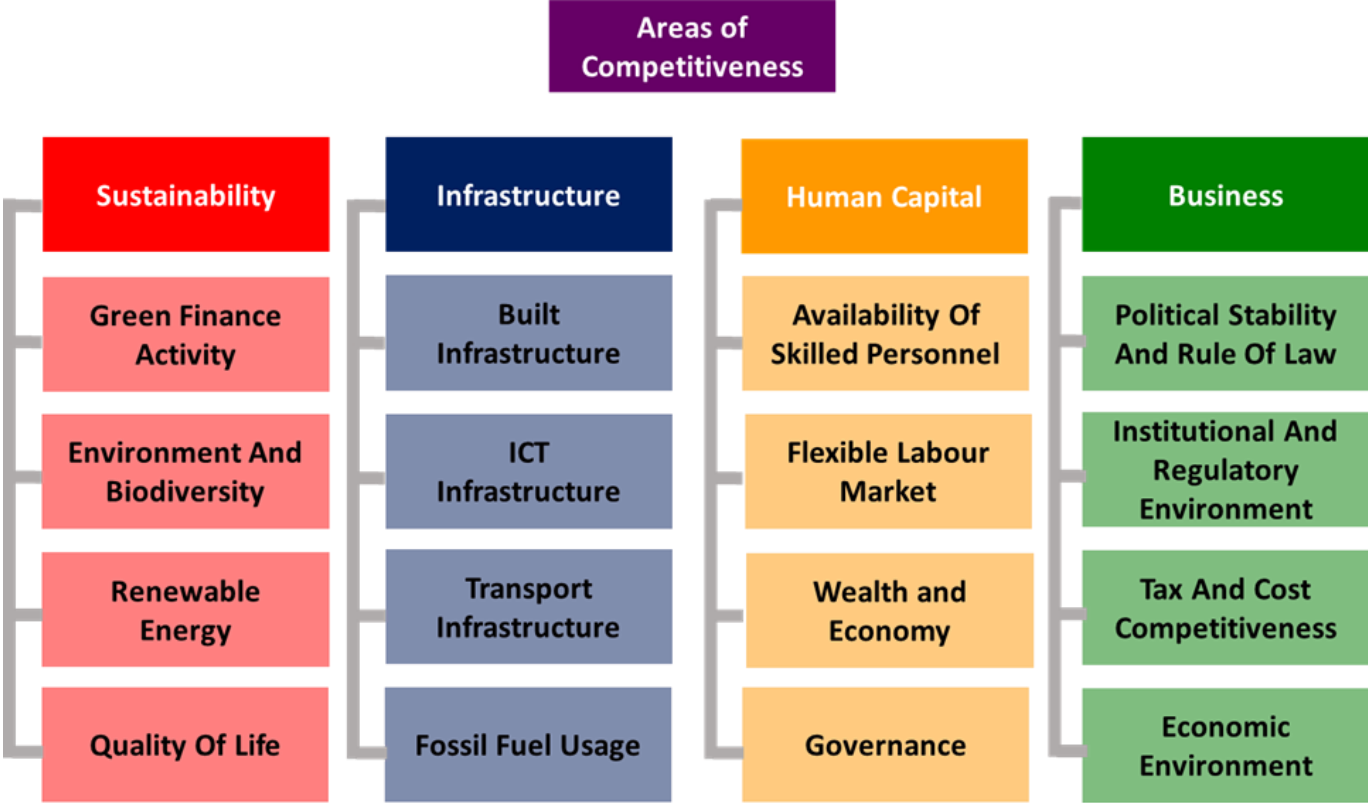
To assess how financial centres' green finance offerings perform against each of these areas, the GGFI model is run for each area separately. The top ranked 15 centres for depth and quality in each sub-index are shown in Tables 8 and 9.

Most of the leading centres have a balance of strengths, and appear in all four of the top 15 rankings. Other centres have some weaknesses, for example, Oslo does not feature in the top 15 for its human capital score. London is top in each analysis for quality.

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

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

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

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

Commentary On Factors

The GGFI survey asks respondents to comment on factors that affect the uptake of green finance, and in particular on regulation, taxation, and the availability of skills. These are summarised in Table 10.

Table 10 | Commentary On Areas Of Competitiveness

Area Of Competitiveness	Number Of Mentions	Main Themes
Regulatory Environment	229	• Regulation must be strong and consistent with international cooperation in place • Mandatory disclosure and work on taxonomies continues to receive support with references to the EU taxonomy. the Bank Of England Supervisory Statement, and the work of the Securities Commission in Malaysia.
Taxation	189	• Carbon taxes were mentioned most frequently as a shift that would change behaviours • There should be a balance of tax incentives and disincentives.
The Availability Of Skills In Green Finance	212	• There is a lack of skills and capacity in green finance. • Universities need to make sustainability mainstream in their curricula. • Open immigration systems remain important.
Other	74	• Political understanding of climate imperatives is weak • Commitment and action from both private and public sector institutions is needed to change mindsets

Regulatory intervention and support was seen as important in moving the financial system in the right direction. This would assist financial institutions to make changes and support investor demand.

There were calls for mandatory disclosure of climate information (or a 'comply or explain' regime) to replace voluntary arrangements; for higher standards and better definitions and taxonomies; capital incentives; and a call for mandatory allocations to support green capital raising.

It would be helpful if regulators were able to move together; and several countries and regulators, such as the China, the US or the UK, were cited as needing to move faster. Although at the same time, initiatives such as the UK Green Finance Initiative were cited as positive steps.

Respondents called for greater consistency in policy around regulatory incentives and for a consistent approach.

Taxation was seen as useful in creating movement in behaviour and markets. There was support both for tax incentives and for penalties, for example, a carbon tax. On this point, respondents noted that this was difficult to deliver on an international basis.

Several respondents said that **skills development** was important, noting that universities could play a bigger role, that professional qualifications needed to include green finance consistently, and that capacity needed to be built to ensure a pool of people able to mode, measure and verify sustainability and changes.

Overall, respondents felt that **government-level action** is needed alongside **private sector development**. Policy incentives and standards needed to be placed alongside action by investors and lenders.

We asked respondents to identify interesting initiatives. These included:
- international networks, such as the Financial Centres For Sustainability Network;
- single country approaches such as Luxflag in Luxembourg, the Belt And Road Green Investment Principles, or the India Innovation Lab For Green Finance;
- The EU green taxonomy and other emerging regulatory and measurement approaches, such as the Sustainable and Responsible Investment Sukuk Framework and Value Based Intermediation guidelines in Malaysia;
- Property Assessed Clean Energy (PACE) financing is becoming important in Canada and the US.

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 11 and 12 use Casablanca and Mauritius as examples to contrast the different levels of connectivity that the two centres enjoy.

Casablanca has connections to a wider variety of centres, and has received more assessments from those centres than Mauritius; and has stronger links in particular with major centres such as New York, London, and Paris.

You can explore the connectivity data using our online tool at https://www.longfinance.net/programmes/financial-centre-futures/global-green-finance-index/ggfi5-explore-data/ggfi-5-connectivity-chart/.
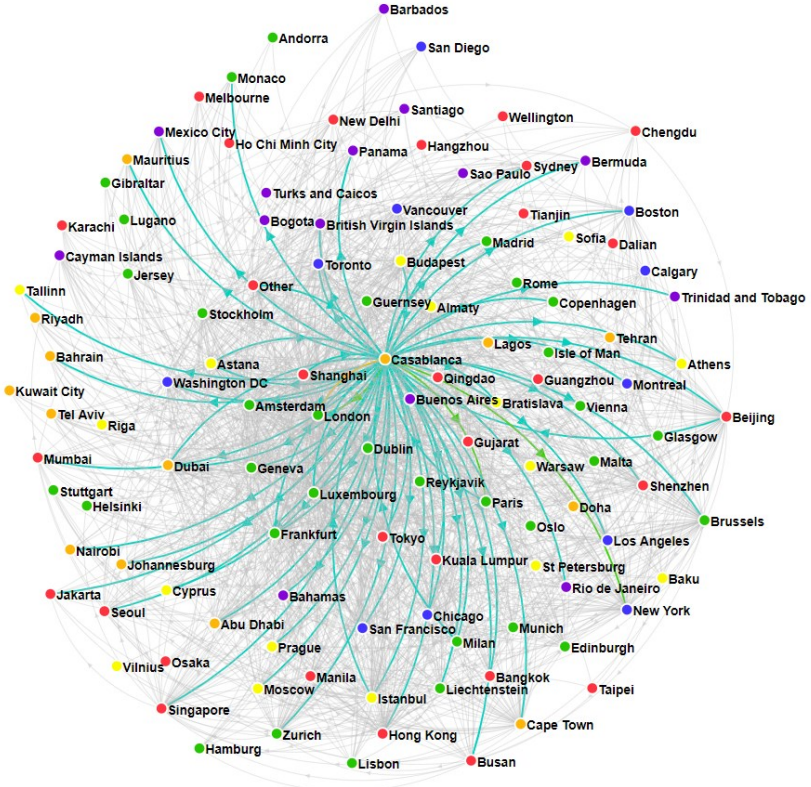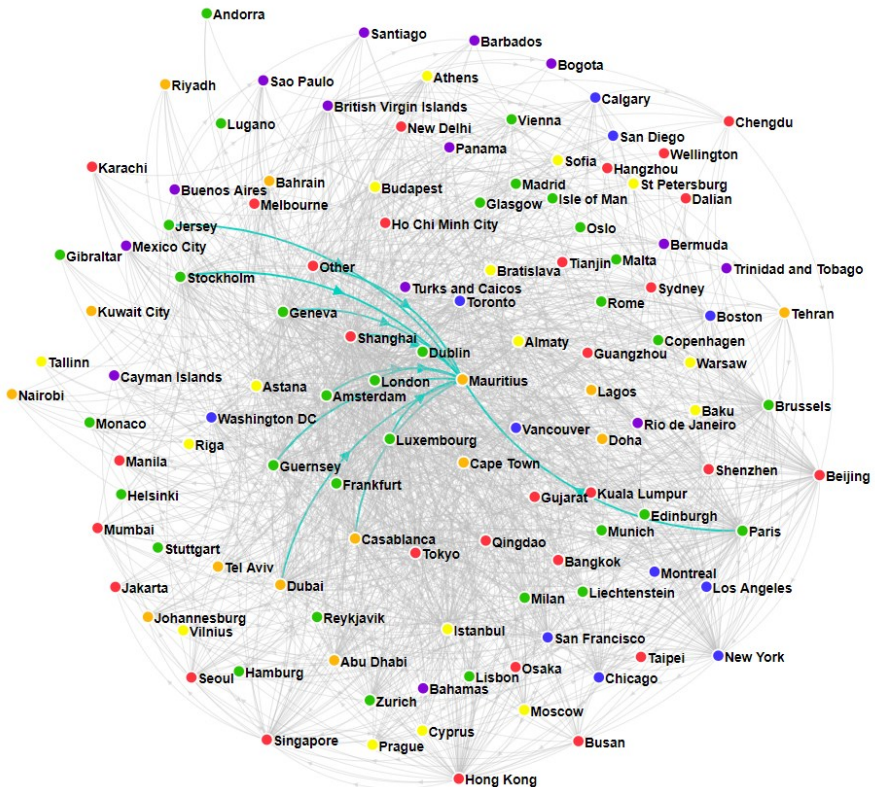
Chart 11 | GGFI 5 Connectivity - Casablanca

Chart 12 | GGFI 5 Connectivity - Mauritius

Another view of connectivity is to look at the number of assessments received by centres and the number of centres that provided assessments. Table 11 shows the relationship between these factors for the centres receiving the highest number of assessments. There is no direct correlation between the number of responses and overall performance in the index. Those receiving a high number of assessments but not ranked highly in the GGFI may need to focus on improving their underlying performance.

Table 11 | Relationship Between Number And Spread Of Assessments For The Top 15 Centres Ranked On The Number Of Assessments Received

| Centre	Number Of Assessments	Number Of Centres Providing Assessments
London	239	44
New York	232	47
Paris	163	32
Hong Kong	154	33
Singapore	144	33
Frankfurt	141	30
Zürich	137	27
Luxembourg	116	28
Amsterdam	106	28
Dubai	102	33
Shanghai	93	34
Geneva	90	27
Beijing	88	25
Tokyo	81	27
Dublin	80	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.

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).

'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.
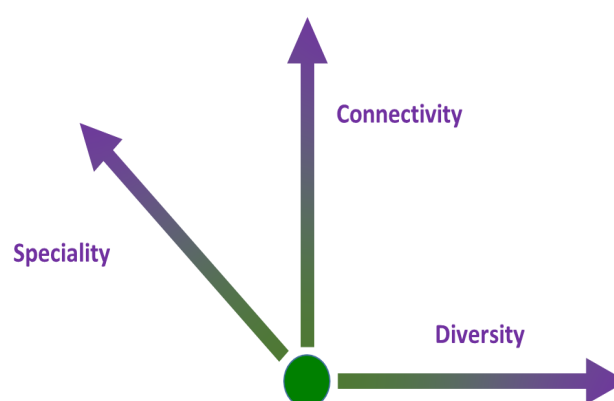
This takes taking account of the range of factors against which the centre has been assessed – the 'richness' of the centre's business environment; and the 'evenness' of the distribution of that centre's scores. A high score means that a centre is well diversified; a low diversity score reflects a less 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 12 and 13, '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 67 centres in GGFI 5 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.
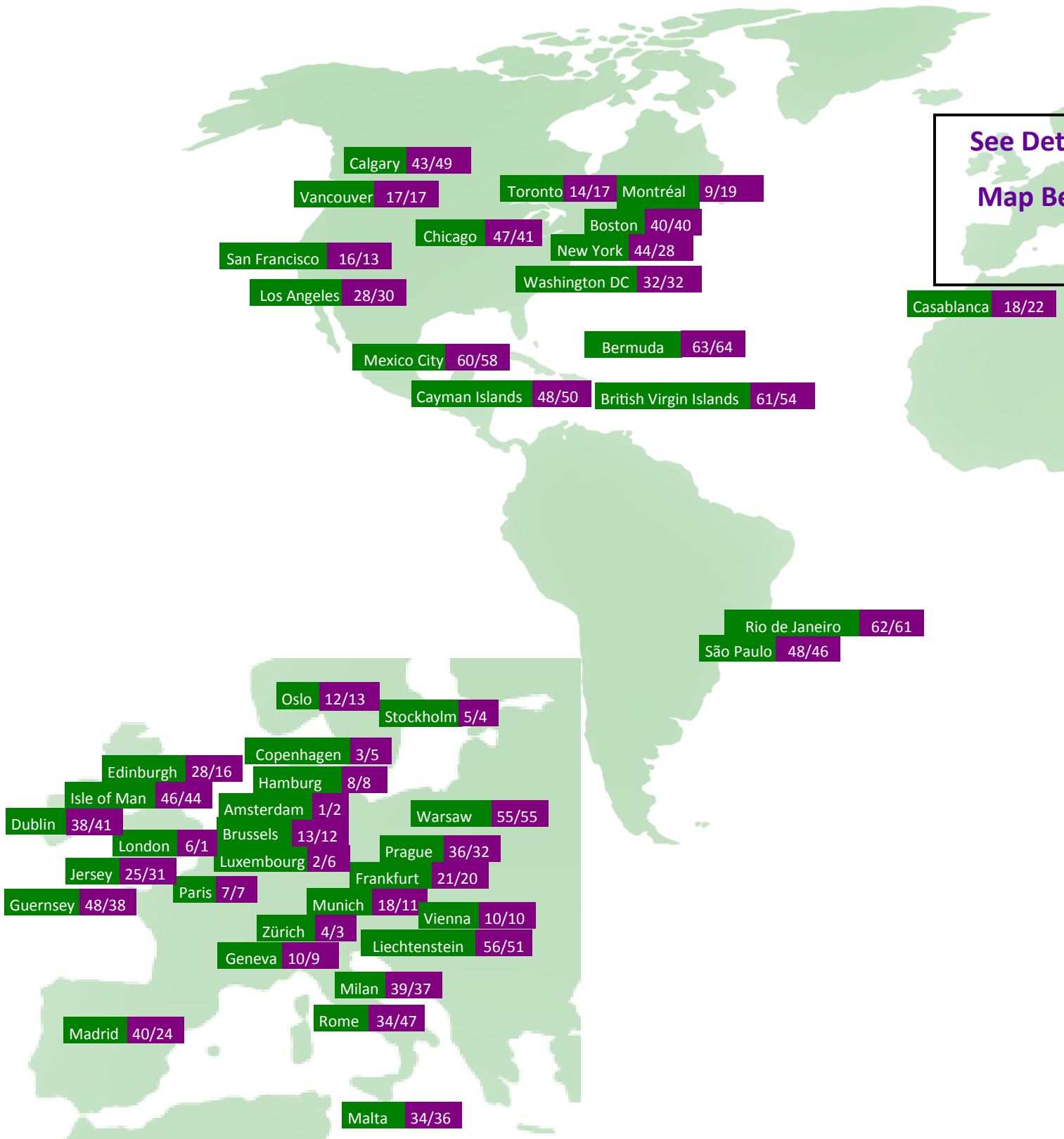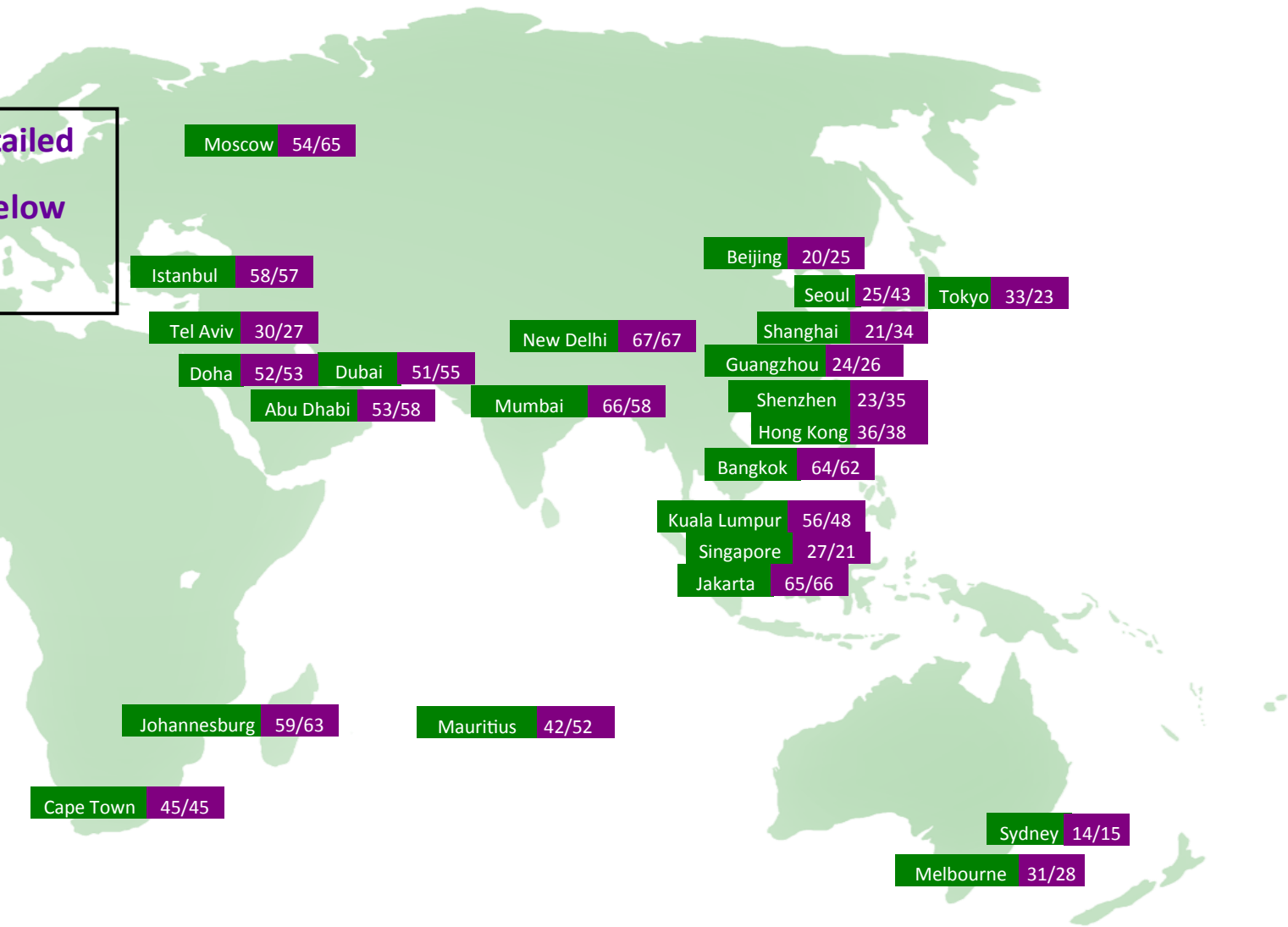
Table 12 | Financial Centre Profiling - Depth

	Broad and Deep	Relatively Broad	Relatively Deep	Emerging
Global	**Global Leaders**	**Global Diversified**	**Global Specialists**	**Global Contenders**
	London	Frankfurt	Luxembourg	
	Amsterdam	Dublin*	Geneva	
	Paris		Shanghai	
	Brussels*		Hong Kong	
	Tokyo		Dubai	
	New York			
International	**Established International**	**International Diversified**	**International Specialists**	**International Contenders**
	Zürich	Toronto*	Casablanca	Guernsey*
	Stockholm	Singapore*	Beijing	Cape Town
	San Francisco	Washington DC*	Shenzhen	Mumbai*
	Sydney	Milan*	Liechtenstein	
	Edinburgh	Boston*	British Virgin Islands*	
	Vancouver*	Chicago	Istanbul	
	Los Angeles		Abu Dhabi	
	Seoul		Moscow	
			New Delhi*	
Local	**Established Players**	**Local Diversified**	**Local Specialists**	**Evolving Centres**
	Copenhagen	Vienna*	Guangzhou	Prague
	Hamburg	Munich*	Tel Aviv*	Isle of Man*
	Montréal	Oslo (New)	Jersey*	São Paulo*
	Madrid*	Melbourne*	Malta	Mexico City*
	Rome	Warsaw	Cayman Islands	Rio de Janeiro*
	Kuala Lumpur*		Mauritius	Johannesburg
	Calgary		Doha (New)	Bermuda
			Bangkok*	
			Jakarta (New)	
Note: An asterisk denotes centres that have changed their classification since GGFI 3				

Table 13 | Financial Centre Profiling - Quality

	Broad and Deep	**Relatively Broad**	**Relatively Deep**	**Emerging**
Global	**Global Leaders**	**Global Diversified**	**Global Specialists**	**Global Contenders**
	London	Frankfurt	Luxembourg	Shanghai
	Amsterdam		Geneva	Dublin*
	Paris		Hong Kong	
	Brussels*		Dubai	
	Tokyo			
	New York			
International	**Established International**	**International Diversified**	**International Specialists**	**International Contenders**
	Zürich*	Vancouver*	Singapore	Guernsey*
	Stockholm	Toronto	Casablanca	Cape Town
	San Francisco	Washington DC*	Beijing	British Virgin Islands
	Sydney*	Milan	Shenzhen	Istanbul
	Edinburgh	Boston*	Liechtenstein	Mumbai*
	Los Angeles*	Chicago	Abu Dhabi	
		Seoul	Moscow*	
			New Delhi*	
Local	**Established Players**	**Local Diversified**	**Local Specialists**	**Evolving Centres**
	Copenhagen	Oslo (New)	Guangzhou	Isle of Man*
	Hamburg	Melbourne*	Tel Aviv*	São Paulo*
	Vienna	Rome	Jersey*	Mauritius*
	Munich	Calgary*	Prague	Mexico City
	Montréal	Warsaw	Malta	Rio de Janeiro
	Madrid		Cayman Islands	Johannesburg
	Kuala Lumpur		Doha (New)	Bermuda
			Bangkok	Jakarta (New)
Note: An asterisk denotes centres that have changed their classification since GGFI 3				

The GGFI 5 World - Centres In The Index

See Det

Map Be

Calgary 43/49

Vancouver 17/17

Toronto 14/17 Montréal 9/19

Boston 40/40

Chicago 47/41

New York 44/28

San Francisco 16/13

Washington DC 32/32

Los Angeles 28/30

Casablanca 18/22

Bermuda 63/64

Mexico City 60/58

Cayman Islands 48/50 British Virgin Islands 61/54

Rio de Janeiro 62/61

São Paulo 48/46

Oslo 12/13

Stockholm 5/4

Copenhagen 3/5

Edinburgh 28/16

Hamburg 8/8

Isle of Man 46/44

Amsterdam 1/2

Warsaw 55/55

Dublin 38/41

Brussels 13/12

London 6/1

Luxembourg 2/6

Prague 36/32

Jersey 25/31

Frankfurt 21/20

Paris 7/7

Munich 18/11

Guernsey 48/38

Vienna 10/10

Zürich 4/3

Liechtenstein 56/51

Geneva 10/9

Milan 39/37

Rome 34/47

Madrid 40/24

Malta 34/36

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Moscow 54/65

Istanbul 58/57

Tel Aviv 30/27

Doha 52/53 Dubai 51/55

Abu Dhabi 53/58

New Delhi 67/67

Mumbai 66/58

Beijing 20/25

Seoul 25/43 Tokyo 33/23

Shanghai 21/34

Guangzhou 24/26

Shenzhen 23/35

Hong Kong 36/38

Bangkok 64/62

Kuala Lumpur 56/48

Singapore 27/21

Jakarta 65/66

Johannesburg 59/63

Mauritius 42/52

Cape Town 45/45

Sydney 14/15

Melbourne 31/28

The numbers beside each centre indicate the rankings first for depth and second for quality in GGFI 5.

