

The Global Green Finance Index 10

London

New York

Amsterdam

Luxembourg San Francisco

Geneva

Los Angeles

Stockholm

Copenhagen

Sydney

October 2022



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Beginning in March 2018, as part of its Long Finance initiative, Z/Yen published the first five editions of the Global Green Finance Index with the generous support of the MAVA Foundation. Z/Yen continues this work and is pleased to present the tenth edition of the Global Green Finance Index (GGFI 10).

In 2022, Abu Dhabi Global Market (ADGM) became the sponsors of the GGFI, and we look forward to working with ADGM to develop the GGFI and to focus on the impact that financial centres make to sustainable finance.

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.

Abu Dhabi Global Market is an award-winning international financial centre strategically located in the capital of the United Arab Emirates. Established by UAE Federal Decree, ADGM's jurisdiction extends across the entire 114 hectares of Al Maryah Island. ADGM's four independent authorities - the Registration Authority (RA), the Financial Services Regulatory Authority (FSRA), ADGM Courts and ADGM Authority - together ensure that its business-friendly environment operates in line with international best practices, recognised by major financial centres worldwide.

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

The authors of this report, Mike Wardle, Simon Mills, and Professor Michael Mainelli, would like to thank Bikash Kharel, Sasha Davis, Charlotte Dawber-Ashley and the rest of the Z/Yen team for their contributions with research, modelling, and ideas.



Foreword

The strategic role and recognised importance of green financing is increasing not only at the level of the world's largest economies but at a wider global level, hence the Global Green Finance Report (GGFI) reports' rigorous process act as an important benchmark for financial decision-makers around the world, to measure the quality and depth of green finance offerings of leading financial centres.

Being the leading international financial centre (IFC) in the heart of UAE's capital, Abu Dhabi Global Market (ADGM) is pleased to co-host the launch of the tenth edition of the GGFI report this year with the Z/Yen Group. We at ADGM, consider sustainable finance as a strategic priority and seek to contribute to forwarding the UAE's net zero emissions target by dedicating considerable resources to initiatives that build a sustainable ecosystem for the financial industry, not only at the national level but globally too. This collaboration is yet another step in this direction to double down on our efforts to become the leading sustainable finance hub in the Middle East and around the world.

On this year's rankings, ADGM extends its congratulation to all jurisdictions on their achievements and progress achieved in the past year despite continuing global economic challenges around green finance. The results for this year have been reassuring for ADGM as an IFC and we are proud to see the progress and various recognition Abu Dhabi has received as a dynamic and growing business hub committed to sustainability.

As Abu Dhabi continues to rank as the top five most desirable places to live and work outside of New York, London, Hong Kong, and Singapore, there are other areas where the capital emirate has earned recognition by showcasing notable advancement. The emirate has increased 5 ranking places overall with a 15-point jump compared to last year and is a close competitor of many established IFCs. In the MENA region, it has been recognised as the second financial centre in the region with strong depth and quality in its green finance initiatives and activities. The GGFI 10 report categorises Abu Dhabi's financial centre profile as 'International Specialists' when looking at aspects such as diversity, speciality and connectivity.

The emirate continues to be the frontrunner, constantly promoting innovation and unlocking several opportunities in Environmental, Social and Governance (ESG) and sustainable finance space regionally and globally. As policymakers, ADGM has been the major catalyst in driving the emirate's regulations around ESG and sustainable finance agenda, contributing to fostering the overall economic development in the UAE, sustainably.

With the ever-changing vibrancy of the global green financial sector, the GGFI 10 index provides a useful platform to start important discussions on the evolution of the IFC landscape keeping our environment and green goals in mind while meeting the needs of the various stakeholders of the industry. As a financial centre that supports the creation and issuance of products that achieve positive economic, social and environmental objectives, we sincerely hope that our work will continue to be useful for financial policymakers, financial institutions and financial researchers globally, as well as contribute to the development of UAE's green financial markets.

Dhaher Bin Dhaher Al Mheiri
Chief Executive Officer
Registration Authority, Abu Dhabi Global Market



Foreword

Welcome to the 10th edition of the Global Green Finance Index.

Global warming has never been a hotter topic than in this year of wildfires, heat-waves, and other extreme weather events, and climate change has been at the forefront of public policy debates around the world.

Financial institutions play a key role in the net zero transition. Green and sustainable finance is our key tool to help mobilise capital and direct it towards a green and sustainable future. In this context, this index provides an invaluable aid to gauge the progress being made towards these goals by financial centres around the world.

At Bank of China, we have made a strong commitment to ESG (environmental, social and governance) principles, with an emphasis on engaging with stakeholders to go green together. We have laid out a clear action plan to help reach Chinese national targets for peak carbon emissions and carbon neutrality.

The bank has embarked on the journey of integrating ESG into our operations and across our asset portfolios. Actions include measuring the operational carbon footprint across the bank around the world, adopting measures to decarbonise our portfolios and no longer funding new coal related projects overseas from Q4 2021. Late last year alone, 2.2 billion USD Bank of China Sustainable Bonds were listed on the London Stock Exchange.

We have allocated considerable resources to ESG training at board, management and working levels, as so to build capacity and more importantly, to embed the green and sustainable concept into the culture. Internally we launched our green learning programmes in our Bank of China Learning platform, and externally we have partnered with global training institutions to provide a professional green and sustainable finance qualification courses for employees.

Bank of China also intends to maintain our momentum towards greener finance and achieving a more sustainable future through redoubled commitment to a range of global initiatives.

Last year we signed up to the United Nations Principles for Responsible Banking, and are also a signatory to the Task Force on Climate-Related Financial Disclosures (TCFD). The TCFD was set up by the Financial Stability Board to improve reporting of climate-related financial information.

London is the front runner in green and sustainable finance among international financial centres, and Bank of China is pleased to embrace the mission to play a leading role in drawing together the strength of our industry and peers, and to support building the world's green and sustainable future.

Wenjian Fang
General Manager, Bank of China Limited London Branch
CEO, Bank of China (UK) Limited



Summary

Overview

This is the tenth edition of the Global Green Finance Index (GGFI 10). The GGFI is a factor assessment index, based on a range of instrumental factors - quantitative measures - and a worldwide survey of finance professionals' assessments on the quality and depth of green finance offerings in financial centres.

As ESG analytics and other aspects of green finance penetrate mainstream financial activity, there is growing confidence in the development of green finance across all regions. There is, however, criticism of ESG as a mechanism, with commentary focusing on complexity, cost, greenwashing, and its low impact on carbon emissions. There is growing interest in carbon pricing and trading as a mechanism to address the central issue of greenhouse gas emissions and it may be that carbon pricing, alongside improved ESG systems, will be the way forward.

Looking at the centres which perform well in the GGFI, they are generally places that commit to environmental improvements across the economy as well as in finance. A key part of this performance relates to skills in the economy. Centres such as London, Amsterdam, and New York have a depth of skills in green finance, but also in other aspects of sustainable economic development.

Among those responding to the GGFI survey, Policy & Regulatory Frameworks continue to be identified as the leading driver in the development of green finance, underlining the reliance of green finance on robust and stable policy frameworks, which require government and regulatory action. Other leading drivers were Risk Management Frameworks, International Initiatives, and Academic Research around climate change.

As anticipated in the last edition of the GGFI, the invasion of Ukraine by the Russian Federation has led to a reduction in Moscow's position in the index. In addition, the economic shock that has arisen from the war, has slowed down the transition away from fossil fuels in the short-term, although it may lead to increased investment in renewable energy.

In the supplement to this edition of the GGFI, we focus on agriculture, which is critical to the achievement of the sustainable development goals and faces challenges from climate change, political instability, and population growth. In the supplement, we consider the role different types of finance can play in supporting agricultural development.

Index Results

- London and Amsterdam maintained their first and second positions in GGFI 10, both improving their rating, but with New York gaining 27 points to move into third place. Sydney and Copenhagen moved into the top 10, displacing Zurich and Oslo.
- Western European centres take six of the top 10 places, with US centres taking three places and Sydney entering the top 10 for the first time.
- Seven Asia/Pacific centres feature in the top 20. There is increasing challenge to Western European dominance, with leading Asia/Pacific and US centres moving steadily up the rankings.
- The margins separating centres at the top of the index have narrowed slightly in GGFI 10. Among the top 10 centres the spread of ratings is 42 out of 1,000, compared to 45 out of 1,000 in GGFI 9.
- We researched 126 financial centres for GGFI 10. The number of centres in the index has increased to 84 (81 in GGFI 9), with the addition of Riyadh, Sofia, and Riga.

Western Europe

- Six Western European centres feature in the top 10 in GGFI 10, and all but one of these leading centres in the region maintained or improved their rating.
- Edinburgh gained 13 rank places, while Brussels and Hamburg fell more than 10 places.

North America

- New York rose to third place overall, with San Francisco falling 2 places to fifth and Los Angeles rising four places to 6th.
- All North American centres either maintained their position or rose in the ratings, and Chicago improved 15 rank places.

Asia/Pacific

- Sydney continues to lead the region and took tenth place overall, overtaking Beijing to lead the Asia/Pacific region.
- Seoul rose three places in the rankings to 12th position and has moved to second place in the region, with Singapore in third place.

Middle East & Africa

- Dubai moved back into first place in the region, rising 16 rank places, with Abu Dhabi in second place, up five rank places overall.
- Casablanca rose eight rank places to maintain third place in the region and the leading position in Africa.
- Riyadh entered the index for the first time, taking 48th position.

Latin America & The Caribbean

- Mexico City has continued to improve its ratings, and is once again in first place in the Latin America & The Caribbean region, while Rio de Janeiro and Santiago move into second and third place in the region.
- Only 36 points out of 1,000 separate the ratings of centres in the region.

Eastern Europe & Central Asia

- Astana has a clear lead in the Eastern Europe & Central Asia region, and Istanbul rose six places to take second place in the region. Other centres in the region fell in the rankings.
- Sofia and Riga are new to the GGFI in this edition, ranking 78th and 82nd respectively.

GGFI 10

GGFI 10 was compiled using 149 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 5,511 financial centre assessments provided by respondents to the [GGFI online questionnaire](#). A breakdown of the 919 respondents is shown in Appendix 3. Further details of the methodology behind GGFI 10 are in Appendix 4.

The 84 centres listed in GGFI 10 are those which received a minimum of 25 assessments from survey respondents located outside of those centres. Assessments of respondents' home centres were excluded from the data, in order to avoid home centre bias.

GGFI 10 Ranks And Ratings

Table 1 | GGFI 10 Ranks And Ratings

Centre	GGFI 10		GGFI 9		Change In Rank		Change In Rating	
	Rank	Rating	Rank	Rating				
London	1	590	1	586	▶	0	▲	4
Amsterdam	2	580	2	573	▶	0	▲	7
New York	3	578	5	551	▲	2	▲	27
Luxembourg	4	554	7	546	▲	3	▲	8
San Francisco	5	553	3	553	▼	-2	▶	0
Los Angeles	6	552	10	541	▲	4	▲	11
Geneva	7	551	9	543	▲	2	▲	8
Stockholm	8	550	4	552	▼	-4	▼	-2
Copenhagen	9	549	12	539	▲	3	▲	10
Sydney	10	548	13	538	▲	3	▲	10
Zurich	11	547	6	548	▼	-5	▼	-1
Seoul	12	546	15	536	▲	3	▲	10
Oslo	13	544	8	545	▼	-5	▼	-1
Paris	14	543	11	540	▼	-3	▲	3
Washington DC	15	542	19	532	▲	4	▲	10
Singapore	16	541	16	535	▶	0	▲	6
Shanghai	17	540	18	533	▲	1	▲	7
Melbourne	18	539	24	526	▲	6	▲	13
Wellington	19	538	17	534	▼	-2	▲	4
Shenzhen	20	537	21	530	▲	1	▲	7
Busan	21	536	22	528	▲	1	▲	8
Edinburgh	22	535	35	513	▲	13	▲	22
Beijing	23	534	14	537	▼	-9	▼	-3
Tokyo	24	533	25	525	▲	1	▲	8
Boston	25	532	27	522	▲	2	▲	10
Chicago	26	531	41	506	▲	15	▲	25
Guangzhou	27	530	23	527	▼	-4	▲	3
Dubai	28	529	44	502	▲	16	▲	27
Helsinki	29	528	20	531	▼	-9	▼	-3
Munich	30	527	26	524	▼	-4	▲	3
Qingdao	31	526	33	516	▲	2	▲	10
Osaka	32	525	36	511	▲	4	▲	14
Abu Dhabi	33	524	38	509	▲	5	▲	15
Montreal	34	523	31	518	▼	-3	▲	5
Toronto	35	522	37	510	▲	2	▲	12
Lisbon	36	521	42	505	▲	6	▲	16
Vancouver	37	520	30	519	▼	-7	▲	1
Casablanca	38	519	46	500	▲	8	▲	19
Madrid	39	518	29	520	▼	-10	▼	-2
Frankfurt	40	517	34	514	▼	-6	▲	3
Hong Kong	41	516	39	508	▼	-2	▲	8
Berlin	42	515	32	517	▼	-10	▼	-2

Table 1 (continued) | GGFI 10 Ranks And Ratings

Centre	GGFI 10		GGFI 9		Change In Rank		Change In Rating	
	Rank	Rating	Rank	Rating				
Brussels	43	514	28	521	▼	-15	▼	-7
GIFT City-Gujarat	44	513	48	498	▲	4	▲	15
Dublin	45	512	43	503	▼	-2	▲	9
Kuala Lumpur	46	510	50	496	▲	4	▲	14
Calgary	47	509	52	494	▲	5	▲	15
Riyadh	48	507	New	New	▲	New	▲	New
Rome	49	505	45	501	▼	-4	▲	4
Tel Aviv	50	504	58	483	▲	8	▲	21
Hamburg	51	499	40	507	▼	-11	▼	-8
Guernsey	52	498	53	493	▲	1	▲	5
Glasgow	53	497	51	495	▼	-2	▲	2
Astana	54	496	49	497	▼	-5	▼	-1
Vienna	55	495	47	499	▼	-8	▼	-4
Jersey	56	493	57	484	▲	1	▲	9
Bangkok	57	492	59	481	▲	2	▲	11
Milan	58	491	54	492	▼	-4	▼	-1
Mauritius	59	490	55	491	▼	-4	▼	-1
Jakarta	60	489	56	485	▼	-4	▲	4
Bahrain	61	487	68	472	▲	7	▲	15
Cape Town	62	486	72	468	▲	10	▲	18
Mexico City	63	485	62	478	▼	-1	▲	7
Johannesburg	64	482	64	476	▶	0	▲	6
Rio de Janeiro	65	481	75	465	▲	10	▲	16
Liechtenstein	66	478	60	480	▼	-6	▼	-2
Santiago	67	477	67	473	▶	0	▲	4
Doha	68	472	61	479	▼	-7	▼	-7
Mumbai	69	467	63	477	▼	-6	▼	-10
Sao Paulo	70	465	66	474	▼	-4	▼	-9
Malta	71	464	65	475	▼	-6	▼	-11
Isle of Man	72	463	77	457	▲	5	▲	6
Istanbul	73	462	79	455	▲	6	▲	7
British Virgin Islands	74	461	69	471	▼	-5	▼	-10
Almaty	75	458	74	466	▼	-1	▼	-8
Moscow	76	457	73	467	▼	-3	▼	-10
Nairobi	77	456	80	452	▲	3	▲	4
Sofia	78	455	New	New	▲	New	▲	New
Warsaw	79	454	70	470	▼	-9	▼	-16
New Delhi	80	453	71	469	▼	-9	▼	-16
Prague	81	452	76	464	▼	-5	▼	-12
Riga	82	448	New	New	▲	New	▲	New
Cayman Islands	83	440	78	456	▼	-5	▼	-16
Bermuda	84	438	81	442	▼	-3	▼	-4

GGFI Dimensions

The GGFI ascertains the green finance performance of international financial centres by asking practitioners to rate them on two dimensions:

- The depth to which green finance has penetrated the business of the financial centre, i.e. the prevalence of green financial services and products within the financial centre in question.
- The quality of the green finance products and services on offer.

The purpose of tracking both aspects is to enable respondents to rate a financial centre independently from its market volumes. Thus, for example, if a centre adopts weak green labelling standards in a bid to boost volumes, this may show up in the GGFI as a lower quality rating.

The additional data generated through this approach increases granularity, allows the identification of trends, and can assist policy makers to track the impacts of their decisions.

The detailed ratings of the dimensions for the top 15 centres are shown in table 2. Additional details are in Appendix 1.

Table 2 | Top 15 Centres - Rating Details For Depth And Quality Dimensions

GGFI 10 Rank	Centre	GGFI Dimensions			
		Green Finance Depth		Green Finance Quality	
		Rank	Rating	Rank	Rating
1	London	1	286	1	304
2	Amsterdam	3	283	2	297
3	New York	2	285	3	293
4	Luxembourg	6	275	6	279
5	San Francisco	4	277	9	276
6	Los Angeles	6	275	8	277
7	Geneva	6	275	9	276
8	Stockholm	4	277	16	273
9	Copenhagen	9	273	9	276
10	Sydney	21	263	4	285
11	Zurich	16	267	5	280
12	Seoul	12	271	12	275
13	Oslo	10	272	19	272
14	Paris	10	272	21	271
15	Washington DC	14	269	16	273

Chart 1 shows the relationship between ratings of the depth and quality dimensions in the index and the generally close correlation between the assessments of each factor by respondents. Centres close to the trend line are balanced for depth and quality, centres further away have either a better rating for depth, or for quality. The relative score of Jersey for green finance quality is highest compared with its score in depth. On the other side of the line, Osaka, San Francisco, and New Delhi have high relative scores for depth.

Chart 1 | Relationship Between Ratings Of Depth And Quality



Chart 2 shows the contribution of each of the dimensions to the overall rating for the top 40 centres in the GGFI. London came first for both quality and depth, with Amsterdam second for quality and third for depth. Successful financial centres focused on green finance need both quality and depth in their green markets to thrive.

“A wider cultural shift is needed away from traditional finance models to embrace ESG and develop a differing view of return on investment and the associated economic models of the future.”

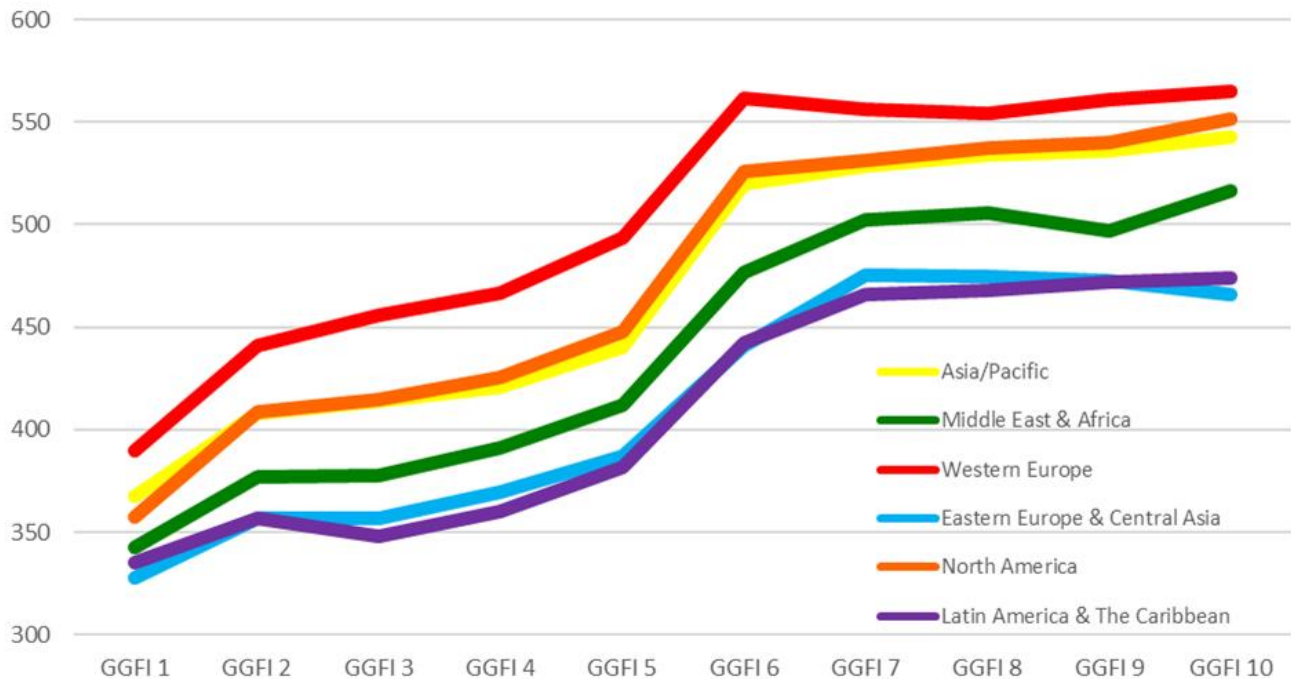
CEO, Consultancy, London

Chart 2 | The Contribution Of The Dimensions To The Overall Rating - GGFI 10 Top 40 Centres



Regional Performance

The average rating of the top five Western European centres improved slightly. The leading North American centres extended their lead over the Asia/Pacific region. There was a marked improvement in this measure in the Middle East & Africa region.



“There is a great need for skills development from the financiers and the project developers to the regulators.”

Founder, Professional Services Organisation, Trinidad & Tobago

Examination of the quality and depth dimensions demonstrates that while leading Western European centres are maintaining their ratings for depth and improving their ratings for quality, leading centres in Asia/Pacific and North America have narrowed the gap over time. Leading centres in the Middle East & Africa have improved on both measures.

Chart 4 | Average Ratings For Depth Of The Top Five Centres In Each Region

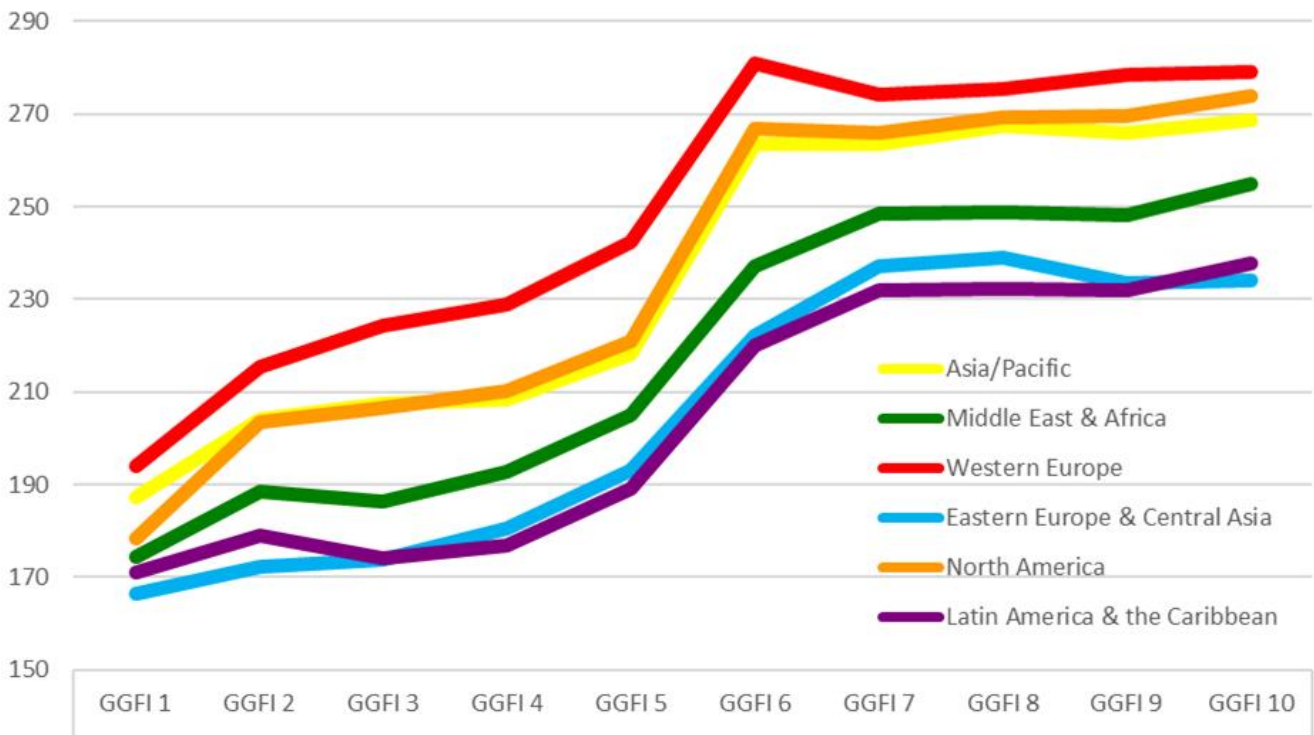
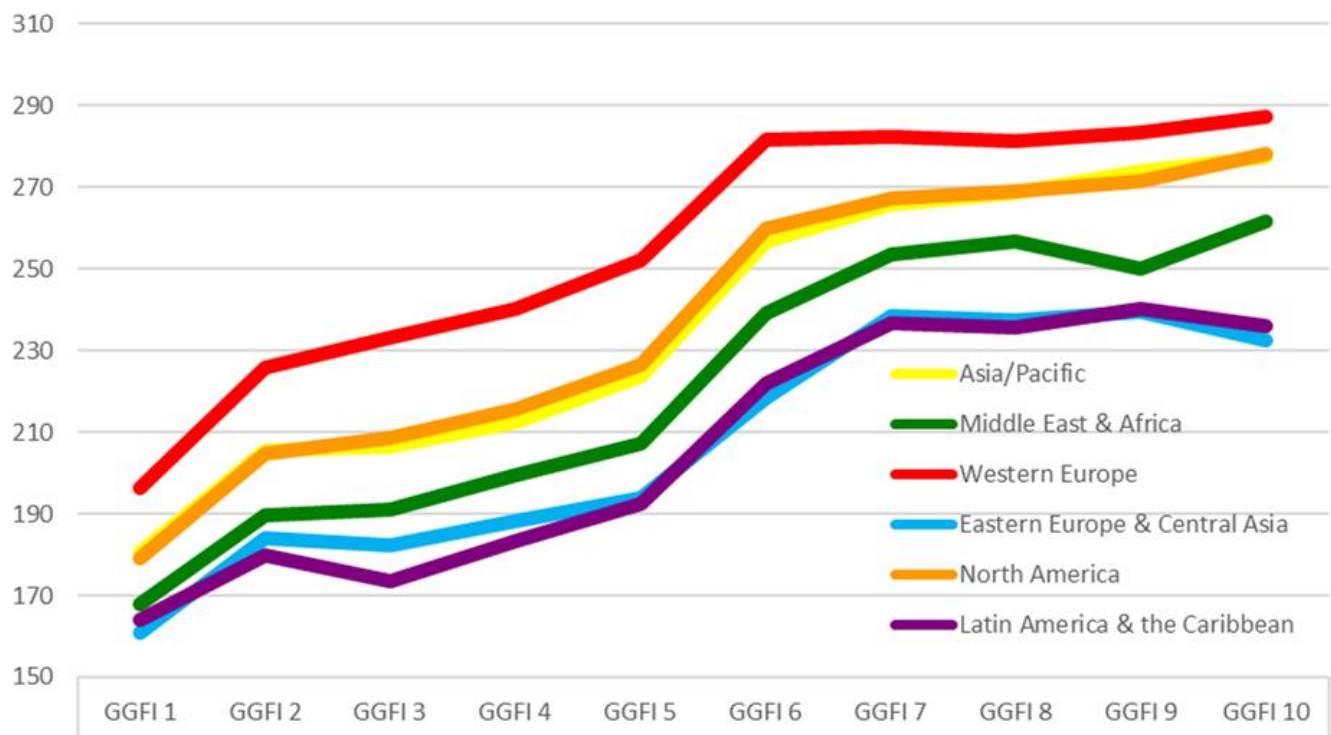


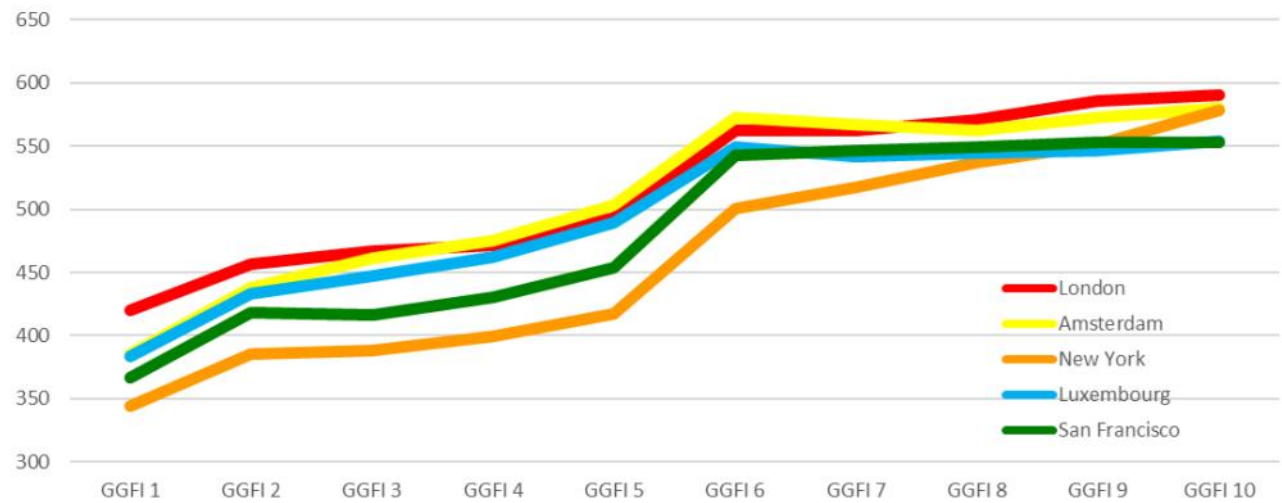
Chart 5 | Average Ratings For Quality Of The Top Five Centres In Each Region



Top Five Centres

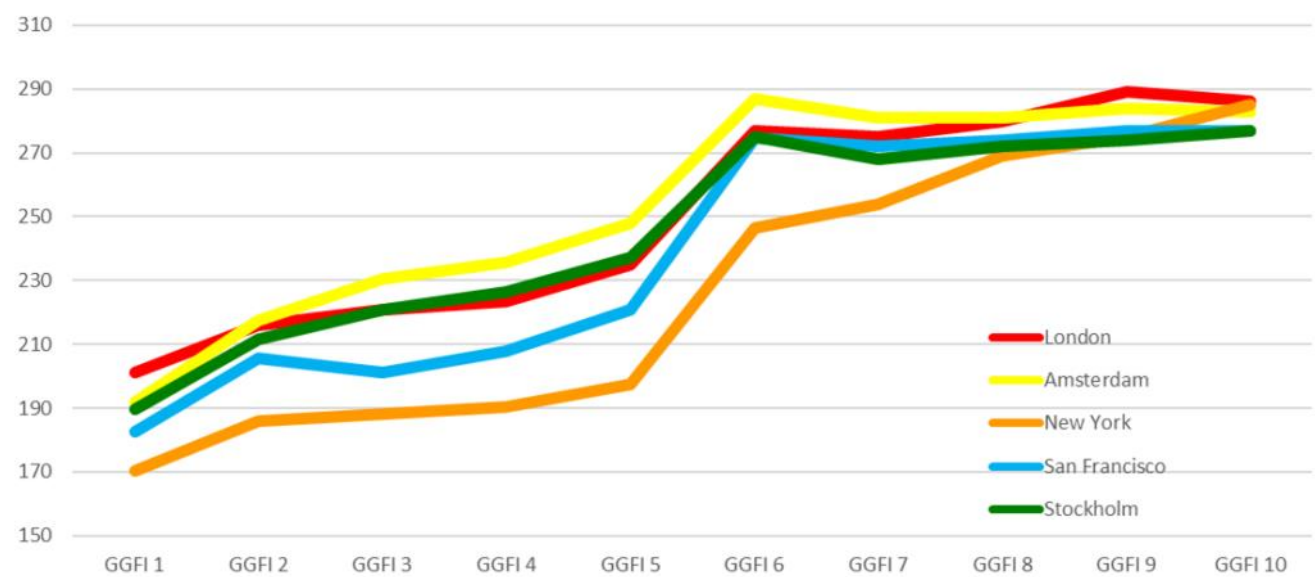
New York improved its rating by 27 points to challenge London and Amsterdam at the top of the index. Along with Luxembourg, these centres improved their rating, while San Francisco’s rating was static.