An interactive map showing the data for each centre is at https://www.longfinance.net/programmes/financial-centre-futures/global-green-finance-index/ggfi5-explore-data/ggfi5-map/

Green Finance In China: Progress And Prospects

We are grateful to the International institute Of Green Finance at the Central University Of Finance And Economics in Beijing for their assistance in producing this Focus on Green Finance in China.

The last few years have seen explosive growth in the uptake of green finance in China. Great strides have been made in the wholesale adoption of green bonds and green loans as well as innovation in green fintech and the adoption of mandatory environmental reporting.

However, in common with other systems around the world, the Chinese financial system continues to provide capital for environmentally damaging activities such as coal mining and high-carbon energy generation. This suggests that despite recent impressive progress, there is still a long way to go to green the financial system as a whole.

This supplement provides an overview of the current progress of green finance in China, as well as examining how the field may develop into the future.

Using Top-Down Governance To Speed Up Implementation

China has made substantial progress in green finance over recent years. This is based on strong commitments from central government, implemented through a top-down governance model.
In 2015, the Central Party Committee of the Chinese Communist Party and the State Council launched two groundbreaking policy documents which have underpinned green policies in China[1]:

- The "*Opinions of China's Central Party* Committee *and the State Council on Accelerating the Development of Ecological Civilization*"; and
- The "*Overall Plan for the Structural Reform for Ecological Civilization*".

Together, these policy documents guide China's sustainable development goals, across fields as diverse as energy, transport, urbanisation, and financial services. Figure 1 illustrates the relationship between the national committee and the branches of government responsible for delivering these goals. From central to local levels through the Chinese administrative levels, concrete tasks being passed down through the system.

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1 People's Bank of China (2016). *The People's Bank of China and six other agencies jointly issue "Guidelines for Establishing the Green Financial System"*, http://www.pbc.gov.cn/english/130721/3131759/index.html

Figure 1 | Top-Down Governance Model Of Green Finance
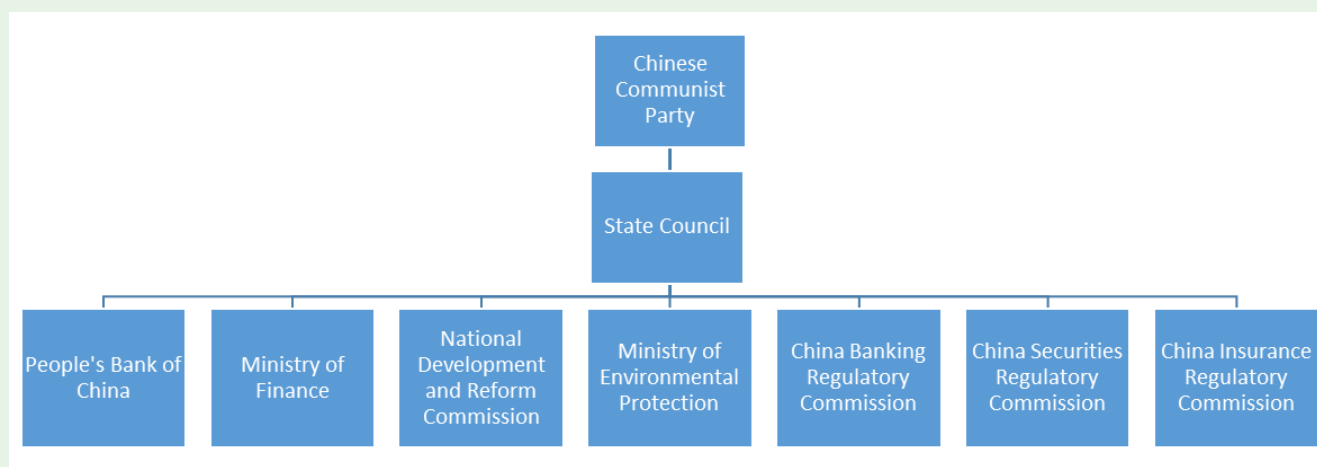
China's current policy framework on green finance was shaped by three landmark developments:

1. The 2007 *launch* of the 'Green Credit Policy' by the China Banking Regulatory Commission (CBRC), People's Bank of China (PBOC), and the Ministry of Environmental Protection (MEP)[2], meant that banks were the primary focus of green finance efforts early on.
2. The establishment of the Green Finance Task Force in 2014 by the PBOC and the UN Environment Program played a critical role in developing a consensus on green finance both at ministry level and among the most senior policymakers.[3]
3. The launch of the *'Guidelines for Establishing A Green Financial System'* in 2016 (jointly developed by the PBOC and six other ministry-level agencies) established a roadmap for action which not only had high-level support but created performance targets and progress indicators for ministries.

Chinese green finance developed rapidly after the launch of the guidelines, which stimulated the development of the Chinese national carbon trading scheme, the green bond market, and mandatory reporting for Chinese listed companies.

As part of the guidelines, the PBOC established the Green Finance Committee (GFC) which became the main body for coordinating the implementation and roll out of the guidelines. The GFC is supported at a local level with over 20 regional Green Finance Committees playing a similar role on the ground.

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2 Later developing into the 'Green Credit Guidelines in 2012' and the 'Green Credit Statistics System' in 2013
3 People's Bank of China & UN Environment Program (2014). *China Green Finance Task Force Report: Establishing China's Green Financial System.*

China's two leading financial centres, Shanghai and Shenzhen, have taken a leadership role in green finance. They have established regulations and processes to facilitate green bond trading, deepened the product offering on green finance through index-linked green-bond wealth management products, and have worked in partnership with other international financial centres to develop benchmarks, standards and indices (such as the Shanghai and Luxembourg stock exchanges' joint launch of green bond indexes.).[4]

Carbon Risk

Currently carbon pricing between the seven regional carbon trading pilots in China is uneven, with prices ranging between 9 and 63 RMB per tonne. The European Emission Trading Scheme (EUETS), the worlds other major carbon trading platform, currently trades carbon at 190 RMB.

Analysis indicates that there is carbon price sensitivity for the 300 largest companies listed in Shanghai and Shenzhen. Should the Chinese pilots be consolidated for a national roll out, and the price of carbon were to reach parity with the EUETS the market capitalisations of these companies could be affected by between 4% and 10%, meaning a potential loss of value at RMB 1tn−2.5tn of at total RMB 25tn of market capitalization.[5]

This provides an indication of the risk of stranded assets in Chinese markets, a topic which has received increasing attention in the last couple of last years[6]. One 2017 report by Oxford University, estimated that stranded assets in coal alone could amount to between 4.1% and 9,5% of China's GDP. With most of such asset being on the books of companies listed on Chinese exchanges, this gives another indication that a significant proportion of market capitalization is still based on fossil fuels[7], although it remains difficult to derive precise figures for this exposure.

Green Bonds

China's annual issuance of labeled green bonds reached RMB 231 billion in 2016 and exceeded RMB 361 billion by the end of 2019 with more than RMB 1.1 trillion in the pipeline, whilst at RMB 1.63 trillion[8] the issuance of un-labeled green or climate aligned bonds was four times larger than the labeled green bond market (see box 1 and figure 2).

However, impressive as these numbers are, they should be considered in the context of China's entire bond market, which had an annual issuance of RMB 45.1 trillion in 2019, of which green bonds made up 0.54%.

4 Luxembourg Stock Exchange (2020). *SSE domestic green bond index series launched,* https://www.bourse.lu/sse-green-bond-index

5 International Institute of Green Finance (2018). *Environmental Stress Testing for the Chinese Asset Management Industry*

6 Z/Yen (2019). *Value* And *Values In A Warming World: Disinvestment Supplement To The Third Edition Of The Global Green Finance Index,* https://www.longfinance.net/programmes/financial-centre-futures/global-green-finance-index/ggfi-publications/global-green-finance-index-3/

7 University of Oxford (2017). *Stranded Assets and Thermal Coal in China: An analysis of environment-related risk exposure*
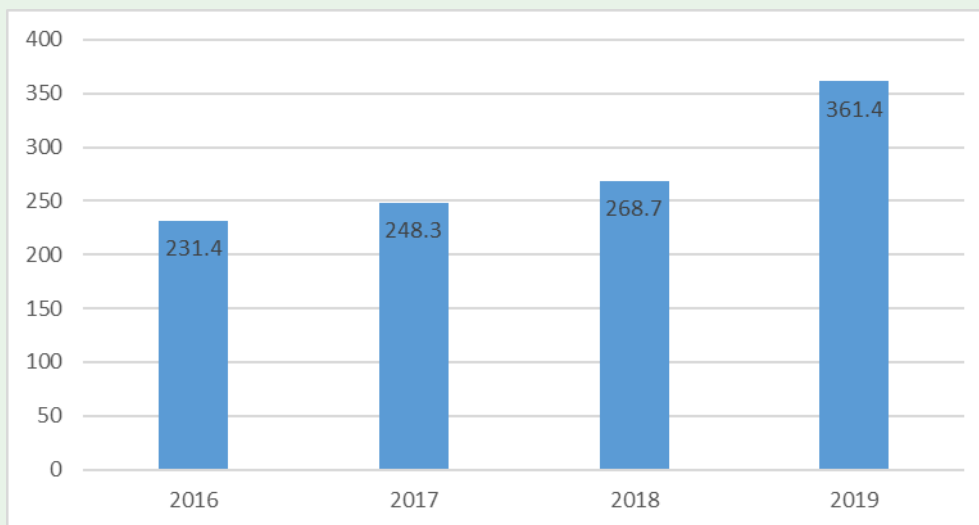
8 International Institute of Green Finance (2020). *Green Bond Database*

Box 1 Shades of Green

- *Labelled green bonds are bonds that earmark proceeds for climate or environmental projects and have been labelled as 'green' by the issuer.*
- *Climate-aligned bonds are bonds that finance green or climate assets that help enable a low-carbon economy but have not been labelled as green by the issuing entity.*
- *Labelled green bonds are primarily issued by diversified companies and institutions, whereas un-labelled bonds are mostly pure-play issuers.*

Source: Climate Bonds Initiative, State of the Market, 2017

Figure 2 | Annual Labeled Green Bond Issuance In RMB

Source: International Institute of Green Finance (2020). Green Bond Database

Chinese green bonds' use of proceeds must go towards the purposes defined in either of the market's two standards, the PBOC or NDRC standard, of which the PBOC standard makes up the majority of issuance. Figure 3 details the allocation of capital for green bonds categorized under the PBOC standard.

Figure 3 | Green Bond Use Of Proceeds Allocation 2019 (PBOC Standard)
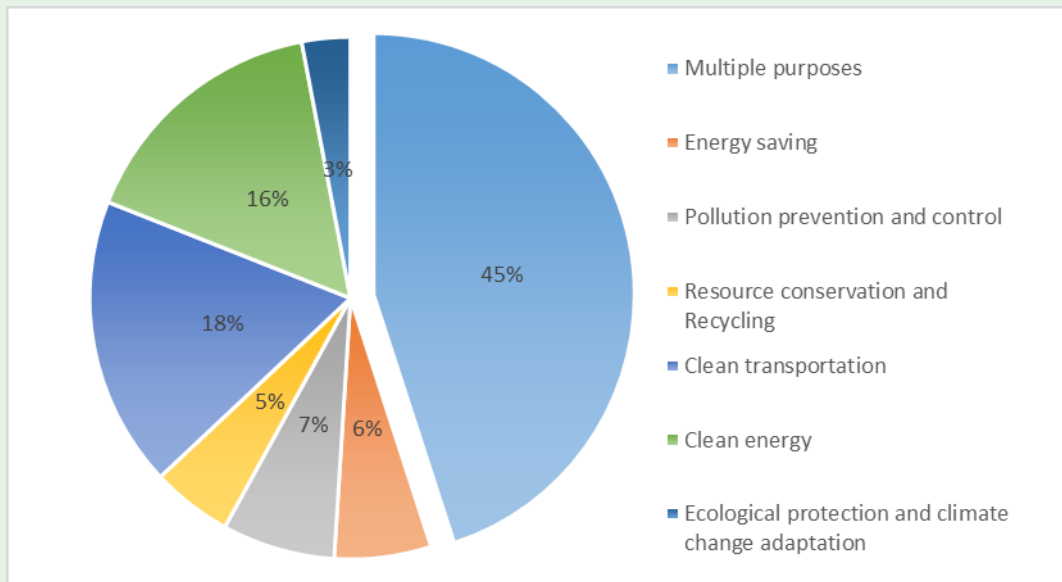
Source: International Institute of Green Finance (2020). Green Bond Database

In 2019, almost half of issuances allocated capital to 'multiple purposes'. The main explanation for this is that financial institutions made up 34% of issuers - down from 62% in 2018- and issue bonds for investment across multiple projects. This can be compared with companies issuing bonds for specific types of projects, which will often be within a single category.

A key issue for the continued development of China's green bond market is the harmonisation of standards both domestically and internationally. China's green bond market is governed by two standards - PBOC covering most issuers and NDRC covering a portion of state-owned enterprises. This leads to confusion for investors, particularly international investors.

To address this issue, a committee has been established to standardise Chinese green bond regulations and it is expected that the committee will launch a single Chinese green bond standard towards the end of 2020.

At the international level, China and the EU have issued two white papers focusing on how to harmonise green bond standards between the two regions.[9] A complicating factor is that clean coal is included in the Chinese standard, which is a major concern for most international green bond investors, but a logical inclusion, given China's desire to reduce emissions from thermal power plants in line with its Ultra-Low Emissions (ULE) Standards Policy. A standard with great effect on air particle pollutants such as in the PM 2.5 category, but with limited effect on CO2 emissions.

9 China Green Finance Committee & European Investment Bank (2018). *The Need for a Common Language in Green Finance*

As both China's and EU's standards evolve over time, there is hope that such issues such can be resolved in the future. With China launching a new version of the PBOC green bond standard and the EU launching its sustainable finance taxonomy in 2020, this could mark a major step forward on developing a global common language on green finance.

Green Credit: Guiding Banks To Increase Green Lending

The China Banking Regulatory Commission (CBRC) issued its *Green Credit Policy* in 2007, making this one of the earliest green finance policy interventions in the Chinese financial market.

Targeting credit is particularly important in China, which has a bank-led financial system, with bank loans making up about 85% of all financing (the remainder made up of approximately 10% bond and 5% stocks).

The 21 largest Chinese banks are required to disclose details of their performance on green credit to the China Banking and Insurance Regulatory Commission (CBIRC, former CBRC). In 2019, outstanding green loans amounted to RMB 10.9 trillion, making up an impressive 9.6% of total lending.[10] A breakdown of lending in 2017 reveals a prioritisation of transport, water, and renewable energy projects (see figure 4).

Figure 4 | Green Credit Balance By Green Categories 2017
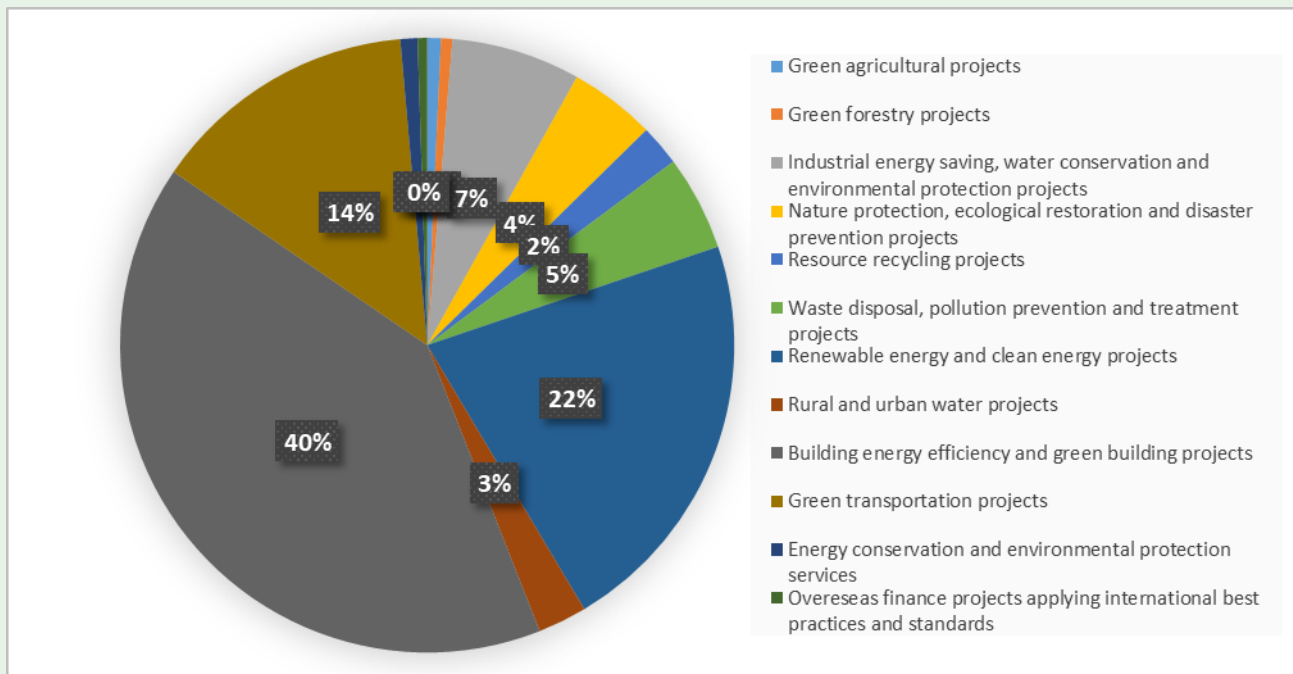
Source: China Banking Regulatory Commission (2017)[11]

10 Xinhua Finance (2019). 银保监会：国内21家主要银行上半年绿色信贷余额10.6万亿., http://greenfinance.xinhua08.com/a/20191023/1894434.shtml

11 China Banking Regulatory Commission (2017). *Statistics on Green Credit of 21 Major Banks,* http://www.cbrc.gov.cn/chinese/files/2018/8E392703618F4CB283AACB07A391FBDE.pdf

Focusing on banks, China is rolling out policies to incentivise green credit:

- At the end of 2017, the PBOC introduced a green macro-prudential assessment (MPA) system, which ranks banks on their performance, and where banks that have a higher proportion of green loans and that have issued green bonds are given higher MPA scores. Incentivisation systems, linked to this ranking, are currently under development.
- In June 2018, the central bank expanded the guarantee scope of its medium-term lending facility (MLF) to include green finance instruments as suitable collateral. The new types of guarantees include collateral, such as highly rated loans from small companies, agricultural financial bonds, and green bonds.

China is also in the process of adopting lower risk-weights for green assets on the basis of financial stability considerations of the banking system. So far, no country has lowered their risk weights for green assets mainly because most still do not have a green loan definition and are thereby unable to calculate the default rate on green loans. Conversely, on the funding side, this incentivises green bond issuance.

### Reporting: Pioneering Mandatory Environmental Disclosure

As environmental, social, and governance variables are being mainstreamed in investment decisions, in 2020 China will become one of a handful of pioneers to mandate environmental disclosure for all listed companies.

This step is underpinned by regulations launched in 2017 by the China Securities Regulatory Commission (CSRC) and MEP, which sets out a roadmap towards mandatory environmental disclosure for China's more than 3,000 listed companies. This builds on a baseline of around 60% of listed companies voluntarily disclosing ESG performance in 2017.[12]

The roadmap is based on three steps, with recommended disclosure in 2018, a 'disclose or explain' policy in 2019, and complete mandatory disclosure in 2020 (although exchanges and companies have not yet received concrete guidance on the disclosure format from CSRC, suggesting that full compliance by the 2020 deadline may not be achieved).

Although the focus of this regulation is on environmental information, the policy thrust is a strong step forward for ESG development in China, and underlines the proliferation of ESG products and services, such as ESG indexes and databases, as more companies disclose on all three variables.

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12 United Nations Principles for Responsible Investment (2019). *ESG Data in China,* https://www.unpri.org/download?ac=6500

Figure 5 | Green Bond Use Of Proceeds Allocation 2019 (PBOC Standard)
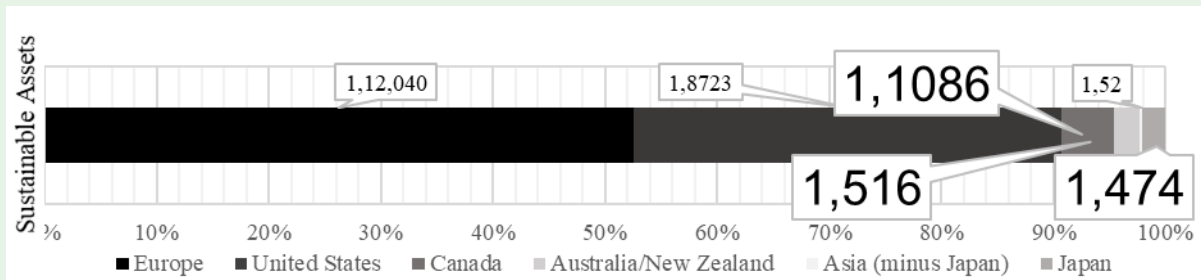
Source: Global Sustainable Investment Alliance (2017).[13]

This prioritisation of environmental information is based on two trends. First, China increasingly wants to attract international investors to participate in its bond and stock markets. These investors have a high level of sustainability awareness and expect, and often require, ESG variables information. Second, while sustainability awareness is still limited amongst Chinese investors, it has grown rapidly over the last few years.

Research by the Global Sustainable Investment Alliance (GSIA) shows that in Asia (excluding Japan) only 0.8% of funds were managed with strategies including sustainability components, (compared with 21.6% in the United States and 50% in Europe).

As a result, over 90.7% of global sustainable investment (around USD 20 trillion), is located in either Europe or in the United States. By increasing access to information on the environmental performance of Chinese assets, it hoped that a proportion of this capital could be attracted to Chinese markets.[14]

Sustainable assets as a proportion of total managed assets in Asia only grew by 16% a year between 2014 and 2016. By comparison, over the same period, the United States saw over 30% growth, whilst in Europe, despite its high starting point sustainable assets grew by 12% annually. A global survey conducted by HSBC in 2017 confirmed that only 68% of Asian investors are willing to increase their efforts to achieve SRI status, compared to 97% of European investors.[15]

Green Fintech: Broadening, Deepening, And Scaling Up Green Finance

With the increasing digitisation of both the economy and financial system in China, the rapidly evolving field of green fintech has the potential to make a significant impact. China has underscored the importance of the topic by including it in both the Belt and Road Forum and the 2018 Argentina G20 Green Finance Study Group (co-chaired by China and the UK).

13,14 Global Sustainable Investment Alliance (2017). *Global Sustainable Investment Review 2014-2016.* New York, USA: Bloomberg

15 HSBC (2017) *Growing Investor Appetite for Green Assets Puts Pressure on Companies to Explain Their Climate Strategies.* London, UK: HSBC

The principal driver behind fintech's importance to green finance is its ability to overcome barriers for scaling up solutions. Big data, artificial intelligence, blockchain and other fintech solutions help surmount information asymmetry, identify green investment opportunities, and unlock complexity in environmental risk management. Reducing costs unlocks new client bases to green finance products, particularly retail customers and small and medium enterprises. New green products such as crowd-funding and peer-to-peer lending enhance inclusivity especially when they are used in conjunction with micro-finance services such as green deposit, credit, and insurance services.

Box 2 Case Study: Enterprise Pollution In Beijing

PBOC is encouraging financial institutions to use green finance IT management systems to report real-time green data. As a result an increasing number of banks, such as ICBC, are using third party digital platforms such as BlueMap by the Institute for Public & Environmental Affairs to source environmental information on clients.

Taking Chinese Green Finance Efforts To The Global Stage

In addition to its efforts to green its domestic financial systems, China is working with a wide range of international partners to deepen and broaden green finance at a global level. When China hosted the G20 in Hangzhou in 2016, China established the green finance study group, which it co-chairs with the UK. The group was so successful that it continued its work in Germany and Argentina the following years, creating global political momentum which integrated a number of existing green finance initiatives, as well as launching a number of new ones.