Chart 6 | The Top Five Centres Over Time



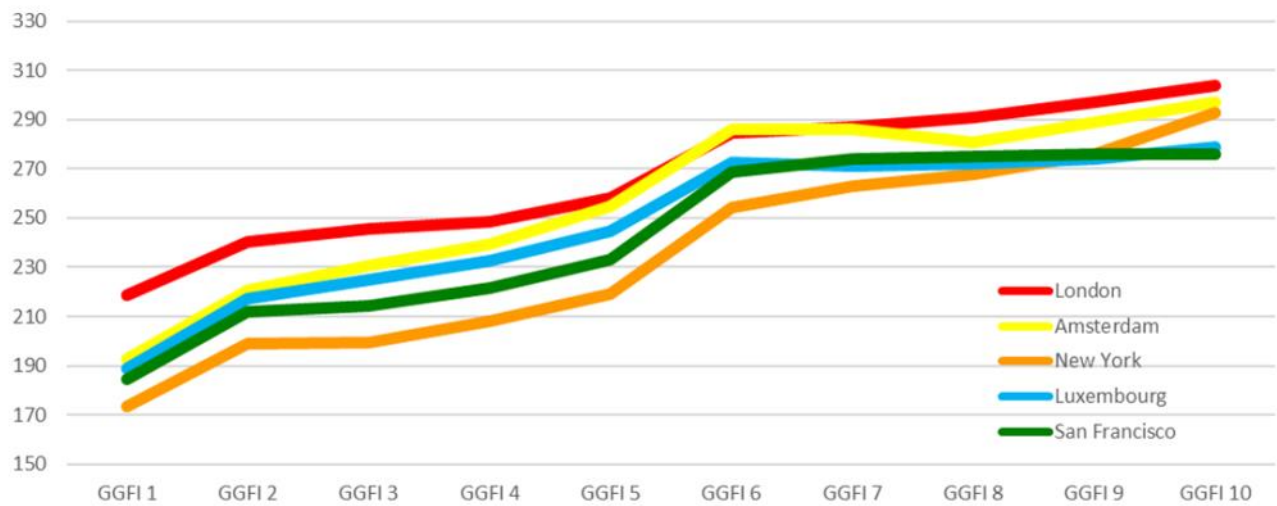
When the depth dimension is examined, London and Amsterdam’s ratings fell slightly, while New York continued to gain ground.

Chart 7 | Ratings For The Depth Dimension In The Top Five Centres Over Time



On the quality measure, again, the leading centres generally improved their position, although San Francisco’s rating was stable.

Chart 8 | Ratings For The Quality Dimension In The Top Five Centres Over Time



Leading Financial Centres

It is notable that some leading financial centres perform less well than expected in the GGFI, considering their performance in the [Global Financial Centres Index](#) (GFCI), which 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. This shows some disconnection between the highest performing centres in the GFCI and performance on green finance in the GGFI. In total, 12 centres feature in the top 20 in both measures with London, New York, San Francisco, and Los Angeles, featuring in the top 10 in both indices.

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

Centre	Global Green Finance Index 10	Green Finance Depth	Green Finance Quality	Financial Centre Competitiveness
New York	3	2	3	1
London	1	1	1	2
Singapore	16	19	12	3
Hong Kong	41	48	34	4
San Francisco	5	4	9	5
Shanghai	17	12	26	6
Los Angeles	6	6	8	7
Beijing	23	25	16	8
Shenzhen	20	16	23	9
Paris	14	10	21	10
Seoul	12	12	12	11
Chicago	26	21	27	12
Sydney	10	21	4	13
Boston	25	25	21	14
Washington DC	15	14	16	15
Tokyo	24	19	30	16
Dubai	28	33	23	17
Frankfurt	40	45	34	18
Amsterdam	2	3	2	19
Geneva	7	6	9	20
Source	GGFI 10 Rank	GGFI 10 Depth Rank	GGFI 10 Quality Rank	GFCI 32 Rank

“A realistic carbon tax is needed if there is going to be any meaningful move towards net zero targets.”

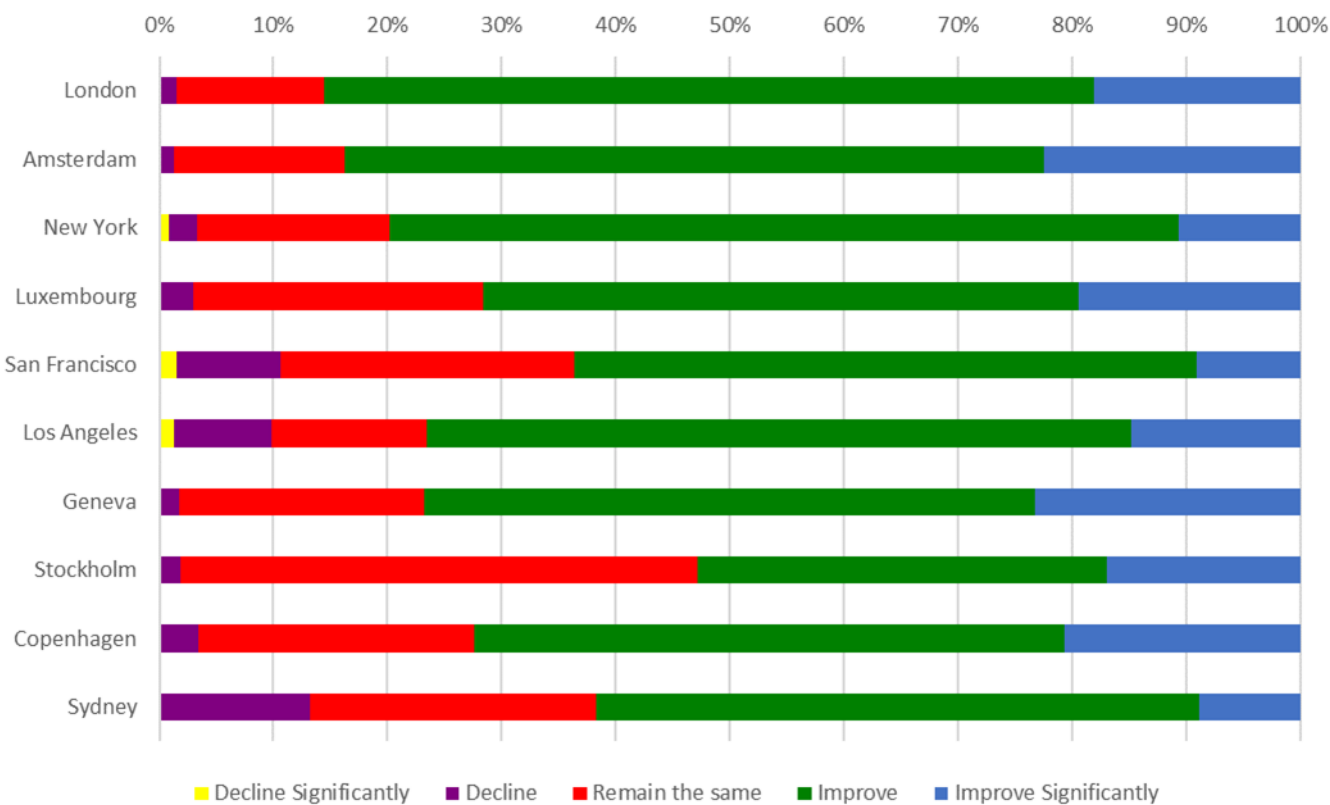
Senior Investment Manager, Investment Firm, London

GGFI 10 Further Analysis

Expected Change In Centres

We asked respondents whether the centres they rated would improve, decline, or stay the same in relation to their green finance offering over the next two to three years. The results for the top 10 centres are displayed in Chart 9, showing high levels of confidence, with the majority of respondents predicting an improvement by all centres in this group, and with very high levels of confidence in London and Amsterdam.

Chart 9 | Top 10 Centres - Expected Change In Green Finance Offering



“Building capacity and capabilities (and culture) to mainstream green and sustainable finance is a key barrier in all markets - even the most developed. The current focus on developing/recruiting increasing numbers of sustainability professionals can only take us so far. To meet Mark Carney's objective that "... every professional financial decision takes account of climate change ..." then all finance professionals will need to have at least a basic understanding of green/sustainable finance.”

Chief Executive, Professional Association, Edinburgh

Instrumental Factors

The GGFI is a factor assessment index, based on a worldwide survey of finance professionals' assessments on the quality and depth of green finance offerings in financial centres. These assessments are run through a statistical model which uses 149 instrumental factors relating to a range of aspects of financial centre competitiveness. These include measures of sustainability, the business environment, infrastructure, and human capital.

Table 4 shows the top 15 instrumental factors' correlation with the GGFI ranking. The correlation with the Global Financial Centres Index reinforces that leading financial centres continue to improve their green finance offering. Other highly correlated factors include the Urban Mobility Readiness Index, and the OECD Country Risk Classification. Infrastructure measures also feature strongly.

Table 4 | Top 15 Instrumental Factors By R-Squared Correlation

Instrumental Factor	R-Squared
The Global Financial Centres Index	0.739
Urban Mobility Readiness Index	0.570
OECD Country Risk Classification	0.537
Cost Of Living City Rankings	0.516
Global Innovation Index	0.515
Safe Cities Index	0.507
IESE Cities In Motion Index	0.492
Fintech Activity Index	0.484
Smart City Index	0.462
Adjusted Net National Income Per Capita	0.459
Quality Of Road Infrastructure	0.458
World Talent Rankings	0.449
Agility Emerging Markets Logistics Index	0.443
Sustainable Cities Index	0.442
Logistics Performance Index	0.436

"There are forthcoming regulations in Shanghai regarding green finance."

Professor, University, Shanghai

Focusing only on the instrumental factors which relate to sustainability, the factors most closely correlated in terms of their R-Squared relationship with the GGFI rankings are set out in Table 5. The leading factors continue to focus on cities as sustainable places and on the development of the green economy.

Table 5 | Top 15 Sustainability Instrumental Factors By R-Squared Correlation

Sustainability Factors	R-Squared
Urban Mobility Readiness Index	0.570
IESE Cities In Motion Index	0.492
Sustainable Cities Index	0.442
Quality Of Living City Rankings	0.349
Sustainable Economic Development	0.326
The Green Future Index	0.251
Energy Transition Index	0.218
Buildings Energy Efficiency Policies Database (Y/N)	0.184
Financial Centre Corporate Sustainability Performance	0.180
World Energy Trilemma Index	0.178
The Global Green Economy Index	0.177
Financial Centre Clean To Fossil-Fuel Related Revenue (Clean Revenue)	0.157
Labelled Green Bonds Issued By Country Of Issuer	0.142
Environmental Performance	0.140
Global Sustainable Competitiveness Index	0.135



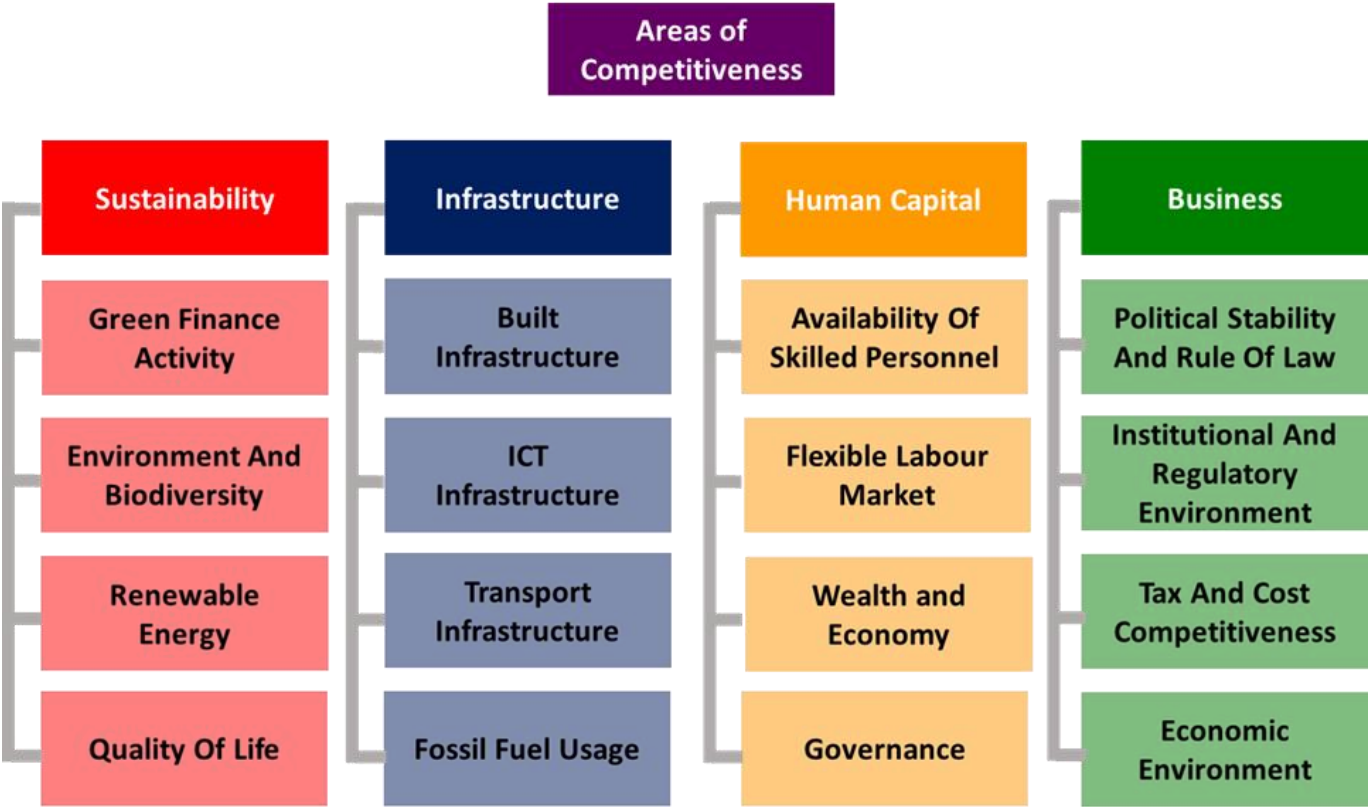
Areas Of Competitiveness

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 statistical model is run for each area of competitiveness separately, allowing a picture to be built of centres’ strengths and weaknesses. The performance of the top ranked 15 centres in each of these areas is illustrated in table 6.

The leading centres in the GGFI have strengths across all four areas of competitiveness. Some centres are strong in a particular area, for example, Helsinki in the sustainability area.

Table 6 | Top 15 Centres By Area Of Competitiveness

Rank	Sustainability	Business	Human Capital	Infrastructure
1	London	Amsterdam	London	London
2	Amsterdam	London	New York	New York
3	New York	New York	Amsterdam	Amsterdam
4	Luxembourg	Copenhagen	Luxembourg	Washington DC
5	Zurich	Los Angeles	Geneva	Copenhagen
6	Oslo	Luxembourg	Copenhagen	San Francisco
7	San Francisco	Zurich	Zurich	Los Angeles
8	Helsinki	Stockholm	Sydney	Luxembourg
9	Los Angeles	Sydney	Seoul	Wellington
10	Stockholm	Melbourne	Boston	Geneva
11	Paris	Shanghai	Los Angeles	Oslo
12	Singapore	San Francisco	San Francisco	Boston
13	Geneva	Geneva	Stockholm	Shanghai
14	Shanghai	Seoul	Oslo	Shenzhen
15	Copenhagen	Edinburgh	Shanghai	Melbourne



Index Ranking For Sustainability

We can compare the overall index ranking with the ranking based on the sustainability area of competitiveness, 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, London and Amsterdam retain their positions. Helsinki, Oslo, and Zurich gain significantly while Sydney, Seoul, and Washington DC drop out of the top 15.

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

Rank	All Factors	Sustainability Factors
1	London	London
2	Amsterdam	Amsterdam
3	New York	New York
4	Luxembourg	Luxembourg
5	San Francisco	Zurich (+6)
6	Los Angeles	Oslo (+7)
7	Geneva	San Francisco (-2)
8	Stockholm	Helsinki (+21)
9	Copenhagen	Los Angeles (-3)
10	Sydney	Stockholm (-2)
11	Zurich	Paris (+3)
12	Seoul	Singapore (+4)
13	Oslo	Geneva (-6)
14	Paris	Shanghai (+3)
15	Washington DC	Copenhagen (-6)

“There is a need to help set up the right mechanisms so that pension funds can easily be invested in longer term sustainable projects.”

Head of Group Sustainability (Reporting), Insurance Firm, Edinburgh

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. The responses are summarised in Table 8.

Table 8 | Commentary On Areas Of Competitiveness

Area Of Competitiveness	Number Of Mentions	Main Themes
Regulatory Environment	91	<ul style="list-style-type: none"> • Greater standardisation of reporting and disclosure is necessary. • Regulation needs to give clear direction to the market to create conditions for change.
The Availability Of Skills In Green Finance	88	<ul style="list-style-type: none"> • There is a requirement for more shared learning across markets to spread good practice. • The existing workforce should be a target for training, to spread sustainability thinking across the workforce. • Expertise is required in finance, and in technical understanding of regulations, standards, and approaches.
Taxation	82	<ul style="list-style-type: none"> • Carbon taxes would help increase the pace of transition. • Tax incentives can help to drive change, e.g., renewables.
Other	22	<ul style="list-style-type: none"> • There is a need to address greenwashing across the sector. • Buy side firms can and should take the lead.

We also asked respondents to identify interesting initiatives in green finance. These included:

- The UK/Europe: Coalition for the Energy Efficiency of Buildings (co-ordinated by the Green Finance Institute).
- The UK Transition Plan Task Force.
- Voluntary Carbon Markets Integrity Initiative.
- Green Finance Education Charter.
- Adaptation Scotland (seed funding for innovative projects).
- AIFC Green Finance Centre.
- Climate KIC.
- HealthTech and AgTech.
- Emergence of private equity access to Micro, Small & Medium Enterprise (MSME) funding;
- Banks moving to Sukuk and other shared-risk financing rather than securitised loans.
- The mnAI Carbon Index, tracking UK companies.
- Natural capital valuations taken to exchange to allow the creation of physical, derivative and indices funds.

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 in the GGFI survey. Charts 11 and 12 use London and Paris as examples to contrast the different levels of connectivity that the two centres enjoy. In this example, both cities are seen to be well-connected, but London has a wider spread of connections across all regions of the world. Paris is also well-connected, but with more of a focus on Western Europe and North America.

You can explore the connectivity data using our online tool at <https://www.longfinance.net/programmes/financial-centre-futures/global-green-finance-index/ggfi10-explore-data/ggfi-10-connectivity-chart/>.

Chart 11 | GGFI 10 Connectivity - London

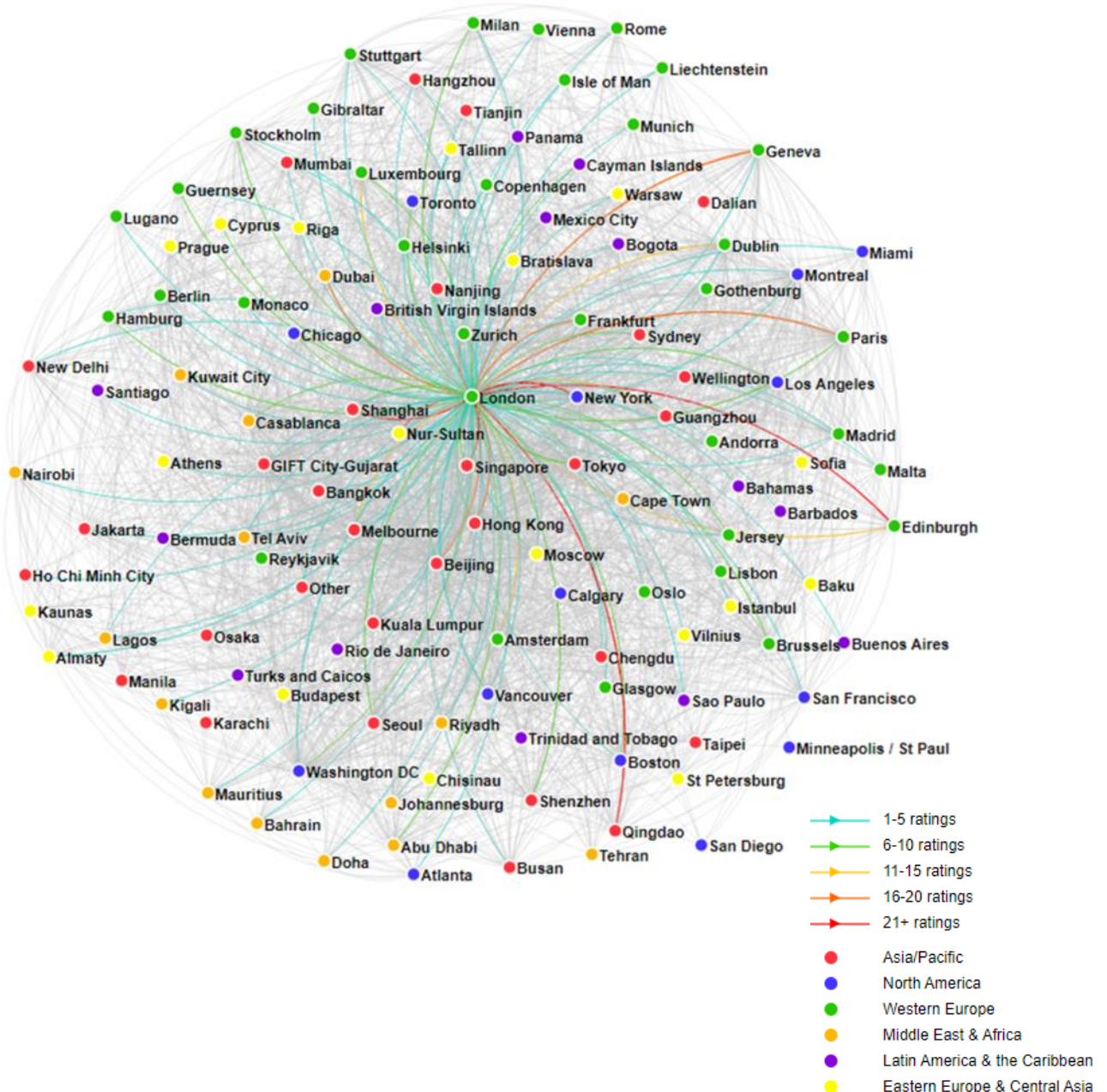
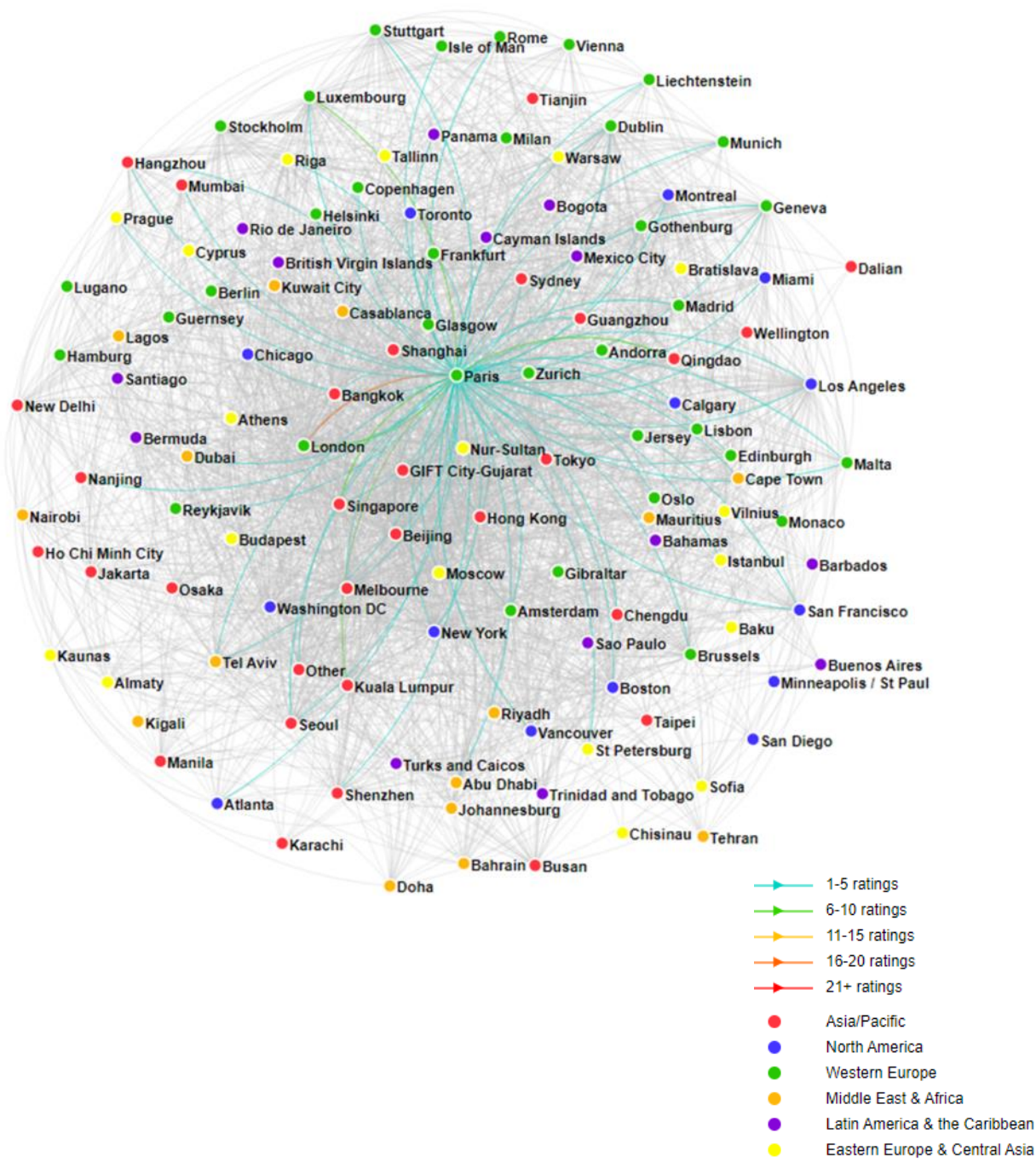


Chart 12 | GGFI 10 Connectivity - Paris



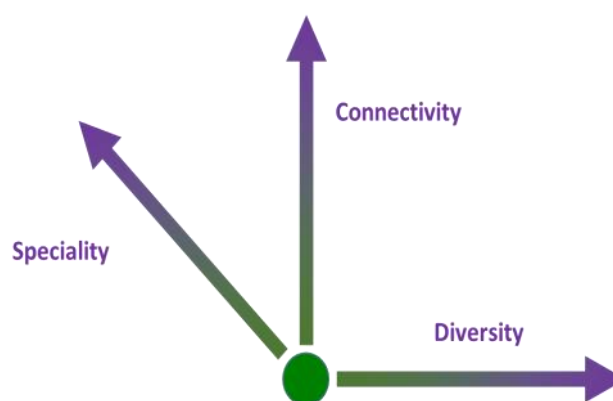
Financial Centre Profiles

We conduct further analyses 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.