One of the most significant outcomes of this momentum has been the greening of the Belt and Road Initiative (BRI). The Ministry of Ecology and the Environment (MEE) published the 'Guidance on Promoting Green Belt and Road' in 2017, stressing the importance of sustainable development, green design resource efficiency, and environmental protection. In 2019, this led to the establishment of the BRI International Green Development Coalition composed of transnational and national policymakers, financial services organisations, businesses and NGOs, to share research and develop solutions to delivering sustainability for the BRI.[16] The BRI Green Investment Principles were established at the

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16 United Nations Environment Program (2020). *The Belt and Road Initiative International Green Development Coalition (BRIGC),* ttps://www.unenvironment.org/regions/asia-and-pacific/regional-initiatives/belt-and-road-initiative-international-green

2019 BRI Forum by the China Green Finance Committee and the City of London Corporation's Green Finance Initiative, with 27 of the world's largest financial institutions as members. This initiative works both to increase designated green projects in the BRI as well as to better manage climate and environmental risks for all BRI projects.

China and Chinese organisations are actively participating in a range of other global multi-stakeholder green finance initiatives, including:

- The Central Banks and Regulators Network for Greening the Financial System (NGFS), where China was a leading co-founder, and in which China is spearheading the implementation of green finance into monetary policy.

- The World Bank's Sustainable Banking Network, where emerging countries learn from each other's experience in green finance through knowledge sharing, events, and dialogue. As both a mature case and as an active participant China is supporting a number of other countries to, develop their green bond markets.

China has also played a key role in developing a global Sustainable Development Goals (SDG) finance standard, which is managed through the Chinese Ministry of Commerce and the United Nations Development Program in Beijing . This standard will be launched by mid-2020 and will provide a global taxonomy of projects that can qualify as supporting sustainable development.[17] Once launched, it is expected that Chinese and global financial markets will use the standard as a basis for a wide range of financial products from credit, to bonds, insurance and funds.

China is also promoting green finance through a number of bilateral relationships. These include the United States, European Union, France, and in particular the UK. With respect to the latter, in addition to co-chairing the G20 study group and launching the BRI Green Investment Principles, the two countries are working together on:

- The UK-China Green Finance Taskforce, which has published a number of reports on ESG investing, green BRI, and environmental risk management.[18]
- Collaboration in the implementation of the recommendations of the Financial Stability Board's Task Force on Climate-related Financial Disclosures (led by HSBC and ICBC).

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17 United Nations Development Program (2020). *UNDP holds Consultation on SDG Impact Practice Standards for Private Equity & Use-of-Proceed Bonds,* https://www.cn.undp.org/content/china/en/home/presscenter/articles/2020/undp-holds-consultation-for-sdg-impact-practice-standards-for-pr.html

18 City of London Green Finance Initiative & China Green Finance Committee (2017). *Turning Green Momentum into Action: Interim Report.*

The Future Of Green Finance In China

Despite impressive progress on green finance, non-SDG aligned investment continues to dominate the Chinese financial system. For further progress to be made, a number of key challenges have to be addressed:

♦   **Standards** remain an important obstacle. Multiple standards exist within China; and, in many cases, these differ from global standards. Both these factors add complexity in the labeling of green financial assets and restricts market access by increasing uncertainty and reducing the confidence of investors. Efforts are under way to address this issue, and the National Development and Reform Commission (NDRC) issued a green industry catalogue in 2019 which consolidated existing domestic green standards in line with the China Green Finance Committee priorities.[19] These efforts will increase clarity for green standards, while efforts expand beyond green in 2020 with the launch of the Chinese government's new climate finance standard and sustainability finance standard.

♦   Mainstreaming **and developing expertise in green finance amongst stakeholders in the Chinese financial system**. This includes regulators, banks, and asset owners and managers, as well as organisations outside the financial services industry such as business and policymakers. The scale of this challenge is enormous, as there are approximately 7 million financial professionals in China, all of whom will need to learn how to integrate environmental concerns into their work. This is a task that will unquestionably take time, but a number of current initiatives will help contribute to the transformation. This includes mandatory environmental disclosure by all listed companies in 2020, the establishment of 20 local green finance committees, and an increasing research focus on the topic from universities, think-tanks, and NGOs. A lack of green finance mainstreaming and expertise amongst China's overseas partners poses an extension of this problem, especially under the BRI. Efforts for addressing this issue are being delivered through initiatives such as the Green Finance Leadership Program hosted by Tsinghua University, and the efforts of the World Bank in taking the Chinese green finance lessons to other developing countries.

Despite these challenges, the prospects for a continuation of the rapid growth of green finance in China look encouraging. The development of unified standards for 'green', as well as new standards for 'climate' and 'SDG' finance, as well as continued innovation within new green financial products, such as green asset-backed securities, hold exceptional promise. ESG investing is continuing to mature, and the success of the five provincial green finance pilot schemes, means other provinces and cities are likely to roll out their own pilots.

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19 Paulson Institute (2019). *The Fourth Anniversary of the China Green Finance Committee,* https:// www.paulsoninstitute.org/green-finance/green-scene/the-fourth-anniversary-of-the-china-green-finance-committee/

Two key areas show particular promise:

♦ **The green bond market** - with labeled green bonds only making up RMB 361 billion of issuance and 0.54% of the total bond market in 2019, and given that China's annual green investment needs are RMB 3 to 4 trillion a year, there is enormous scope for further issuance.[20] As 85% of the financing required to meet China's environmental ambitions will need to come from private capital, using capital market instruments like bonds is an excellent way to access private sources such as institutional investors, private banks, and retail investors. Although in its infancy, the Chinese green bond market was primarily created by state-owned commercial banks, but the pool of issuers has grown to include more corporate bonds. As bond markets always evolve from the high credit rated and government-backed organizations, we expect this trend to continue past corporate issuers and on to special purpose vehicles and project bonds. Given the continued scale of Chinese infrastructure investments, this an area of tremendous potential for the green bond market.

♦ **Internationalisation** - In the four years since the launch of the Guidelines, China has made enormous strides in growing its domestic green finance markets, but the internationalisation of these efforts remains in its infancy. As China gradually opens up its financial system, and as Chinese financial institutions increasingly participate in global financial markets, the internationalisation of green finance will become a key trend. The first steps in making this a reality are already starting - green panda bonds (non-Chinese organizations issuing RMB denominated green bonds in China) are making an appearance. With increasing volumes allowed under the Hong Kong and London stock connect programs as well as the revision of the Qualified Foreign Institutional Investors schemes, we expect to see increasing amounts of foreign capital in Chinese green assets. Including Chinese A-shares in the MSCI Emerging Market index is an indication that Chinese assets could be including in global sustainable indexes.[21] Greening the BRI through the initiatives listed above is another concrete way Chinese green finance is currently internationalising.

In conclusion, China has made substantial progress in greening its financial system driven by a strong political commitment and implemented via a top-down governance model. China has not only begun to make serious inroads into existing green finance markets, such as green bonds but is also a pioneer in new areas in green finance governance and monetary policy.

Looking forward, China needs to speed up its gains in this field in order to finance an increasingly ambitious climate and environmental agenda. Only by driving cultural change, which moves green finance from niche to mainstream within the financial system can these goals be achieved. What remains to be seen is the pace at which this transition can be made, in a financial system that faces many other challenges.

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20 Project Syndicate (2016). *The G20 Embraces Green Finance,* https://www.project-syndicate.org/commentary/g20-embraces-green-finance-by-ma-jun-and-simon-zadek-2016-09?barrier=accesspaylog

21 MSCI (2019). *Third Step in the Weight Increase in China A Shares in the MSCI Emerging Markets Indexes in 2019,* https://www.msci.com/documents/1296102/12275477/China_A_Further_Weight_Increase_QA_Feb_2019.pdf/601ed226-477d-13e5-c6ea-6d9c12640641

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; and
- the proportion of assessments provided by each region.

Chart 13 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 13 | Example: Assessments Compared With The Mean For A Region
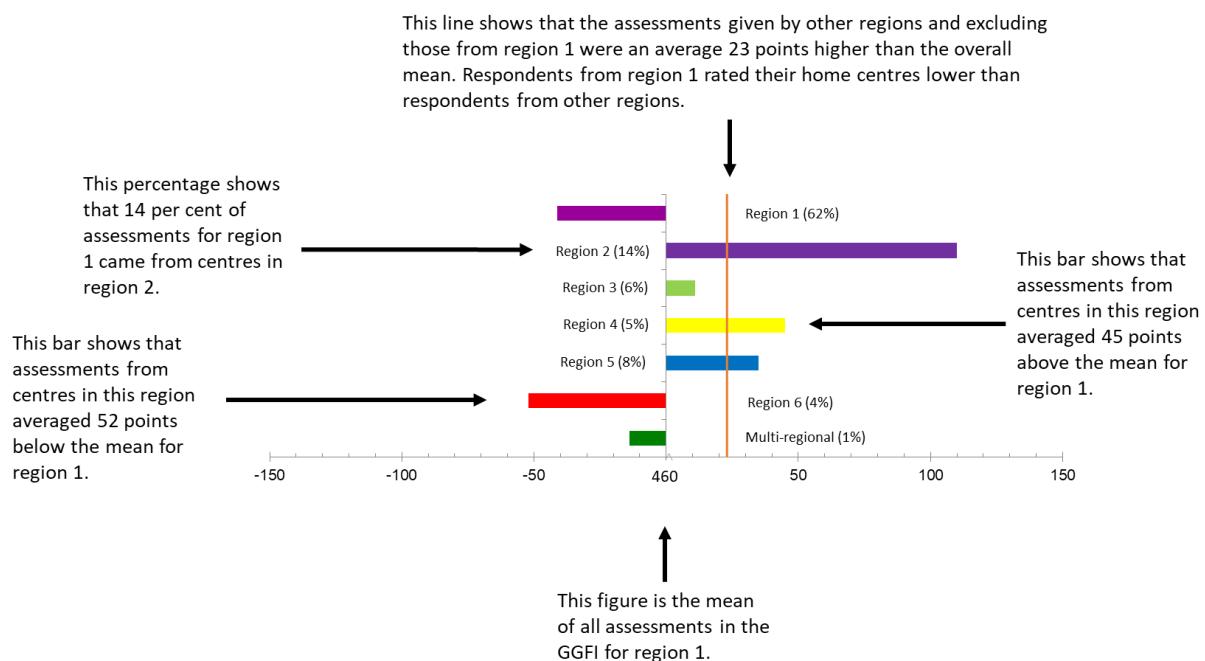
North America

- Ten North American centres feature in the GGFI. Three Canadian centres are in the top 20 overall in GGFI 5.
- Calgary and San Francisco are outliers in terms of country performance. This may reflect San Francisco's early adoption of disinvestment and Calgary's legacy of brown finance.
- Montréal is top in the region for depth, while San Francisco takes top position for quality.
- People from Western Europe, North America, and Latin America & The Caribbean gave North American centres a lower than average rating. Respondents from other regions gave North American centres a higher than average rating.

Table 14 | North America Centres In GGFI 5

| Centre | Depth GGFI 5 | | Centre | Quality GGFI 5 | |
	Rank	Rating		Rank	Rating
Montréal	9	454	San Francisco	13	466
Toronto	14	444	Vancouver	17	455
San Francisco	16	442	Toronto	17	455
Vancouver	17	441	Montréal	19	453
Los Angeles	28	429	New York	28	438
Washington DC	32	415	Los Angeles	30	437
Boston	40	406	Washington DC	32	433
Calgary	43	399	Boston	40	419
New York	44	395	Chicago	41	418
Chicago	47	391	Calgary	49	395

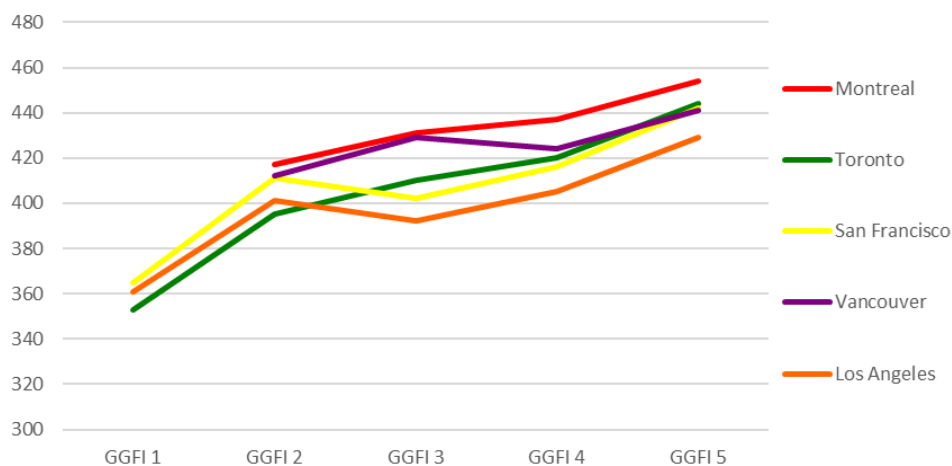**Chart 14 | Top Five North American Centres Ratings Over Time - Depth**

Chart 15 | Top Five North American Centres Ratings Over Time - Quality
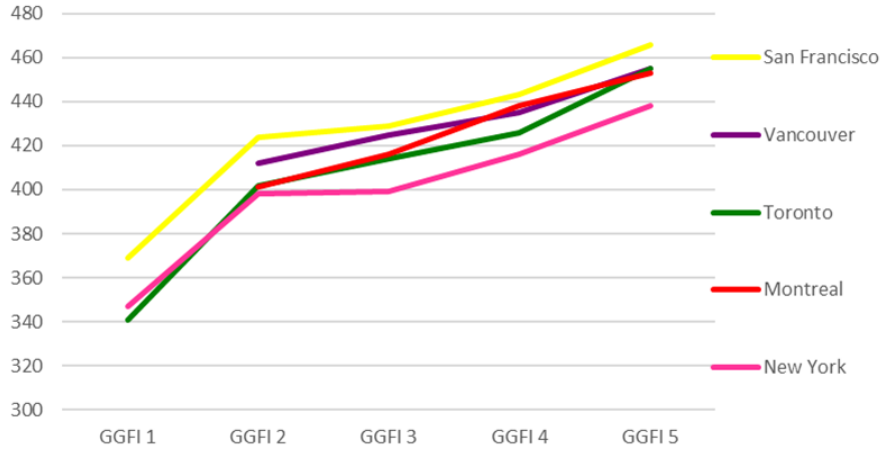
Chart 16 | North American Regional Assessments For Depth – Difference From The Mean

Chart 17 | North American Regional Assessments For Quality – Difference From The Mean

Global Green Finance Index 5 | 48

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

Chart 19 | Regional Assessments For Quality For San Francisco – Difference From The Mean
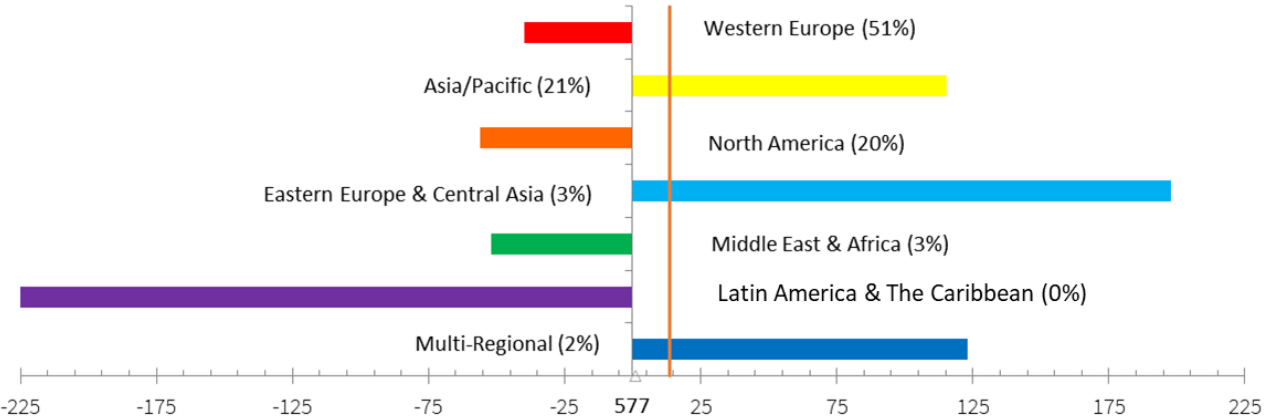
"Green financing is an important activity for ethical investing or impact investing. The emerging green bond market all over world is one of the areas of finance that requires development."

Student, Technology Institute, New Delhi

Middle East & Africa

- Casablanca retained its position as the leading centre in the Middle East & Africa, although it dropped to 18th place for depth and to 22nd place for quality.
- Tel Aviv retained its position as second in the region for green finance.
- All centres in the region fell in the rankings for quality with the exception of Cape Town. Abu Dhabi and Johannesburg fell in the rankings for depth.
- Doha is listed in the GGFI for the first time.
- Respondents from Asia/Pacific, Eastern Europe & Central Asia, and the Middle East & Africa scored cities in the region higher than the average. Those from North America scored centres in the region higher than average for depth and lower than average for quality.

Table 15| Middle Eastern & African Centres In GGFI 5

| Centre | Depth | | Centre | Quality | |
| | GGFI 5 | | | GGFI 5 | |
	Rank	Rating		Rank	Rating
Casablanca	18	439	Casablanca	22	446
Tel Aviv	30	428	Tel Aviv	27	439
Mauritius	42	405	Cape Town	45	406
Cape Town	45	393	Mauritius	52	391
Dubai	51	386	Doha	53	390
Doha	52	382	Dubai	55	382
Abu Dhabi	53	381	Abu Dhabi	58	373
Johannesburg	59	374	Johannesburg	63	367

Chart 20 | Top Five Middle East & African Centres Ratings Over Time—Depth
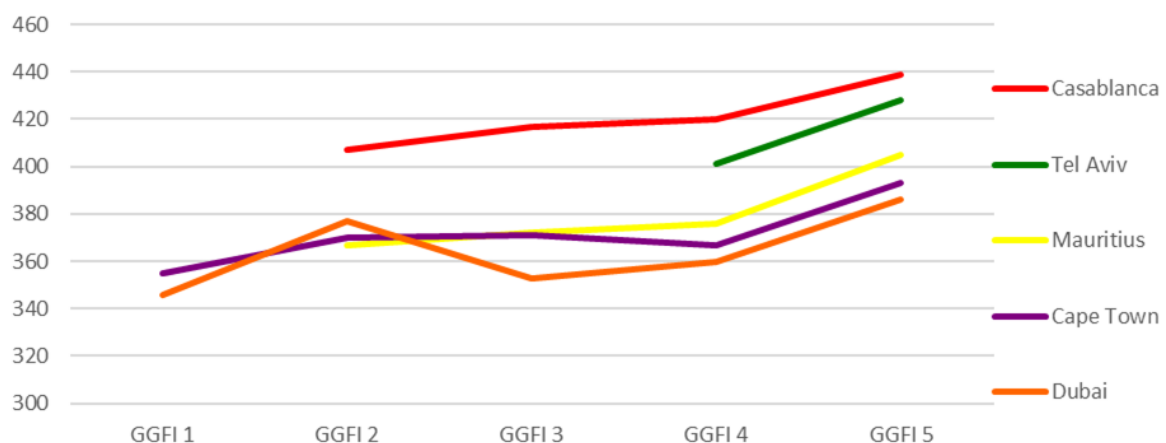
Chart 21 | Top Five Middle East & African Centres Ratings Over Time - Quality
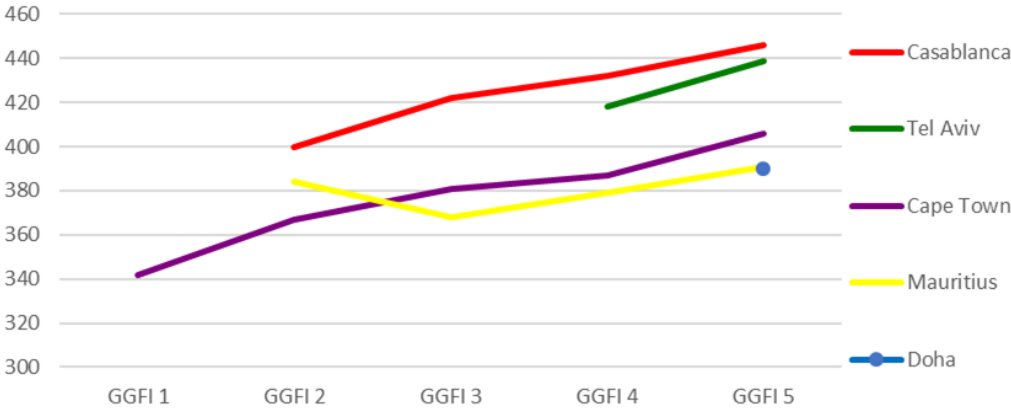
Chart 22 | Middle East & Africa Regional Assessments For Depth – Difference From The Mean
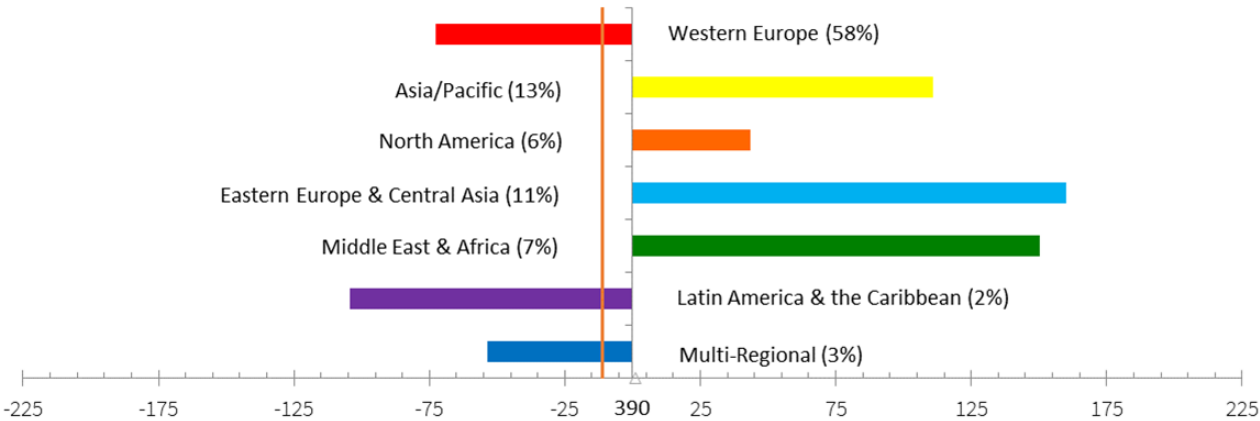
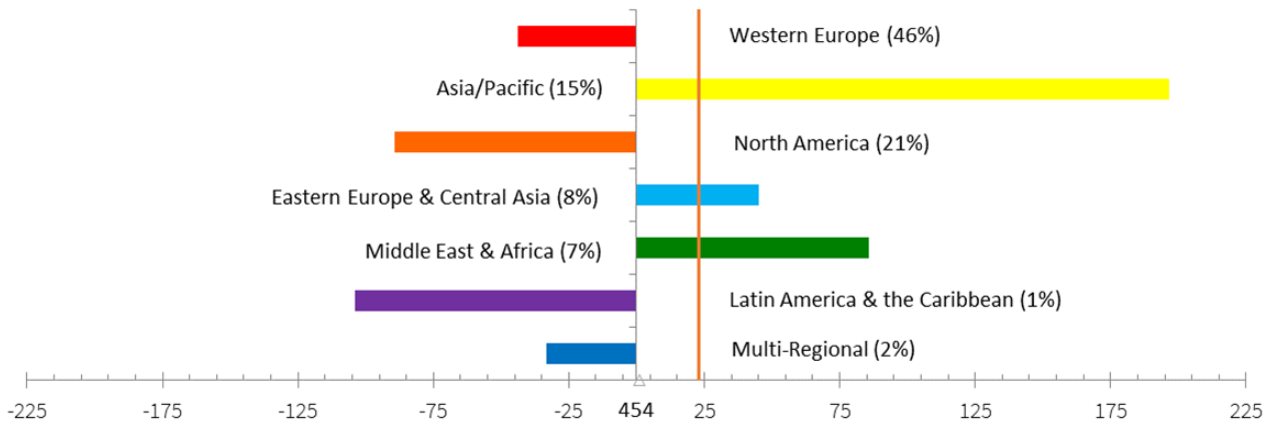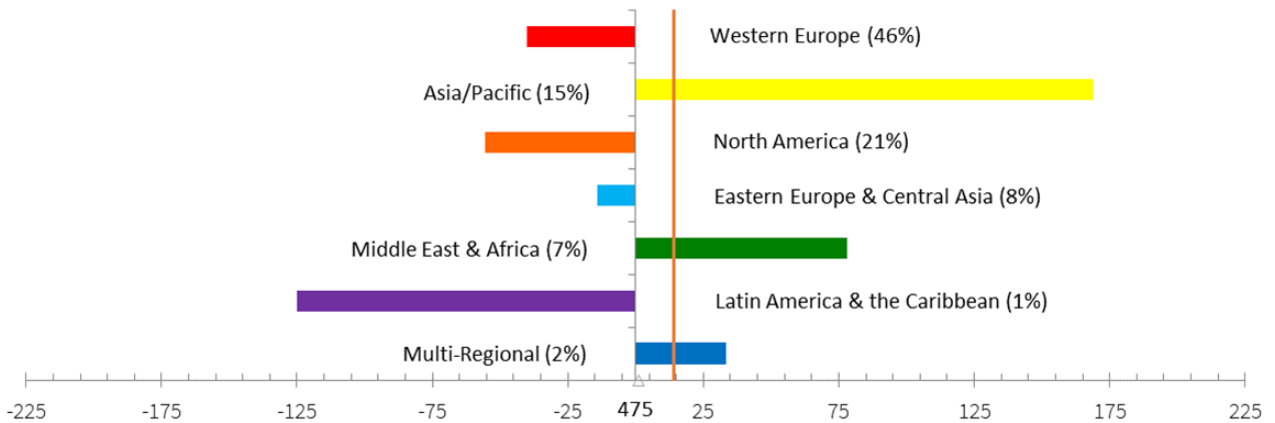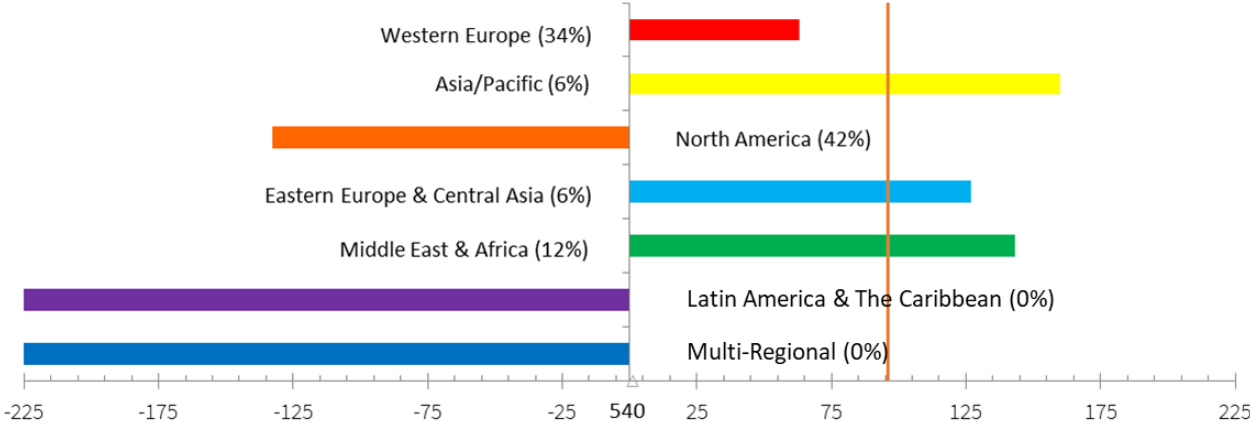**Chart 23 | Middle East & Africa Regional Assessments For Quality – Difference From The Mean**
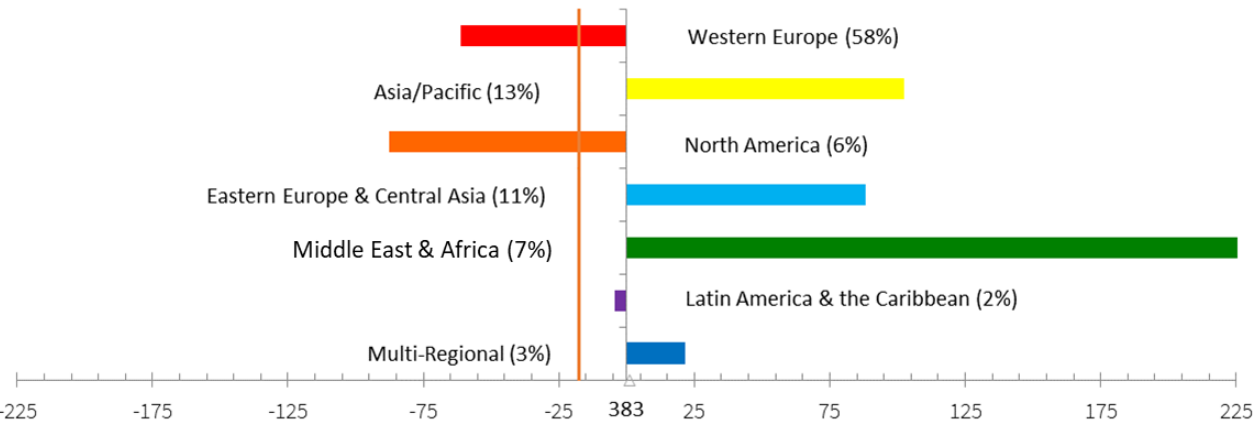
Chart 24 | Regional Assessments For Depth For Casablanca – Difference From The Mean
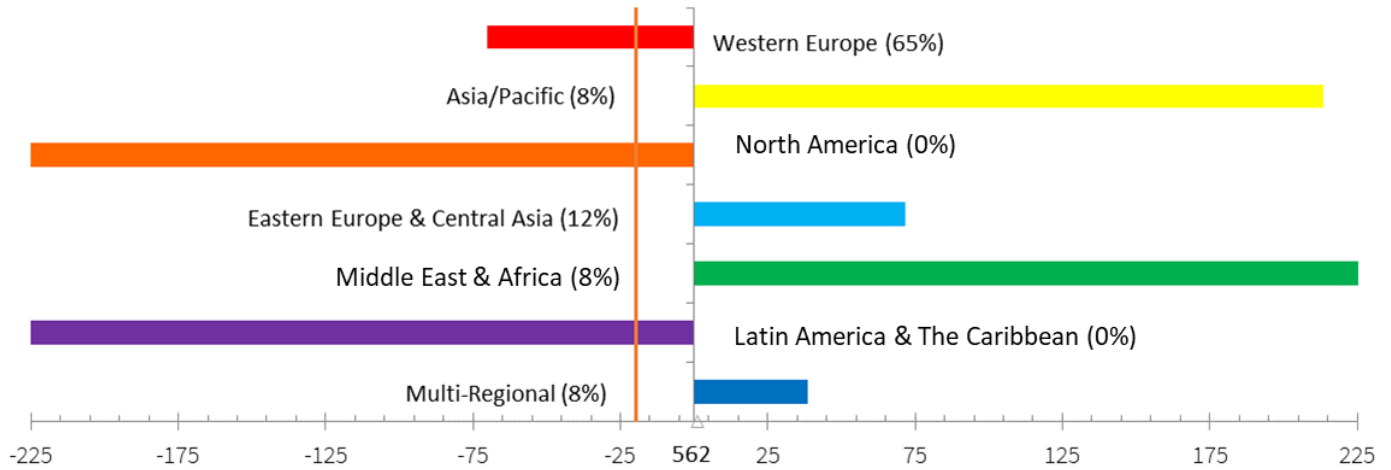
Chart 25 | Regional Assessments For Quality For Casablanca – Difference From The Mean
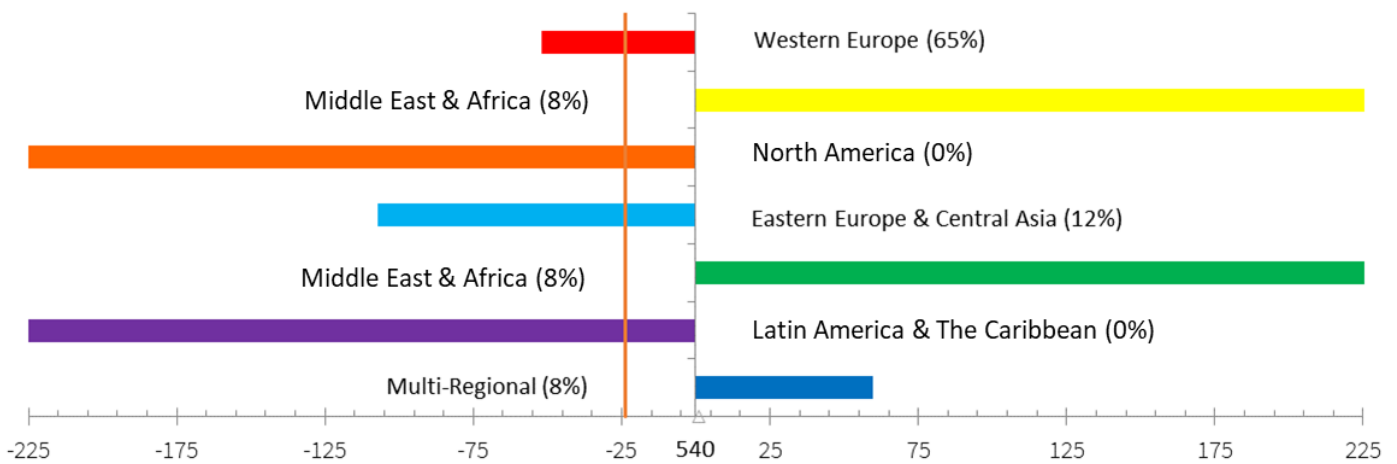
"Tougher building codes with the aspiration of becoming zero-emissions by 2030 are creating new market opportunities for green building suppliers. This kind of regulation is stimulating innovation and investment."

Director, Economic Development Agency, Vancouver

Eastern Europe & Central Asia

- Prague remained as the leading centre for depth and quality in the region. It rose eight places for depth and was down ten places for quality.
- Moscow and Warsaw fell in the rankings for both depth and quality.
- Ratings given by Western European and North American respondents were below the average for the region and ratings for quality given by Eastern European & Central Asian respondents were also below average.

Table 16 | Eastern European & Central Asian Centres In GGFI 5

| Centre | Depth GGFI 5 | | Centre | Quality GGFI 5 | |
	Rank	Rating		Rank	Rating
Prague	36	409	Prague	32	433
Moscow	54	380	Warsaw	55	382
Warsaw	55	379	Istanbul	57	380
Istanbul	58	376	Moscow	65	356

Chart 26 | Eastern European & Central Asian Centres Ratings Over Time—Depth
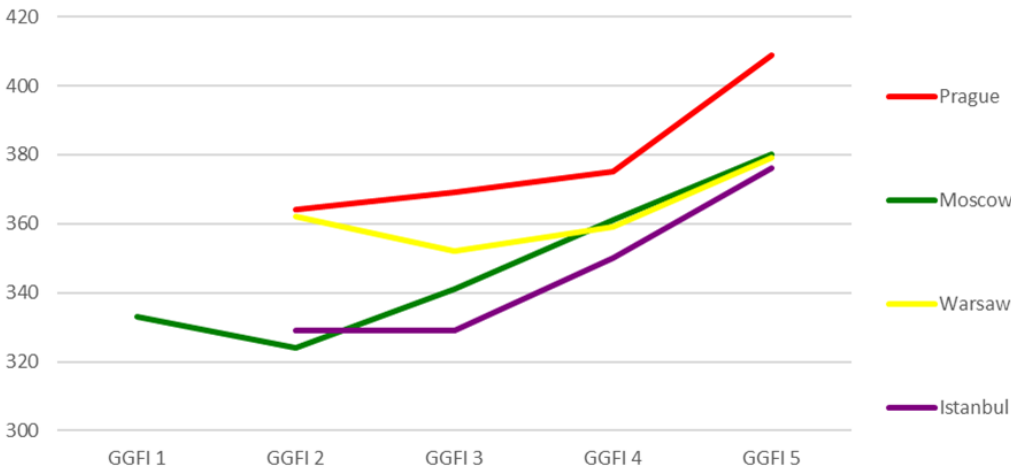
Chart 27 | Eastern European & Central Asian Centres Ratings Over Time—Quality
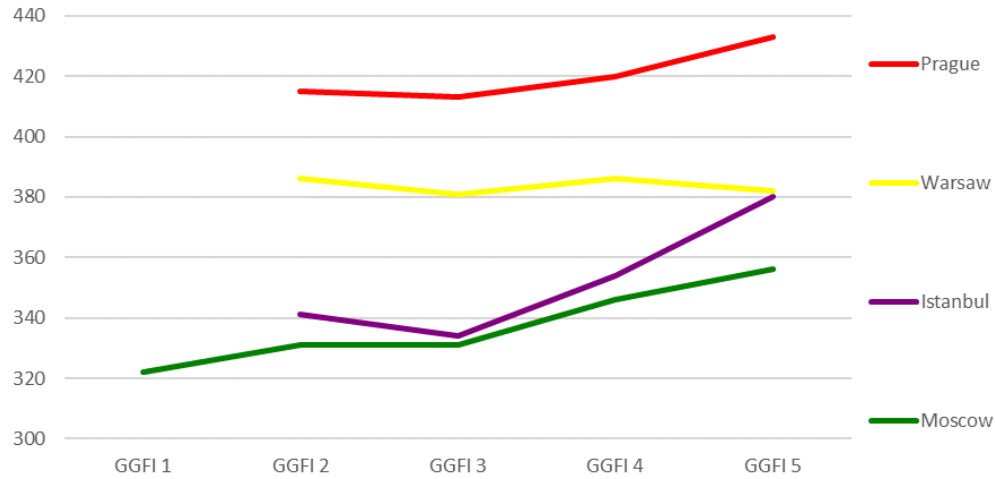
Chart 28 | Eastern European & Central Asian Regional Assessments For Depth – Difference From The Mean
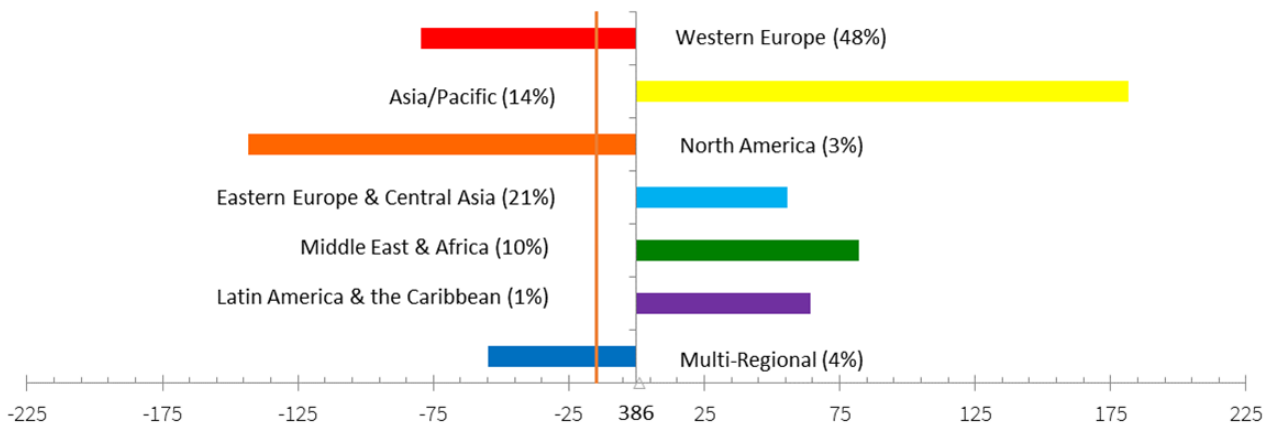
Chart 29 | Eastern European & Central Asian Regional Assessments For Quality – Difference From The Mean

Chart 30 | Regional Assessments For Prague For Depth – Difference From The Mean
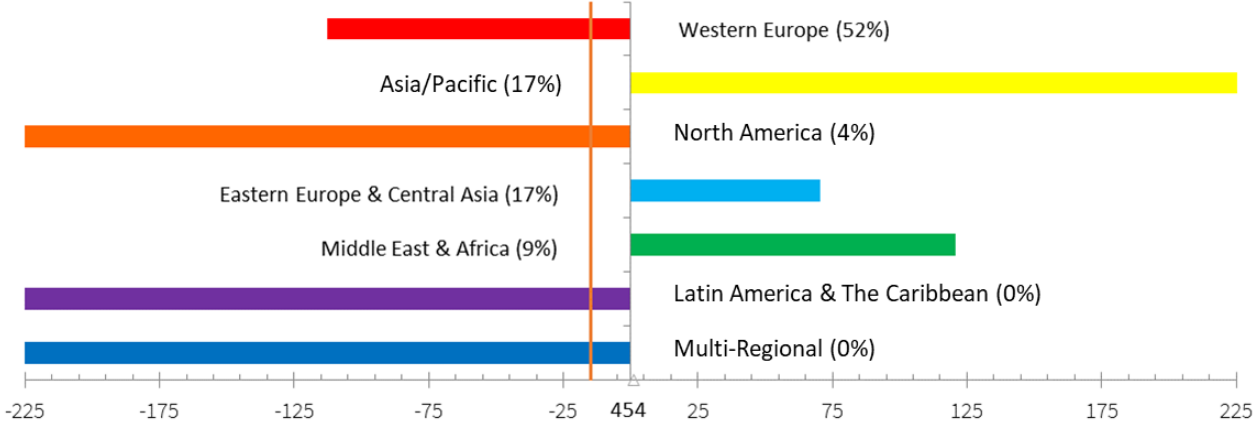
Chart 31 | Regional Assessments For Prague For Quality – Difference From The Mean
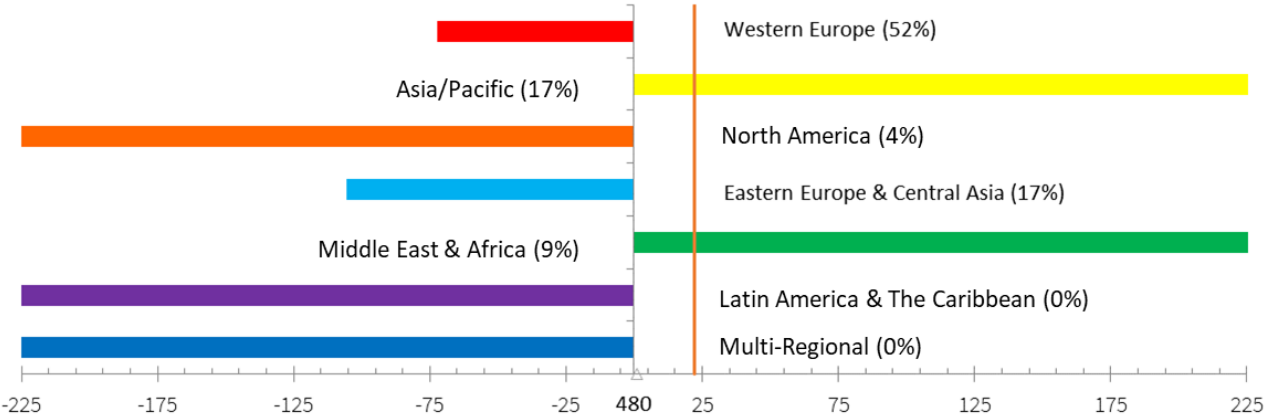
"Not many experts yet, but there is active investing in green bonds by big banks. Investors are investing more into green and the number of green companies invested in by Venture Capital firms is increasing."

Investment Advisor, Government Body, Seoul

Western Europe

- Western European centres continue to perform well for both depth and quality.
- Amsterdam retained its leading place in the depth index, and its second place in the quality index.
- In the quality index, London remains at the top of the table, although its improvement in ratings was slower than the main challengers. We noted in GGFI 4 that if the trend then in place continued, London would be overtaken by other centres for quality by the time of the publication of GGFI 6 in September 2020. Amsterdam and Zürich remain on track to achieve this milestone on current trends.
- Oslo entered the index for the first time, taking 12th place for depth and 13th place for quality.
- Assessments from Western Europe and North America were below average for depth. For quality, assessments from all regions other than Western Europe were above average.

Table 17 | Western European Top 10 Centres In GGFI 5

Centre	Depth GGFI 5		Centre	Quality GGFI 5	
	Rank	Rating		Rank	Rating
Amsterdam	1	496	London	1	516
Luxembourg	2	488	Amsterdam	2	510
Copenhagen	3	484	Zürich	3	507
Zürich	4	483	Stockholm	4	496
Stockholm	5	474	Copenhagen	5	491
London	6	470	Luxembourg	6	489
Paris	7	460	Paris	7	487
Hamburg	8	456	Hamburg	8	477
Geneva	10=	452	Geneva	9	476
Vienna	10=	452	Vienna	10	472

"Malaysia has introduced tax deductibility of green finance issuance costs, as well as some specialized incentives around sukuk."

CEO, Industry Body, London

Chart 32 | Top Five Western European Centres Ratings Over Time - Depth
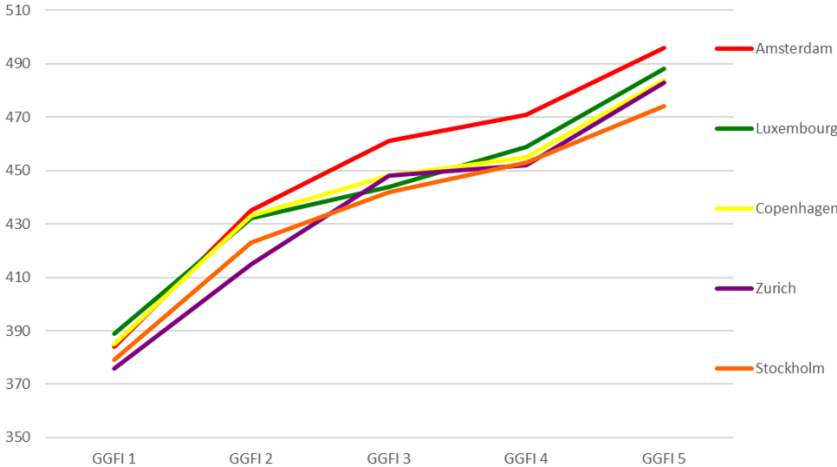
Chart 33 | Top Five Western European Centres Ratings Over Time - Quality
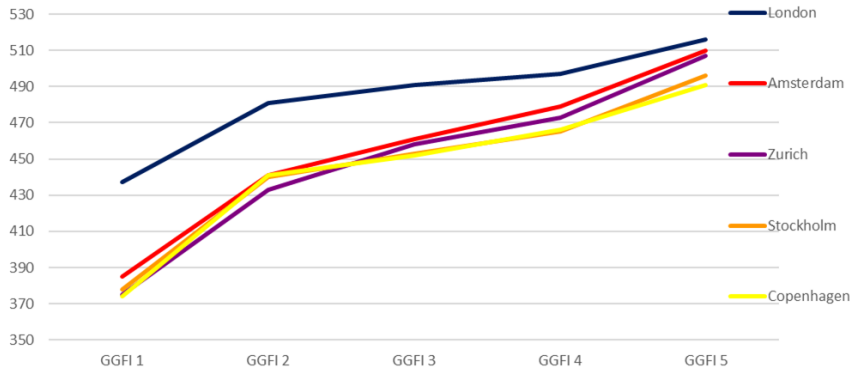
Chart 34 | Western Europe Regional Assessments For Depth – Difference From The Mean
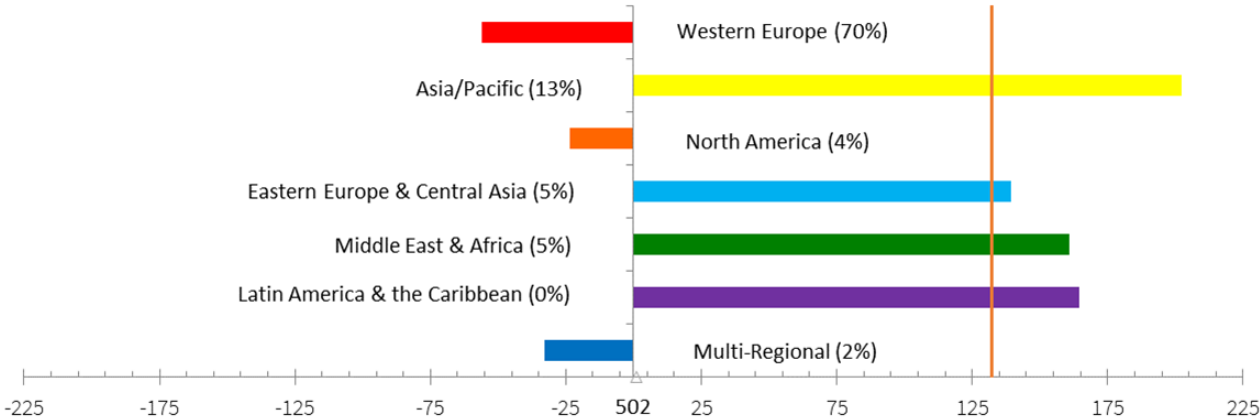
Chart 35 | **Western Europe Regional Assessments For Quality – Difference From The Mean**