Chart 13 | GGFI Dimensions



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 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.

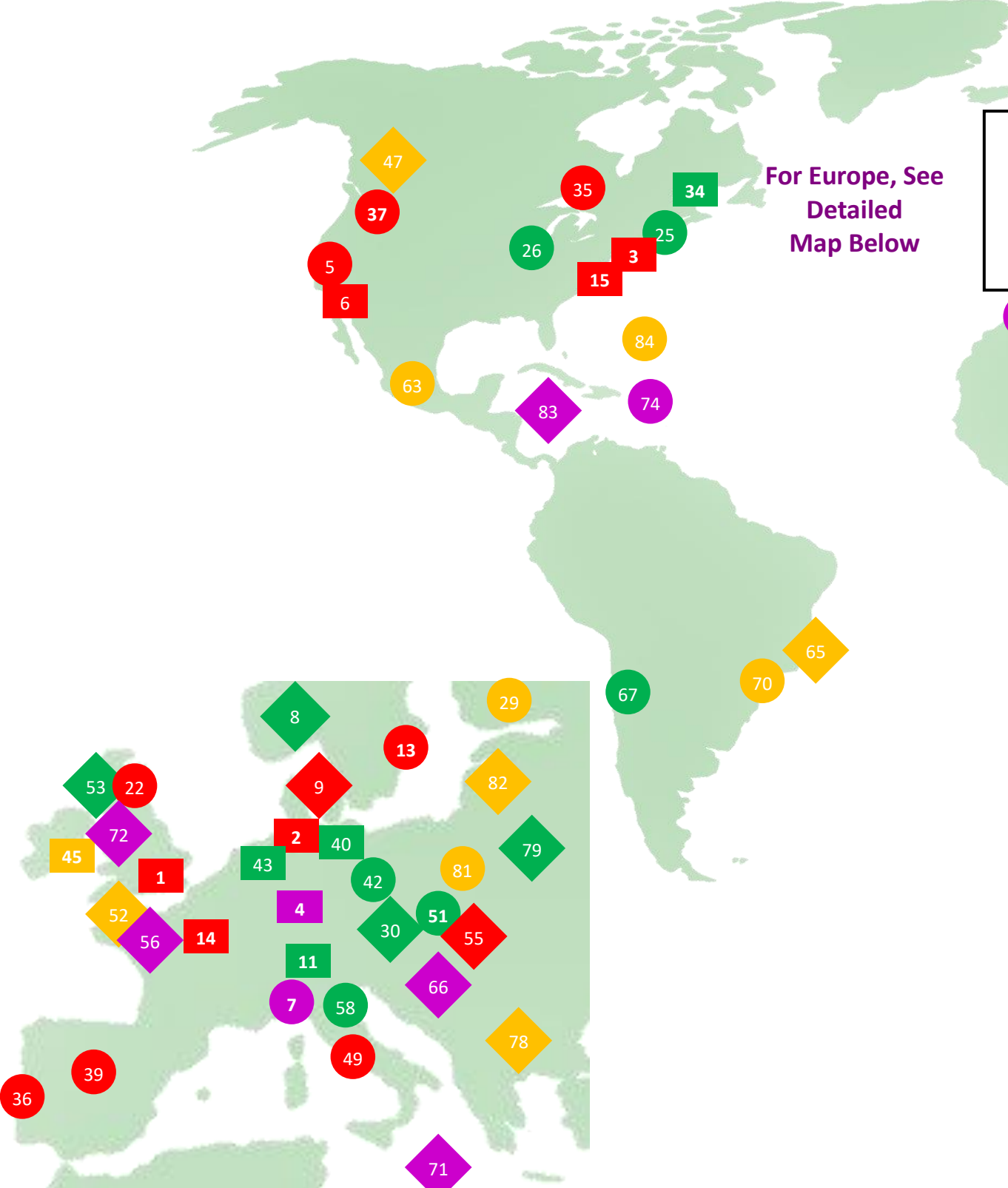
In Table 9, 'Diversity' (Breadth) and 'Speciality' (Depth) are combined on one axis to create a two-dimensional table of financial centre profiles. The 84 centres in GGFI 10 are assigned a profile on the basis of a set of rules for the three measures: how well connected a centre is, how broad its services are, and how specialised it is.

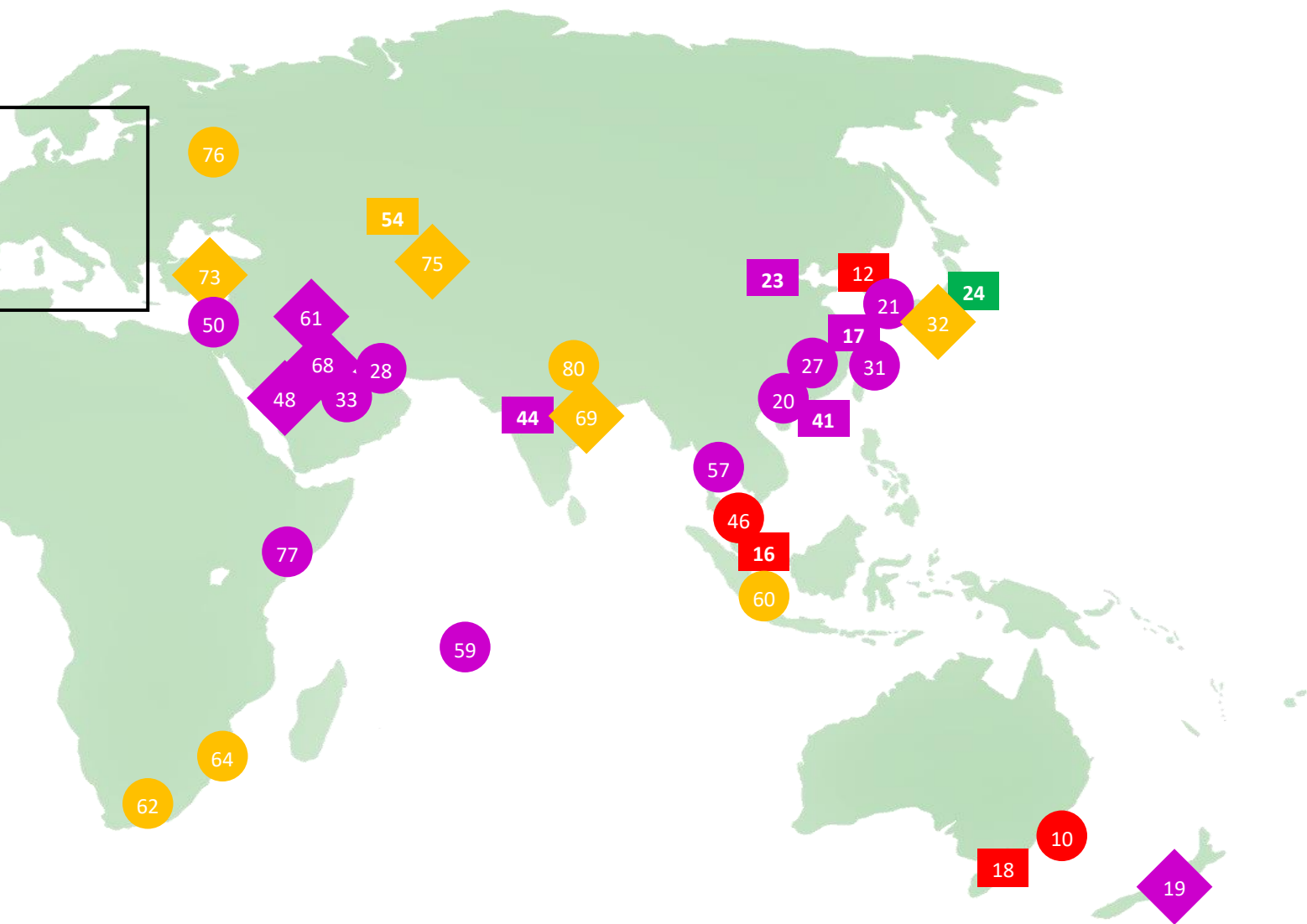
The Global Leaders (in the top left of the table) have both broad and deep green finance activity and are connected with a greater range of other financial centres. Other leading centres are profiled as Established International Centres.

Table 9 | Financial Centre Profiling













	Broad and Deep	Relatively Broad	Relatively Deep	Emerging
	Global Leaders	Global Diversified	Global Specialists	Global Contenders
Global	London	Zurich*	Luxembourg	Dublin
	Amsterdam	Tokyo*	Shanghai	Astana*
	New York	Montreal*	Beijing	
	Los Angeles	Frankfurt	Hong Kong	
	Seoul	Brussels*	GIFT City-Gujarat	
	Paris			
	Washington DC*			
	Singapore			
	Melbourne			
	Established International	International Diversified	International Specialists	International Contenders
International	San Francisco	Boston	Geneva	Helsinki*
	Stockholm	Chicago	Shenzhen	Jakarta*
	Sydney	Berlin	Busan	Cape Town*
	Edinburgh*	Hamburg	Guangzhou*	Mexico City
	Toronto	Milan	Dubai*	Johannesburg*
	Lisbon*	Santiago*	Qingdao	Sao Paulo
	Vancouver		Abu Dhabi	New Delhi*
	Madrid		Casablanca	Bermuda*
	Kuala Lumpur		Tel Aviv	Moscow*
	Rome		Bangkok	
			Mauritius*	
			British Virgin Islands	
			Nairobi	
			Prague	
	Established Players	Local Diversified	Local Specialists	Evolving Centres
Local	Copenhagen	Oslo*	Wellington*	Osaka*
	Vienna	Munich*	Riyadh (New)	Calgary*
		Glasgow	Jersey	Guernsey
		Warsaw*	Bahrain	Rio de Janeiro
			Liechtenstein	Mumbai
			Doha	Istanbul
			Malta	Almaty
			Isle of Man	Sofia (New)
			Cayman Islands	Riga (New)

* An asterisk denotes a change since GGFI 9





The numbers on the map indicate the GGFI 10 rankings.

Broad and Deep		Relatively Broad		Relatively Deep		Emerging	
	Global Leaders		Global Diversified		Global Specialists		Global Contenders
	Established International		International Diversified		International Specialists		International Contenders
	Established Players		Local Diversified		Local Specialists		Evolving Centres

People Gotta Eat: The Role Of The Financial Services Sector In Supporting Agriculture

Introduction

Globally, the financial services market is estimated to be worth around 22,515 billion USD, almost twice the size of the global agriculture market worth 11,287 billion USD in 2021¹.

Yet, approximately a third of the world's labour force works in agriculture². Around 40% of these people are in waged employment, whilst the remainder are self-employed as farmers (mainly as small holders)³ who may not own formal title to their land. For small holders a lack of formal identification, collateral and credit histories, difficulties in contract enforcement, and the high cost of serving geographically dispersed customers, present significant obstacles to financial inclusion.

At the other end of the scale, massive agri-businesses such as Viterro (the agricultural arm of mining giant Glencore) as well as agri-commodity traders, such as Bunge, Cargill and Louis Dreyfus are enjoying booming profits and rising share prices⁴, linked to rising demand post-covid for food products in India and China⁵.

In the age of digital currencies, AI traders, high speed trading, and environmental social and governance analytics, it is easy to lose sight of the fundamentals. Modern society is dependent on relatively cheap, easily accessible food. Any perturbation to the global network of production, processing and distribution of food sees impacts ripple out like a stone dropped in a pond, toppling governments, and driving wars and revolutions⁶. Ensuring access to finance and risk management products, avoiding market instabilities, and investing in research and development for both production and distribution, should be at the cornerstone of sustainable finance.

The Economic Importance Of Agriculture

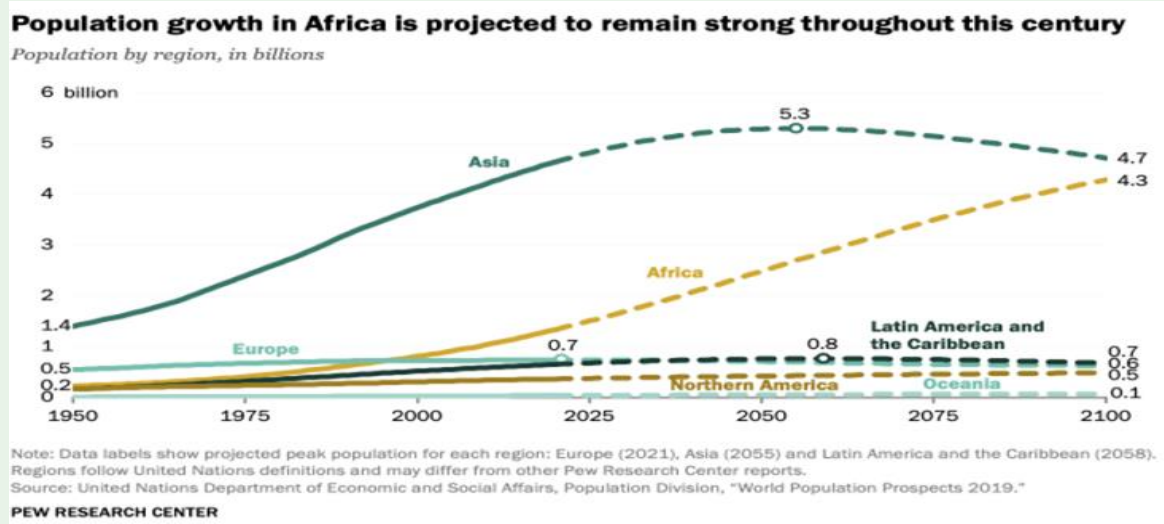
The global population is expected to surpass 10 billion by 2050, with more than half of the projected growth expected to occur in Africa⁷.

An increasing population will create more demand for food and crop production and as a result, farming activities and trade volumes will have to increase accordingly. The first two UN sustainable

- 1 **BRC 2022** *Agriculture Global Market Report 2022* <https://www.thebusinessresearchcompany.com/report/agriculture-global-market-report>
- 2 <https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS>
- 3 **Fyfe A 2002** *Bitter Harvest, Child Labour in Agriculture* http://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---actrav/documents/publication/wcms_111427.pdf
- 4 **The Economist 2021** *As food prices soar, big agriculture is having a field day* <https://www.economist.com/business/2021/07/29/as-food-prices-soar-big-agriculture-is-having-a-field-day>
- 5 **Zhao et al 2021** *China's future food demand and its implications for trade and environment* <https://www.nature.com/articles/s41893-021-00784-6>
- 6 Perkins T 2022 Ukraine, Brexit, Arab spring have one source – prices, says sociologist
- 7 **Pew Research Centre 2019** *World's Population Is Projected To Nearly Stop Growing By The End Of The Century* <https://www.pewresearch.org/fact-tank/2019/06/17/worlds-population-is-projected-to-nearly-stop-growing-by-the-end-of-the-century/>

development goals, SDG 1 No Poverty and SDG 2 No Hunger, are directly dependent on successfully delivering this growth. Currently these indicators are going in the wrong direction with 2020 estimates showing between 720 and 811 million people in the world facing hunger⁸.

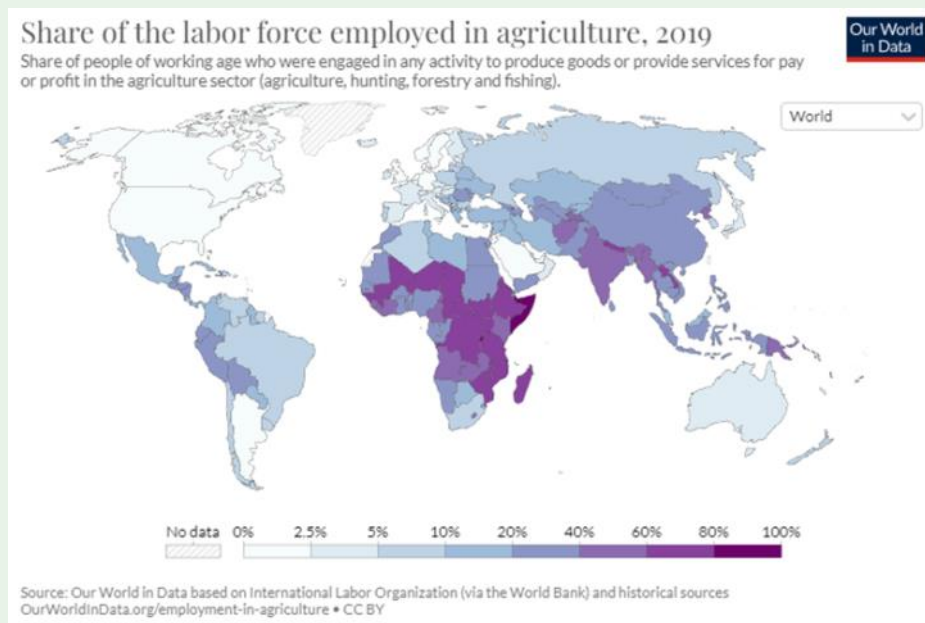
Figure 1 | Global Population Growth To 2100 By Region



Globally, agriculture is still the largest single sector employer. However, the proportion of the population directly engaged in food production has seen a precipitous decline over the last thirty years – from 44% in 1991 to 27% in 2019⁹.

This decline is likely to be driven by efficiency gains arising from mechanisation and more effective farming techniques, which has resulted in a reduction in the number of smallholdings. There remains regional variation, with agriculture remaining a significant employer in Africa and Southeast Asia (see figure 2).

Figure 2: | Agricultural Employment By Region



⁸ UNFAO 2021 *The State of Food Security And Nutrition In The World* <https://www.fao.org/publications/sofi/2021/en/>

⁹ International Labour Organization 2021, ILOSTAT database <https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS>

Over this same period, there have been profound changes in the demographics of those engaged in agricultural activity: The average age of farmers globally has risen to 60¹⁰, and more women are becoming engaged in agriculture¹¹ with 70% of women in South Asia and 60% in Sub-Saharan Africa working in agriculture¹². Despite the great deal of variation between regions, these demographic changes are relatively straightforward to define- from the lack of development in rural communities, to a desire for better paid city-based careers, and the sub-division of land between siblings.

Figure 3 | Global Employment In The Agricultural Sector



When the full supply chain is taken into account, incorporating support industries such as agricultural machinery and agri-chemicals, financial and veterinary services, logistics, food processing and packaging, wholesale and retail, and the hospitality industry, the agricultural sector touches the lives of the majority of people on the planet.

10 **Reuters 2016** *Agriculture needs a makeover to lure young people back to farming* <https://www.reuters.com/article/africa-farming-food/feature-agriculture-needs-a-makeover-to-lure-young-people-back-to-farming-idUSL8N1AR4WS>

11 **World Bank 2017** *Women in Agriculture: The Agents of Change for the Global Food System* <https://www.worldbank.org/en/news/feature/2017/03/07/women-in-agriculture-the-agents-of-change-for-the-food-system>

12 **Sadler M 2016** *Making Climate Finance Work In Agriculture*, World Bank <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/986961467721999165/making-climate-finance-work-in-agriculture>

Challenges Facing The Agricultural Sector

The world's agricultural systems are currently facing severe systemic and endemic challenges including:

Supply Chain Disruption

The outbreak of Covid-19 significantly depressed the agriculture market in 2020 due to supply chain disruption, trade restrictions, and reduced consumption resulting from the lockdowns imposed by governments globally. International meat prices were particularly hard hit with a 7-18% reduction compared to business as usual with dairy products experiencing a 4-7% reduction¹³. As the global economy ground to a halt, biofuel prices also fell, followed by their main feedstocks, maize and oilseeds. The resultant loss of income and local supply chain disruptions increased food insecurity in many developing countries¹⁴.

This threat to global food security has been compounded by Russia's invasion of Ukraine, and subsequent spikes in food prices. As a result, it is estimated that more than 276 million people¹⁵ can be classed as having severe food insecurity, effectively doubling pre-pandemic levels of hunger.

Damage To Agricultural Land

Soil erosion: Agriculture, particularly high intensity farming, is the primary cause of soil erosion, which degrades and reduces the productivity of agricultural land, pollutes water courses, and leads to desertification. The UN Food and Agricultural Organisation states that *'...the majority of the world's soil resources are in only fair, poor or very poor condition'*¹⁶. Soil erosion has substantial implications for nutrient and carbon cycling, land productivity and in turn, worldwide socio-economic conditions¹⁷.

Competition for Resources

Land and water: Agriculture uses approximately 50% of the Earth's habitable land area¹⁸, and most of the agricultural land (77%) is set aside for livestock farming, despite 82% of calories and 63% of protein being derived from plant sources. Furthermore, according to a study published in the Journal Proceedings of the National Academy of Sciences, as urbanisation gathers pace, some of the world's most productive farmland is under threat from urban sprawl¹⁹.

Urban water demand will increase by 80% by 2050²⁰, while climate change will alter the timing and distribution of precipitation. In many regions, growing cities will have water demands that exceed surface-water availability, creating potential conflict between the urban and agricultural sectors.

13 **European Commission 2020** Impacts Of The COVID-19 Pandemic On The Global Agricultural Markets <https://publications.jrc.ec.europa.eu/repository/handle/JRC121186>

14 **World Food Programme 2022** Hunger Hotspots FAO-WFP Early Warnings On Acute Food Insecurity https://docs.wfp.org/api/documents/WFP-0000136243/download/?_ga=2.255854217.364832805.1649800231-1462048986.1649800231

15 **USGLC 2022** COVID-19 Brief: Impact On Food Security <https://www.usglc.org/coronavirus/global-hunger/>

16 **UNFAO 2015** The Status of the World's Soil Resources (Main Report) <https://www.fao.org/documents/card/en/c/c6814873-efc3-41db-b7d3-2081a10ede50/>

17 **Borelli et al 2017** An assessment of the global impact of 21st century land use change on soil erosion Nature Communications Volume 8, Article number: 2013 (2017) <https://www.nature.com/articles/s41467-017-02142-7>

18 <https://ourworldindata.org/land-use>

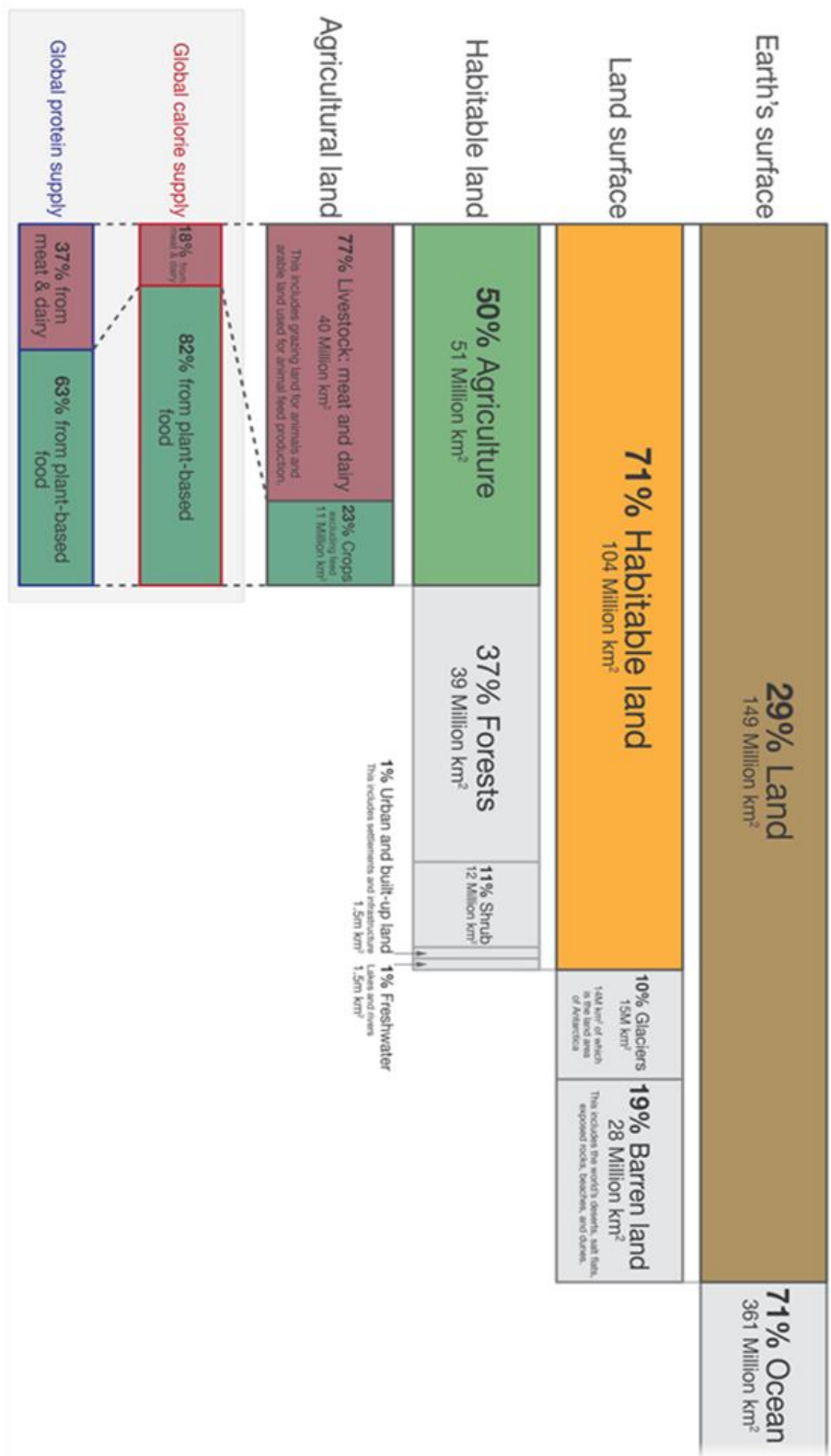
19 **Bren d'Amour C et al 2016** Future urban land expansion and implications for global croplands <http://www.db.zs-intern.de/uploads/1482922742-PNAS.pdf>

20 **Flörke M et al 2018** Water competition between cities and agriculture driven by climate change and urban growth <https://www.nature.com/articles/s41893-017-0006-8>

Figure 4 | Global Land Use & Food Supply

Global land use for food production

Our World
in Data



Source: Ourworldindata.org

Fertilisers: Making fertilisers is an energy-intensive process, especially for nitrogen-based fertilisers, which use natural gas as feedstock. The price of fertilizers corresponds with energy costs, which have spiked in 2022. Fertiliser prices have come under more pressure because of EU sanctions imposed on Russia and Belarus in the wake of the invasion of Ukraine. It is difficult for other countries to buy Russian fertilizers²¹ as Russia was excluded from the SWIFT international payments system and insurance costs for shipping have risen sharply.