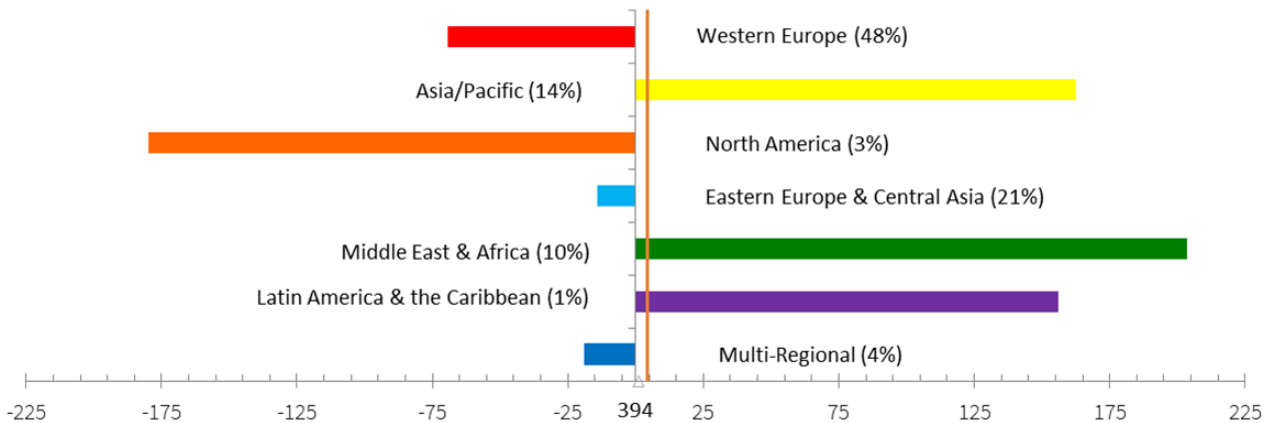**Chart 36 |** **Regional Assessments For Amsterdam For Depth – Difference From The Mean**
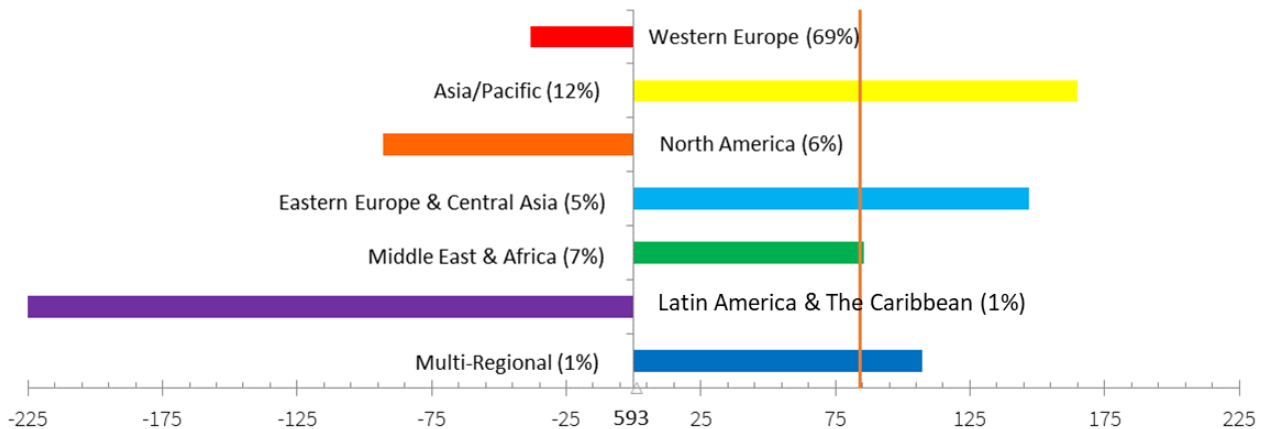
Chart 37 | **Regional Assessments For London For Quality – Difference From The Mean**
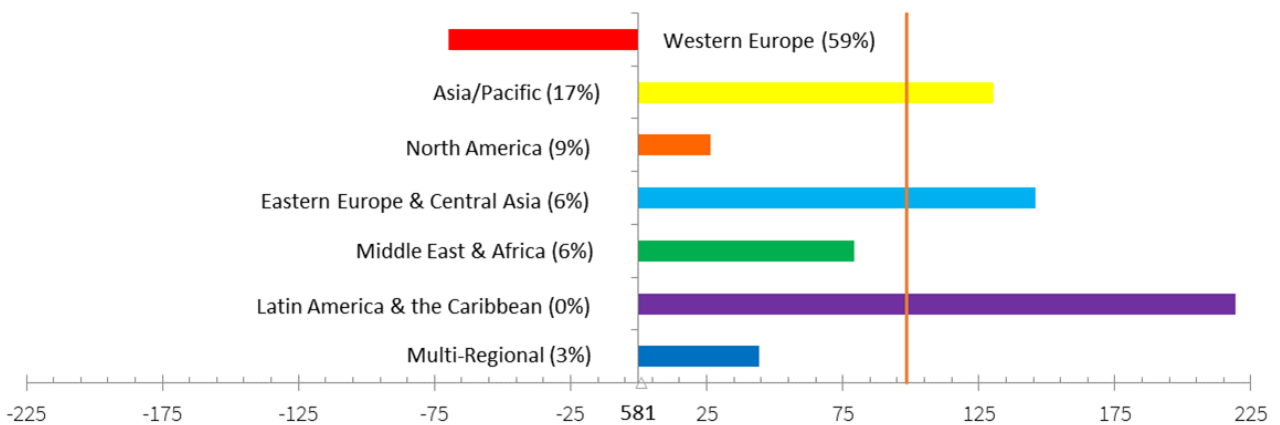
Latin America & The Caribbean

- São Paulo continued to lead the region for both depth and quality and improved its ranking by three places in the quality measure. The case study that we published on São Paulo in April 2019 noted that interest in green finance in Brazil was sparked by hosting the Earth Summit in Rio de Janeiro in 1992. The establishment of the *Protocolo Verde* in 1995 requiring state-owned banks to consider green finance prompted action in the private sector.
- The British Virgin Islands and Mexico City fell in both the depth and quality rankings.
- Assessments from North America, Western Europe, and Latin America & The Caribbean were lower than average.

Table 18 | **Latin American & Caribbean Centres In GGFI 5**

| Centre | Depth | | Centre | Quality | |
| | GGFI 5 | | | GGFI 5 | |
	Rank	Rating		Rank	Rating
São Paulo	48	390	São Paulo	46	400
Cayman Islands	48	390	Cayman Islands	50	394
Mexico City	60	373	British Virgin Islands	54	386
British Virgin Islands	61	371	Mexico City	58	373
Rio de Janeiro	62	366	Rio de Janeiro	61	370
Bermuda	63	356	Bermuda	64	359

Chart 38 | **Top Five Latin American & Caribbean Centres Ratings Over Time - Depth**
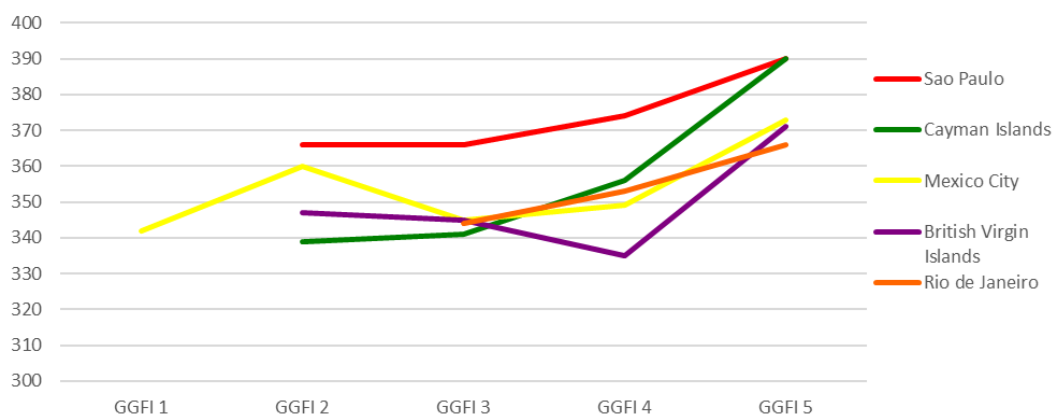
Chart 39 | Top Five Latin American & Caribbean Centres Ratings Over Time - Quality
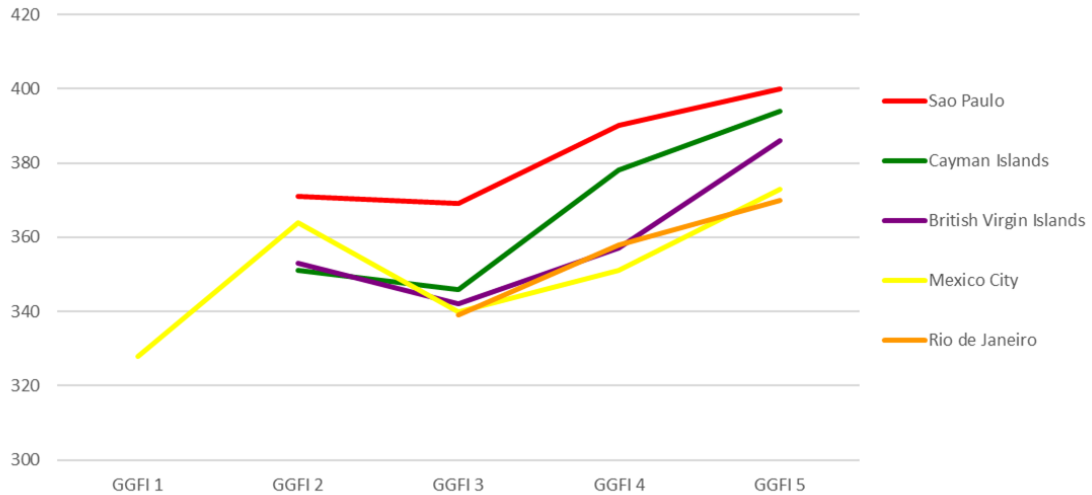
Chart 40 | Latin American & Caribbean Regional Assessments For Depth – Difference From The Mean
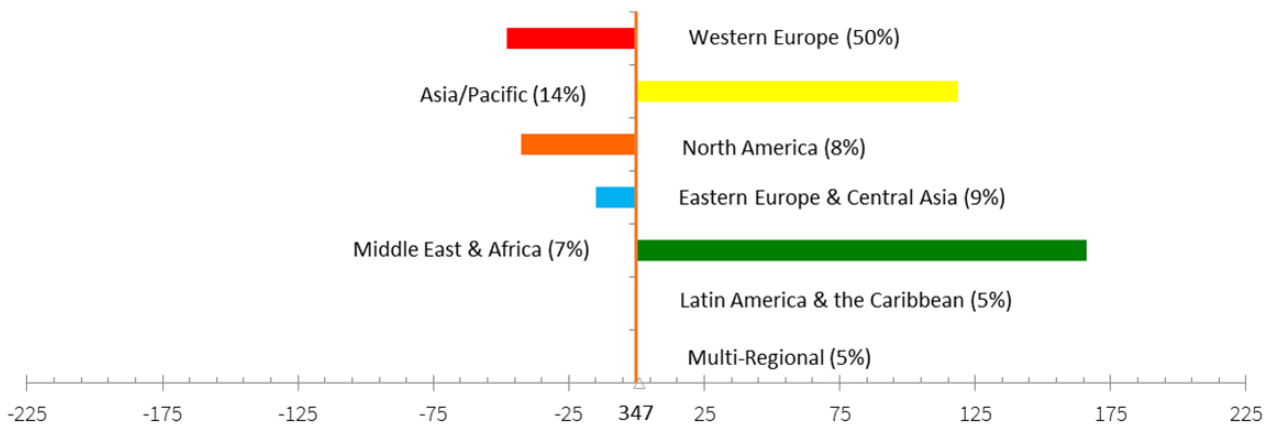
Chart 41| Latin America & The Caribbean Regional Assessments For Quality – Difference From The Mean
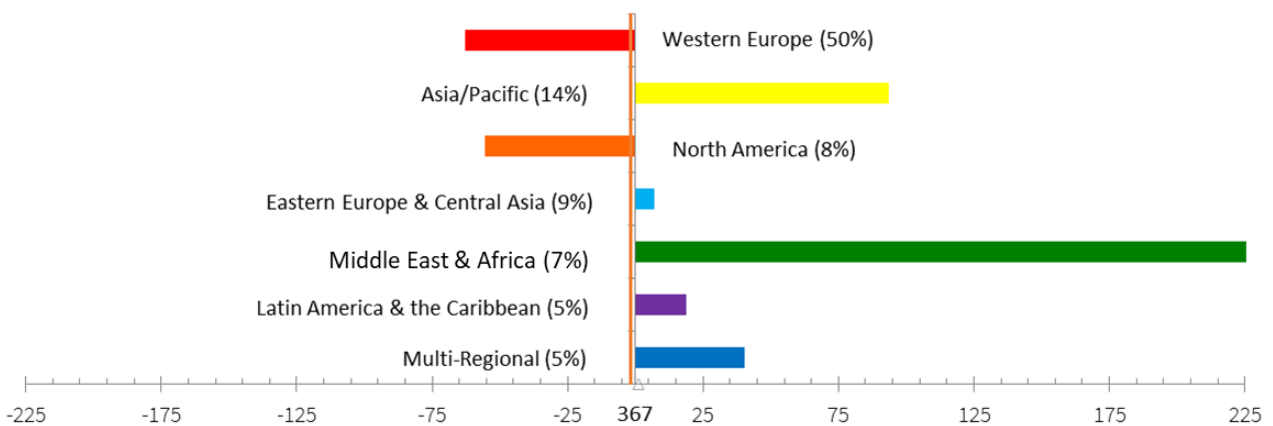
**Chart 42 | Regional Assessments For São Paulo For Depth – Difference From The Mean**
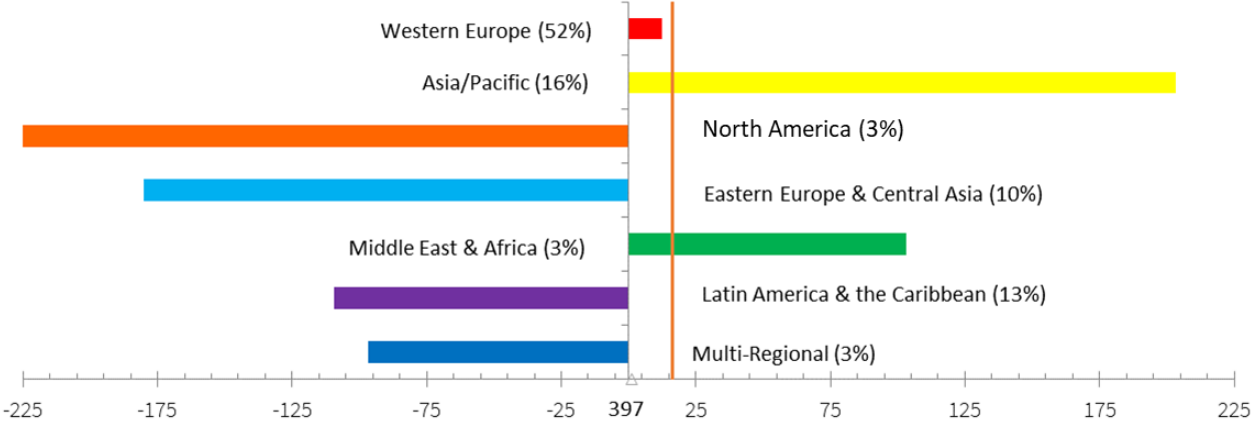
Chart 43 | Regional Assessments For São Paulo For Quality – Difference From The Mean
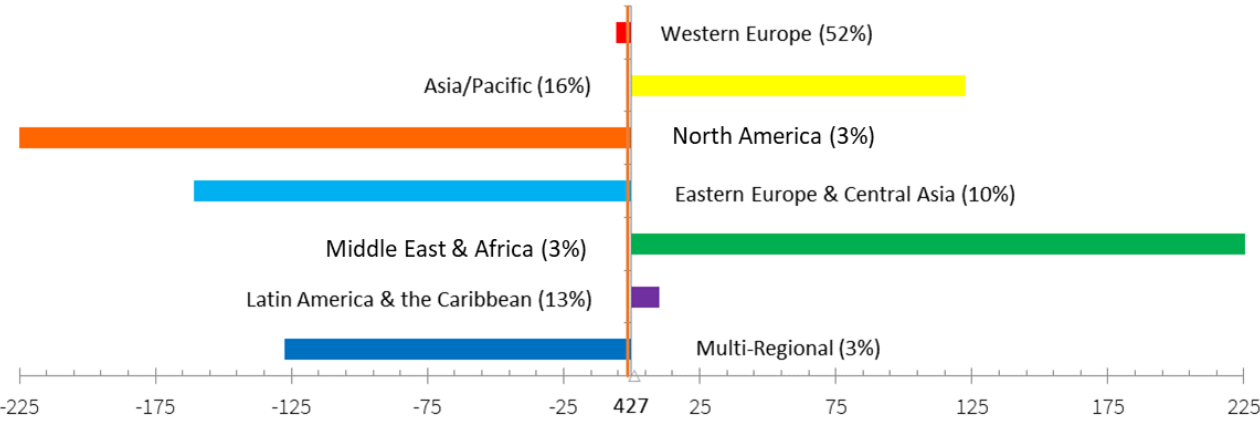
"International accounting standards for green finance are required, also common framework of the International Organization Standards on green finance."

Visiting Professor, University, Tokyo

Asia/Pacific

- Sydney took the leading place in the region for both depth and quality, overtaking Shanghai and Melbourne respectively.
- Asia/Pacific centres' scores for depth generally fell. Shanghai, Shenzhen, Melbourne, and New Delhi fell in both the depth and quality rankings.
- Jakarta entered the index for the first time.
- Assessments from Western Europe, North America, and Latin America & The Caribbean were lower for the region than those from other parts of the world.

Table 19 | Asia/Pacific Top 10 Centres In GGFI 5

Centre	Depth GGFI 5		Centre	Quality GGFI 5	
	Rank	Rating		Rank	Rating
Sydney	14	444	Sydney	15	457
Beijing	20	437	Singapore	21	451
Shanghai	21	436	Tokyo	23	445
Shenzhen	23	434	Beijing	25	443
Guangzhou	24	432	Guangzhou	26	441
Seoul	25	431	Melbourne	28	438
Singapore	27	430	Shanghai	34	431
Melbourne	31	427	Shenzhen	35	425
Tokyo	33	414	Hong Kong	38	420
Hong Kong	36	409	Seoul	43	416

Chart 44 | Top Five Asia/Pacific Centres Ratings Over Time—Depth
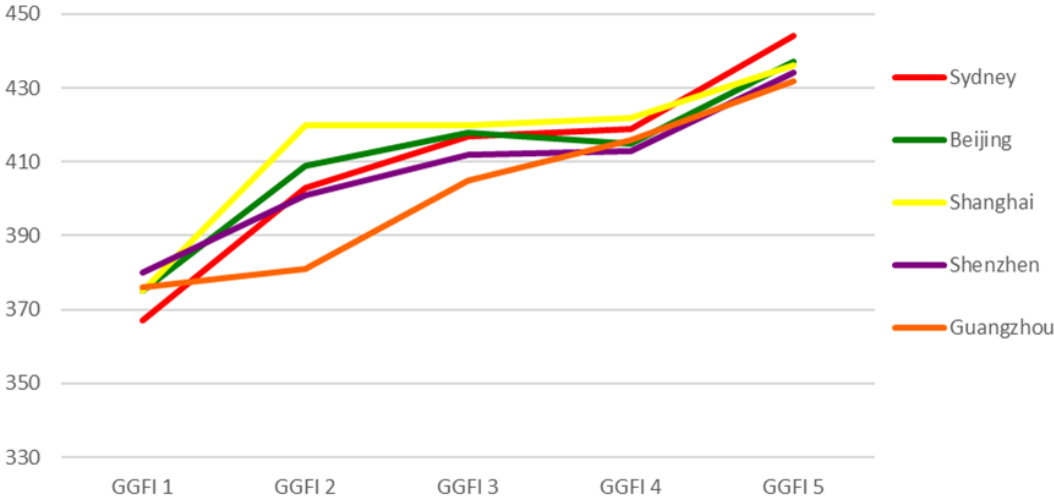
Chart 45 | Top Five Asia/Pacific Centres Ratings Over Time—Quality
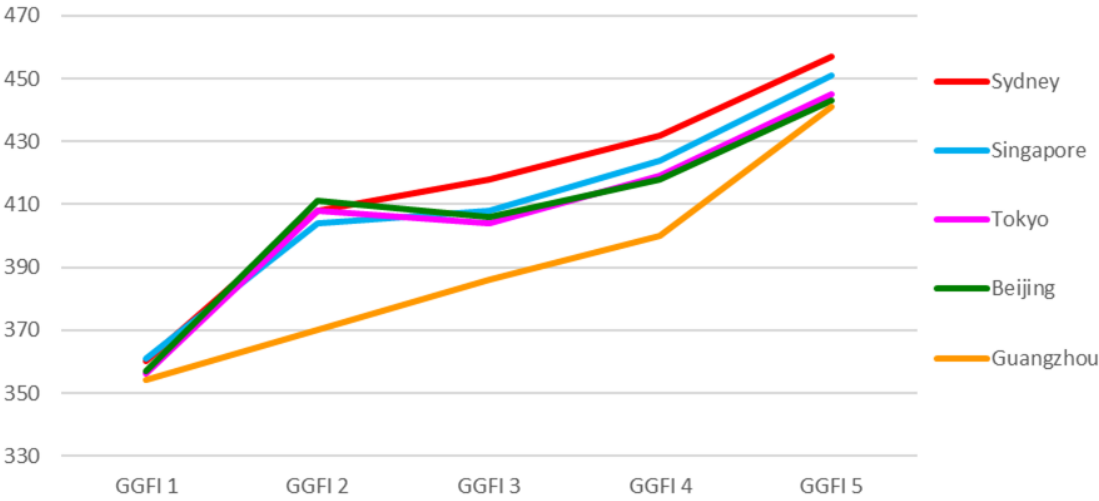
Chart 46 | Asia/Pacific Regional Assessments For Depth – Difference From The Mean
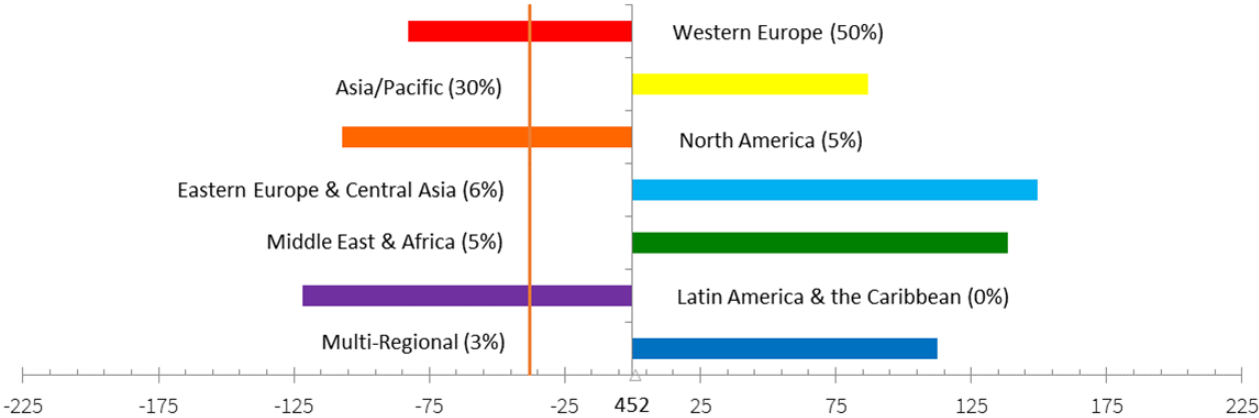
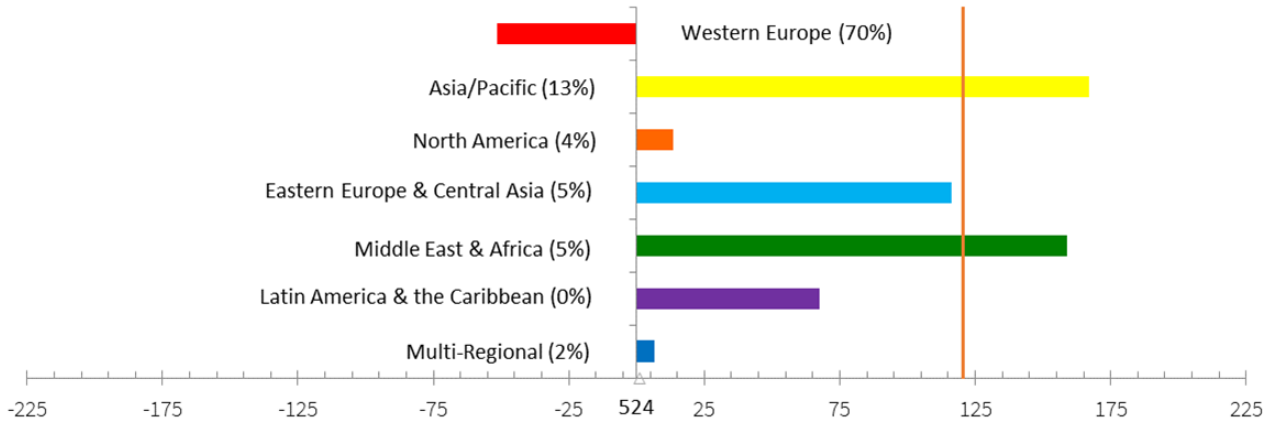**Chart 47 |** Asia/Pacific Regional Assessments For Quality – Difference From The Mean
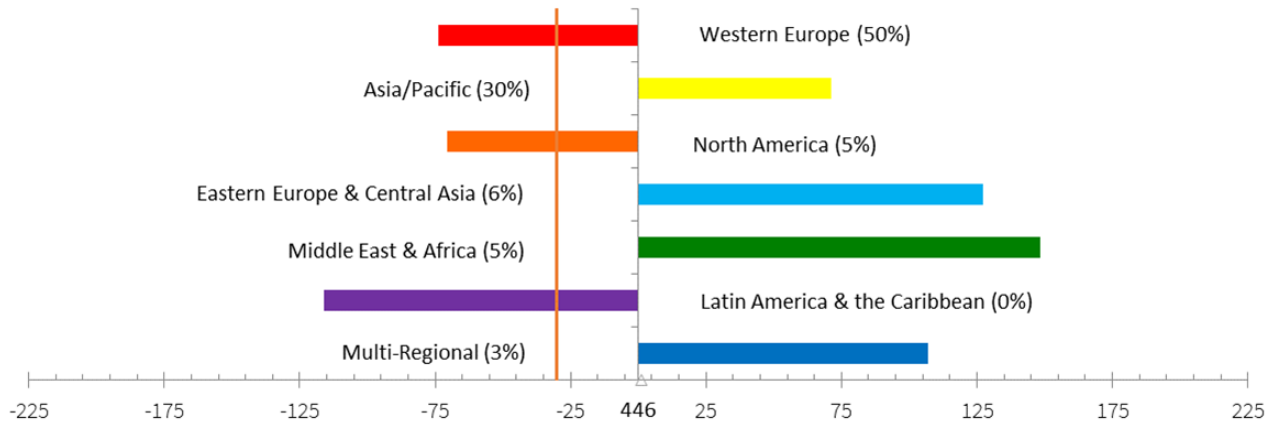
**Chart 48 |** Regional Assessments For Shanghai For Depth – Difference From The Mean
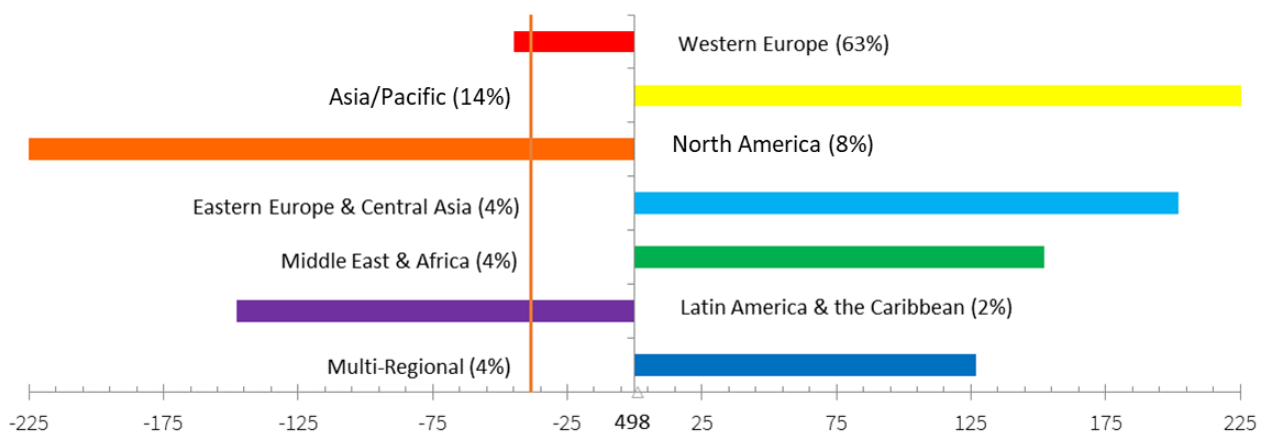
Chart 49 | Regional Assessments For Sydney For Quality – Difference From The Mean
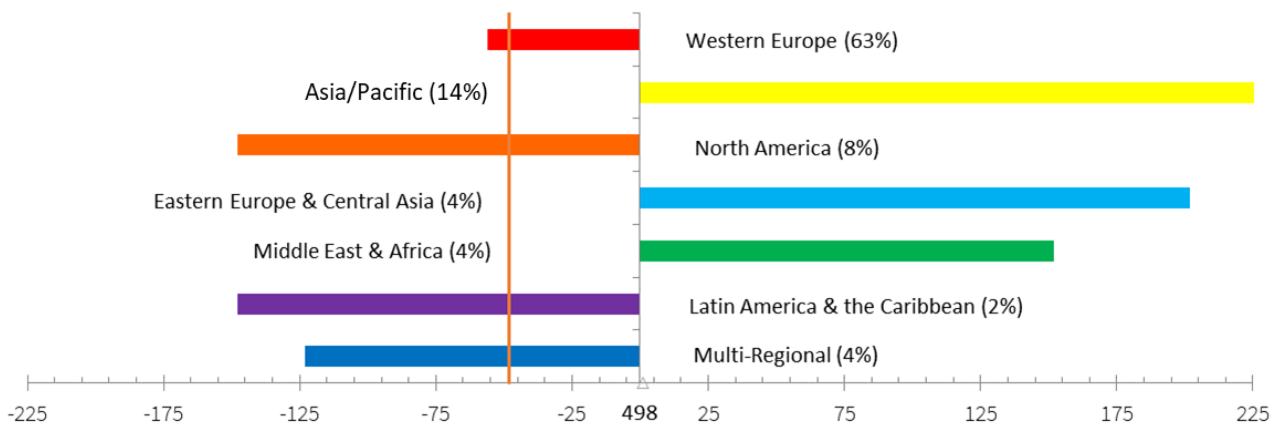
Organisation Size

There is variation in how the leading centres are viewed by respondents working for different sizes of organisation. Taking the six centres that appear in the top five of the rankings for both depth and quality, Charts 50 and 51 show the average of the assessments given by respondents in different sizes of organisation.

Centres had a mixed range of responses, with London, for example, receiving lower ratings from those in organisations of 2,000 to 5,000 people, and Copenhagen scoring high in responses from those in organisations of 1,000 to 2,000 people. Stockholm received the highest ratings from those working in large organisations of over 5,000 people for depth, but those people rated Copenhagen higher for quality.

Chart 50| Average Assessments By Respondents' Organisation Size: Depth

■ <100 ■ 100-500 ■ 500-1000 ■ 1000-2000 ■ 2000-5000 ■ >5000
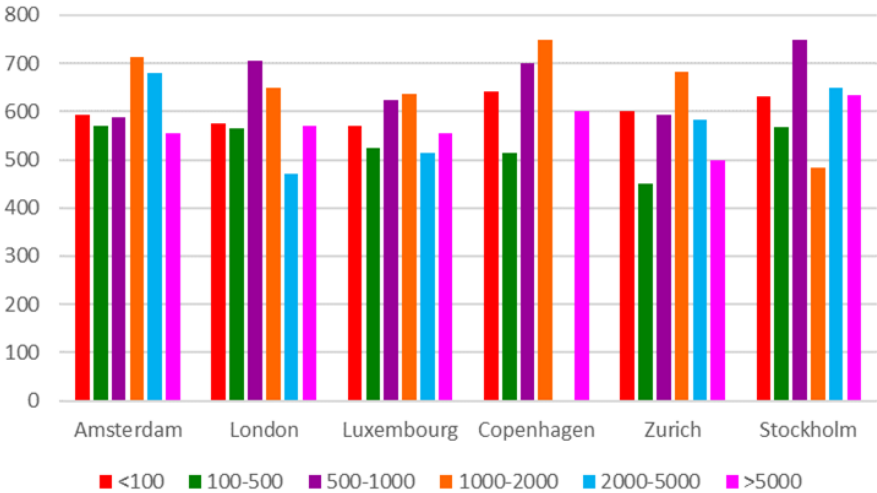
Chart 51 | Average Assessments By Respondents' Organisation Size: Quality

■ <100 ■ 100-500 ■ 500-1000 ■ 1000-2000 ■ 2000-5000 ■ >5000
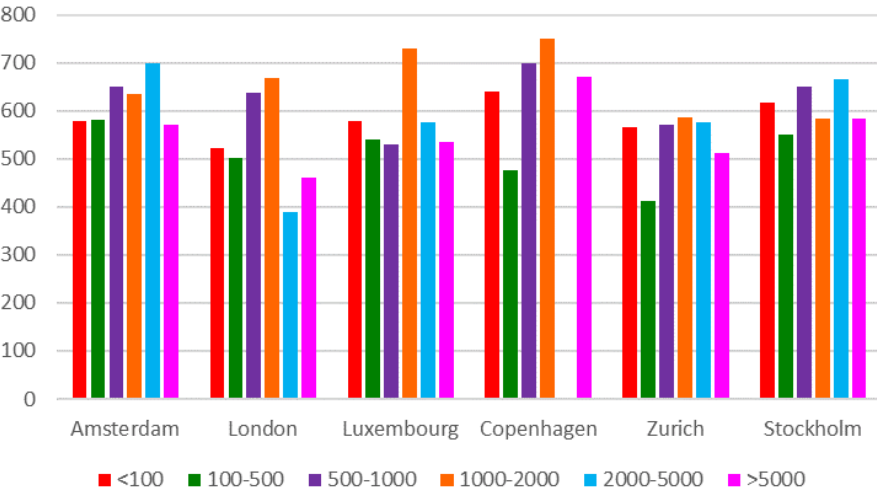
Stability

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 development strategies. Charts 52 and 53 contrast the 'spread' or variance of the individual assessments given to each of the centres in GGFI 5, 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.

Chart 52| Stability In Depth Assessments And Instrumental Factors
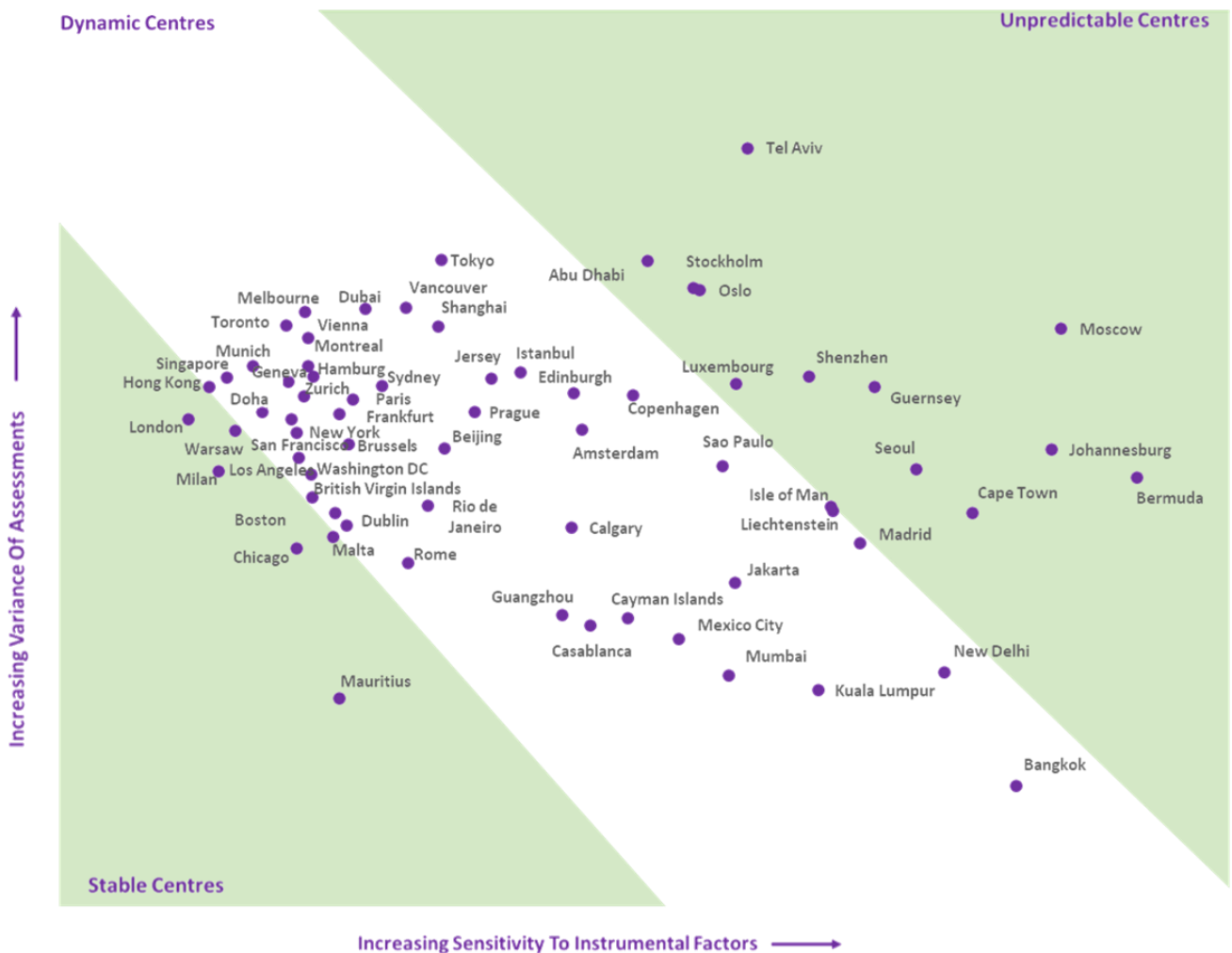
Chart 53 | Stability In Quality Assessments And Instrumental Factors

Dynamic Centres

Unpredictable Centres

Increasing Variance Of Assessments

Tokyo
Seoul
Oslo
Geneva
Dubai
Munich
Moscow
Shanghai
Abu Dhabi
Tel Aviv
Beijing
Singapore
Vancouver
Liechtenstein
Toronto
Chicago
Jersey
Shenzhen
Sydney
Montreal
Prague
Zurich
Hong Kong
New York
Rio de Janeiro
Rome
Luxembourg
Edinburgh
Bermuda
San Francisco
Paris
Washington DC
Stockholm
Brussels
Frankfurt
British Virgin Islands
Madrid
Boston
Copenhagen
Isle of Man
Guernsey
Los Angeles
Calgary
London
Melbourne
Amsterdam
Johannesburg
Sao Paulo
Dublin
Hamburg
Cayman Islands
Malta
Milan
Kuala Lumpur
Vienna
Mauritius
Cape Town
Guangzhou
Doha
New Delhi
Warsaw
Casablanca
Mexico City
Bangkok
Jakarta
Mumbai

Stable Centres

Increasing Sensitivity To Instrumental Factors →

"The few green capital markets projects have required the engagement of verifiers and in some cases specialised ratings from ratings agencies. The cost of these usually inflate issuance costs, however, they are a necessity as we have found that the local affiliates of some of these verifiers are not well equipped or have not been trained to market or deliver these services locally."

Managing Director, Investment Banking Advisor, Lagos

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 weighted for the age of the response. 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. Centres in this position may need to focus on their underlying strengths and build a solid foundation.

Ten of the top 15 centres in terms of reputational advantage for depth are in the Western European region, with one from the Middle East & Africa, two from North America, and two from Asia/Pacific. For quality, Istanbul, Munich, Shanghai, and Paris replace Casablanca, Los Angeles, Vienna, and Guangzhou in the top 15.

Table 20 | Top 15 Centres – Reputational Advantage For Depth In GGFI 5

Centre	Weighted Average Assessment	GGFI 4 Rating	Reputational Advantage
Stockholm	657	474	183
Hamburg	635	456	179
Copenhagen	653	484	169
Oslo	611	447	164
Amsterdam	644	496	148
Casablanca	575	439	136
Luxembourg	608	488	120
Zürich	602	483	119
Beijing	555	437	118
San Francisco	551	442	109
Los Angeles	538	429	109
Vienna	558	452	106
Edinburgh	525	429	96
Guangzhou	528	432	96
Madrid	499	406	93

Table 21| Top 15 Centres – Reputational Advantage For Quality In GGFI 5

Centre	Weighted Average Assessment	GGFI 4 Rating	Reputational Advantage
Oslo	645	466	179
Copenhagen	649	491	158
Stockholm	649	496	153
Amsterdam	652	510	142
Zürich	648	507	141
San Francisco	594	466	128
Istanbul	502	380	122
Hamburg	596	477	119
Munich	584	471	113
Luxembourg	597	489	108
Madrid	546	444	102
Shanghai	528	431	97
Paris	582	487	95
Beijing	537	443	94
Edinburgh	549	456	93

Tables 22 and 23 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. These centres may need to market their strengths to ensure that their underlying quality is known to respondents.

A similar range of centres feature in the bottom 15 for both depth and quality. although Rome, Dublin, and Bangkok feature in the quality measure in place of Mexico City, Mauritius, and Malta, which appear in the depth table.

Table 22 | Bottom 15 Centres – Reputational Disadvantage For Depth In GGFI 5

Centre	Weighted Average Assessment	GGFI 4 Rating	Reputational Advantage
Mexico City	372	373	-1
Mauritius	400	405	-5
Cape Town	384	393	-9
British Virgin Islands	351	371	-20
Mumbai	328	349	-21
Warsaw	357	379	-22
Bermuda	333	356	-23
Johannesburg	350	374	-24
Malta	382	410	-28
Jakarta	322	352	-30
Cayman Islands	353	390	-37
Isle of Man	345	392	-47
Jersey	379	431	-52
New Delhi	266	340	-74
Calgary	303	399	-96

Table 23 | Bottom 15 Centres – Reputational Disadvantage For Quality In GGFI 5

Centre	Weighted Average Assessment	GGFI 4 Rating	Reputational Advantage
Warsaw	374	382	-8
Dublin	406	418	-12
Rome	382	399	-17
Jersey	416	435	-19
Cayman Islands	375	394	-19
British Virgin Islands	362	386	-24
Cape Town	380	406	-26
Johannesburg	340	367	-27
Bangkok	328	368	-40
Calgary	344	395	-51
Bermuda	301	359	-58
Jakarta	287	346	-59
Isle of Man	346	407	-61
Mumbai	310	373	-63
New Delhi	265	331	-66

Industry Sectors And Green Finance Professionals

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 24 and 25 show the top 15 centres in these industry sectors for depth and quality.

Amsterdam as the leader in the general depth index does not feature in the top 15 for policy & public finance, suggesting that the ratings it receives in this areas are considerably lower than from those working in professional services, knowledge, banking, and investment. Similarly, Luxembourg does not feature in the top 15 for Investment.

Table 24 | GGFI 5 Industry Sector Sub-Indices - Depth

Rank	Professional Services	Knowledge	Banking	Investment	Policy & Public Finance
1	Zürich	Copenhagen	Amsterdam	Amsterdam	Zürich
2	Luxembourg	Hamburg	Oslo	London	Luxembourg
3	Amsterdam	Paris	London	Copenhagen	Paris
4	Vienna	Stockholm	Stockholm	Stockholm	Warsaw
5	Stockholm	Amsterdam	Copenhagen	Montréal	Seoul
6	London	Shenzhen	Hong Kong	Geneva	Beijing
7	Copenhagen	Los Angeles	Seoul	Brussels	Shanghai
8	Tokyo	Munich	Washington DC	Munich	London
9	Shanghai	Zürich	Luxembourg	Vienna	Geneva
10	Oslo	Luxembourg	Hamburg	Edinburgh	Guangzhou
11	Frankfurt	Oslo	Sydney	Paris	Shenzhen
12	Sydney	Beijing	Beijing	Toronto	Tel Aviv
13	Vancouver	Frankfurt	Edinburgh	Oslo	Copenhagen
14	Seoul	Seoul	Zürich	Milan	Stockholm
15	Brussels	San Francisco	Shenzhen	Hamburg	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, but has dropped a further place in the banking sub-sector to fourth.

Table 25 | GGFI 5 Industry Sector Sub-Indices - Quality

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

"We should support the work done by the EU commission."

Advisor, Trade Association, Luxembourg

Taking the sectoral analysis further, we have calculated the index on the basis of the responses only from those working directly in green finance in financial services organisations.   The results are shown in tables 26 and 27 below for depth and quality respectively. On this analysis, Hamburg, Shenzhen, Tel Aviv, Seoul, and Doha would lose ten rank places or more in the index for depth if scored only on the responses from this group. Los Angeles, Melbourne, and Dublin would improve ten or more places. This may illustrate the different perspectives of people working in policy and regulation as opposed to those working directly in financial services and trading.

Table 26 | GGFI 5 Using Responses Only From Financial Services Professionals Working In Green Finance - Depth

| City | Depth | | | |
	Depth	Rank	GGFI 5 Rank	Difference
Luxembourg	497	1	2	-1
Amsterdam	490	2	1	1
Zürich	487	3	4	-1
Copenhagen	477	4	3	1
Geneva	468	5	10	-5
Stockholm	466	6	5	1
Paris	465	7	7	0
London	458	8=	6	2
Montréal	458	8=	9	-1
Vienna	452	10	10	0
Toronto	445	11	14	-3
Brussels	444	12	13	-1
Oslo	440	13	12	1
San Francisco	439	14=	16	-2
Vancouver	439	14=	17	-3
Sydney	435	16=	14	2
Munich	435	16=	18	-2
Los Angeles	429	18	28	-10
Hamburg	428	19	8	11
Singapore	423	20	27	-7
Frankfurt	421	21=	21	0
Jersey	421	21=	25	-4
Melbourne	421	21=	31	-10
Shanghai	417	24=	21	3
Washington DC	417	24=	32	-8
Casablanca	416	26	18	8
Beijing	415	27	20	7
Dublin	412	28	38	-10
Edinburgh	411	29	28	1
Rome	409	30	34	-4
Boston	408	31	40	-9
Guangzhou	407	32=	24	8
Madrid	407	32=	40	-8
Tokyo	406	34=	33	1

| City | Depth | | | |
	Depth	Rank	GGFI 5 Rank	Difference
Malta	406	34=	34	0
Shenzhen	404	36=	23	13
Mauritius	404	36=	42	-6
Prague	402	38	36	2
Milan	401	39	39	0
Tel Aviv	399	40	30	10
Guernsey	398	41	48	-7
Calgary	396	42	43	-1
Hong Kong	394	43	36	7
Isle of Man	393	44	46	-2
Cayman Islands	392	45	48	-3
Seoul	391	46	25	21
Chicago	386	47	47	0
New York	385	48	44	4
São Paulo	382	49	48	1
Moscow	380	50	54	-4
Istanbul	372	51=	58	-7
Johannesburg	372	51=	59	-8
Cape Town	366	53	45	8
Liechtenstein	365	54	56	-2
Mexico City	362	55=	60	-5
British Virgin Islands	362	55=	61	-6
Kuala Lumpur	360	57	56	1
Warsaw	354	58	55	3
Dubai	353	59=	51	8
Rio de Janeiro	353	59=	62	-3
Mumbai	350	61	66	-5
Abu Dhabi	348	62	53	9
Bermuda	345	63	63	0
Bangkok	339	64	64	0
Doha	338	65	52	13
New Delhi	335	66	67	-1
Jakarta	328	67	65	2

Turning to quality, Singapore, Guangzhou, Beijing, Dubai, and Doha would lose ten or more places, while Jersey, Prague, Guernsey, Boston, Isle of Man, Calgary, Mauritius, and Istanbul would gain ten or more places.

We will continue to track the responses from green finance professionals alongside the GGFI main index results.