Figure 5 | Fertiliser Prices

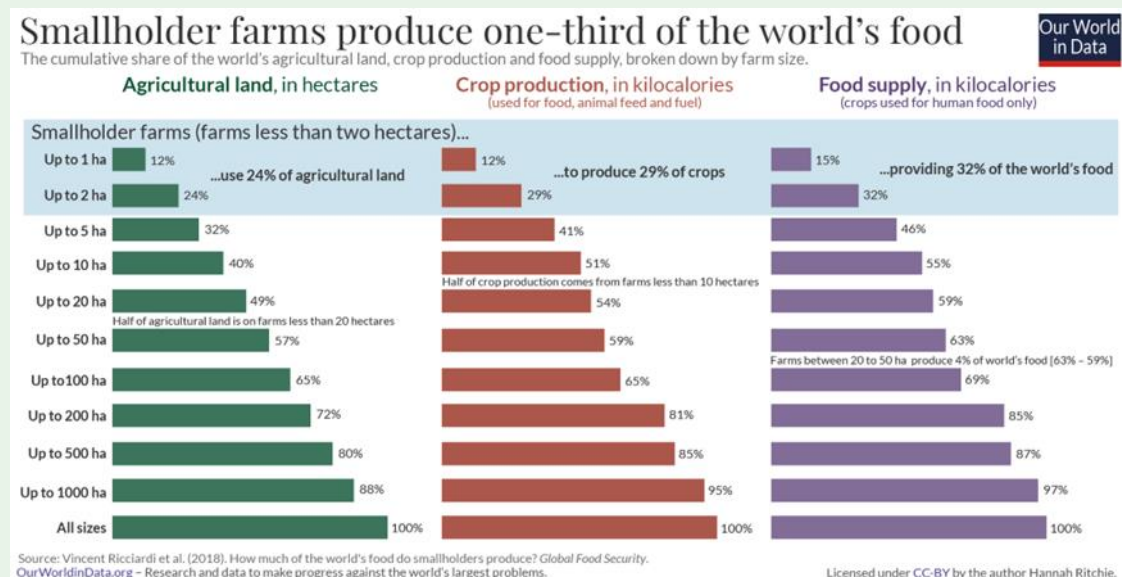


Source: US Department Of Agriculture

Climate Change

The impacts of **climate change** on agriculture are well documented - drought, flood, and extreme weather, all impact on crop yields and the livelihoods of farmers. The impact is particularly felt by the 450-550 million smallholder farming households who produce a third of the world's food (see figure 6).

Figure 6 | Food Production By Farm Size



21 Wax E & Brzezinski B 2022 *Enormous' fertilizer shortage spells disaster for global food crisis* <https://www.politico.eu/article/fertilizer-soil-ukraine-war-the-next-global-food-crisis/>

On the other hand, agriculture contributes towards 23% of anthropogenic greenhouse gas emissions globally²², and 36% of global tropical forest loss between 2000 and 2011 was driven by the production of beef, palm oil, and soy²³. An additional challenge has been theft and supply chain interference. This includes land theft with land converted to agriculture and the counterfeiting of food produce.

Access To Finance

Access to finance is essential for enhancing the efficiency of agricultural production, eradicating poverty and hunger, and increasing the resilience of rural areas²⁴. Whilst large agri-businesses benefit from the support of the financial markets, small holders can struggle to get access to mainstream financial services. Agriculture remains a key economic activity in Africa employing approximately 55% of the population, however only around 1% of bank lending goes to the agricultural sector²⁵. As agricultural production transforms into integrated and more complex market chains, value chain finance has gained importance helping to link small farmers with the rest of the chain.

Estimates show that 2.5 billion people are involved in agriculture in developing countries, and the World Bank has found that agriculture GDP growth has twice the impact on poverty reduction compared with non-agriculture GDP growth²⁶. However, the demand for finance and investment in the sector remains largely unmet, along with large swathes of the world's population (especially in rural areas) remaining unbanked²⁷, financial service providers remain wary of investing in agriculture²⁸ (particularly in developing countries) due to a perception that agricultural operations carry high risks²⁹. Likewise, a large percentage of the developing world do not have access to risk management products, and even where available, traditional agricultural insurance schemes are known to be plagued by problems of asymmetric information and systemic risk³⁰.

Identity and Land Title

Identity and title to land is a fundamental enabler for agriculture. According to the World Bank Group's #ID4D Global Dataset 81³¹, an estimated one billion people lack an official identity. Half of these are women, excluding them from property ownership and frequently from social protection, and the right to free movement. Lack of official identification also excludes them from financial services thus making them vulnerable to corruption, and crimes, such as land theft.

- 22 **IPCC 2019** *Climate Change And Land: An IPCC Special Report On Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and greenhouse gas fluxes in terrestrial ecosystems* <https://www.ipcc.ch/srccl/>
- 23 **World Economic Forum 2017** *Commodities And Forests Agenda 2020: Ten Priorities To Remove Tropical Deforestation From Commodity Supply Chains* <https://climatefocus.com/publications/commodities-and-forests-agenda-2020-ten-priorities-remove-tropical-deforestation/>
- 24 **Financial Protection Forum 2022** *DRF Agriculture Module 3 Factsheet - The Role of Financial Market Solutions for Building Resilience to Shocks in Agriculture* [https://www.financialprotectionforum.org/sites/default/files/DRF%20Agriculture Module%203 Factsheet Final 0 0.pdf](https://www.financialprotectionforum.org/sites/default/files/DRF%20Agriculture%20Module%203%20Factsheet%20Final%200.pdf)
- 25 **IFC 2014** *Access to Finance for Smallholder Farmers Learning from the Experiences of Microfinance Institutions in Latin America* <https://www.ifc.org/wps/wcm/connect/536ed03b-82ef-4733-ac27-2282844cdf8e/A2F+for+Smallholder+Farmers-Final+English+Publication.pdf?MOD=AJPERES&CVID=kAQzrkq>
- 26 <https://www.worldbank.org/en/topic/agriculture/overview>
- 27 <https://www.worldbank.org/en/publication/globalindex>
- 28 **EIB 2020** *Financial needs in the agriculture and agri-food sectors in the European Union* https://www.fi-compass.eu/sites/default/files/publications/financial_needs_agriculture_agrifood_sectors_eu_summary.pdf
- 29 **Voora V et al 2022** *Standards and Investments in Sustainable Agriculture* <https://www.iisd.org/system/files/2022-04/ssi-initiatives-review-standards-investments-agriculture.pdf>
- 30 **Stoppa A & Hess U 2003** *International Conference on Agricultural policy reform and the WTO Design and Use of Weather Derivatives in Agricultural Policies: the Case of Rainfall Index Insurance in Morocco*. <http://siteresources.worldbank.org/INTCOMRISMAN/Resources/rainfallmoroccocopy.pdf>
- 31 <https://id4d.worldbank.org/global-dataset>

Opportunities For The Financial Services Sector

Banking The Unbanked

Access to finance is a particular challenge facing the world's small hold farmers (see figure 6), who require credit facilities to buy seed and fertiliser to make a return on the next season's harvest.

Over 40% of people globally use mobile phones to access financial services³², however, modes of use vary widely. In Southeast Asia and Europe, the majority of individuals use mobile phones to access traditional banking services, yet in Africa, banking services are provided by Mobile Network Operators.

Mobile money allows digital money storage, payments, and transfers, currently benefiting over 690 million customers globally. More than 20% of service providers offer savings, pensions or investment products, with another 37% intending to do so in the next year³³.

At present, 69% of the world's adult population (3.8 billion people) have access to a bank account or an account through a mobile money provider³⁴ (see table A). Providing access to the remaining 31% of the planet's population is crucial for these people to be lifted out of poverty.

Table A | Access To Banking vs Access to Mobile Phones

Country	Adults With a Bank Account	Mobile Phone Connections
Congo, Dem. Rep.	25.80%	40%
Guinea	23.50%	102%
Iraq	22.70%	103%
Chad	21.80%	37%
Cambodia	21.70%	128%
Pakistan	21.30%	75%
Mauritania	20.90%	99%
Sierra Leone	19.80%	87%
Madagascar	17.90%	33%
Niger	15.50%	47%
Afghanistan	14.90%	70%
Central African Republic	13.70%	48%
South Sudan	8.60%	20%

32 World Bank 2018 Global Findex Database 2017 <https://globalfindex.worldbank.org/>

33 GSMA 2018 Mobile Money Policy And Regulatory Handbook <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2018/09/GSMA-Mobile-Money-Policy-Handbook-2018.pdf>

34 World Bank 2018 Global Findex Database 2017 <https://globalfindex.worldbank.org/>

Box 1 | Mobile Banking In Africa

Mobile money is a growing phenomenon in Africa. With hardly any legacy infrastructure to overcome, the existing commercial banking landscape is ready for disruption. **M-Pesa**, developed by Vodafone with the assistance of the UK's Department for International Development is the most successful mobile-phone-based financial service in the developing world. Markets include Kenya, Afghanistan, South Africa, India, Romania and Albania.

M-Pesa uses encrypted SMS to transfer money from one phone to another. In Kenya, nearly 7 in 10 people own a mobile phone and use it regularly to make or receive payments. <https://www.vodafone.com/what-we-do/services/m-pesa>.

Micro-Finance

In the first decade of the 21st-century, micro-finance was flagged as a universal panacea for poverty reduction. Unfortunately, a series of highly publicised corporate governance scandals³⁵ regarding exorbitant interest rates and unscrupulous collection practices³⁶ somewhat tarnished its reputation. However, salvation for this sector has come in the form of digitally enabled peer-to-peer (P2P) lending, and digitised credit unions. Globally, micro-finance institutions are estimated to have 139 million clients and a credit portfolio of 114 billion USD³⁷.

Crowd funding in agriculture has a history which predates the internet as there is a long tradition of buying shares in a pig which a farmer will then raise for slaughter. The digital revolution has brought this concept into the 21st century and there are now several crowd funding platforms in the market with an agricultural sector focus. Examples of these platforms include AgFunder, Cropital, the agriculture funding platform of Symbid, and Harvest Returns. Some are equity based (the traditional model of a return was in sausages or cider) and others are debt based.

Crowd funding is well suited to agricultural projects as farming can require large amounts of capital that exceed the investment thresholds for smaller investors. As such it can fill the gap between debt financing and equity investment. For farmers it provides an attractive option as the time constraints of food production cycles often exceeds what is required for arranging equity financing and capital return timing expectations.

35 **Di Benedetto et al 2017** Corporate Governance In Microfinance Institutions <http://documents.worldbank.org/curated/en/567251468189242027/pdf/96022-May-WP-P130793-PUBLIC-Box391458B-microfinance-APRIL-15-2015.pdf>

36 **Kadigamar A 2017** Micro-finance and Leasing: Today's Loan Sharks <https://www.cadtm.org/Micro-finance-and-Leasing-Today-s-Loan-Sharks>

37 **OECD 2019** OECD SME and Entrepreneurship Outlook 2019 OECD

Micro Insurance

The global micro-insurance market is growing at an expected Compound Annual Growth Rate of around 7% from 2019 to 2024³⁸. While it is still small scale, it is likely to grow rapidly through the catalyst of smart ledger enabled peer-to-peer insurance.

In developing economies, two developments have the potential to extend insurance cover to the vulnerable: peer-to-peer insurance and peer-to-peer derivatives. Peer-to-peer insurance is similar to peer-to-peer lending and offers the potential for lower-cost insurance through a shareconomy approach. Policy owners with the same insurance type form small groups and a part of their premiums is paid into a cashback pool. If no claims are submitted, the members of the group get some of their money back at the end of the year. In case of claims, the cashback decreases for everyone. Small claims are settled with the money in the pool. Bigger claims are settled via standard insurance and if there is insufficient money left in the pool to cover a claim, stop-loss insurance covers the rest. The benefit of this approach is that moral hazard decreases as individuals are less likely to make fraudulent claims if they will be taking money from friends and neighbours. Examples of organisations using this approach include Friendsurance³⁹ and Lemonade⁴⁰.

Another route worth consideration is derivatives as these are already used in the form of crop yield insurance in developed economies. Promotion of weather derivatives in developing economies is being undertaken by a number of international organisations working in partnership with national governments.

The World Bank has undertaken pilot programmes in Nicaragua, Morocco, Tunisia, Ethiopia, India, Ukraine, Malawi, Peru, and, Mongolia⁴¹. Fintech, in particular, the application of mobile platforms, remote sensing, and modelling, has the potential to allow groups of farmers or small businesses access to this product. Peer-to-peer insurance and the use of derivatives both have the potential to extend insurance coverage to some of the world's poorest people, greatly enhancing resilience to disasters and vulnerability to hunger and famine.

Identity, Land Ownership and Land Rights

Official identification is a fundamental enabler for access to financial services, and a check on the scourge of human trafficking. Approximately, 2.4 billion people worldwide lack official identification, with 1.5 billion being over the age of 14⁴². Promisingly, the rise of blockchain-enabled smart ledgers is providing a potential solution to this issue.

Many developing nations lack a functioning ledger of land ownership⁴³. This can contribute to issues of unclear ownership and tenure, which lock land into unproductive use. The development of secure registries helps facilitate market transactions and unlocks access to finance for people lacking funds. Increasingly countries are turning to "blockchain" solutions to help solve this issue.

38 **IMARC 2019** *Microinsurance Market: Global Industry Trends, Share, Size, Growth, Opportunity And Forecast 2019-2024* <https://www.imarcgroup.com/microinsurance-market>

39 <http://www.friendsurance.com>

40 <http://www.lemonade.com>

41 **S Bush 2012** *Derivatives and Development: A Political Economy of Global Finance, Farming*. Palgrave McMillan

42 **McKinsey 2019** *Digital Identification: A Key To Inclusive Growth* <https://www.mckinsey.com/~media/mckinsey/featured%20insights/innovation/the%20value%20of%20digital%20id%20for%20the%20global%20economy%20and%20society/mgi-digital-identification-a-key-to-inclusive-growth.ashx>

43 **World Bank 2019** *Keeping It Clean: Can Blockchain Change The Nature Of Land Registry In Developing Countries?* <http://blogs.worldbank.org/developmenttalk/keeping-it-clean-can-blockchain-change-nature-land-registry-developing-countries>

The use of distributed ledger technology can also assist smallholders in upholding and enforcing tenancy agreements by documenting users' land rights in the informal land rental market⁴⁴.

ESG, Impact Investing And Sustainable Finance

Traditionally, a much smaller share of the financial sector loan portfolio has gone to agriculture than to other sectors, especially compared with agriculture's share in GDP. Given the challenges faced by agriculture in terms of feeding a growing population in a warming world, whilst overcoming significant challenges in logistics and supply, and the existential risks associated with failures in either of these areas, it may well be time to review this situation.

Agriculture is perceived as having low profitability, low margins, high risks, and high transaction costs. Most lenders in agriculture limit their exposure, raise interest rates, and tighten lending criteria. This is also true within the ESG and Sustainable Finance space, where ESG issues around animal welfare, labour issues, environmental impact, and carbon risk can drive portfolio holders to seek more stable returns from such sectors as renewable energy, healthcare, and infrastructure.

This is compounded by a fluid policy environment, where a lack of effective policies and regulations governing agricultural finance not only discourage lending but also create additional barriers to the flow of liquidity to agriculture⁴⁵.

Yet opportunities abound with exciting growth areas, such as vertical farms⁴⁶, lab grown meat⁴⁷, AI and robotics⁴⁸, and biofuels⁴⁹, all offering the opportunity to invest in low carbon sustainable agriculture. Therefore, the solutions needed to support the poorest communities in developing economies are being developed and filled by non-traditional players.

Conclusions

Agriculture faces multiple challenges with an increased demand for food due to a growing population and changing diets, increasing poverty and hardship for farmers, and dwindling natural resources and biodiversity. A warming climate could cut crop yields by more than 25% and the extreme weather associated with climate change could devastate farms, land, and crops, driving farmers into penury.

Financial services are a product of society, and society is utterly dependent upon agriculture. The financial services sector, regulators, and policy makers must ensure that the agricultural sector receives the services and support that it requires to ensure that society can meet the challenges it faces in the coming century.

44 **Daniel D & Speranza C 2020** *The Role of Blockchain in Documenting Land Users' Rights: The Canonical Case of Farmers in the Vernacular Land Market* <https://www.frontiersin.org/articles/10.3389/fbloc.2020.00019/full>

45 **World Bank 2016** *Making Climate Finance Work In Agriculture* <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/986961467721999165/making-climate-finance-work-in-agriculture>

46 <https://www.theguardian.com/environment/2021/oct/18/its-not-as-carbon-hungry-uks-largest-sunlit-vertical-farm-begins-harvest>

47 <https://www.sciencefocus.com/science/what-is-lab-grown-meat-a-scientist-explains-the-taste-production-and-safety-of-artificial-foods/>

48 **Krishnan A et al 2020** *Robotics, IoT, and AI in the Automation of Agricultural Industry: A Review* <https://ieeexplore.ieee.org/abstract/document/9297856>

49 <https://www.energy.gov/eere/bioenergy/biofuel-basics>

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.

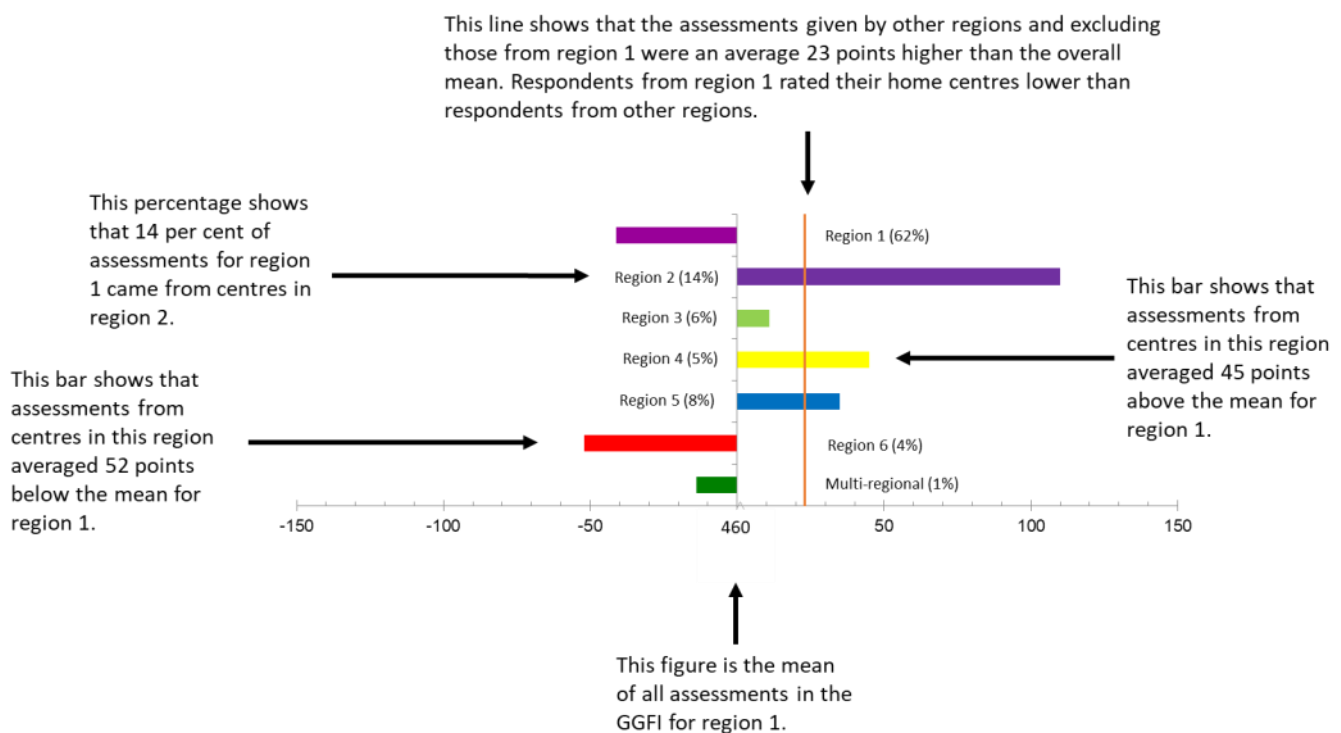
We display this analysis in charts, either for a region or an individual centre. These charts show:

- 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 15 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 15 | Example: Assessments Compared With The Mean For A Region



North America

- New York rose 2 ranking places to take the lead position in the region, with San Francisco and Los Angeles also in the world top 10.
- US centres other than San Francisco improved their rank position and all centres in the region either maintained or improved their rating.
- North American centres were rated significantly above average by people from the Asia/Pacific and Latin America & The Caribbean region and below average by people in other regions.

Table 10 | North American Centres In GGFI 10

Centre	GGFI 10		GGFI 9		Change In	Change In
	Rank	Rating	Rank	Rating	Rank	Rating
New York	3	578	5	551	2	27
San Francisco	5	553	3	553	-2	0
Los Angeles	6	552	10	541	4	11
Washington DC	15	542	19	532	4	10
Boston	25	532	27	522	2	10
Chicago	26	531	41	506	15	25
Montreal	34	523	31	518	-3	5
Toronto	35	522	37	510	2	12
Vancouver	37	520	30	519	-7	1
Calgary	47	509	52	494	5	15

Chart 16 | Top Five North American Centres Ratings Over Time

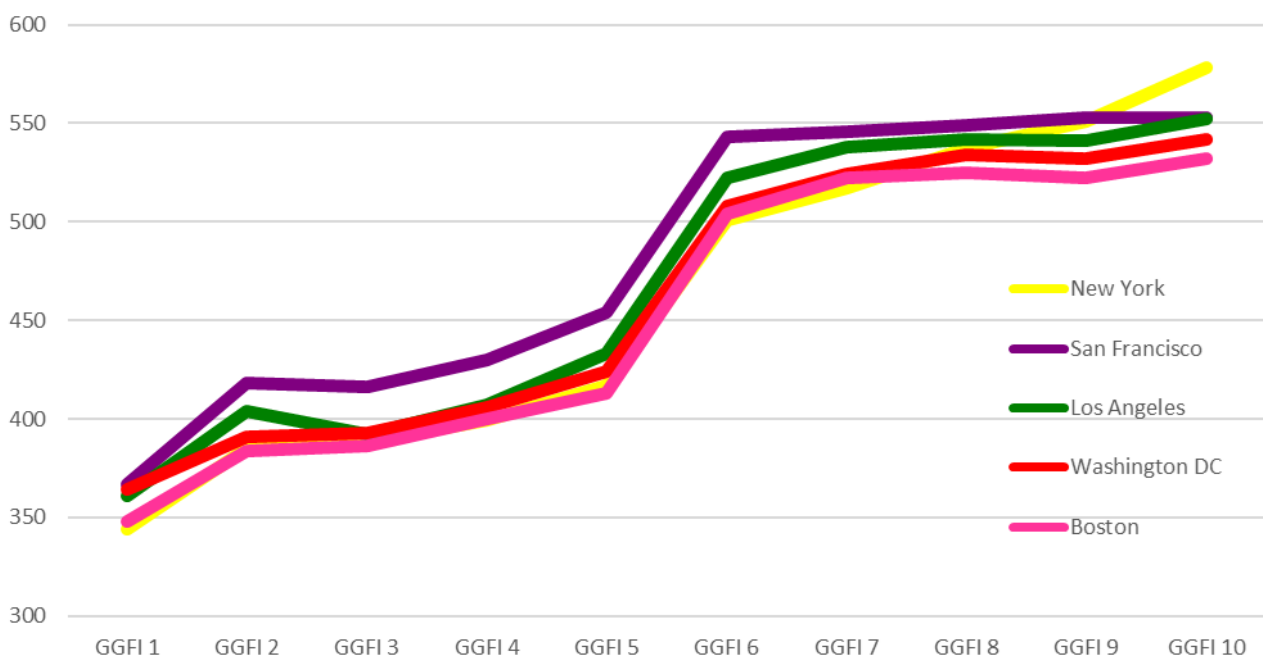
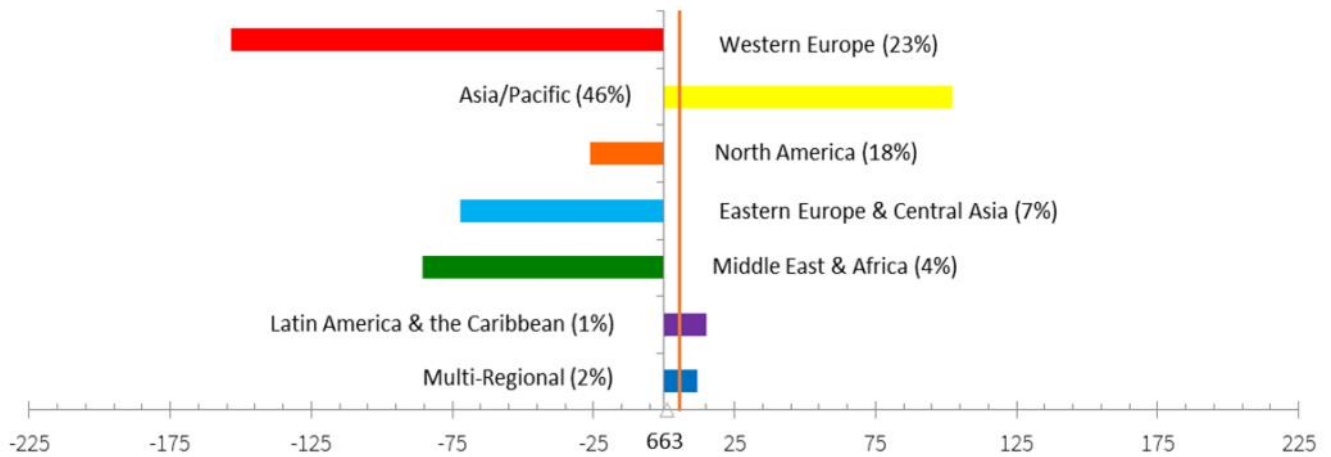
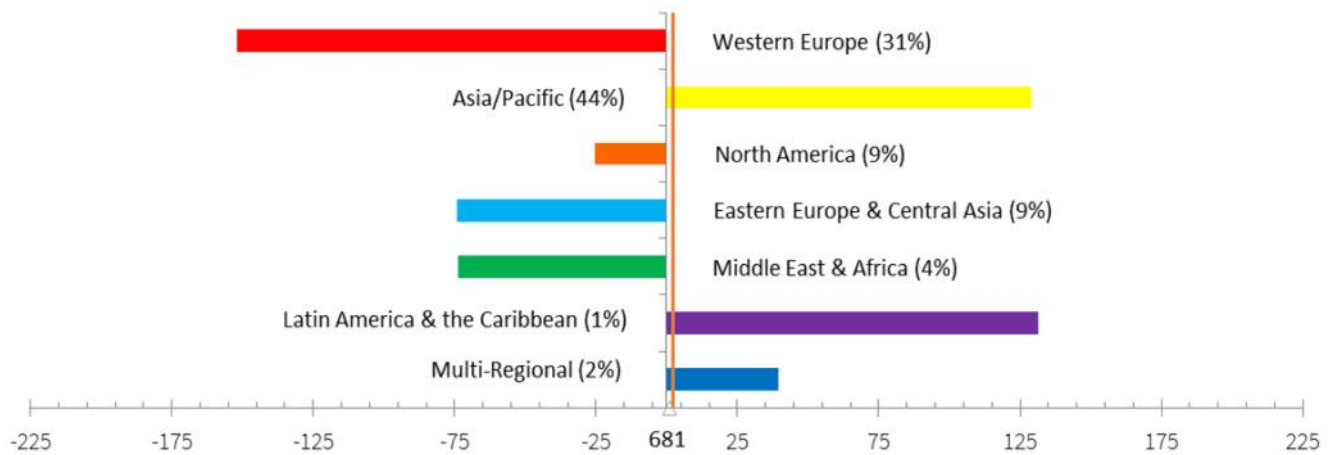
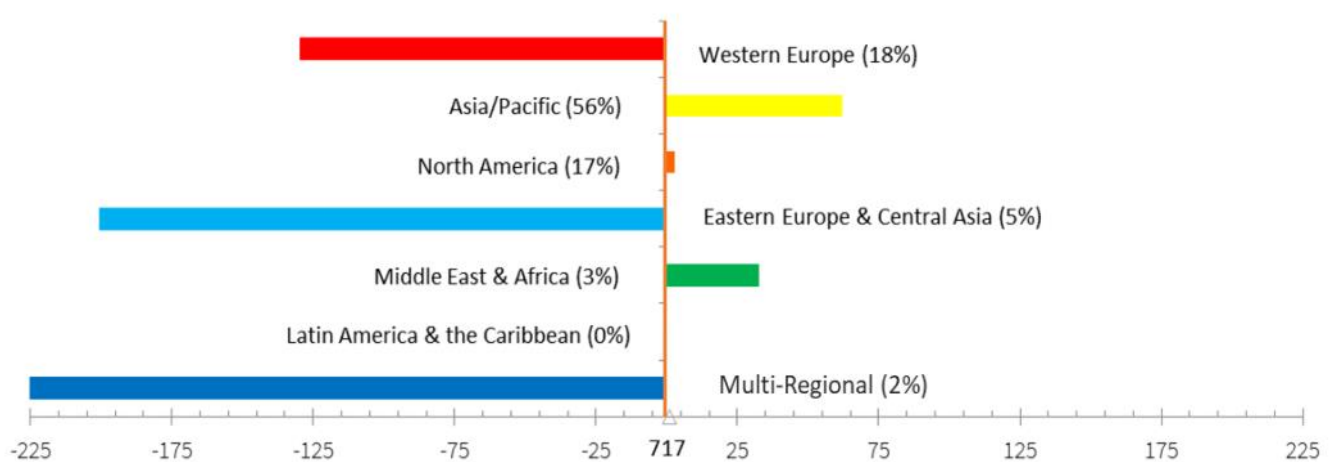


Chart 17 | North American Regional Assessments - Difference From The Mean**Chart 18 | Regional Assessments For New York - Difference From The Mean****Chart 19 | Regional Assessments For San Francisco - Difference From The Mean**

Middle East & Africa

- Dubai overtook Abu Dhabi in this edition, reversing their relative positions once again.
- Casablanca remains the leading African centre.
- Riyadh joined the index for the first time.
- Respondents from Western Europe, North America, and Latin America & The Caribbean rated Middle East & African centres lower than average.

Table 11 | Middle Eastern & African Centres In GGFI 10

Centre	GGFI 10		GGFI 9		Change In Rank	Change In Rating
	Rank	Rating	Rank	Rating		
Dubai	28	529	44	502	16	27
Abu Dhabi	33	524	38	509	5	15
Casablanca	38	519	46	500	8	19
Riyadh	48	507	New	New	New	New
Tel Aviv	50	504	58	483	8	21
Mauritius	59	490	55	491	-4	-1
Bahrain	61	487	68	472	7	15
Cape Town	62	486	72	468	10	18
Johannesburg	64	482	64	476	0	6
Doha	68	472	61	479	-7	-7
Nairobi	77	456	80	452	3	4

Chart 20 | Top Five Middle East & Africa Centre Ratings Over Time

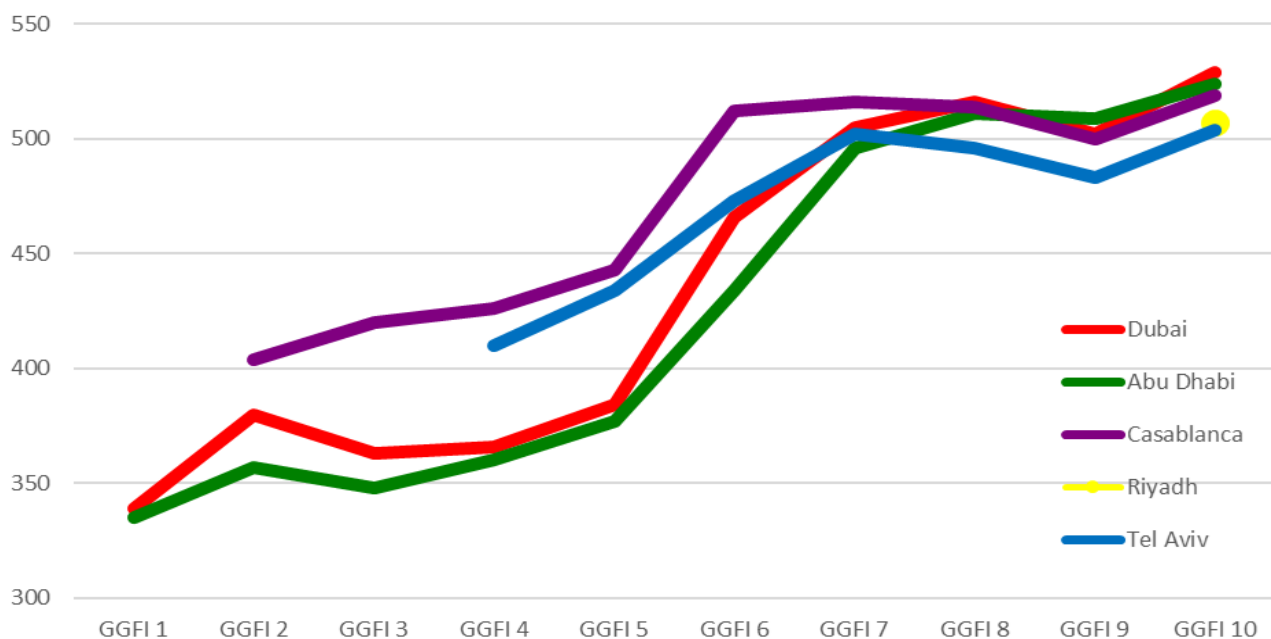
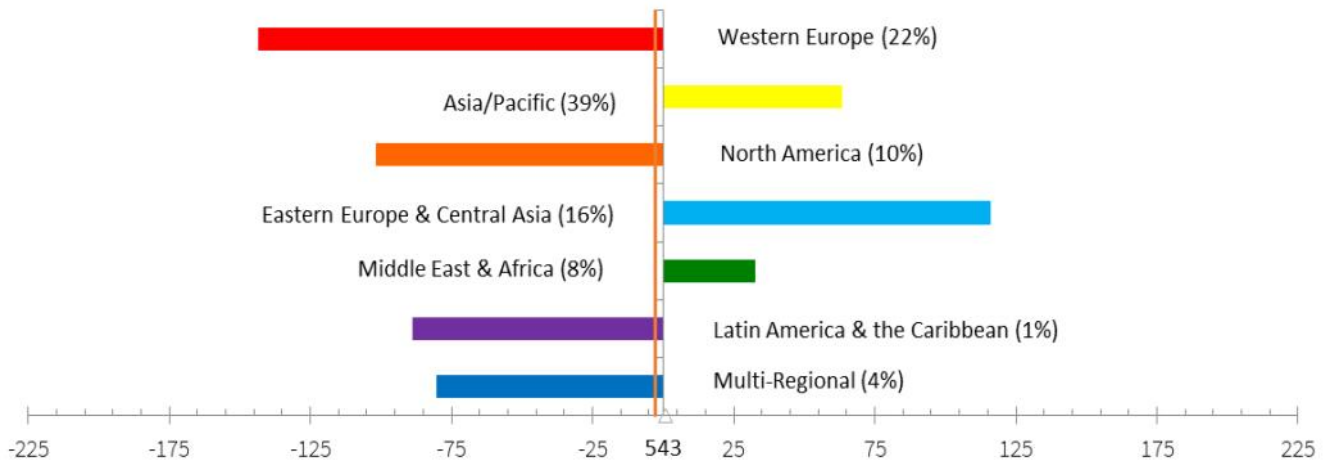
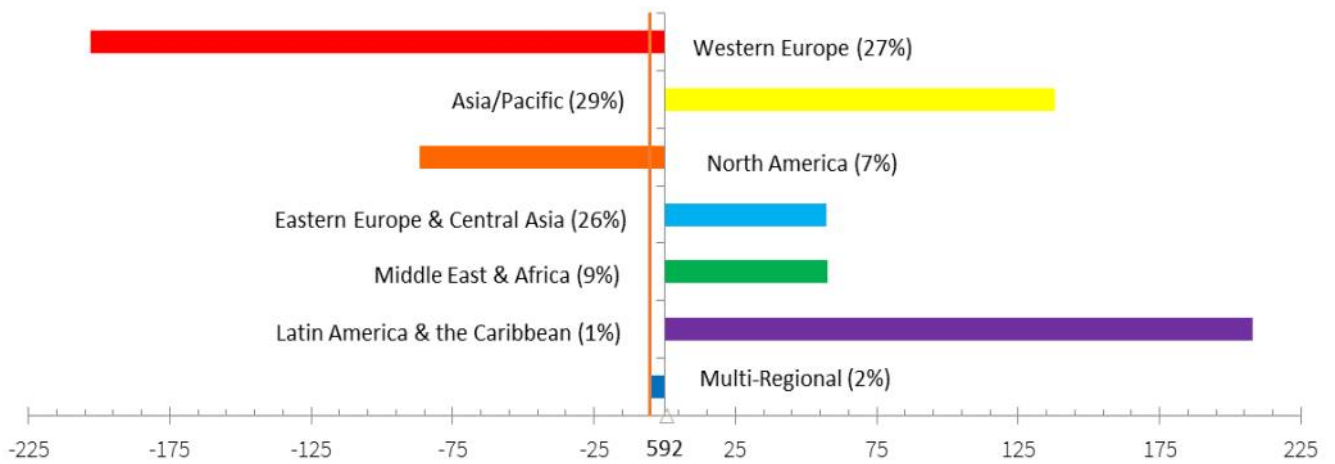
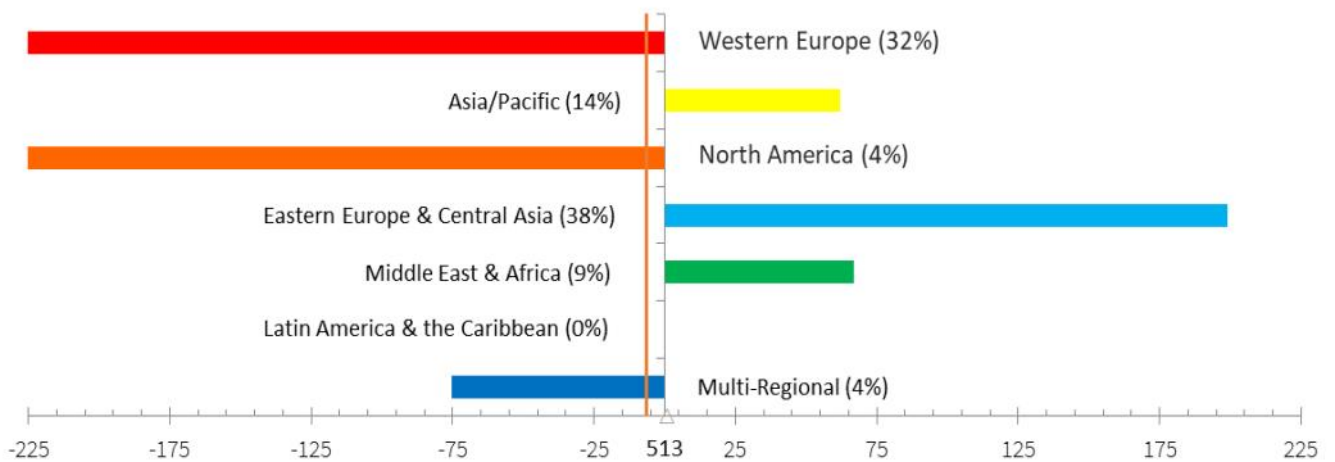


Chart 21 | Middle East & Africa Regional Assessments - Difference From The Mean**Chart 22 | Regional Assessments For Dubai - Difference From The Mean****Chart 23 | Regional Assessments For Abu Dhabi - Difference From The Mean**

Eastern Europe & Central Asia

- Astana is the clear leader in green finance in the region, ranking 21 places above Istanbul in second place.
- Sofia and Riga joined the index in GGFI 10.
- Respondents from Western Europe, North America, and Latin America & The Caribbean rate these centres lower than average while those from all other regions rate them higher than average.

Table 12 | Eastern European & Central Asian Centres In GGFI 10

Centre	GGFI 10		GGFI 9		Change In Rank	Change In Rating
	Rank	Rating	Rank	Rating		
Astana	54	496	49	497	-5	-1
Istanbul	73	462	79	455	6	7
Almaty	75	458	74	466	-1	-8
Moscow	76	457	73	467	-3	-10
Sofia	78	455	New	New	New	New
Warsaw	79	454	70	470	-9	-16
Prague	81	452	76	464	-5	-12
Riga	82	448	New	New	New	New

Chart 24 | Top Five Eastern Europe & Central Asia Centre Ratings Over Time

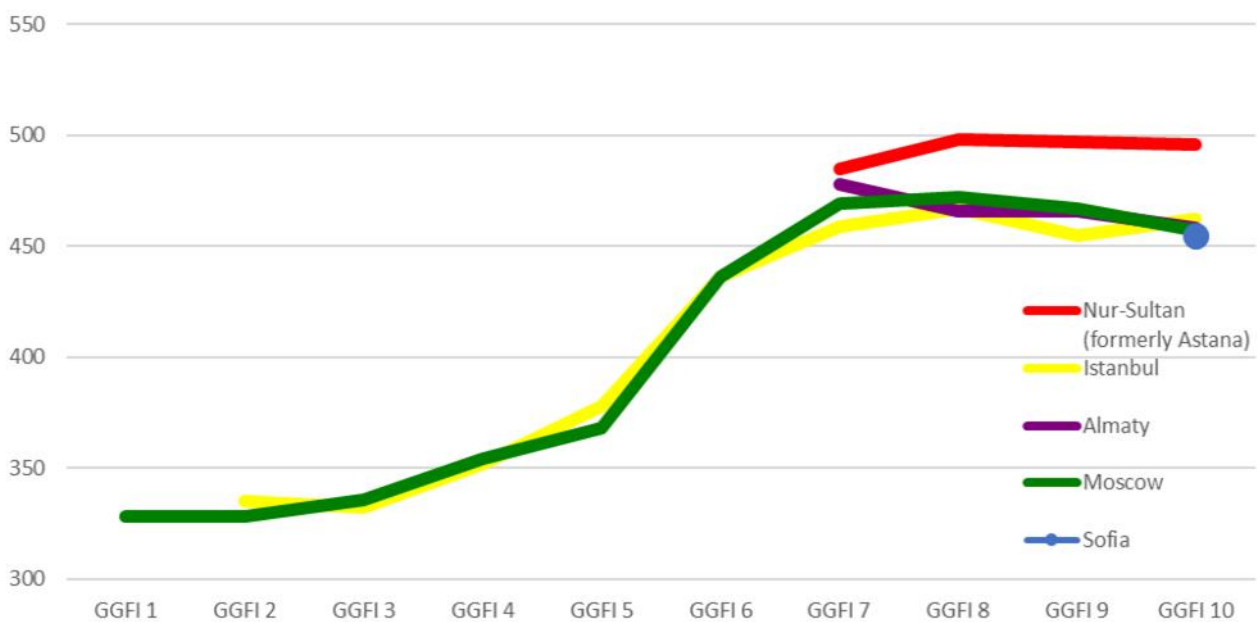


Chart 25 | Eastern Europe & Central Asia Regional Assessments - Difference From The Mean

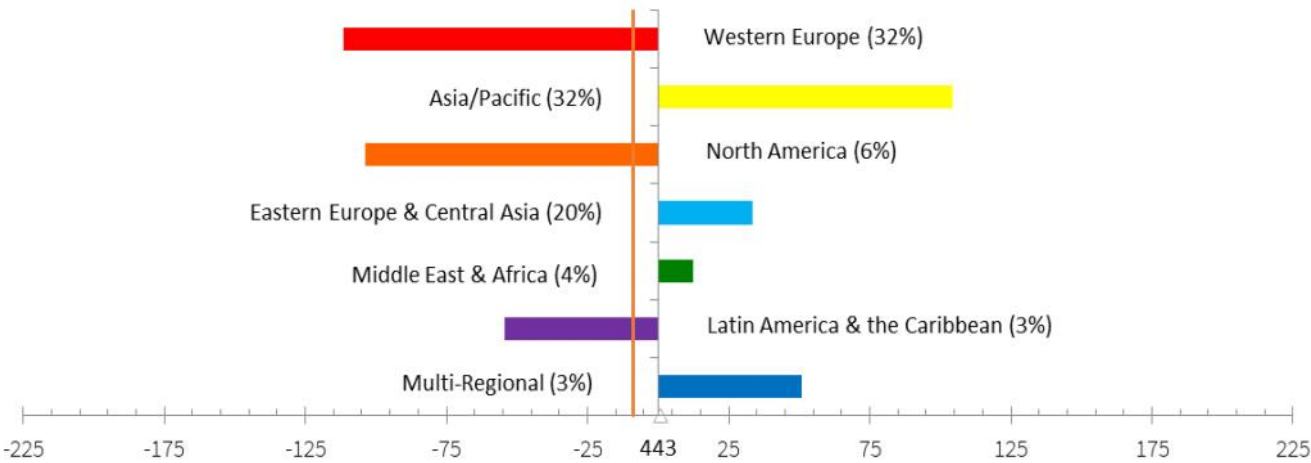


Chart 26 | Regional Assessments For Astana - Difference From The Mean

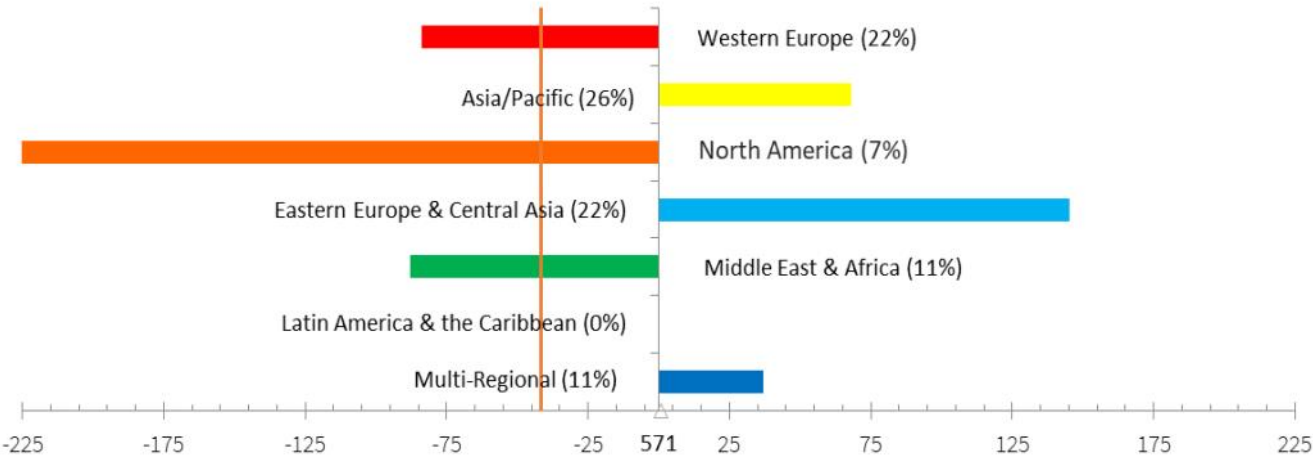
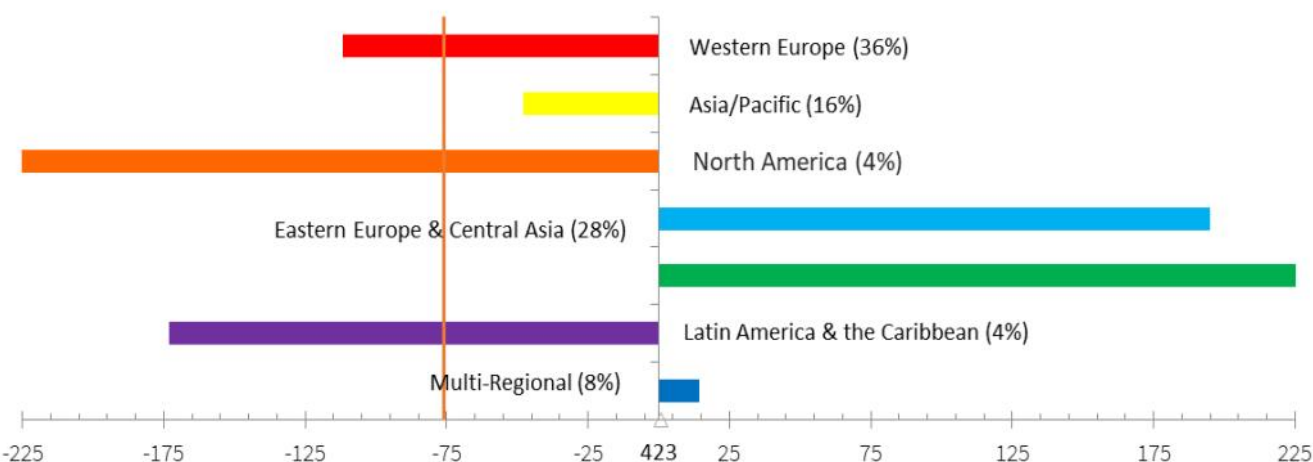


Chart 27 | Regional Assessments For Istanbul - Difference From The Mean



Western Europe

- London and Amsterdam remained in first and second place in GGFI 10 overall. Luxembourg and Geneva overtook Stockholm to take the third and fourth positions in the region.
- Only respondents from Asia/Pacific and Eastern Europe & Central Asia rated Western European centres higher than average.

Table 13 | Top 15 Western European Centres In GGFI 10

Centre	GGFI 10		GGFI 9		Change In Rank	Change In Rating
	Rank	Rating	Rank	Rating		
London	1	590	1	586	0	4
Amsterdam	2	580	2	573	0	7
Luxembourg	4	554	7	546	3	8
Geneva	7	551	9	543	2	8
Stockholm	8	550	4	552	-4	-2
Copenhagen	9	549	12	539	3	10
Zurich	11	547	6	548	-5	-1
Oslo	13	544	8	545	-5	-1
Paris	14	543	11	540	-3	3
Edinburgh	22	535	35	513	13	22
Helsinki	29	528	20	531	-9	-3
Munich	30	527	26	524	-4	3
Lisbon	36	521	42	505	6	16
Madrid	39	518	29	520	-10	-2
Frankfurt	40	517	34	514	-6	3

Chart 28 | Top Five Western European Centre Ratings Over Time

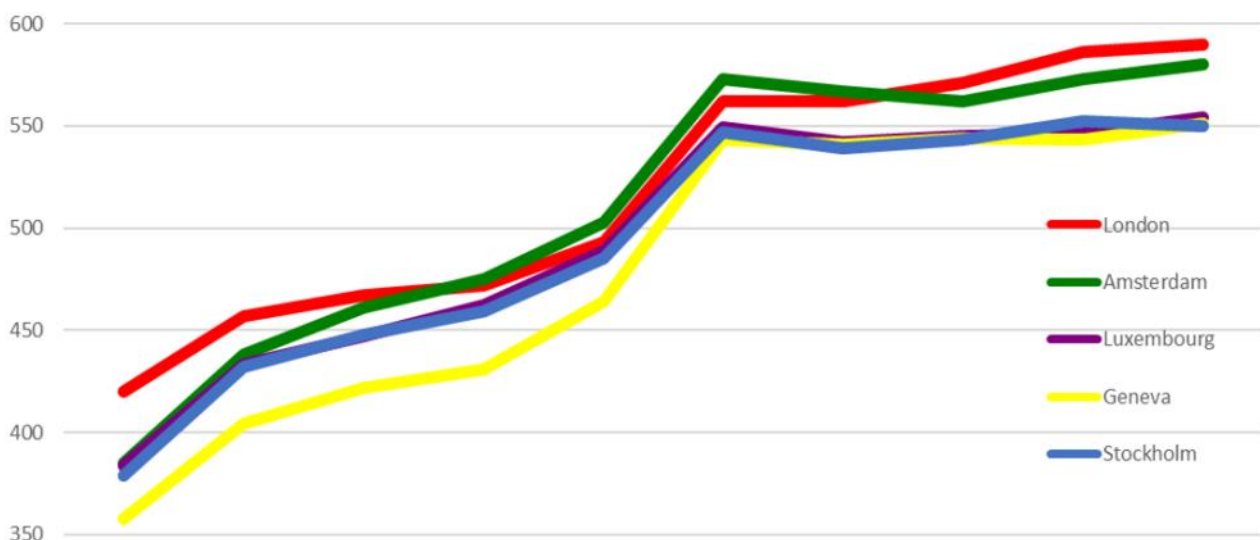


Chart 29 | Western Europe Regional Assessments - Difference From The Mean

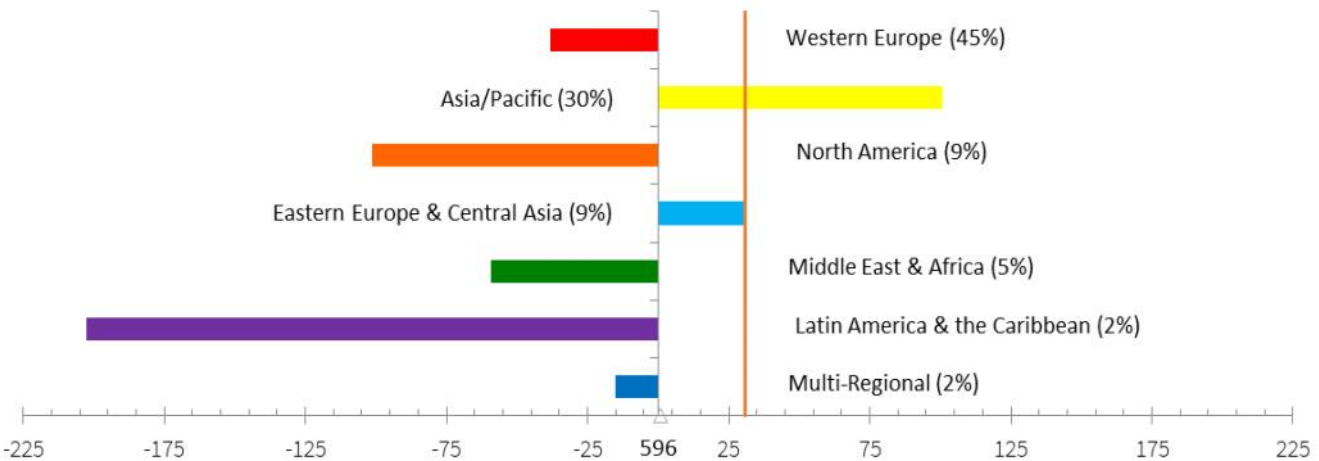


Chart 30 | Regional Assessments For London - Difference From The Mean

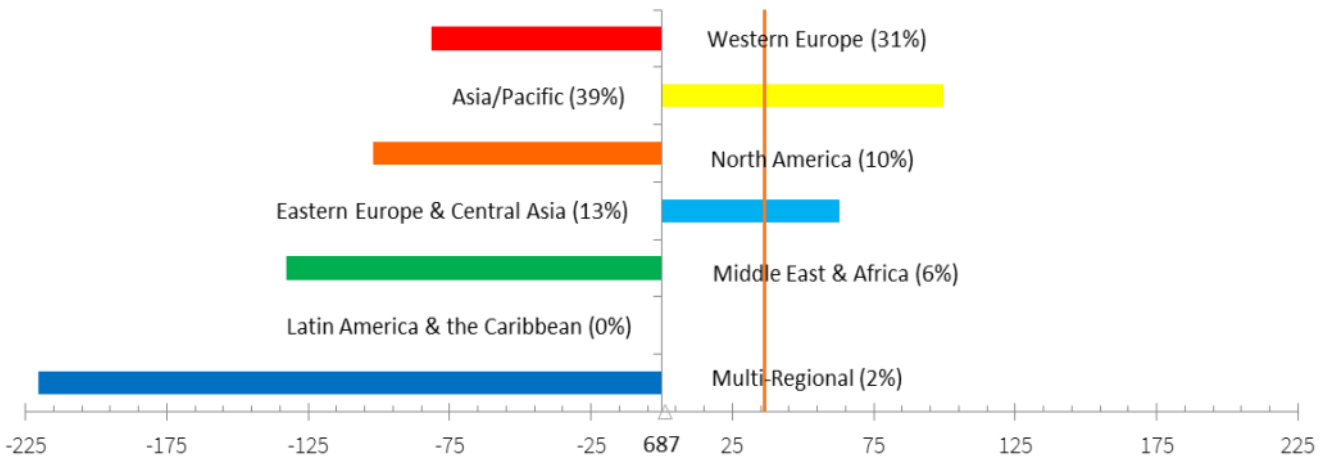
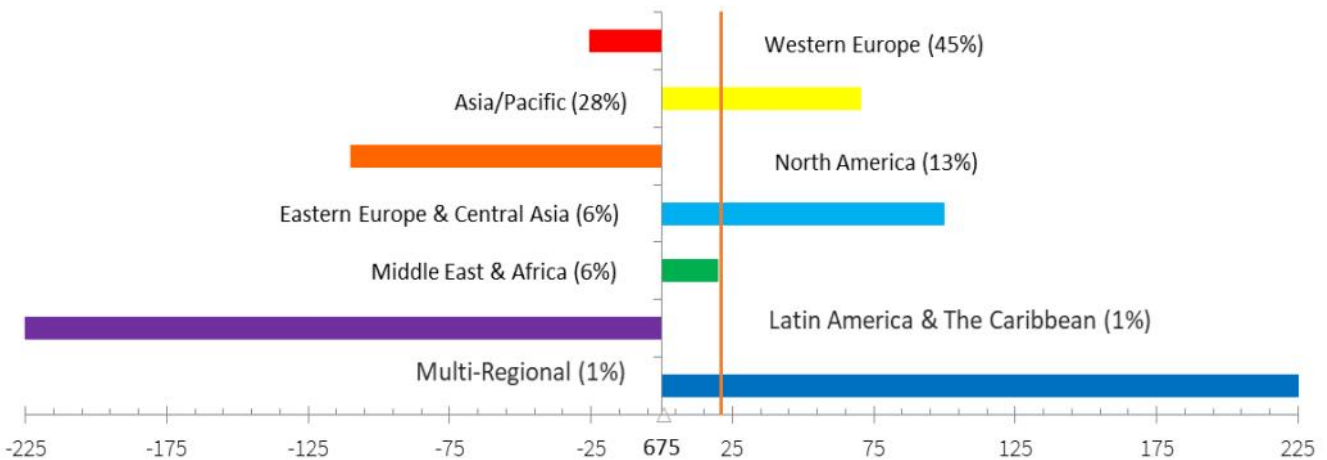


Chart 31 | Regional Assessments For Amsterdam - Difference From The Mean



Latin America & The Caribbean

- Mexico City retained its leading position in the region, with Rio de Janeiro rising 10 rank places to take second place in the region.
- Respondents from Asia/Pacific, Eastern Europe & Central Asia, and Middle East & Africa centres rated centres in this region above average.