Table 27 | GGFI 5 Using Responses Only From Financial Services Professionals Working In Green Finance - Quality

Quality				Difference
City	Depth	Rank	GGFI 5 Rank	Difference
Zürich	514	1	3	-2
Amsterdam	512	2	2	0
London	510	3	1	2
Copenhagen	505	4	5	-1
Stockholm	503	5	4	1
Luxembourg	485	6	6	0
Geneva	484	7	9	-2
Paris	475	8	7	1
Vienna	474	9	10	-1
Munich	467	10=	11	-1
Brussels	467	10=	12	-2
San Francisco	466	12	13	-1
Oslo	465	13	13	0
Vancouver	458	14=	17	-3
Toronto	458	14=	17	-3
Hamburg	457	16	8	8
Sydney	452	17	15	2
Montréal	449	18	19	-1
Edinburgh	441	19=	16	3
Jersey	441	19=	31	-12
Frankfurt	440	21=	20	1
Casablanca	440	21=	22	-1
Prague	440	21=	32	-11
Tel Aviv	439	24=	27	-3
Melbourne	439	24=	28	-4
Guernsey	438	26=	38	-12
Boston	438	26=	40	-14
Washington DC	436	28	32	-4
Los Angeles	431	29	30	-1
Malta	428	30	36	-6
Singapore	427	31	21	10
Tokyo	426	32	23	9
Madrid	425	33	24	9
Dublin	421	34=	41	-7

Quality				Difference
City	Depth	Rank	GGFI 5 Rank	Difference
Isle of Man	421	34=	44	-10
Calgary	419	36	49	-13
New York	417	37	28	9
Milan	414	38	37	1
Mauritius	412	39	52	-13
Shanghai	411	40	34	6
Istanbul	408	41	57	-16
Chicago	406	42	41	1
Hong Kong	405	43	38	5
Shenzhen	404	44	35	9
Guangzhou	403	45	26	19
Beijing	400	46=	25	21
Cayman Islands	400	46=	50	-4
Liechtenstein	398	48	51	-3
Cape Town	392	49=	45	4
São Paulo	392	49=	46	3
Seoul	389	51	43	8
Kuala Lumpur	387	52	48	4
Warsaw	386	53	55	-2
Rome	383	54	47	7
Mumbai	382	55	58	-3
Mexico City	378	56	58	-2
British Virgin Islands	376	57	54	3
Johannesburg	372	58	63	-5
Bermuda	370	59	64	-5
Moscow	368	60	65	-5
Bangkok	359	61	62	-1
Abu Dhabi	358	62	58	4
Rio de Janeiro	352	63	61	2
Jakarta	348	64	66	-2
Dubai	345	65	55	10
New Delhi	334	66	67	-1
Doha	323	67	53	14

GGFI 5 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; and
- 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 areas of green finance which they considered most interesting; and areas of green finance that they consider have most impact on sustainability. The results are shown in Charts 54 and 55.

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

- sustainable infrastructure finance;
- green bonds; and
- renewable energy investment.

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

Chart 54 | Most Interesting Areas Of Green Finance
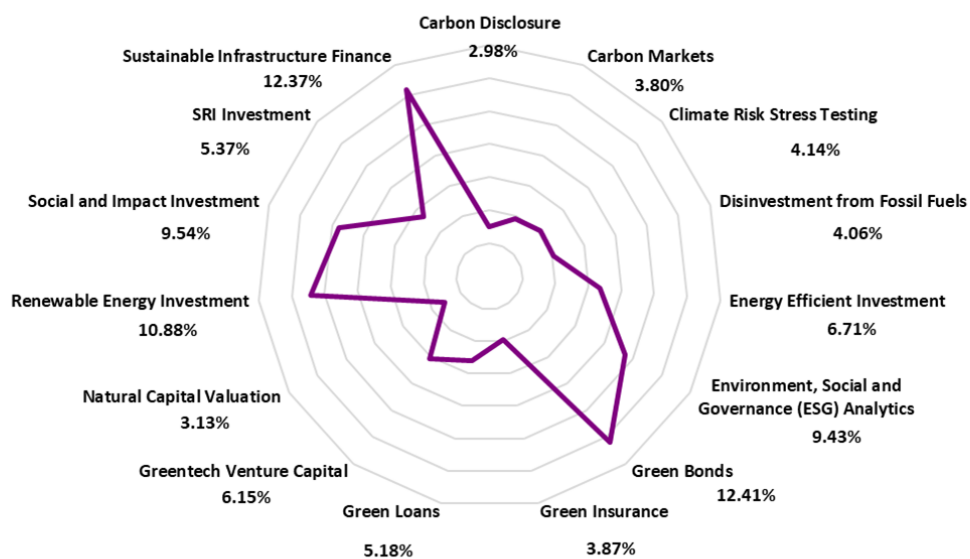
Chart 55 | Green Finance Activities With Most Impact On Sustainability
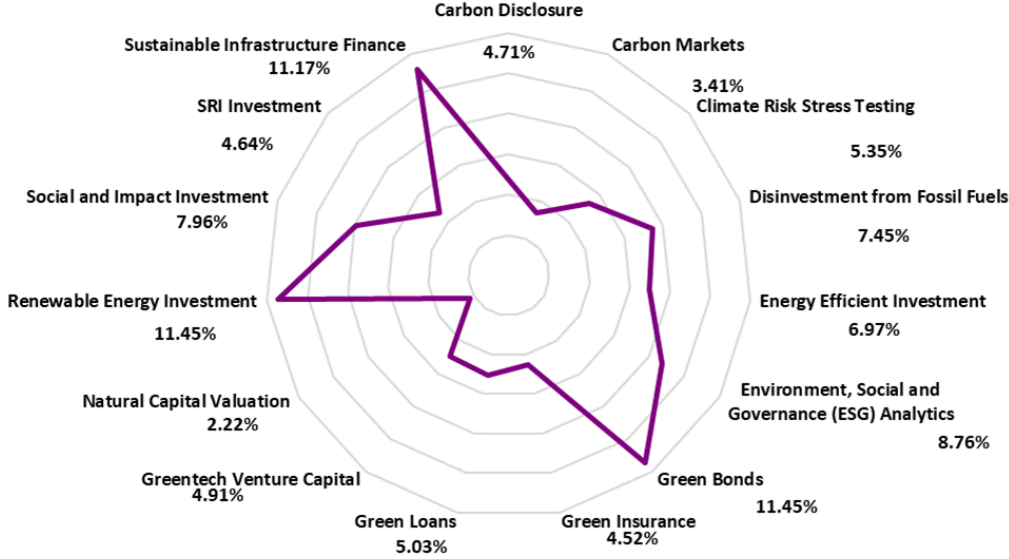
Relationship Between Areas Of Interest And Impact

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 56. 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 56 | Relationship Between Areas Of Interest And Impact
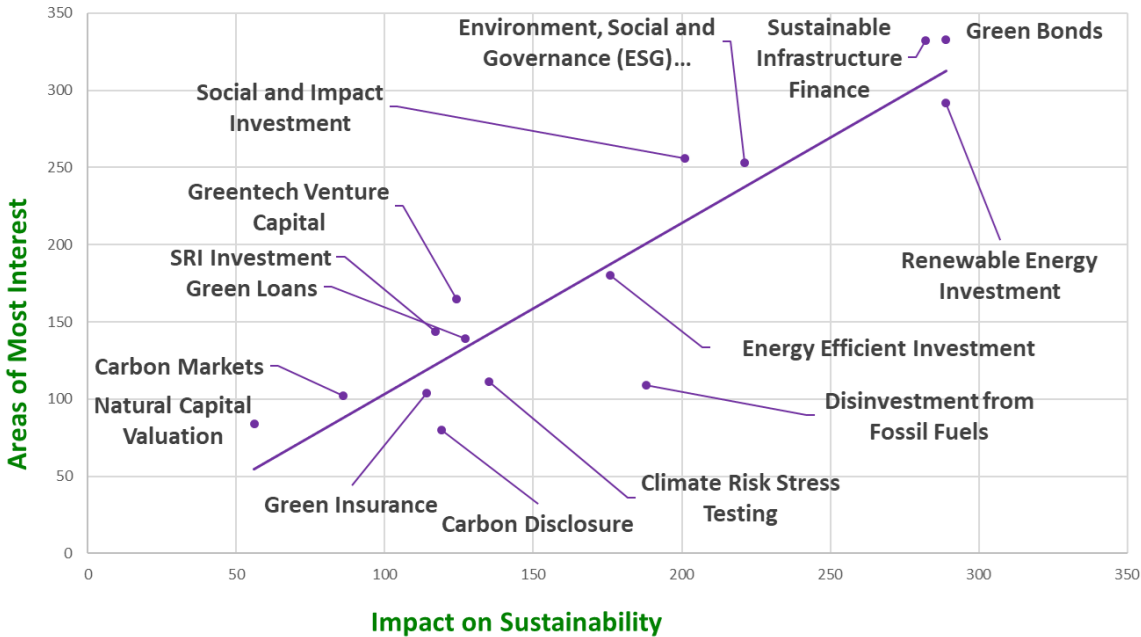
Drivers Of Green Finance

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 57 below. The top drivers identified were:

- policy and regulatory frameworks;
- investor demand;
- climate change; and
- public awareness.

These top four factors have been consistent in all five editions of the GGFI. Arguably, 'climate change' and 'public awareness' could be combined. Green finance, to date, has depended on public policy. Public policy, to date, has largely been driven by public awareness. This heavy dependence on public policy distinguishes green finance from 'normal' finance. The strength of centres in Western Europe in green finance reflects both the action taken by the European Union, governments, and regulatory authorities, as well as public demand for action on sustainability.

Chart 57 | Leading Drivers Of Green Finance
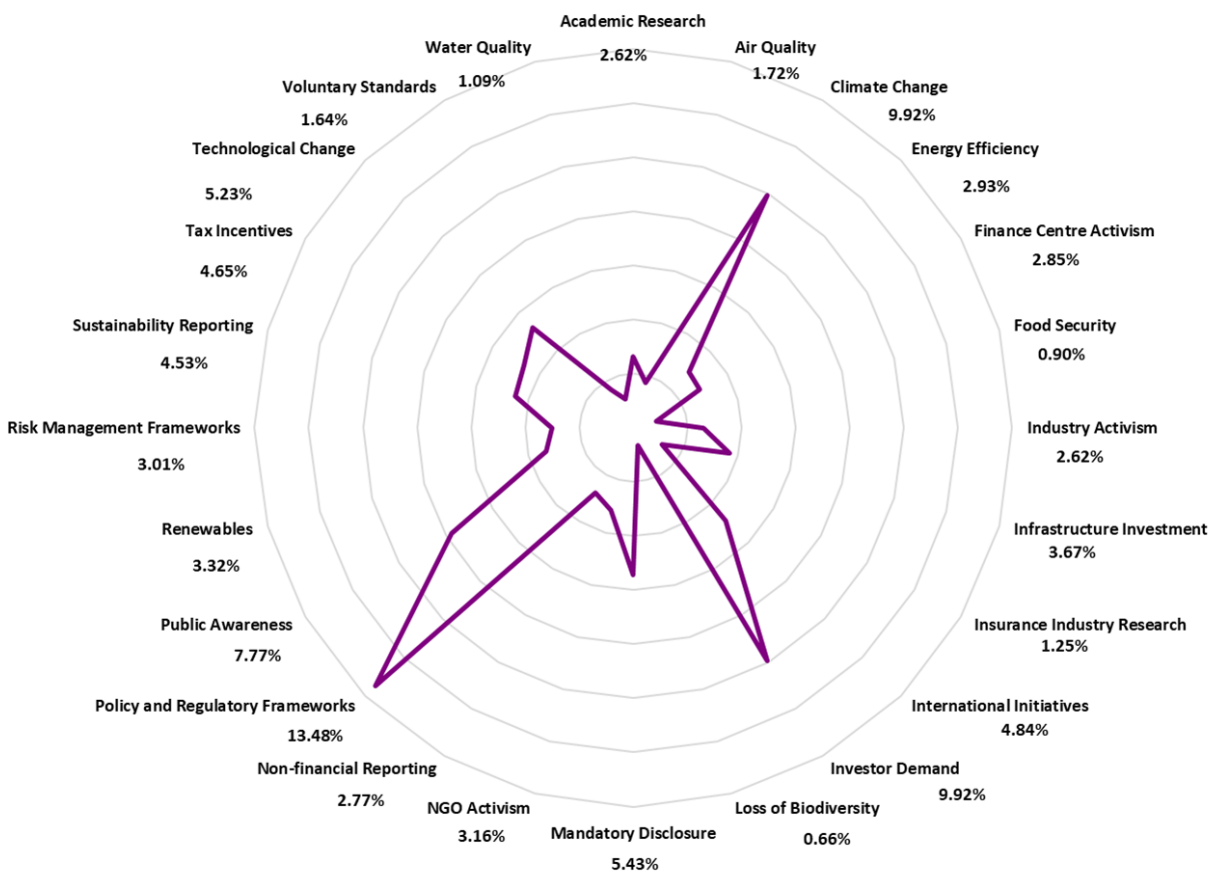
Appendix 1: Assessment Details

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

Centre	GGFI 5 Rank	GGFI 5 Rating	Number	Average	St. Dev
Amsterdam	1	496	105	591	252
Luxembourg	2	488	116	569	263
Copenhagen	3	484	30	627	260
Zürich	4	483	136	545	260
Stockholm	5	474	46	620	286
London	6	470	237	517	255
Paris	7	460	161	522	259
Hamburg	8	456	27	598	265
Montréal	9	454	50	540	267
Geneva	10=	452	90	495	264
Vienna	10=	452	31	473	274
Oslo	12	447	22	584	286
Brussels	13	445	69	502	248
Toronto	14=	444	59	497	277
Sydney	14=	444	49	498	263
San Francisco	16	442	59	534	251
Vancouver	17	441	31	471	281
Munich	18=	439	30	510	267
Casablanca	18=	439	26	562	205
Beijing	20	437	86	530	248
Shanghai	21=	436	93	527	277
Frankfurt	21=	436	139	476	256
Shenzhen	23	434	41	491	265
Guangzhou	24	432	24	504	207
Seoul	25=	431	25	464	243
Jersey	25=	431	38	388	264
Singapore	27	430	142	473	264
Edinburgh	28=	429	42	481	261
Los Angeles	28=	429	50	510	245
Tel Aviv	30	428	21	455	320
Melbourne	31	427	22	450	280
Washington DC	32	415	56	435	241
Tokyo	33	414	81	452	293
Rome	34=	410	21	398	220
Malta	34=	410	27	317	226

Centre	GGFI 5 Rank	GGFI 5 Rating	Number	Average	St. Dev
Hong Kong	36=	409	151	429	262
Prague	36=	409	23	454	256
Dublin	38	408	80	393	229
Milan	39	407	45	429	242
Boston	40=	406	60	438	232
Madrid	40=	406	35	461	225
Mauritius	42	405	21	381	187
Calgary	43	399	24	277	228
New York	44	395	230	417	255
Cape Town	45	393	18	356	232
Isle of Man	46	392	35	350	234
Chicago	47	391	63	396	223
São Paulo	48=	390	30	392	243
Guernsey	48=	390	28	370	262
Cayman Islands	48=	390	35	316	207
Dubai	51	386	99	393	281
Doha	52	382	23	446	256
Abu Dhabi	53	381	57	372	293
Moscow	54	380	36	371	276
Warsaw	55	379	29	350	252
Liechtenstein	56=	377	18	394	233
Kuala Lumpur	56=	377	39	378	189
Istanbul	58	376	26	460	266
Johannesburg	59	374	38	325	247
Mexico City	60	373	36	340	202
British Virgin Islands	61	371	32	320	236
Rio de Janeiro	62	366	28	366	234
Bermuda	63	356	22	323	240
Bangkok	64	353	25	296	166
Jakarta	65	352	21	267	215
Mumbai	66	349	31	298	193
New Delhi	67	340	25	262	194

Table 29 | Details Of Assessments Of Green Finance Quality By Centre

| Centre | GGFI 5 Rank | GGFI 5 Rating | ——— Assessments ——— | | | Centre | GGFI 5 | GGFI 5 | ——— Assessments —— | | |
			Number	Average	St. Dev				Numbe	Averag	St. Dev
London	1	516	237	578	240	Shenzhen	35	425	41	470	260
Amsterdam	2	510	105	595	240	Malta	36	424	27	350	237
Zürich	3	507	136	578	261	Milan	37	421	45	470	232
Stockholm	4	496	46	620	250	Hong Kong	38=	420	151	427	256
Copenhagen	5	491	30	617	242	Guernsey	38=	420	28	389	242
Luxembourg	6	489	116	563	253	Boston	40	419	60	430	240
Paris	7	487	161	562	252	Dublin	41=	418	80	391	235
Hamburg	8	477	27	580	235	Chicago	41=	418	63	410	262
Geneva	9	476	90	517	280	Seoul	43	416	25	422	293
Vienna	10	472	31	481	226	Isle of Man	44	407	35	356	238
Munich	11	471	30	553	281	Cape Town	45	406	18	364	225
Brussels	12	467	69	498	244	São Paulo	46	400	30	423	236
San Francisco	13=	466	59	569	242	Rome	47	399	21	360	253
Oslo	13=	466	22	602	289	Kuala Lumpur	48	398	39	385	226
Sydney	15	457	49	498	265	Calgary	49	395	24	315	240
Edinburgh	16	456	42	506	255	Cayman Islands	50	394	35	334	233
Vancouver	17=	455	31	485	266	Liechtenstein	51	392	18	406	262
Toronto	17=	455	59	497	261	Mauritius	52	391	21	405	223
Montréal	19	453	50	504	263	Doha	53	390	23	409	222
Frankfurt	20	452	139	483	249	British Virgin Islands	54	386	32	325	248
Singapore	21	451	142	482	265	Warsaw	55=	382	29	364	212
Casablanca	22	446	26	540	218	Dubai	55=	382	99	387	280
Tokyo	23	445	81	473	289	Istanbul	57	380	26	479	295
Madrid	24	444	35	486	245	Abu Dhabi	58=	373	57	364	273
Beijing	25	443	86	508	263	Mexico City	58=	373	36	344	192
Guangzhou	26	441	24	460	218	Mumbai	58=	373	31	274	194
Tel Aviv	27	439	21	450	274	Rio de Janeiro	61	370	28	371	255
Melbourne	28=	438	22	423	240	Bangkok	62	368	25	290	198
New York	28=	438	230	469	254	Johannesburg	63	367	38	334	234
Los Angeles	30	437	50	490	243	Bermuda	64	359	22	295	245
Jersey	31	435	38	436	260	Moscow	65	356	36	349	280
Prague	32=	433	23	480	255	Jakarta	66	346	21	245	193
Washington DC	32=	433	56	457	252	New Delhi	67	331	25	254	213
Shanghai	34	431	93	520	276						

Appendix 2: Interest, Impact, And Drivers Details

Table 30 | Interesting Areas Of Green Finance

Area Of Green Finance	Number Of Mentions	Percentage Of Total Mentions
Carbon Disclosure	80	3.0
Natural Capital Valuation	84	3.1
Carbon Markets	102	3.8
Green Insurance	104	3.9
Disinvestment from Fossil Fuels	109	4.1
Climate Risk Stress Testing	111	4.1
Green Loans	139	5.2
SRI Investment	144	5.4
Greentech Venture Capital	165	6.1
Energy Efficient Investment	180	6.7
Environment, Social and Governance (ESG) Analytics	253	9.4
Social and Impact Investment	256	9.5
Renewable Energy Investment	292	10.9
Sustainable Infrastructure Finance	332	12.4
Green Bonds	333	12.4
Totals	**2,684**	**100.0**

Table 31 | Areas Of Green Finance With Most Impact On Sustainability

Area Of Green Finance	Number Of Mentions	Percentage Of Total Mentions
Natural Capital Valuation	56	2.2
Carbon Markets	86	3.4
Green Insurance	114	4.5
SRI Investment	117	4.6
Carbon Disclosure	119	4.7
Greentech Venture Capital	124	4.9
Green Loans	127	5.0
Climate Risk Stress Testing	135	5.3
Energy Efficient Investment	176	7.0
Disinvestment from Fossil Fuels	188	7.4
Social and Impact Investment	201	8.0
Environment, Social and Governance (ESG) Analytics	221	8.8
Sustainable Infrastructure Finance	282	11.2
Renewable Energy Investment	289	11.5
Green Bonds	289	11.5
Totals	**2,524**	**100.0**

Table 32 | Drivers Of Green Finance

Driver	Number Of Mentions	Percentage Of Total Mentions
Loss of Biodiversity	17	0.7
Food Security	23	0.9
Water Quality	28	1.1
Insurance Industry Research	32	1.3
Voluntary Standards	42	1.6
Air Quality	44	1.7
Academic Research	67	2.6
Industry Activism	67	2.6
Non-financial Reporting	71	2.8
Finance Centre Activism	73	2.9
Energy Efficiency	75	2.9
Risk Management Frameworks	77	3.0
NGO Activism	81	3.2
Renewables	85	3.3
Infrastructure Investment	94	3.7
Sustainability Reporting	116	4.5
Tax Incentives	119	4.6
International Initiatives	124	4.8
Technological Change	134	5.2
Mandatory Disclosure	139	5.4
Public Awareness	199	7.8
Climate Change	254	9.9
Investor Demand	254	9.9
Policy and Regulatory Frameworks	345	13.5
Totals	**2,560**	**100.0**

Appendix 3: Respondents' Details

Table 33 | Respondents By Industry Sector

Industry Sector	Number Of Respondents	Percentage Of Respondents
Banking	89	12.41%
Debt Capital Market	46	6.42%
Equity Capital Markets	31	4.32%
Insurance	13	1.81%
Investment	92	12.83%
Knowledge	141	19.67%
Local Green Initiatives	24	3.35%
Other	45	6.28%
Policy and Public Finance	62	8.65%
Professional Services	166	23.15%
Trading	8	1.12%
Total	**717**	**100.00%**

Table 34 | Respondents By Region

Region	Number Of Respondents	Percentage Of Respondents
Western Europe	430	59.97%
Asia Pacific	89	12.41%
North America	62	8.65%
Middle East and Africa	45	6.28%
Eastern Europe and Central Asia	48	6.69%
Latin America and the Caribbean	18	2.51%
Other	25	3.49%
Total	**717**	**100.00%**

Table 35 | Respondents By Engagement In Green Finance

a. All Respondents

Engagement In Green Finance	Number Of Respondents	Percentage Of Respondents
Working on Green Finance (All)	394	54.29%
Interested in Green Finance	272	39.32%
Other/Not Given	51	6.39%
Total	**717**	**100.00%**

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

Engagement In Green Finance	Number Of Respondents	Percentage Of Respondents
Working Full-time On Green Finance	97	24.25%
Working Part-time On Green Finance	136	34.00%
Interested in Green Finance	134	33.50%
Other/not given	33	8.25%
Total	**400**	**100.00%**

Table 36 | **Respondents By Size Of Organisation**

Size Of Organisation	Number Of Respondents	Percentage Of Respondents
<100	367	51.19%
100-500	90	12.55%
500-1000	33	4.60%
1000-2000	41	5.72%
2000-5000	44	6.14%
>5000	107	14.92%
Other/not given	35	4.88%
Total	**717**	**100.00%**

Table 38 | **Respondents By Age**

Age Band	Number Of Respondents	Percentage Of Respondents
18-30	148	20.64%
30-45	229	31.94%
45-60	232	32.36%
60+	73	10.18%
Other/not given	35	4.88%
Total	**717**	**100.00%**

Table 37 | **Respondents By Gender**

Gender	Number Of Respondents	Percentage Of Respondents
Female	241	33.61%
Male	441	61.51%
Other	1	0.14%
Prefer not to say/not given	34	4.74%
Total	**717**	**100.00%**

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 132 different sources covering sustainability, comprising green finance activities as well as the physical attributes of a centre, such as air quality and local carbon emissions; business, including legal and policy factors and statistics on economic performance; human capital, reflecting educational development and social factors; and infrastructure, including telecommunications and public transport. A full list of the instrumental factors used in the model is in Appendix 5.

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

Factors Affecting The Inclusion Of Centres In The GGFI

The questionnaire lists a total of 120 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 20 in GGFI 5. This means that not all 120 centres in the questionnaire 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 58 - this recognises that older ratings, while still valid, are less likely to be up-to-date.