Table 14 | Latin American & Caribbean Centres In GGFI 10

Centre	GGFI 10		GGFI 9		Change In Rank	Change In Rating
	Rank	Rating	Rank	Rating		
Mexico City	63	485	62	478	-1	7
Rio de Janeiro	65	481	75	465	10	16
Santiago	67	477	67	473	0	4
Sao Paulo	70	465	66	474	-4	-9
British Virgin Islands	74	461	69	471	-5	-10
Cayman Islands	83	440	78	456	-5	-16
Bermuda	84	438	81	442	-3	-4

Chart 32 | Top Five Latin American & Caribbean Centre Ratings Over Time

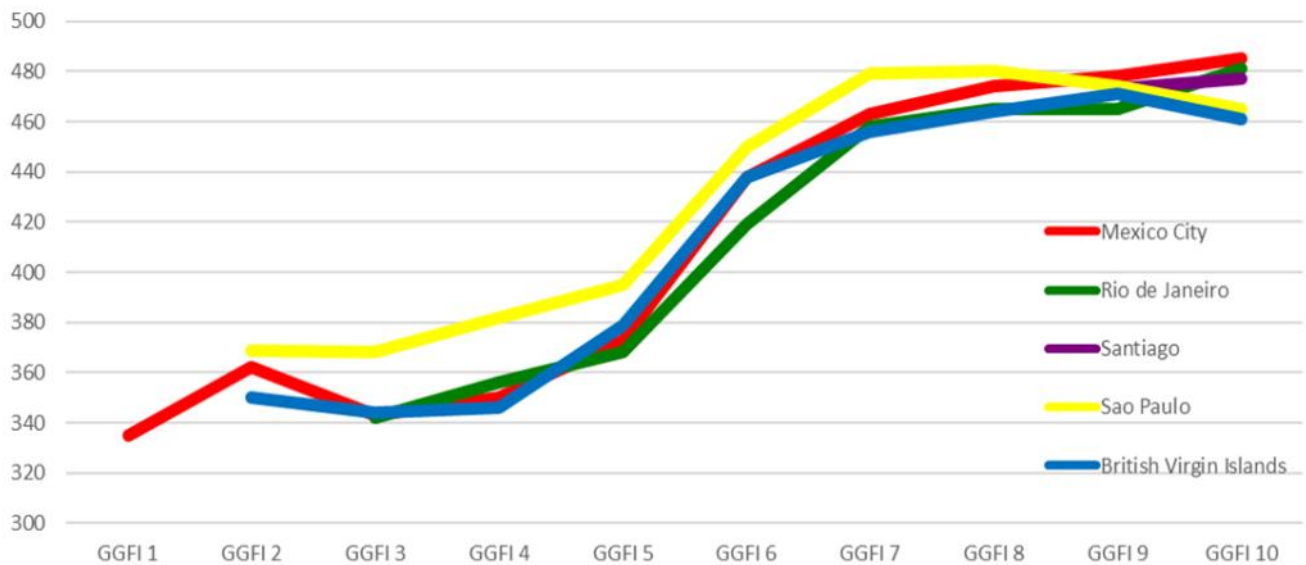


Chart 33 | Latin America & The Caribbean Regional Assessments - Difference From The Mean

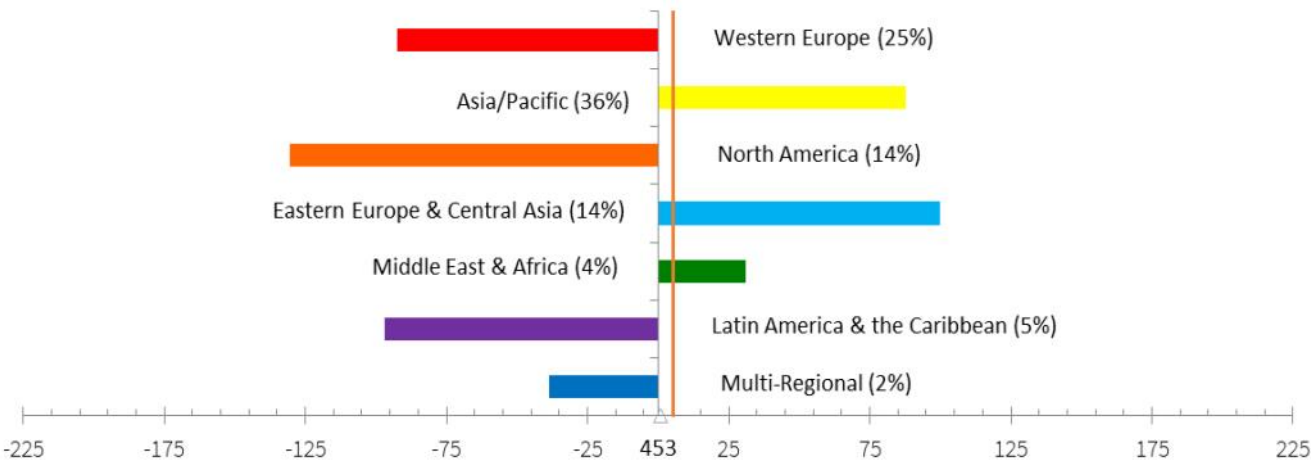


Chart 34 | Regional Assessments For Mexico City - Difference From The Mean

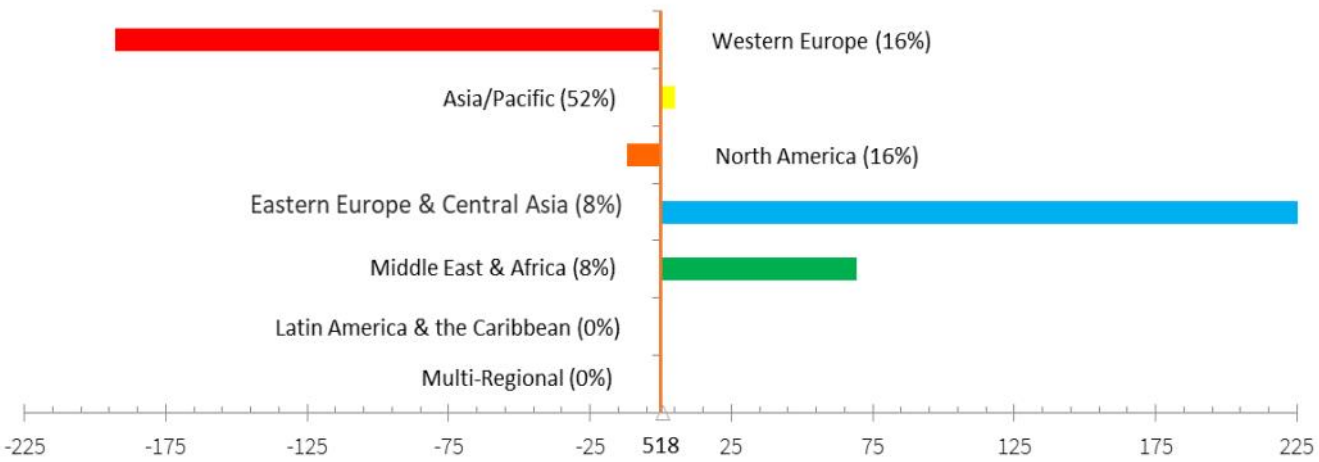
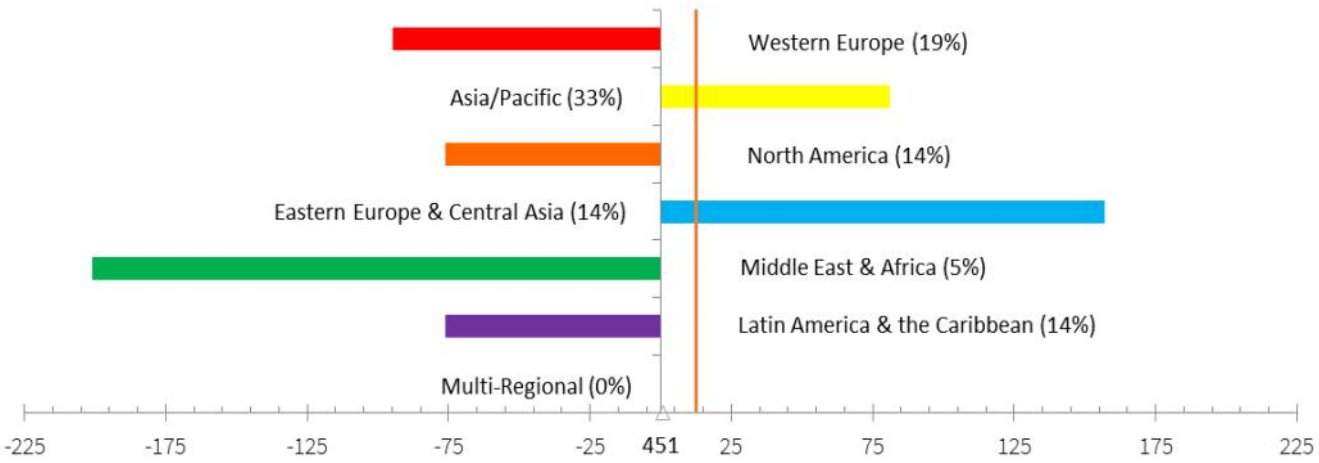


Chart 35 | Regional Assessments For Rio de Janeiro - Difference From The Mean



Asia/Pacific

- Sydney maintained its leading position in the region in GGFI 10, with Seoul moving up into second place.
- Singapore, Shanghai, Melbourne, Wellington, and Shenzhen featured in the top 20 in the world.
- Respondents from Asia/Pacific were the only region to rate local centres above average.

Table 15 | Top 15 Asia/Pacific Centres In GGFI 10

Centre	GGFI 10		GGFI 9		Change In Rank	Change In Rating
	Rank	Rating	Rank	Rating		
Sydney	10	548	13	538	3	10
Seoul	12	546	15	536	3	10
Singapore	16	541	16	535	0	6
Shanghai	17	540	18	533	1	7
Melbourne	18	539	24	526	6	13
Wellington	19	538	17	534	-2	4
Shenzhen	20	537	21	530	1	7
Busan	21	536	22	528	1	8
Beijing	23	534	14	537	-9	-3
Tokyo	24	533	25	525	1	8
Guangzhou	27	530	23	527	-4	3
Qingdao	31	526	33	516	2	10
Osaka	32	525	36	511	4	14
Hong Kong	41	516	39	508	-2	8
GIFT City-Gujarat	44	513	48	498	4	15

Chart 36 | Top Five Asia/Pacific Centre Ratings Over Time

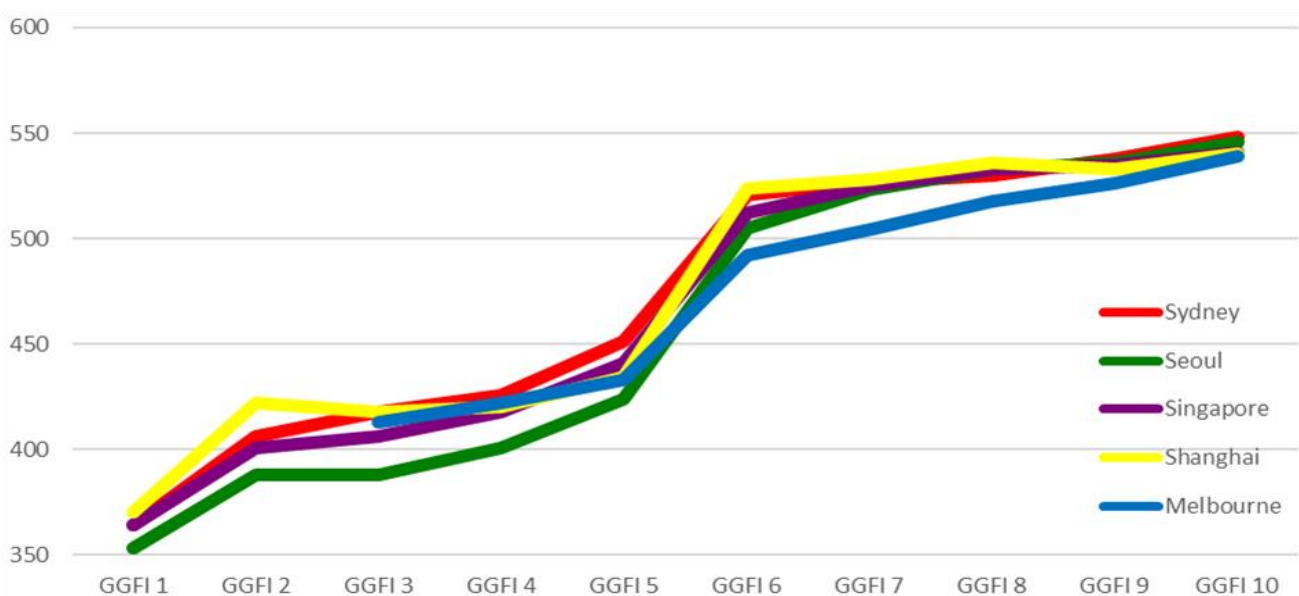
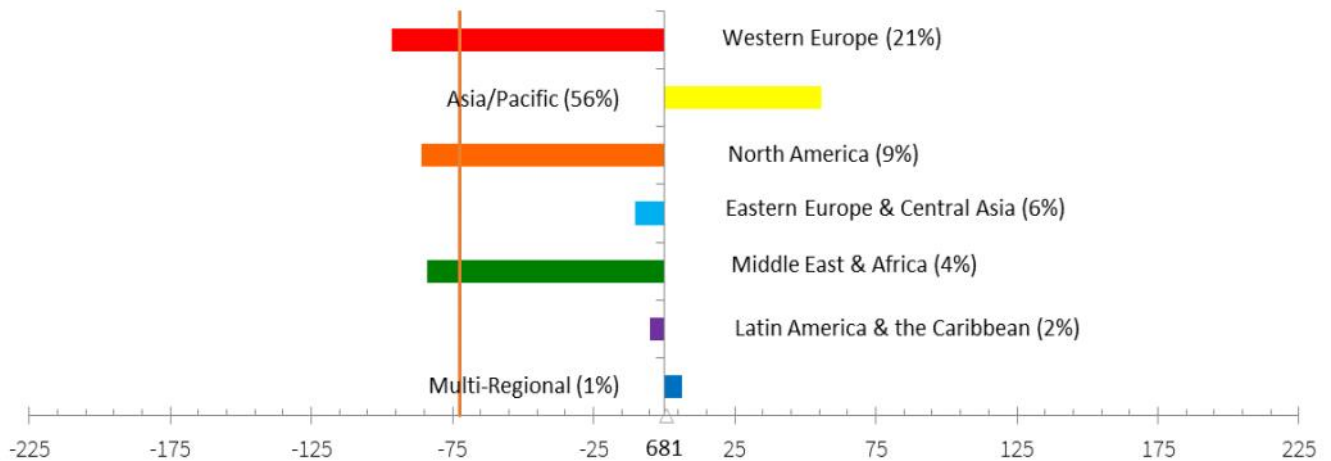
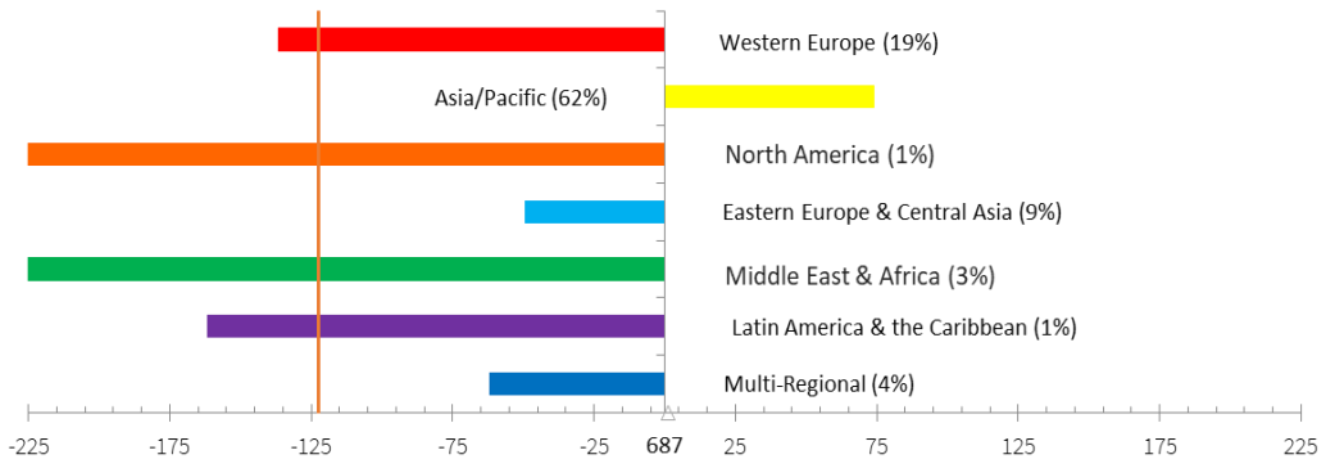
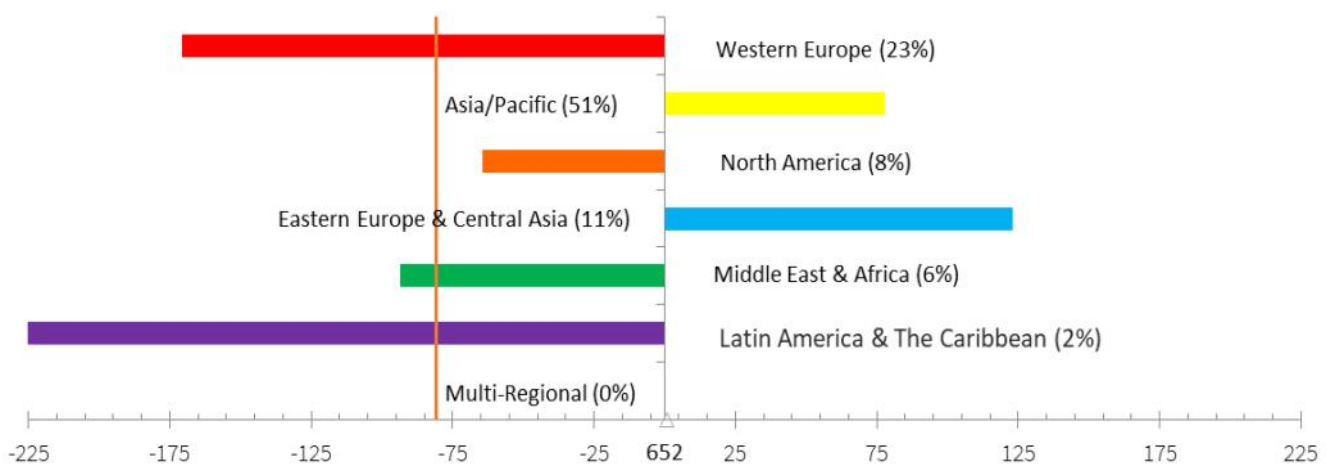


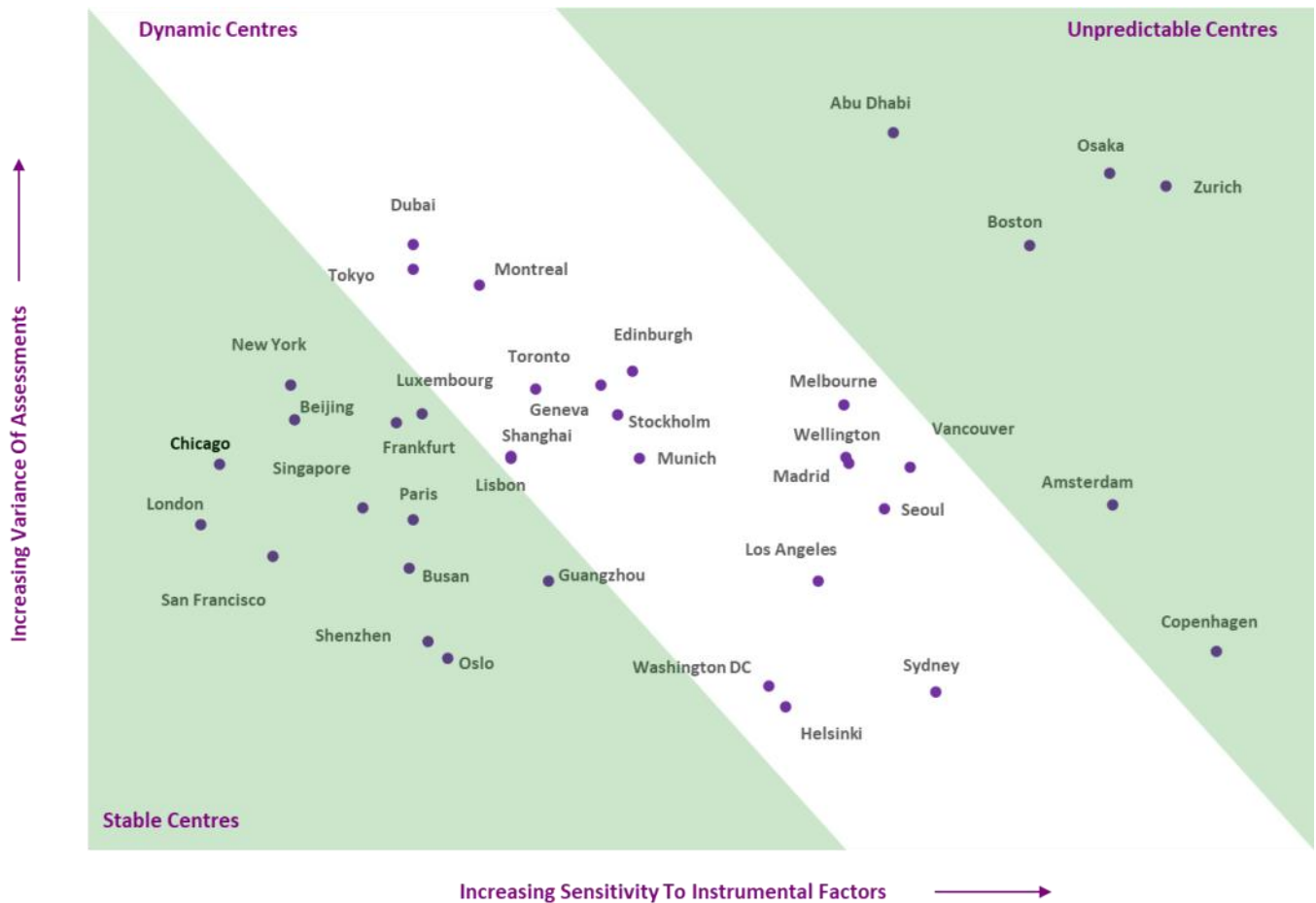
Chart 37 | Asia/Pacific Regional Assessments - Difference From The Mean**Chart 38 | Regional Assessments For Sydney - Difference From The Mean****Chart 39 | Regional Assessments For Seoul - Difference From The Mean**

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. Chart 14 contrasts the ‘spread’ or variance of the individual assessments given to the top 40 centres in GGFI 10, with the sensitivity to changes in the instrumental factors.

The chart shows three bands of financial centres. In the top right segment, Zurich has a higher sensitivity to changes in the instrumental factors and a higher variance of assessments than other centres and centres in this area have the highest potential for future movement. The stable centres in the bottom left have a lower sensitivity to change and demonstrate greater consistency in their GGFI ratings.

Chart 14 | Stability In Assessments And Instrumental Factors



Industry Sectors

We can analyse the differing assessments provided by respondents working in various industry sectors by building the index separately using the responses provided only from those industries. This analysis allows a relative measure of the sectoral strengths and weaknesses for each centre.

Table 16 illustrates separate sub-indices for the Policy, Knowledge (incorporating universities and NGOs), Banking, Investment, and Trading sectors. The table shows how the index ranking varies according to industry sector. The leading centres in the index generally feature in the higher ranks of the industry sector sub-indices, although there are interesting strengths and weaknesses. For example, US centres take the top five places in the trading sub-index, Geneva tops the policy list, and Shanghai is rated highest in the banking sub-index.

Table 16 | GGFI 10 Industry Sector Sub-Indices - Top 15

Rank	Industry Sub-Sector				
	Policy	Knowledge	Banking	Investment	Trading
1	Geneva	London	Shanghai	London	New York
2	London	Amsterdam	Sydney	Amsterdam	San Francisco
3	New York	New York	Hong Kong	Dubai	Boston
4	Luxembourg	Copenhagen	London	Geneva	Los Angeles
5	Zurich	San Francisco	Melbourne	Luxembourg	Washington DC
6	Los Angeles	Paris	Shenzhen	New York	Shanghai
7	Amsterdam	Singapore	Geneva	Zurich	London
8	Singapore	Los Angeles	New York	Busan	Amsterdam
9	Stockholm	Shenzhen	Zurich	San Francisco	Chicago
10	San Francisco	Sydney	Oslo	Shanghai	Shenzhen
11	Edinburgh	Luxembourg	Beijing	Tokyo	Dubai
12	Beijing	Stockholm	Luxembourg	Copenhagen	Stockholm
13	Copenhagen	Seoul	Amsterdam	Sydney	Luxembourg
14	Melbourne	Zurich	Stockholm	Singapore	Abu Dhabi
15	Shenzhen	Chicago	Copenhagen	Paris	Geneva

Taking the sectoral analysis further, we can also calculate the index using the responses only from those working directly in green finance in financial services organisations. The results are shown in table 17.

Table 17 | GGFI 10 Using Responses Only From Respondents Working Directly In Green Finance

Centre	Rating	Adjusted Rank	GGFI 10 Rank	Difference	Centre	Rating	Adjusted Rank	GGFI 10 Rank	Difference
London	585	1	1	0	Brussels	498	35	43	8
Amsterdam	546	3	2	-1	GIFT City-Gujarat	481	48	44	-4
New York	571	2	3	1	Dublin	483	46	45	-1
Luxembourg	536	6	4	-2	Kuala Lumpur	467	57	46	-11
San Francisco	540	4	5	1	Calgary	490	38	47	9
Los Angeles	524	13	6	-7	Riyadh	475	53	48	-5
Geneva	529	10	7	-3	Rome	485	43	49	6
Stockholm	509	21	8	-13	Tel Aviv	469	55	50	-5
Copenhagen	520	14	9	-5	Hamburg	483	46	51	5
Sydney	518	16	10	-6	Guernsey	421	82	52	-30
Zurich	527	12	11	-1	Glasgow	480	50	53	3
Seoul	513	19	12	-7	Astana	466	58	54	-4
Oslo	519	15	13	-2	Vienna	501	32	55	23
Paris	538	5	14	9	Jersey	445	72	56	-16
Washington DC	532	7	15	8	Bangkok	454	69	57	-12
Singapore	517	17	16	-1	Milan	492	37	58	21
Shanghai	531	8	17	9	Mauritius	458	67	59	-8
Melbourne	498	35	18	-17	Jakarta	461	65	60	-5
Wellington	509	21	19	-2	Bahrain	441	74	61	-13
Shenzhen	528	11	20	9	Cape Town	450	71	62	-9
Busan	481	48	21	-27	Mexico City	486	41	63	22
Edinburgh	514	18	22	4	Johannesburg	463	63	64	1
Beijing	530	9	23	14	Rio de Janeiro	464	61	65	4
Tokyo	513	19	24	5	Liechtenstein	460	66	66	0
Boston	502	28	25	-3	Santiago	466	58	67	9
Chicago	505	25	26	1	Doha	438	78	68	-10
Guangzhou	499	34	27	-7	Mumbai	488	40	69	29
Dubai	503	27	28	1	Sao Paulo	463	63	70	7
Helsinki	485	43	29	-14	Malta	476	52	71	19
Munich	502	28	30	2	Isle of Man	421	82	72	-10
Qingdao	500	33	31	-2	Istanbul	453	70	73	3
Osaka	477	51	32	-19	British Virgin Islands	432	80	74	-6
Abu Dhabi	466	58	33	-25	Almaty	436	79	75	-4
Montreal	502	28	34	6	Moscow	464	61	76	15
Toronto	507	23	35	12	Nairobi	441	74	77	3
Lisbon	490	38	36	-2	Sofia	445	72	78	6
Vancouver	484	45	37	-8	Warsaw	456	68	79	11
Casablanca	474	54	38	-16	New Delhi	468	56	80	24
Madrid	505	25	39	14	Prague	441	74	81	7
Frankfurt	502	28	40	12	Riga	440	77	82	5
Hong Kong	486	41	41	0	Cayman Islands	415	84	83	-1
Berlin	507	23	42	19	Bermuda	423	81	84	3

GGFI 10 Interest, Impact, And Drivers Of Green Finance

In addition to requesting ratings of depth and quality for financial centres, the GGFI questionnaire asks additional questions concerning the development of green finance. Amongst the topics covered are:

- The areas of green finance considered most interesting by respondents;
- The areas of green finance which respondents consider to have the greatest impact on sustainability; and
- 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 separately the areas of green finance that they consider have most impact on sustainability. The results are shown in Charts 40 and 41.

With respect to interest, ESG Analytics has taken over as the leading area mentioned by our respondents, just ahead of Green Bonds, with Sustainable Infrastructure Finance the third most frequently mentioned area. The area considered least interesting are Carbon Disclosure and Natural Capital Valuation.

Chart 40 | Interest - Percentage Of Total Mentions



With respect to impact, ESG Analytics, Green Insurance, Energy Efficient Investment, and Sustainable Infrastructure Finance are rated as the areas of green finance with the most impact. Natural Capital Valuation and GreenTech Venture Capital are ranked lowest on this measure by our respondents.

Chart 41 | Impact - Percentage Of Total Mentions

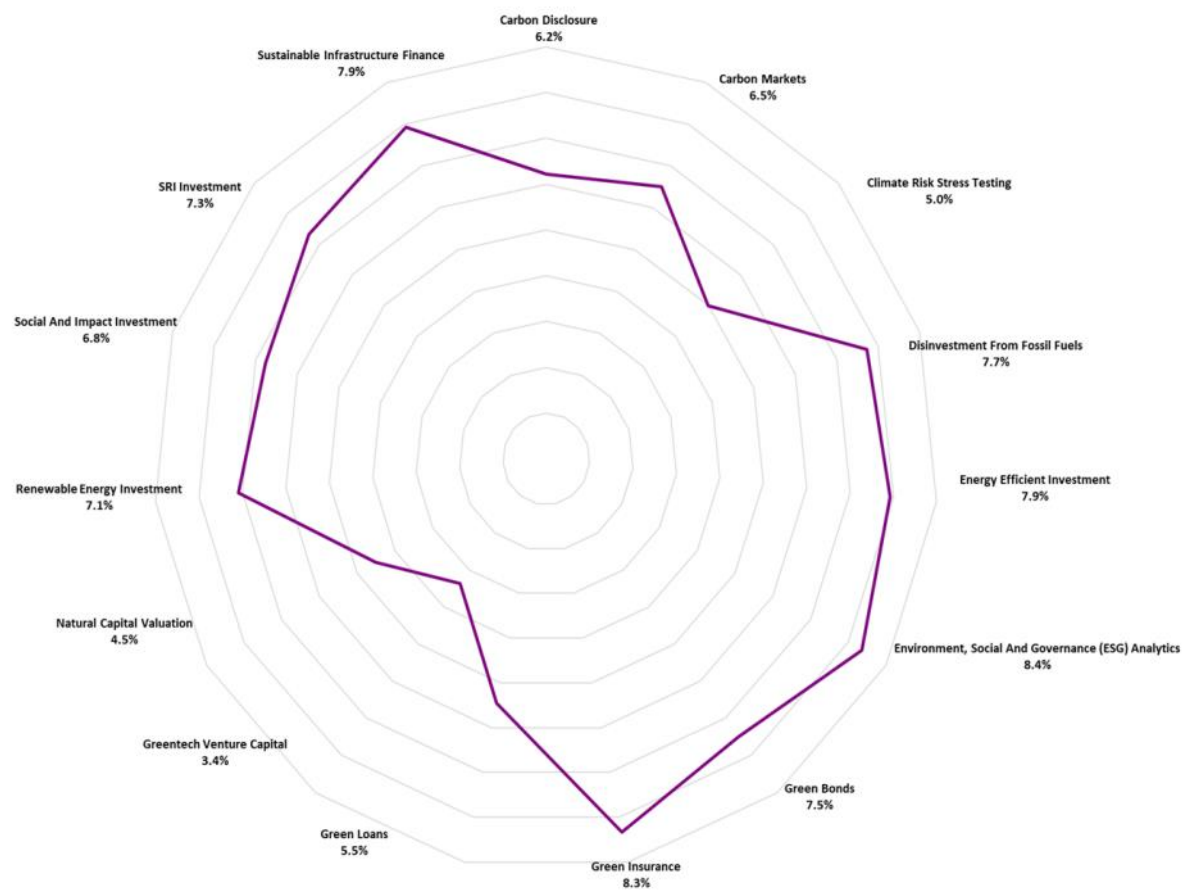
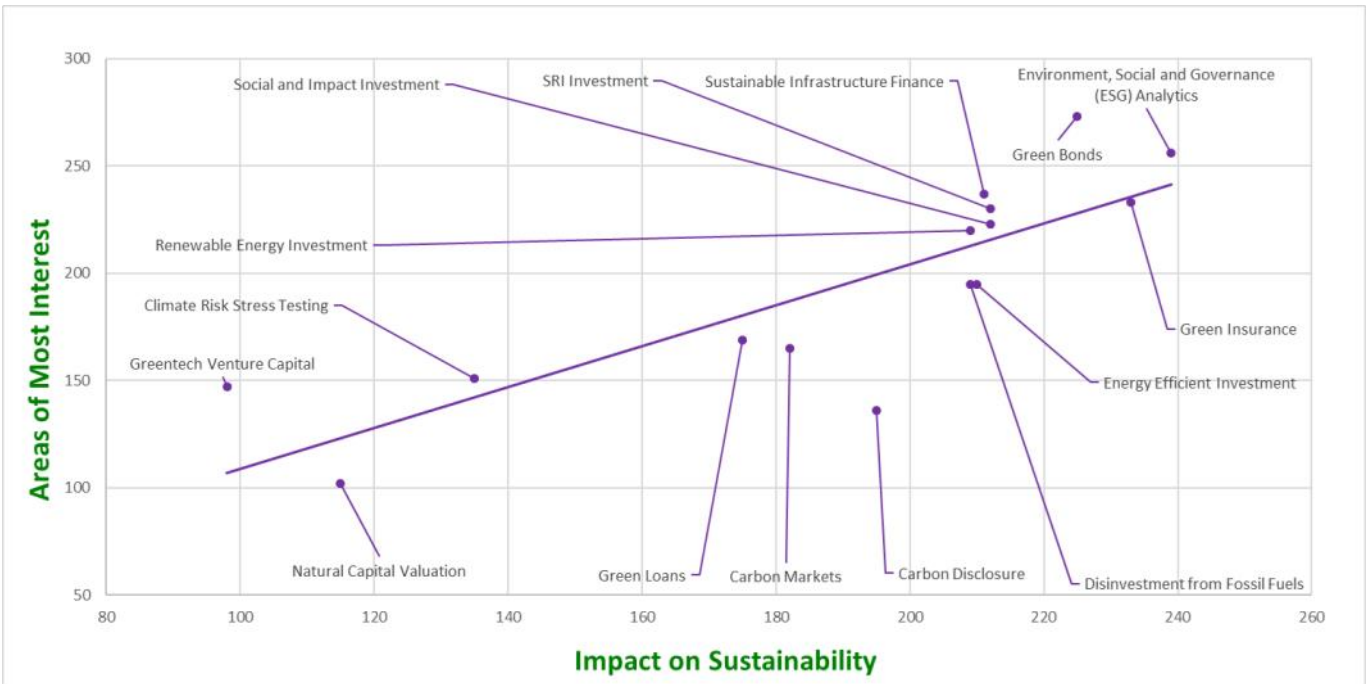
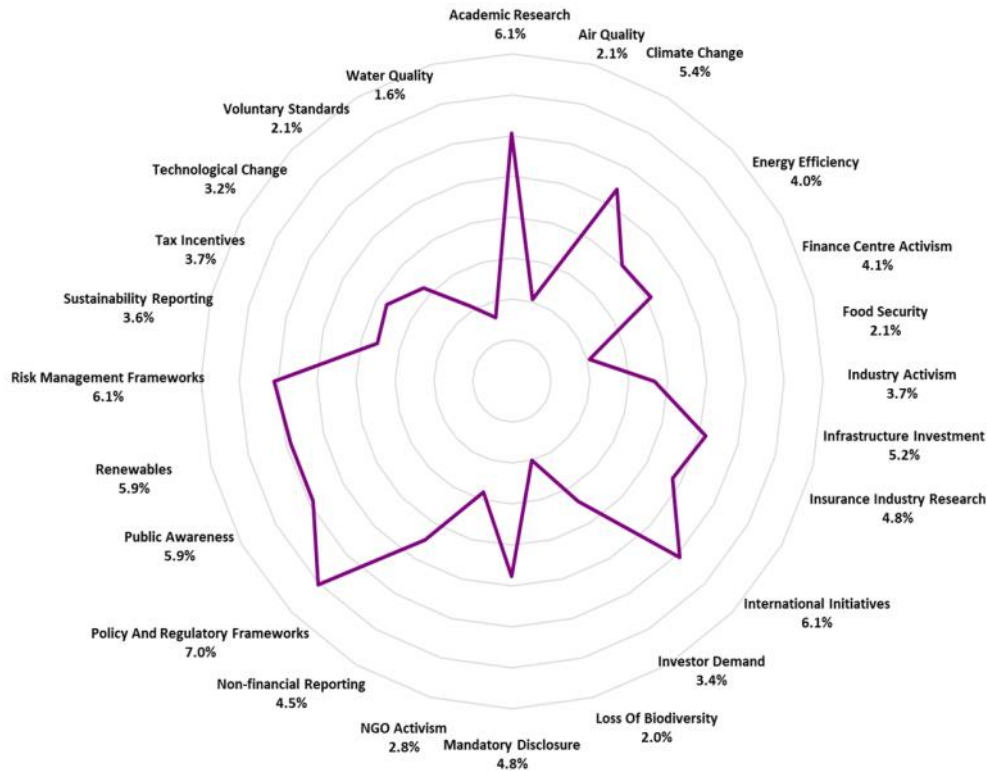


Chart 42 | The Correlation Between Interest And Impact



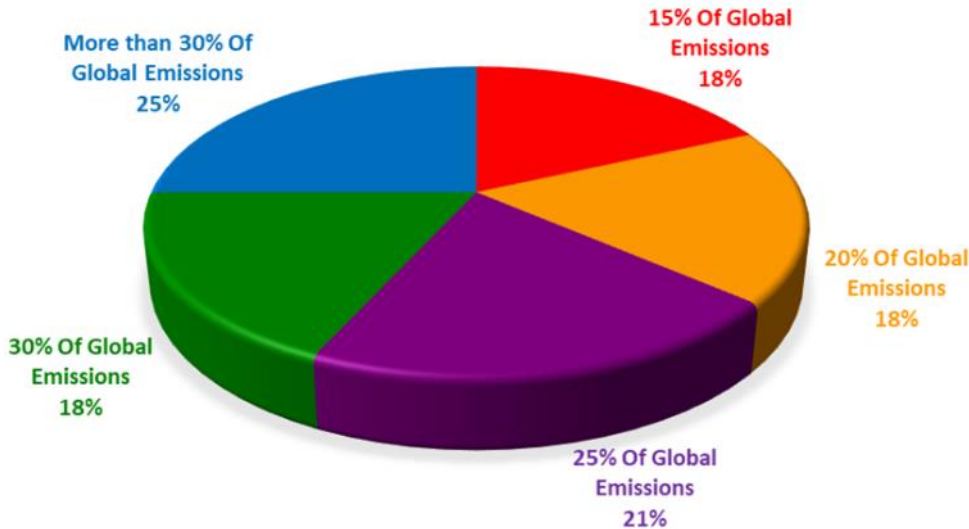
With respect to drivers, Policy & Regulatory Frameworks continues to be rated as the most important driver of green finance, followed by Risk Management Frameworks, International Initiatives, and Academic Research. Loss Of Biodiversity and Water Quality rank lowest. These results underline the continuing importance of policy and regulation and international cooperation in the development of green finance.

Chart 43 | Drivers - Percentage Of Total Mentions



We also asked respondents to the GGFI survey to assess the proportion of global emissions that they thought will be covered by carbon pricing schemes by 2030, building on the World Bank's estimate that 13% of annual global greenhouse gas (GHG) emissions were covered by carbon pricing schemes in June 2022 – both emissions trading schemes and carbon taxation. Chart 44 shows a mixed response, but with the highest percentage of respondents (25%) thinking that over 30% of emissions will be within carbon pricing schemes by 2030.

Chart 44 | Expected Proportion Of GHG Emissions To Be Covered By Carbon Pricing By 2030



Appendix 1: Assessment Details

Table 18 | Details Of GGFI 10 Assessments By Centre

Centre	GGFI 10		Assessments		
	Rank	Rating	Number	Average	Std Dev
London	1	590	194	687	204
Amsterdam	2	580	80	675	208
New York	3	578	245	681	229
Luxembourg	4	554	68	625	224
San Francisco	5	553	66	717	199
Los Angeles	6	552	81	730	194
Geneva	7	551	56	630	229
Stockholm	8	550	54	588	224
Copenhagen	9	549	30	645	182
Sydney	10	548	69	687	175
Zurich	11	547	82	608	264
Seoul	12	546	53	652	207
Oslo	13	544	17	644	181
Paris	14	543	108	613	205
Washington DC	15	542	116	718	176
Singapore	16	541	124	631	207
Shanghai	17	540	220	652	216
Melbourne	18	539	31	684	226
Wellington	19	538	21	675	216
Shenzhen	20	537	110	671	184
Busan	21	536	33	745	197
Edinburgh	22	535	53	628	232
Beijing	23	534	200	689	223
Tokyo	24	533	110	657	250
Boston	25	532	54	628	254
Chicago	26	531	63	623	215
Guangzhou	27	530	118	694	194
Dubai	28	529	129	592	254
Helsinki	29	528	31	631	172
Munich	30	527	30	588	216
Qingdao	31	526	321	827	120
Osaka	32	525	28	658	267
Abu Dhabi	33	524	56	513	274
Montreal	34	523	27	552	247
Toronto	35	522	65	600	228
Lisbon	36	521	26	633	216
Vancouver	37	520	38	607	215
Casablanca	38	519	21	686	134
Madrid	39	518	43	567	215
Frankfurt	40	517	85	552	222
Hong Kong	41	516	125	556	261
Berlin	42	515	46	593	190
Brussels	43	514	55	615	214
GIFT City-Gujarat	44	513	202	794	202
Dublin	45	512	46	520	226
Kuala Lumpur	46	510	27	610	222
Calgary	47	509	23	508	268
Riyadh	48	507	27	534	186
Rome	49	505	46	530	204
Tel Aviv	50	504	29	515	230
Hamburg	51	499	41	635	224
Guernsey	52	498	29	563	258
Glasgow	53	497	31	534	256
Astana	54	496	27	571	228
Vienna	55	495	24	474	192
Jersey	56	493	27	507	263
Bangkok	57	492	22	488	203
Milan	58	491	29	507	216
Mauritius	59	490	38	553	177
Jakarta	60	489	17	571	248
Bahrain	61	487	25	478	247
Cape Town	62	486	26	506	167
Mexico City	63	485	25	518	226
Johannesburg	64	482	23	530	194
Rio de Janeiro	65	481	21	451	201
Liechtenstein	66	478	17	510	199
Santiago	67	477	27	481	197
Doha	68	472	26	564	225
Mumbai	69	467	34	387	296
Sao Paulo	70	465	41	489	199
Malta	71	464	24	424	179
Isle of Man	72	463	16	430	228
Istanbul	73	462	25	423	242
British Virgin Islands	74	461	35	455	221
Almaty	75	458	35	423	251
Moscow	76	457	76	450	209
Nairobi	77	456	31	455	173
Sofia	78	455	25	534	189
Warsaw	79	454	23	370	221
New Delhi	80	453	32	355	292
Prague	81	452	24	406	199
Riga	82	448	25	486	172
Cayman Islands	83	440	32	360	209
Bermuda	84	438	25	373	173

Table 19 | Details Of Assessments Of GGFI Dimensions By Centre

Centre	Overall Rank	Depth Rating	Quality Rating	Centre	Overall Rank	Depth Rating	Quality Rating
London	1	286	304	Brussels	43	258	256
Amsterdam	2	283	297	GIFT City-Gujarat	44	256	257
New York	3	285	293	Dublin	45	254	258
Luxembourg	4	275	279	Kuala Lumpur	46	252	258
San Francisco	5	277	276	Calgary	47	244	265
Los Angeles	6	275	277	Riyadh	48	251	256
Geneva	7	275	276	Rome	49	253	252
Stockholm	8	277	273	Tel Aviv	50	255	249
Copenhagen	9	273	276	Hamburg	51	250	249
Sydney	10	263	285	Guernsey	52	247	251
Zurich	11	267	280	Glasgow	53	245	252
Seoul	12	271	275	Astana	54	244	252
Oslo	13	272	272	Vienna	55	241	254
Paris	14	272	271	Jersey	56	235	258
Washington DC	15	269	273	Bangkok	57	241	251
Singapore	16	266	275	Milan	58	243	248
Shanghai	17	271	269	Mauritius	59	247	243
Melbourne	18	261	278	Jakarta	60	243	246
Wellington	19	268	270	Bahrain	61	238	249
Shenzhen	20	267	270	Cape Town	62	245	241
Busan	21	261	275	Mexico City	63	242	243
Edinburgh	22	260	275	Johannesburg	64	246	236
Beijing	23	261	273	Rio de Janeiro	65	244	237
Tokyo	24	266	267	Liechtenstein	66	241	237
Boston	25	261	271	Santiago	67	243	234
Chicago	26	263	268	Doha	68	229	243
Guangzhou	27	262	268	Mumbai	69	241	226
Dubai	28	259	270	Sao Paulo	70	230	235
Helsinki	29	263	265	Malta	71	229	235
Munich	30	260	267	Isle of Man	72	227	236
Qingdao	31	261	265	Istanbul	73	233	229
Osaka	32	267	258	British Virgin Islands	74	230	231
Abu Dhabi	33	252	272	Almaty	75	233	225
Montreal	34	255	268	Moscow	76	228	229
Toronto	35	256	266	Nairobi	77	227	229
Lisbon	36	261	260	Sofia	78	231	224
Vancouver	37	254	266	Warsaw	79	230	224
Casablanca	38	258	261	New Delhi	80	237	216
Madrid	39	259	259	Prague	81	224	228
Frankfurt	40	252	265	Riga	82	228	220
Hong Kong	41	251	265	Cayman Islands	83	221	219
Berlin	42	253	262	Bermuda	84	219	219

Appendix 2: Interest, Impact, And Drivers Details

Table 20 | Areas Of Green Finance Of Most Interest To Respondents

Area of Green Finance	Number Of Mentions	Percentage Of Total
Environment, Social And Governance (ESG) Analytics	325	9.0%
Green Bonds	322	8.9%
Sustainable Infrastructure Finance	286	7.9%
Green Insurance	279	7.7%
SRI Investment	279	7.7%
Energy Efficient Investment	268	7.4%
Renewable Energy Investment	267	7.4%
Disinvestment From Fossil Fuels	260	7.2%
Social and Impact Investment	249	6.9%
Carbon Markets	219	6.1%
Green Loans	197	5.5%
Climate Risk Stress Testing	190	5.3%
Greentech Venture Capital	169	4.7%
Carbon Disclosure	153	4.2%
Natural Capital Valuation	149	4.1%
Totals	3,612	100.00%

Table 21 | Areas Of Green Finance With The Greatest Impact

Area of Green Finance	Number Of Mentions	Percentage Of Total
Environment, Social And Governance (ESG) Analytics	294	8.4%
Green Insurance	293	8.3%
Energy Efficient Investment	279	7.9%
Sustainable Infrastructure Finance	279	7.9%
Disinvestment From Fossil Fuels	272	7.7%
Green Bonds	264	7.5%
SRI Investment	258	7.3%
Renewable Energy Investment	250	7.1%
Social And Impact Investment	238	6.8%
Carbon Markets	229	6.5%
Carbon Disclosure	219	6.2%
Green Loans	192	5.5%
Climate Risk Stress Testing	176	5.0%
Natural Capital Valuation	159	4.5%
Greentech Venture Capital	118	3.4%
Totals	3,520	100.0%

Table 22 | Drivers Of Green Finance

Driver	Number of Mentions	Percentage Of Total
Policy And Regulatory Frameworks	250	7.0%
Risk Management Frameworks	217	6.1%
International Initiatives	216	6.1%
Academic Research	215	6.1%
Public Awareness	209	5.9%
Renewables	209	5.9%
Climate Change	192	5.4%
Infrastructure Investment	183	5.2%
Insurance Industry Research	169	4.8%
Mandatory Disclosure	169	4.8%
Non-financial Reporting	159	4.5%
Finance Centre Activism	146	4.1%
Energy Efficiency	142	4.0%
Tax Incentives	132	3.7%
Industry Activism	130	3.7%
Sustainability Reporting	127	3.6%
Investor Demand	120	3.4%
Technological Change	114	3.2%
NGO Activism	100	2.8%
Voluntary Standards	75	2.1%
Air Quality	73	2.1%
Food Security	73	2.1%
Loss of Biodiversity	71	2.0%
Water Quality	57	1.6%
Totals	3,548	100.0%

Appendix 3: Respondents' Details

Table 23 | Respondents By Industry Sector

Industry Sector	Number Of Respondents	Percentage Of Respondents
Banking	72	7.83%
Debt Capital Market	62	6.75%
Equity Capital Markets	80	8.71%
Insurance	35	3.81%
Investment	82	8.92%
Knowledge	92	10.01%
Local Green Initiatives	42	4.57%
Policy and Public Finance	91	9.90%
Professional Services	183	19.91%
Trading	108	11.75%
Other	72	7.83%
Total	919	100.00%

Table 24 | Respondents By Engagement In Green Finance

Engagement In Green Finance	Number Of Respondents	Percentage Of Respondents
Working Full-time On Green Finance	347	37.76%
Working Part-time On Green Finance	176	19.15%
Interested in Green Finance	351	38.19%
Other/not given	45	4.90%
Total	919	100.00%

Table 25 | Respondents By Region

Region	Number Of Respondents	Percentage Of Respondents
Asia/Pacific	392	42.66%
Western Europe	238	25.90%
Eastern Europe & Central Asia	110	11.97%
North America	75	8.16%
Middle East & Africa	48	5.22%
Latin America & The Caribbean	39	4.24%
Multi-Regional	17	1.85%
Total	919	100.00%

Table 26 | Respondents By Size Of Organisation

Size of Organisation	Number Of Respondents	Percentage Of Respondents
<100	333	36.24%
100-500	100	10.88%
500-1000	89	9.68%
1000-2000	89	9.68%
2000-5000	76	8.27%
>5000	167	18.17%
Other/not given	65	7.07%
Total	919	100.00%

Table 27 | Respondents By Gender

Gender	Number Of Respondents	Percentage Of Respondents
Female	306	33.30%
Male	530	57.67%
Other	1	0.11%
Prefer not to say/not given	82	8.92%
Total	919	100.00%

Table 28 | Respondents By Age

Age Band	Number Of Respondents	Percentage Of Respondents
18-30	317	34.49%
30-45	287	31.23%
45-60	167	18.17%
60+	71	7.73%
Other/not given	77	8.38%
Total	919	100.00%

Appendix 4: Methodology

The GGFI provides ratings 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 10 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, we use a database of indicators, or Instrumental Factors, that contains quantitative data about each financial centre. We use a machine learning algorithm to investigate the correlation between the financial centre assessments and these Instrumental Factors to predict how each respondent would have rated the financial centres they do not know. These 149 instrumental factors draw on data from a range of different sources covering sustainability, business, human capital, 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. We add the results for depth and quality to produce the GGFI.

Factors Affecting The Inclusion Of Centres In The GGFI

The questionnaire lists a total of 126 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 25 in GGFI 10. This means that not all 126 centres in the questionnaire receive a ranking.

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.