Chart 58 | Reduction In Weighting As Assessments Get Older
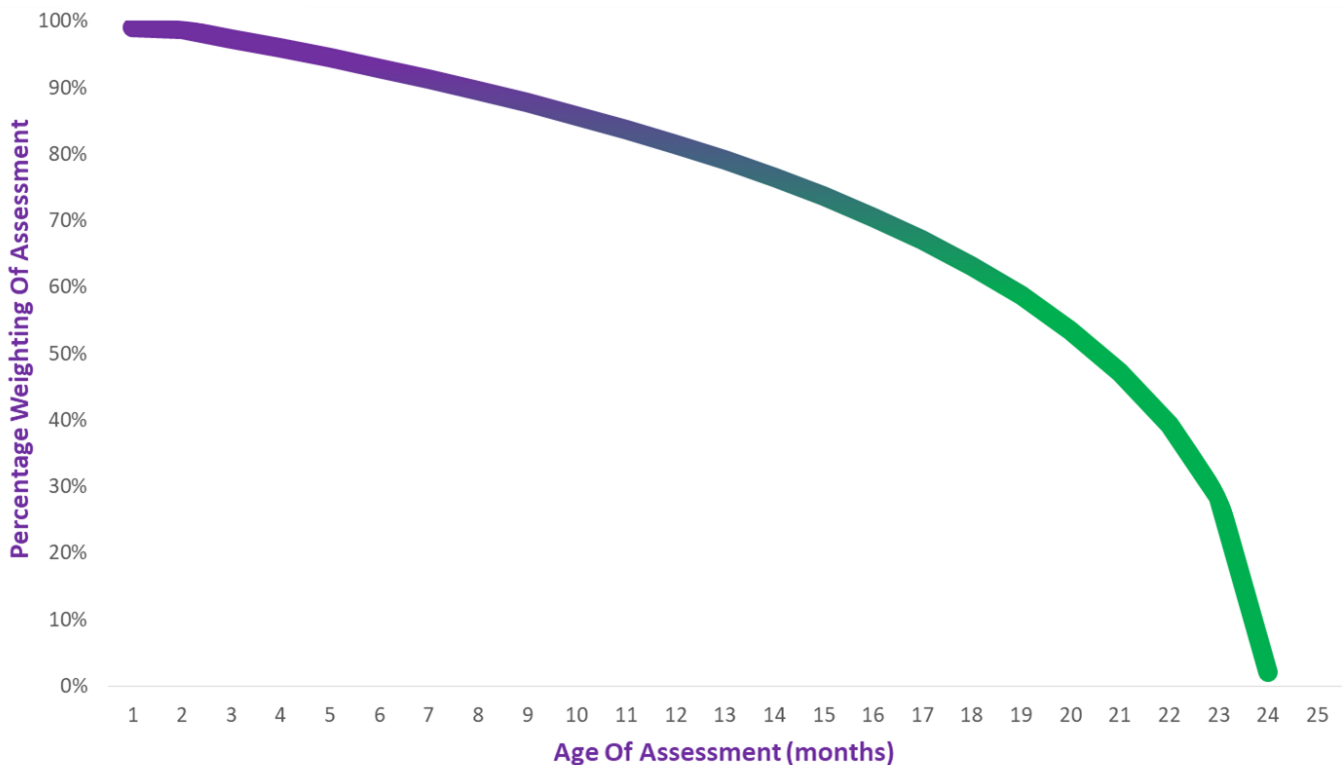
Instrumental Factor Data

For the instrumental factors, we have the following data requirements:
- data series should come from a reputable body and be derived by a sound methodology; and
- data series should be readily available (ideally in the public domain) and be regularly updated.

The rules on the use of instrumental factor data in the model are as follows:
- updates to the indices are collected and collated every six months;
- no weightings are applied to indices;
- indices are entered into the GGFI model as directly as possible, whether this is a rank, a derived score, a value, a distribution around a mean or a distribution around a benchmark;
- if a factor is at a national level, the score will be used for all centres in that country; nation-based factors will be avoided if financial centre (city)-based factors are available;
- if an index has multiple values for a city or nation, the most relevant value is used;
- if an index is at a regional level, the most relevant allocation of scores to each centre is made (and the method for judging relevance is noted); and
- 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; and
- 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; and
- 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?
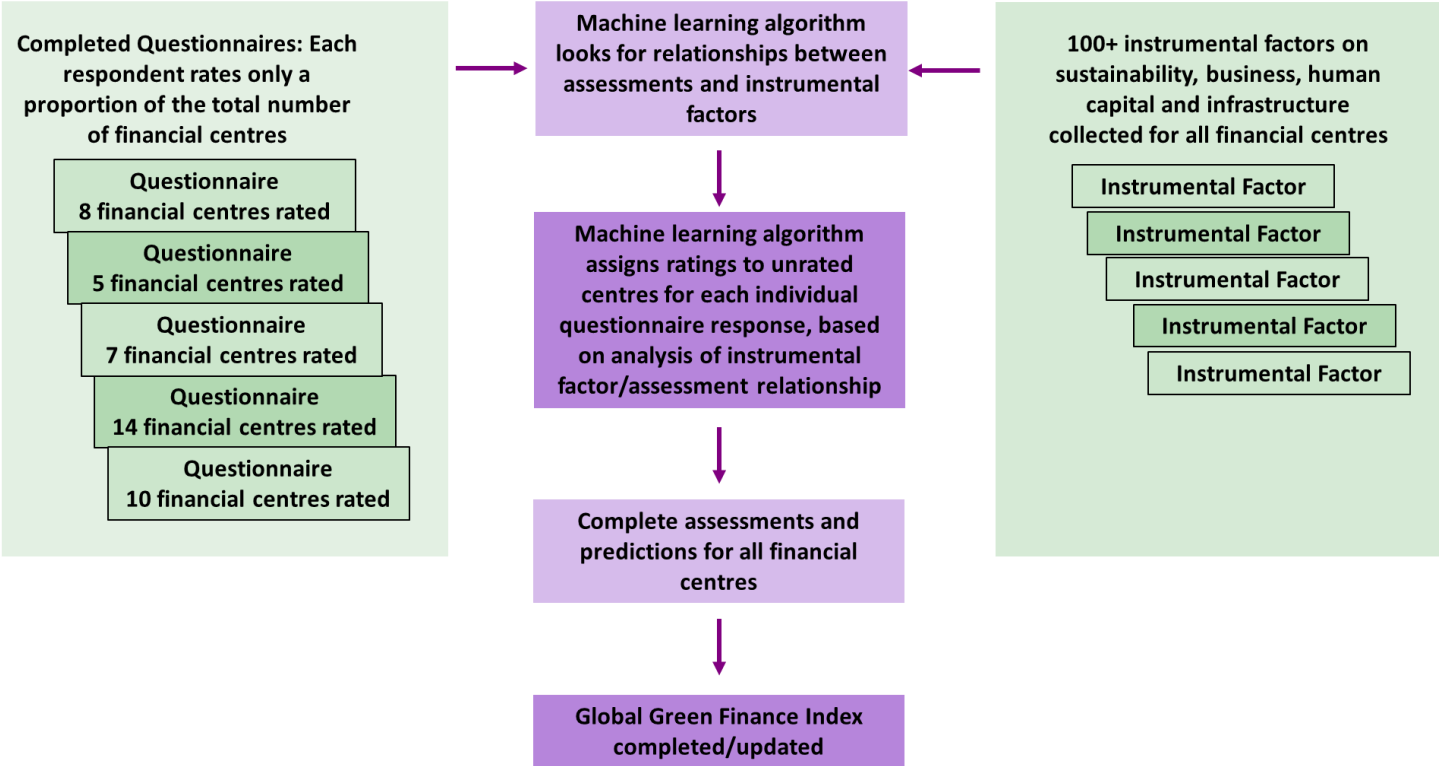
Or

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 59 below.

Chart 59 | The GGFI Process

Completed Questionnaires: Each respondent rates only a proportion of the total number of financial centres

Questionnaire
8 financial centres rated

Questionnaire
5 financial centres rated

Questionnaire
7 financial centres rated

Questionnaire
14 financial centres rated

Questionnaire
10 financial centres rated

Machine learning algorithm looks for relationships between assessments and instrumental factors

Machine learning algorithm assigns ratings to unrated centres for each individual questionnaire response, based on analysis of instrumental factor/assessment relationship

Complete assessments and predictions for all financial centres

Global Green Finance Index completed/updated

100+ instrumental factors on sustainability, business, human capital and infrastructure collected for all financial centres

Instrumental Factor

Instrumental Factor

Instrumental Factor

Instrumental Factor

Instrumental Factor

Appendix 5: Instrumental Factors

Table 39 | Sustainability Instrumental Factor Correlation With Depth Ratings - Highest 15 Factors

Instrumental Factors	R-squared
Sustainable Cities Index	0.544
Quality of Living City Rankings	0.510
Water Quality	0.478
Environmental Performance	0.469
IESE Cities In Motion Index	0.461
Sustainable Economic Development	0.423
World Energy Trilemma Index	0.402
Financial Centre Corporate Sustainability Performance	0.400
Quality of Life Index	0.368
Global Sustainable Competitiveness Index	0.359
Air Quality Data	0.259
Total Number Of Labelled Green Bonds Issued To December 2018	0.174
Total Issuance Of Labelled Green Bonds To December 2018, USDm	0.158
Share Of Wind And Solar In Electricity Production	0.152
Financial Centre Sustainability Disclosure	0.123

Table 40 | Sustainability Instrumental Factor Correlation With Quality Ratings - Highest 15 Factors

Instrumental Factors	R-squared
Sustainable Cities Index	0.606
Quality of Living City Rankings	0.587
IESE Cities In Motion Index	0.569
Environmental Performance	0.540
Water Quality	0.525
Sustainable Economic Development	0.481
World Energy Trilemma Index	0.474
Financial Centre Corporate Sustainability Performance	0.436
Global Sustainable Competitiveness Index	0.391
Quality of Life Index	0.375
Air Quality Data	0.289
Share Of Wind And Solar In Electricity Production	0.256
Financial Centre Sustainability Disclosure	0.171
Total Number Of Labelled Green Bonds Issued To December 2018	0.145
Total Issuance Of Labelled Green Bonds To December 2018, USDm	0.142

Table 41 | Sustainability Factors

Instrumental Factor	Source	Website	Updated
Air Quality Data	WHO	http://www.who.int/airpollution/data/cities/en/	Y
Average Precipitation In Depth (mm Per Year)	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators&series=AG.LND.PRCP.MM	N
Buildings Energy Efficiency Policies Database (Y/N)	IEA	https://www.iea.org/policies	N
Certified Climate Bonds Issued To December 2018, % Of Centre Total	CBI	https://www.finance-watch.org/publication/global-green-finance-index-3/	N
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/	N
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/	N
World Energy Trilemma Index	World Energy Council	https://trilemma.worldenergy.org/	Y
Environmental Performance	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/	N
Financial Centre Carbon Intensity	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	N
Financial Centre Clean To Fossil-Fuel Related Revenue (Clean Revenue)	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	N
Financial Centre Clean To Fossil-Fuel Related Revenue (Dirty Revenue)	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	N
Financial Centre Corporate Sustainability Performance	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	N
Financial Centre Sustainability Disclosure	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	N
Financial Centres Green Alignment - Non-Regulatory Actors	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	N
Financial Centres Green Alignment - Regulators And Stock Exchanges	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	N
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	Y
GRESB Green Real Estate And Infrastructure Investment Score	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	N
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/	N
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/	N
Protected Land Area % Of Land Area	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=2&series=ER.LND.PTLD.ZS&country=	N
Quality of Life Index	Numbeo	http://www.numbeo.com/quality-of-life/rankings.jsp	Y

Table 41 (continued) | Sustainability Factors

Instrumental Factor	Source	Website	Updated
Quality Of Living City Rankings	Mercer	https://mobilityexchange.mercer.com/Insights/quality-of-living-rankings	N
Ratio Climate-Aligned Bonds To Total Debt Securities By Issuer Location	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	N
Ratio Labelled Green Bonds To Total Debt Securities By Issuer Location	Corporate Knights	https://www.finance-watch.org/publication/global-green-finance-index-3/	N
Share Of Renewables In Electricity Production	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	N
Share Of Wind And Solar In Electricity Production	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	N
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/	N
Sustainable Cities Index	Arcadis	https://www.arcadis.com/en/global/our-perspectives/sustainable-cities-index-2018/citizen-centric-cities/	N
Sustainable Economic Development	Boston Consulting Group	https://www.bcg.com/en-gb/publications/2019/seda-measuring-well-being.aspx	Y
Sustainable Stock Exchanges (Y/N)	UN Sustainable Stock Exchange Initiative	http://www.sseinitiative.org/sse-partner-exchanges/list-of-partner-exchanges/	N
Total Issuance Of Labelled Green Bonds To December 2018, USDm	CBI	https://www.finance-watch.org/publication/global-green-finance-index-3/	N
Total Number Of Labelled Green Bonds Issued To December 2018	CBI	https://www.finance-watch.org/publication/global-green-finance-index-3/	N
Water Quality	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	N

Table 42 | 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	https://www.transparency.org/cpi2018	N
Cost Of Living City Rankings	Mercer	https://mobilityexchange.mercer.com/Insights/cost-of-living-rankings	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 (Constant 2011 PPP $)	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	Y
Global Cities Index	AT Kearney	https://www.atkearney.com/global-cities/2019	N
Global Innovation Index	INSEAD	http://www.globalinnovationindex.org/content.aspx?page=GII-Home	Y
Global Intellectual Property Index	Taylor Wessing	https://united-kingdom.taylorwessing.com/en/ip-index/reports	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://visionofhumanity.org/indexes/terrorism-index/	Y
Good Country Index	Good Country Party	https://www.goodcountry.org/index/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&series=UIS.FOSGP.5T8.F400	Y
Gross Tertiary Graduation Ratio	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=Education%20Statistics&series=SE.TER.CMPL.ZS	Y
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/2019-report/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

Table 42 (continued) | Human Capital Factors

Instrumental Factor	Source	Website	Updated
Innovation Cities Global Index	2ThinkNow Innovation Cities	https://www.innovation-cities.com/index-2019-global-city-rankings/18842/	Y
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-2019/rankings/#series=NRFAIREX	Y
OECD Country Risk Classification	OECD	http://www.oecd.org/trade/topics/export-credits/documents/cre-crc-current-english.pdf	Y
Open Data Barometer	World Wide Web Foundation	https://opendatabarometer.org/4thedition/?_year=2016&indicator=ODB	N
Open Government	World Justice Project	http://worldjusticeproject.org/rule-of-law-index	N
Henley Passport Index	Henley Partners	https://www.henleypassportindex.com/passport	Y
Personal Tax Rates	OECD	https://stats.oecd.org/index.aspx?DataSetCode=TABLE_I6	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)	https://rsf.org/en/ranking/2019	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 Revenue As Percentage Of GDP	The World Bank	https://data.worldbank.org/indicator/GC.TAX.TOTL.GD.ZS	Y
Top Tourism Destinations	Euromonitor	https://go.euromonitor.com/white-paper-travel-2019-100-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/world-talent-ranking-2019/	Y

Table 43 | Business Factors

Instrumental Factor	Source	Website	Updated
Best Countries For Business	Forbes	http://www.forbes.com/best-countries-for-business/list/#tab:overall	N
Bilateral Tax Information Exchange Agreements	OECD	http://www.oecd.org/ctp/exchange-of-tax-information/taxinformationexchangeagreementstieas.htm	N
Broad Stock Index Levels	The World Federation of Stock Exchanges	https://focus.world-exchanges.org/issue/december-2019/market-statistics	Y
Business Environment Rankings	EIU	http://country.eiu.com/All	Y
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	https://focus.world-exchanges.org/issue/december-2019/market-statistics	Y
Common Law Countries	CIA	https://www.cia.gov/library/publications/the-world-factbook/fields/308.html	N
Corporate Tax Rates	PWC	https://www.pwc.com/payingtaxes	Y
Democracy Index	The Economist	https://www.eiu.com/topic/democracy-index	N
Domestic Credit Provided By Banking Sector (% Of GDP)	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators&series=FS.AST.DOMS.GD.ZS	Y
Ease Of Doing Business Index	The World Bank	https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020	Y
Economic Performance Index	The Brookings Institution	https://www.brookings.edu/research/global-metro-monitor-2018/#rank	N
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 As A Percentage of GDP	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	www.logistics.dhl/gci	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/gsli	N
Government Debt As % of GDP	CIA	https://www.cia.gov/library/publications/the-world-factbook/rankorder/2186rank.html	N
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-2019	N
Open Budget Survey	International Budget Partnership	http://survey.internationalbudget.org/#download	N

Table 43 (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&series=IC.FRM.BNKS.ZS	Y
Real Interest Rate	The World Bank	https://databank.worldbank.org/reports.aspx?source=world-development-indicators&series=FR.INR.RINR	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	https://statistics.world-exchanges.org/ReportGenerator/Generator#	Y
Value Of Share Trading	The World Federation of Stock Exchanges	https://focus.world-exchanges.org/issue/december-2019/market-statistics	Y
Volume Of Share Trading	The World Federation of Stock Exchanges	https://statistics.world-exchanges.org/ReportGenerator/Generator#	Y
World Competitiveness Scoreboard	IMD	https://www.imd.org/wcc/world-competitiveness-center-rankings/world-competitiveness-ranking-2019/	N
The Global Financial Centres Index	Z/Yen	https://www.longfinance.net/programmes/financial-centre-futures/global-financial-centres-index/	New
The Global Fintech Index	Findexable	https://findexable.com/	New
TRACE Bribery Risk Matrix	Trace International	https://matrixbrowser.traceinternational.org/	New

Table 44 | Infrastructure Factors

Instrumental Factor	Source	Website	Updated
Crude Oil Input To Refineries	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	N
Global Competitiveness Index	World Economic Forum	http://reports.weforum.org/global-competitiveness-report-2019/competitiveness-rankings/	Y
INRIX Traffic Scorecard	INRIX	http://inrix.com/scorecard/	N
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=2&series=IS.SHP.GCNW.XQ	Y
Logistics Performance Index	The World Bank	http://lpi.worldbank.org/international/global	N
Metro Network Length	Metro Bits	http://mic-ro.com/metro/table.html	Y
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/en/reports-and-papers/networked-society-insights/city-index	N
Quality Of Domestic Transport Network	World Economic Forum	http://reports.weforum.org/travel-and-tourism-competitiveness-report-2019/rankings/#series=TRSPEFFICY	Y
Quality Of Road Infrastructure	World Economic Forum	http://reports.weforum.org/travel-and-tourism-competitiveness-report-2019/rankings/#series=EOSQ057	Y
Railways Per Land Area	CIA	https://www.cia.gov/library/publications/the-world-factbook/rankorder/2121rank.html	N
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	N
TomTom Traffic Index	TomTom	https://www.tomtom.com/en_gb/traffic-index/ranking/	Y

Seoul — Together we stand

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 preemptively gain a foothold in the Seoul financial hub. Seoul is the gateway to Northeast Asia and the world.

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BIFC — BUSAN INTERNATIONAL FINANCE CENTER

Since 2009 Busan Metropolitan City has been developing a financial hub specialized 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 was completed in 2018, residing the fintech hub center and financial museum. In addition, Busan has been designated as a Regulation-Free Blockchain Zone by the government, becoming a hub of the financial industry that applies the new technology.

With this world-class business infrastructure, BIFC offers an attractive incentive package to global financial leaders, including 25 years of free office rentals to be offered to a small number of companies.

BIFC will support you to identify opportunities in Busan, one of the fastest developing cities in Asia.

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CASABLANCA FINANCE CITY — القطب المـــالي للـــدار البيضـــاء

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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ABU DHABI GLOBAL MARKET — سوق أبوظبي العالمي

Abu Dhabi Global Market (ADGM), an award-winning financial centre in the capital of the UAE, opened for business in October 2015, consisting of three independent authorities: the Registration Authority (RA); the Financial Services Regulatory Authority (FSRA); and ADGM Courts. Comprised of the three independent authorities where Common English Law is directly applicable, ADGM plays an essential role in the diversification of the economy in the UAE and is committed to providing a comprehensive business ecosystem operating with the highest standards of integrity and is renowned for its ease of doing business.

Strategically situated in Abu Dhabi, home to one of the world's largest sovereign wealth funds, ADGM plays a vital role in positioning Abu Dhabi as a global trade and business hub and serves as a link between the growing economies of the Middle East, Africa and South Asia to the rest of the world. ADGM has earned industry recognition as the Financial Centre of the Year (MENA) four years in a row as well as being recognized as the leading FinTech Hub in the region.

www.adgm.com/ info@adgm.com

Global Times Consulting

Global Times Consulting Co. is a strategic consultancy with a focus on China. We help Chinese (local) governments at all levels to build their reputation globally, providing strategic counsel, stakeholder outreach and communications to support their sustainable development. We also partner with multinational companies operating in this dynamic but challenging market, serving as a gateway to China. In addition, we help Chinese companies extend their reach overseas.

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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 24,000 professionals working across over 2,200 active registered companies – making up the largest and most diverse pool of industry talent in the region. 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.

Comprising a variety of world-renowned retail and dining venues, a dynamic art and culture scene, residential apartments, hotels and public spaces, DIFC continues to be one of Dubai's most sought-after business and lifestyle destinations.

www.difc.ae Twitter @DIFC

LONG FINANCE

The Long Finance initiative grew out of the London Accord, a 2005 agreement among investment researchers to share environmental, social and governance research with policy-makers and the public. Long Finance was established more formally by Z/Yen Group and Gresham College from 2007 with the aim of exploring long-term thinking across a global network of people.

We work on researching innovative ways of building a more sustainable financial system. In so doing, we try to operate openly and emulate scientific ideals. At the same time, we are looking to create a supportive and caring community where people can truly question the accepted paradigms of risk and reward.

www.longfinance.net

FINANCE MONTRÉAL

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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Vantage Financial Centres

Vantage Financial Centres is an exclusive network of financial centres around the world looking for a deeper understanding of financial centre competitiveness. Members receive enhanced access to GGFI and GFCI data, marketing opportunities, and training for centres seeking to enhance their profile and reputation.

AIFC — Astana International Financial Centre

AIFC is an all-around financial centre located in Nur-Sultan, the capital of Kazakhstan, which offers ample opportunities for businesses to grow. AIFC provides greater access to world-class capital markets and the asset management industry. It also promotes financial technology and drives the development of niche markets such as Islamic and green finance in the region.

AIFC provides unprecedented conditions and opportunities for its participants and investors: legal system based on the principles of English law, independent judicial system, regulatory framework consistent with internationally recognised standards, wide range of financial services and instruments, simplified visa and labour regimes, zero corporate tax rate, and English as a working language.

Located in the heart of Eurasia, AIFC is striving to become the gateway to the Eurasian Economic Union, Central Asia and Caucasus, and play a key role in the Belt and Road Initiative. AIFC is already gaining tremendous recognition as a leading financial hub in the region: recently, Asiamoney Awards recognised it as the best Belt and Road Initiative project of 2019.

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CDI — China Development Institute

Approved by the China's State Council, China Development Institute (CDI) was founded in 1989 with one hundred and sixteen representatives from the government, academia and business in China. Being an independent think-tank, CDI is committed to develop policy solutions via research and debates that help to advance China's reform and opening-up. After years of development, CDI has become one of the leading think-tanks in China. CDI focuses on the studies of open economy and innovation-driven development, regional economy and regional development, industrial policies and industrial development, urbanization and urban development, business strategies and investment decision-making. Via conducting research, CDI provides policy recommendations for the Chinese governments at various levels and develops consultation for corporate sectors at home and abroad. CDI organizes events in different formats that evokes dialogue among scholars, government officials, business people and civil society members around the globe. Based in Shenzhen, Southern China, CDI has one hundred and sixty staff, with an affiliated network that consists of renowned experts from different fields.

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www.cdi.org.cn

GIFT — Gujarat International Finance Tec-City

Gujarat International Finance Tec-City (GIFT), Gujarat, India has set up International Financial Services Centre (IFSC) which is the only approved IFSC in India. The GIFT IFSC is a gateway for inbound and outbound business from India. Centre is fast emerging as a preferred destination for undertaking International Financial Services. The GIFT IFSC covers Banking, Insurance, Capital Market and allied services covering law firms, accounting firms and professional services firms.

It provides very competitive cost of operation with competitive tax regime, single window clearance, relaxed Company Law provisions, International Arbitration Centre with overall facilitation of doing business.

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LuxembourgforFinance — Agency for the Development of the Financial Centre

Luxembourg for Finance (LFF) is the Agency for the Development of the Financial Centre. It is a public-private partnership between the Luxembourg Government and the Luxembourg Financial Industry Federation (PROFIL). Founded in 2008, its objective is to develop Luxembourg's financial services industry and identify new business opportunities.

LFF connects international investors to the range of financial services provided in Luxembourg, such as investment funds, wealth management, capital market operations or advisory services. In addition to being the first port of call for foreign journalists, LFF cooperates with the various professional associations and monitors global trends in finance, providing the necessary material on products and services available in Luxembourg.

Furthermore, LFF manages multiple communication channels, organises seminars in international business locations, and takes part in selected world-class trade fairs and congresses.

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www.zyen.com

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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.

THE GLOBAL GREEN FINANCE INDEX
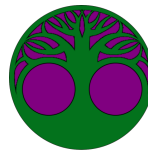
www.greenfinanceindex.net

The Global Green Finance Index provides a measure of how financial centres are responding to the challenge of developing a sustainable economy, enabling centres to compare their performance with their peers, improve policy makers' understanding of the drivers of green growth, and assist them in shaping the financial system to support sustainability goals.

www.financialcentrefutures.net

Financial Centre Futures is a programme within the Long Finance initiative that initiates discussion on the changing landscape of global finance. 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.