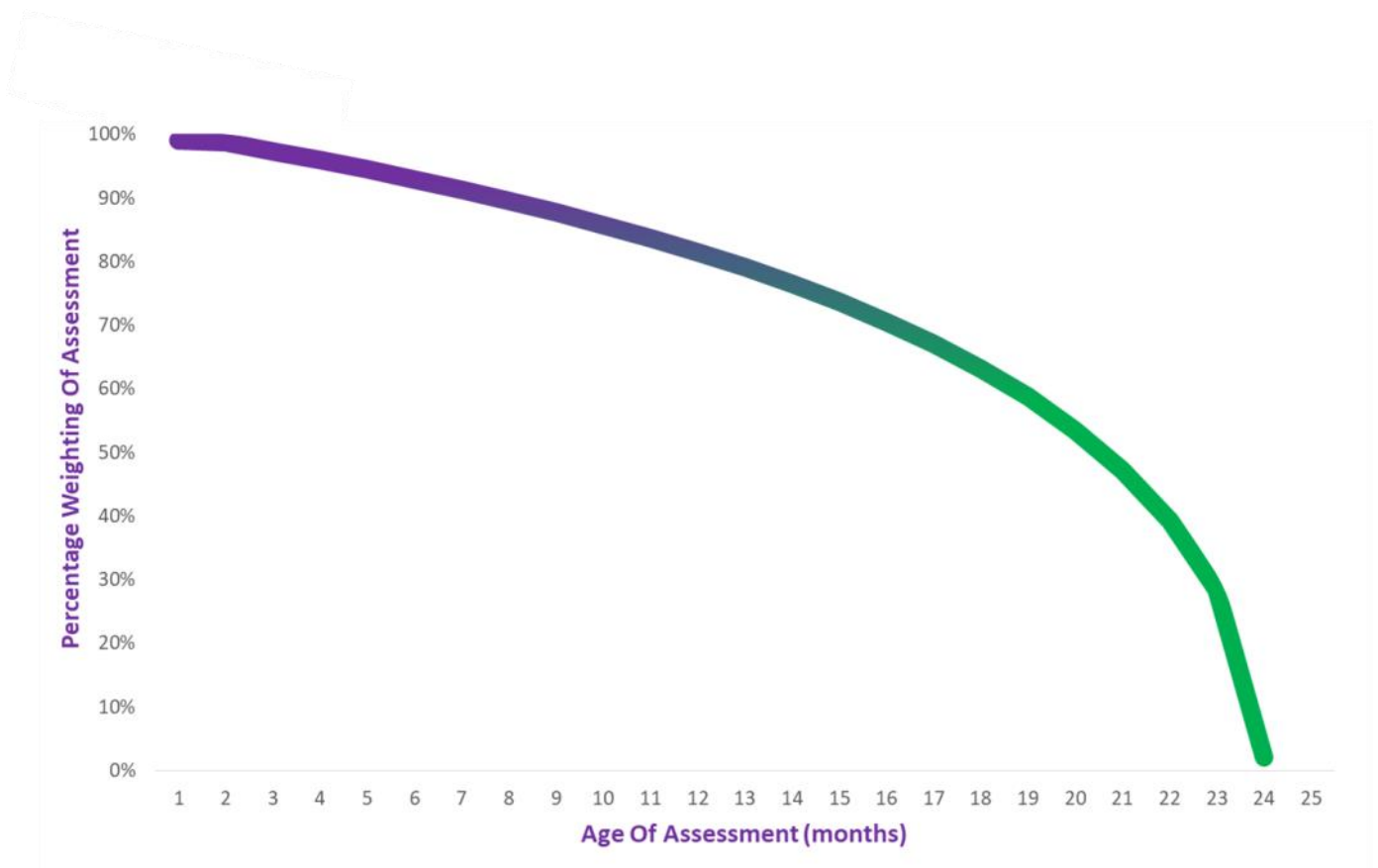
Financial Centre Assessments

Financial centre assessments are collected via an online questionnaire which runs continuously and which is at greenfinanceindex.net/survey/. A link to this questionnaire is emailed to a target list of respondents at regular intervals. Other interested parties can complete the questionnaire by following the link given in GGFI publications.

In calculating the GGFI:

- the score given by a respondent to their home centre, and scores from respondents who do not specify a home centre, are excluded from the model – this is designed to prevent home bias;
- financial centre assessments are included in the GGFI model for 24 months after they have been received – we consider that this is a period during which assessments maintain their validity; and
- financial centre assessments from the month when the GGFI is created will be given full weighting with earlier responses given a reduced weighting on a logarithmic scale as shown in Chart 45 - this recognises that older ratings, while still valid, are less likely to be up-to-date.

Chart 45 | Reduction In Weighting As Assessments Get Older



Instrumental Factor Data

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

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

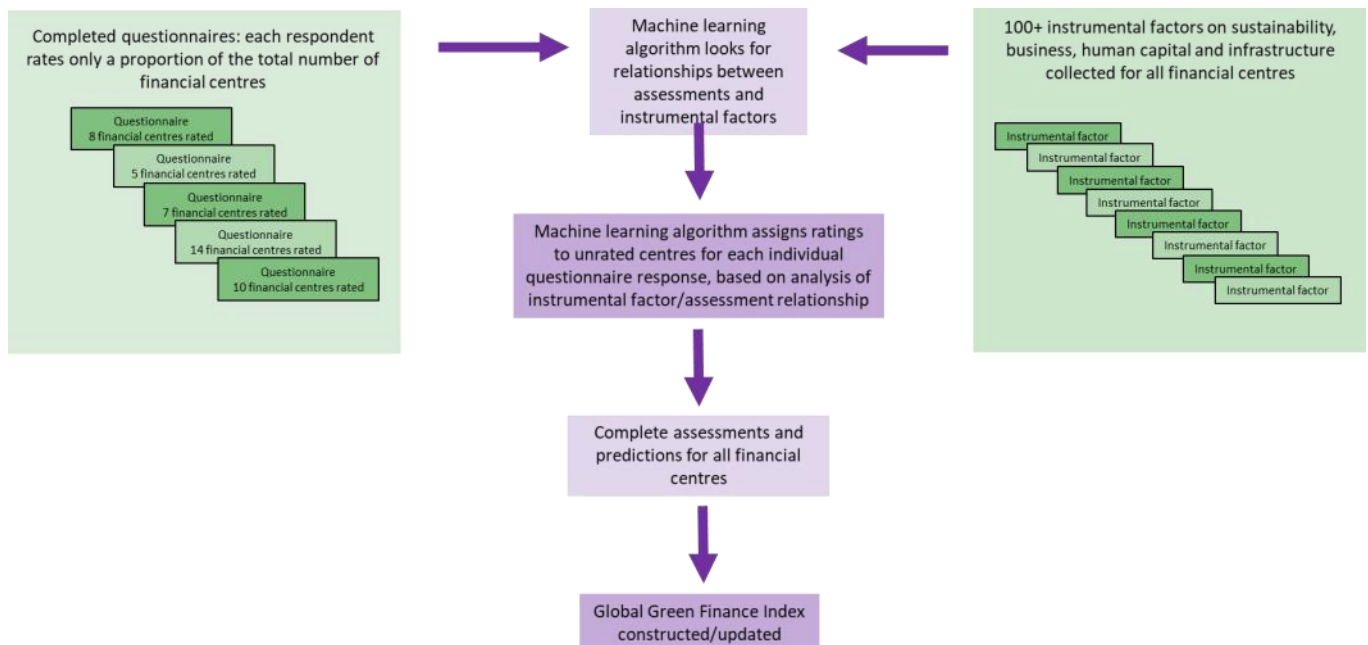
The rules on the use of instrumental factor data in the model are as follows:

- 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)

The details of the methodology can be accessed at <https://www.longfinance.net/programmes/financial-centre-futures/global-green-finance-index/ggfi-methodology/>.

The process of creating the GGFI is outlined in Chart 46.

Chart 46 | The GGFI Process



Appendix 5: Instrumental Factors

Table 29 | Sustainability Instrumental Factor Correlation With GGFI Ratings - Highest 30 Factors

Instrumental Factors	R-squared
Urban Mobility Readiness Index	0.570
IESE Cities In Motion Index	0.492
Sustainable Cities Index	0.442
Quality of Living City Rankings	0.349
Sustainable Economic Development	0.326
The Green Future Index	0.251
Energy Transition Index	0.218
Buildings Energy Efficiency Policies Database (Y/N)	0.184
Financial Centre Corporate Sustainability Performance	0.180
World Energy Trilemma Index	0.178
The Global Green Economy Index	0.177
Financial Centre Clean To Fossil-Fuel Related Revenue (Clean Revenue)	0.157
Labelled Green Bonds Issued By Country Of Issuer	0.142
Environmental Performance Index	0.140
Global Sustainable Competitiveness Index	0.135
Climate-Aligned Bonds Outstanding By Country Of Issuer	0.107
Quality of Life Index	0.103
Total Issuance Of Labelled Green Bonds To December 2018, USDm	0.095
City Commitment To Carbon Reduction (Cooperative Action)	0.092
Total Number Of Labelled Green Bonds Issued To December 2018	0.087
Proportion Of Population Using Safely-managed Drinking-water Services (%)	0.085
Financial Centres Green Alignment - Non-Regulatory Actors	0.082
Pollution Index	0.062
GRESB Green Real Estate And Infrastructure Investment Score	0.062
Share Of Wind And Solar In Electricity Production	0.059
Stock Exchanges With A Green Bond Segment (Y/N)	0.052
CO2 Emissions Per Capita	0.050
City Commitment To Carbon Reduction (Individual Action)	0.043
Financial Centre Sustainability Disclosure	0.038
Financial Centre Carbon Intensity	0.032

Table 30 | All Instrumental Factor Correlation With GGFI Ratings - Highest 30 Factors

Instrumental Factors	R-squared
The Global Financial Centres Index	0.739
Urban Mobility Readiness Index	0.570
OECD Country Risk Classification	0.537
Cost Of Living City Rankings	0.516
Global Innovation Index	0.515
Safe Cities Index	0.507
IESE Cities In Motion Index	0.492
Fintech Activity Index	0.484
Smart City Index	0.462
Adjusted Net National Income Per Capita	0.459
Quality Of Road Infrastructure	0.458
World Talent Rankings	0.449
Agility Emerging Markets Logistics Index	0.443
Sustainable Cities Index	0.442
Logistics Performance Index	0.436
JLL Real Estate Transparency Index	0.423
Best Countries For Business	0.423
Domestic Credit To Private Sector (% Of GDP)	0.418
International IP Index	0.396
Business Environment Rankings	0.389
World Competitiveness Scoreboard	0.376
Innovation Cities Global Index	0.373
Legatum Prosperity Index	0.353
Quality Of Living City Rankings	0.349
Average Wages	0.343
Government Effectiveness	0.342
Sustainable Economic Development	0.326
Quality of Domestic Transport Network	0.322
Liner Shipping Connectivity Index	0.319
Telecommunication Infrastructure Index	0.304

Table 31 | Sustainability Factors

Instrumental Factor	Source	Website	Updated
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	Y
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-greenfinance-index-3/	N
City Commitment To Carbon Reduction (Cooperative Action)	UNFCCC	https://climateaction.unfccc.int/	Y
City Commitment To Carbon Reduction (Individual Action)	UNFCCC	https://climateaction.unfccc.int/	Y
Climate Change Performance Index	Germanwatch, NewClimate Institute & Climate Action Network	https://ccpi.org/download/the-climate-change-performance-index-2021/	N
Climate-Aligned Bonds Outstanding By Country Of Issuer	CBI	https://www.finance-watch.org/publication/global-greenfinance-index-3/	N
CO2 Emissions Per Capita	World Bank	https://databank.worldbank.org/reports.aspx?source=2&series=EN.ATM.CO2E.PC&country=#	Y
Energy Intensity Of GDP	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	Y
Energy Transition Index	World Economic Forum	https://www.weforum.org/reports/1edb4488-deb4-4151-9d4f-ff355eec499a/in-full/rankings	N
Environmental Performance	Yale University	https://epi.yale.edu/epi-results/2020/component/epi	Y
Externally-Reviewed (excl CCB) Labelled Green Bonds Issued To December 2018, % Of Centre Total	CBI	https://www.finance-watch.org/publication/global-greenfinance-index-3/	N
Financial Centre Carbon Intensity	Corporate Knights	https://www.finance-watch.org/publication/global-greenfinance-index-3/	N
Financial Centre Clean To Fossil-Fuel Related Revenue (Clean Revenue)	Corporate Knights	https://www.finance-watch.org/publication/global-greenfinance-index-3/	N
Financial Centre Clean To Fossil-Fuel Related Revenue (Dirty Revenue)	Corporate Knights	https://www.finance-watch.org/publication/global-greenfinance-index-3/	N
Financial Centre Corporate Sustainability Performance	Corporate Knights	https://www.finance-watch.org/publication/global-greenfinance-index-3/	N
Financial Centre Sustainability Disclosure	Corporate Knights	https://www.finance-watch.org/publication/global-greenfinance-index-3/	N
Financial Centres Green Alignment - Non-Regulatory Actors	Corporate Knights	https://www.finance-watch.org/publication/global-greenfinance-index-3/	N
Financial Centres Green Alignment - Regulators And Stock Exchanges	Corporate Knights	https://www.finance-watch.org/publication/global-greenfinance-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	N
GRESB Green Real Estate And Infrastructure Investment Score	Corporate Knights	https://www.finance-watch.org/publication/global-greenfinance-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-greenfinance-index-3/	N
Not-Externally-Reviewed Labelled Green Bonds Issued To December 2018, % Of Centre Total	CBI	https://www.finance-watch.org/publication/global-greenfinance-index-3/	N
Pollution Index	Numbeo	https://www.numbeo.com/pollution/rankings.jsp	Y

Table 31 | (Continued) Sustainability Factors

Instrumental Factor	Source	Website	Updated
Proportion Of Population Using Safely-managed Drinking-water Services (%)	WHO	https://www.who.int/data/gho/publications/world-health-statistics	Y
Protected Land Area % Of Land Area	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=2&series=ER.LND.PTLD.ZS&country=	Y
Quality Of Life Index	Numbeo	http://www.numbeo.com/quality-of-life/rankings.jsp	Y
Quality Of Living City Rankings	Mercer	https://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-greenfinance-index-3/	N
Ratio Labelled Green Bonds To Total Debt Securities By Issuer Location	Corporate Knights	https://www.finance-watch.org/publication/global-greenfinance-index-3/	N
Share Of Renewables In Electricity Production	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	Y
Share Of Wind And Solar In Electricity Production	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	Y
Sovereign Green Bond (Y/N)	Climate Bonds	https://www.climatebonds.net/2021/11/cop26-briefing-sovereign-green-bond-issuance-takes-start-long-boom	New
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-greenfinance-index-3/	N
Sustainable Cities Index	Arcadis	https://www.arcadis.com/en/global/our-perspectives/sustainable-cities-index-2018/citizen-centric-cities/	Y
Sustainable Economic Development	Boston Consulting Group	https://www.bcg.com/en-gb/publications/2021/prioritizing-societal-well-being-seda-report	N
Sustainable Stock Exchanges (Y/N)	UN Sustainable Stock Exchange Initiative	https://sseinitiative.org/members/	N
Total Issuance Of Labelled Green Bonds To December 2018, USDm	CBI	http://www.finance-watch.org/our-work/dossiers?fid=192	N
Total Number Of Labelled Green Bonds Issued To December 2018	CBI	https://www.finance-watch.org/publication/global-greenfinance-index-3/	N
World Energy Trilemma Index	World Energy Council	https://trilemma.worldenergy.org/	N
Urban Mobility Readiness Index	Oliver Wyman	https://www.oliverwymanforum.com/mobility/urban-mobility-readiness-index/rankings.html	N
The Green Future Index	MIT Technology Review	https://www.technologyreview.com/2022/03/24/1048253/the-green-future-index-2022/	Y
The Global Green Economy Index	Dual Citizen	https://dualcitizeninc.com/global-green-economy-index/	Y

Table 32 | Human Capital Factors

Instrumental Factor	Source	Website	Updated
Average Wages	OECD	https://data.oecd.org/earnwage/average-wages.htm	Y
Adjusted Net National Income Per Capita	The World Bank	https://data.worldbank.org/indicator/NY.ADJ.NNTY.PC.CD	Y
Corruption Perception Index	Transparency International	https://www.transparency.org/en/cpi/2021/	Y
Cost Of Living City Rankings	Mercer	https://www.mercer.com/our-thinking/career/cost-of-living.html	Y
Crime Index	Numbeo	http://www.numbeo.com/crime/rankings.jsp#	Y
Educational Attainment, At Least Bachelor's Or Equivalent, Population 25+, Total (%)	The World Bank	https://data.worldbank.org/indicator/SE.TER.CUAT.BA.ZS	Y
Employees Working Very Long Hours	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	Y
English Proficiency	Education First	https://www.ef.com/wwen/epi/	New
GDP Per Person Employed (Constant 2017 PPP \$)	The World Bank	https://databank.worldbank.org/reports.aspx?source=world-development-indicators&series=SL.GDP.PCAP.EM.KD	Y
Global Cities Index	AT Kearney	https://www.kearney.com/global-cities/2021	N
Global Health Security Index	Nuclear Threat Initiative, Johns Hopkins Center for Health Security, and Economist Impact	https://www.ghsindex.org/	N

Table 32 | (Continued) Human Capital Factors

Instrumental Factor	Source	Website	Updated
Global Innovation Index	INSEAD	http://www.globalinnovationindex.org/content.aspx?page=GII-Home	N
Global Peace Index	Institute for Economics & Peace	https://www.visionofhumanity.org/maps/#/	Y
Global Skills Index	Hays	https://www.hays.com/resources/reports/global-skills-index-	N
Global Terrorism Index	Institute for Economics & Peace	https://www.visionofhumanity.org/wp-content/uploads/2022/03/GTI-2022-web-09062022.pdf	Y
Good Country Index	Good Country Party	https://www.goodcountry.org/index/results	Y
Government Effectiveness	The World Bank	http://info.worldbank.org/governance/wgi/	N
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	N
Gross Tertiary Graduation Ratio	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=Education%20Statistics&series=SE.TER.CMPL.ZS	N
Health Care Index	Numbeo	http://www.numbeo.com/health-care/rankings.jsp	Y
Henley Passport Index	Henley Partners	https://www.henleypassportindex.com/passport	Y
Homicide Rates	UN Office of Drugs & Crime	https://dataunodc.un.org/content/data/homicide/homicide-rate	N
Household Net Financial Wealth	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	Y
Human Development Index	UN Development Programme	http://hdr.undp.org/en/2020-report/download	N
Human Freedom Index	Cato Institute	https://www.cato.org/human-freedom-index	N
ICT Development Index	United Nations	http://www.itu.int/net4/ITU-D/idi/2017/index.html	N
Individual Income Tax Rates	KPMG	https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/individual-income-tax-rates-table.html	N
Innovation Cities Global Index	2ThinkNow Innovation Cities	https://www.innovation-cities.com/city-rankings-2021/	N
International IP Index	GIPC	https://www.theglobalipcenter.com/ipindex2020/	Y
Legatum Prosperity Index	Legatum Institute	http://www.prosperity.com/#!/ranking	N
Life Expectancy At Birth, Total	The World Bank	https://data.worldbank.org/indicator/SP.DYN.LE00.IN	Y
Linguistic Diversity	Ethnologue	https://www.ethnologue.com/guides/countries-most-	N
Lloyd's City Risk Index 2015-2025	Lloyd's	https://lloyds.spub7.com/locations	N
Number Of High Net Worth Individuals	Capgemini	https://www.worldwealthreport.com/	Y
Number Of International Association Meetings	World Economic Forum	http://reports.weforum.org/travel-and-tourism-competitiveness-report-2019/rankings/#series=NRFAIREX	N
OECD Country Risk Classification	OECD	http://www.oecd.org/trade/topics/export-credits/	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
Patent Applications, Residents	The World Bank	https://data.worldbank.org/indicator/IP.PAT.RES.D?end=2020&start=1980	New
People Near Services	ITDP	https://pedestriansfirst.itdp.org/	N
Personal Tax Rates	OECD	https://stats.oecd.org/index.aspx?DataSetCode=TABLE_I6	Y
Political Stability And Absence Of Violence/ Terrorism	The World Bank	http://info.worldbank.org/governance/wgi/	N
Press Freedom Index	Reporters Without Borders (RSF)	https://rsf.org/en/ranking/2021	Y
Prime International Residential Index	Knight Frank	https://www.knightfrank.com/research/report-library/the-wealth-report-2022-8858.aspx	Y
Purchasing Power Index	Numbeo	https://www.numbeo.com/quality-of-life/rankings.jsp?title=2022-mid&displayColumn=1	Y
Regulatory Quality	The World Bank	http://info.worldbank.org/governance/wgi/	N
Tax Revenue As Percentage Of GDP	The World Bank	https://databank.worldbank.org/reports.aspx?source=2&series=GC.TAX.TOTL.GD.ZS&country=#	Y
Top Tourism Destinations	Euromonitor	https://go.euromonitor.com/white-paper-travel-211202-top-100-city-destinations-index.html	N
World Talent Rankings	IMD	https://www.imd.org/centers/world-competitiveness-center/rankings/world-competitiveness/	Y

Table 33 | Business Factors

Instrumental Factor	Source	Website	Updated
Best Countries For Business	Forbes	https://www.forbes.com/best-countries-for-business/list/	N
Bilateral Tax Information Exchange Agreements	OECD	http://www.oecd.org/ctp/exchange-of-tax-information/taxinformationexchangeagreementsstieas.htm	N
Broad Stock Index Levels	The World Federation of Stock Exchanges	https://focus.world-exchanges.org/issue/december-2021/market-statistics	Y
Business Environment Rankings	EIU	http://country.eiu.com/All	Y
Capitalisation Of Stock Exchanges	The World Federation of Stock Exchanges	https://focus.world-exchanges.org/issue/december-2021/market-statistics	Y
Common Law Countries	CIA	https://www.cia.gov/the-world-factbook/countries/	N
Corporate Tax Rates	KPMG	https://home.kpmg/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html	N
Democracy Index	The Economist	https://www.eiu.com/topic/democracy-index	Y
Domestic Credit To Private Sector (% Of GDP)	The World Bank	https://data.worldbank.org/indicator/FS.AST.PRVT.GD.ZS?most_recent_value_desc=false	Y
Ease Of Doing Business Index	The World Bank	https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020	N
Economic Freedom	The Heritage Foundation	https://www.heritage.org/index/ranking	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
FATF AML Effectiveness	FATF	http://www.fatf-gafi.org/publications/mutualevaluations/documents/assessment-ratings.html	Y
FDI Inward Stock (In Million Dollars)	UNCTAD	https://unctad.org/webflyer/world-investment-report-2021	N
Financial Secrecy Index	Tax Justice Network	http://www.financialsecrecyindex.com/	Y
Fintech Activity Index	World Bank	https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099735504212234006/	New
Foreign Direct Investment Inflows	UNCTAD	http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=96740	Y
Global Business Complexity Index	TMF Group	https://www.tmf-group.com/en/news-insights/publications/2021/global-business-complexity-index/	Y
Global Connectedness Index	DHL	https://www.dhl.com/global-en/spotlight/globalization/global-connectedness-index.html	Y
Global Services Location	AT Kearney	https://www. Kearney.com/digital/article/?a/the-2021-kearney-global-services-location-index	N
Government Debt As % Of GDP	CIA	https://www.cia.gov/the-world-factbook/field/public-debt/country-comparison	N
Jurisdictions Participating In The Convention On Mutual Administrative Assistance In Tax Matters	OECD	https://www.oecd.org/ctp/exchange-of-tax-information/Status_of_convention.pdf	N
Level of Internet Freedom	Freedom House	https://freedomhouse.org/countries/freedom-net/scores	New
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	Y
Operational Risk Rating	EIU	http://www.eiu.com/site_info.asp?info_name=VW2_RISK_nib&page=rk&page_title=Risk%20table	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

Table 33 | (Continued) Business Factors

Instrumental Factor	Source	Website	Updated
Real Interest Rate	The World Bank	https://databank.worldbank.org/reports.aspx?source=world-development-indicators&series=FR.INR.RINR	Y
Safe Cities Index	Economist	https://safecities.economist.com/	N
The Global Financial Centres Index	Z/Yen	https://www.longfinance.net/programmes/financial-centre-futures/global-financial-centres-index/	Y
The Global Fintech Index	Findexable	https://findexable.com/	N
Total Net Assets Of Regulated Open-End Funds	Investment Company Institute	http://www.icifactbook.org/	Y
TRACE Bribery Risk Matrix	Trace International	https://matrixbrowser.traceinternational.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-2021/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-2020/	Y

Table 34 | Infrastructure Factors

Instrumental Factor	Source	Website	Updated
Agility Emerging Markets Logistics Index	Agility	https://www.agility.com/en/emerging-markets-logistics-index/rankings/	New
Global Competitiveness Index	World Economic Forum	http://reports.weforum.org/global-competitiveness-report-2019/competitiveness-rankings/	N
INRIX Traffic Scorecard	INRIX	http://inrix.com/scorecard/	N
JLL Real Estate Transparency Index	Jones Lang LaSalle	https://www.jll.co.uk/en/trends-and-insights/research/global-real-estate-transparency-index	Y
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
Quality Of Domestic Transport Network	World Economic Forum	http://reports.weforum.org/travel-and-tourism-competitiveness-report-2019/rankings/#series=TRSPEFFICY	N
Quality of Road Infrastructure	World Economic Forum	http://reports.weforum.org/travel-and-tourism-competitiveness-report-2019/rankings/#series=EOSQ057	N
Railways Per Land Area	CIA	https://www.cia.gov/the-world-factbook/field/railways/country-comparison	Y
Refined Oil Products Production	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	Y
Roadways Per Land Area	CIA	https://www.cia.gov/the-world-factbook/field/roadways/country-comparison	Y
Smart City Index	IMD	https://www.imd.org/smart-city-observatory/smart-city-index/	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
Smart City Index	IMD	https://www.imd.org/smart-city-observatory/smart-city-index/	Y

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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.

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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



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AIFC is an all-around financial centre located in Astana, 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.

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Since 2009 Busan Metropolitan City has been developing a financial hub specialising in maritime finance and derivatives. With its strategic location in the center of the southeast economic block of Korea and the crossroads of a global logistics route, Busan envisions growing into an international financial city in Northeast Asia. Busan Finance Center (BFC) will continue to develop and implement measures to promote Busan as the financial hub and bolster the local financial industry, while working together with various local economic players to pursue sustainable growth of the financial sector including FinTech. These efforts will enable BFC to play a leading role in taking Busan to the next level and become the international financial center and maritime capital of Northeast Asia.

BFC offers an attractive incentive package to global financial leaders and cooperation network of Busan Metropolitan City, and Busan Finance Center will support you to identify opportunities in Busan, one of the fastest developing cities in Asia.

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Established in 2001, the Financial Services Commission, Mauritius ('FSC') is the integrated regulator for the non-bank financial services sector and global business and is mandated to license, regulate, and supervise the conduct of business activities in the non-bank financial services sector and global business.

Our vision is to be an internationally recognised financial supervisor committed to the sustained development of Mauritius as a sound and competitive financial services centre.

The FSC aims to:

- promote the development, fairness, efficiency and transparency of financial institutions and capital markets;
- suppress crime and malpractices so as to provide protection to members of the public investing in non-banking financial products; and
- ensure the soundness and stability of the financial system in Mauritius.

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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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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.

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

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

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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) region, 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 2,300 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.

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Supported by the industry, the Financial Services Development Council (FSDC) is a high-level, cross-sectoral advisory body to the Hong Kong Special Administrative Region Government.

FSDC formulates proposals to promote the further development of Hong Kong's financial services industry and to map out the strategic direction for the development. As of March 2020, 110 of the 137 policy recommendations had been adopted by the Government and relevant regulators since FSDC's inception in 2013. On top of research, FSDC also carries out market promotion and human capital development functions.

Among others, FSDC focuses on topics including Mainland and international connectivity, green and sustainable finance, FinTech, as well as asset and wealth management.

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Kigali International Financial Centre, KIFC, is Rwanda's financial centre facilitating international investment and cross-border transactions in Africa. KIFC was established in 2020 and positions Rwanda as a preferred financial jurisdiction for investments into Africa by providing an attractive destination for investors, with a robust legal and regulatory framework fully compliant with international standards and competitive tax structures, including a network of double tax treaties. KIFC attracts regional and international investors such as Pan-African based investment funds, asset managers and administrators, regional holding structures, foundations, and global trading firms.

In addition, with its niche focus on Fintech, KIFC offers FinTechs a framework to pilot their business models in a controlled environment before expanding into the wider African market.

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PRODUCED BY Z/YEN GROUP



www.zyen.com

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

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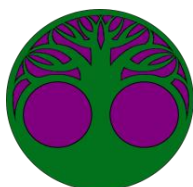


ABU DHABI
GLOBAL MARKET

www.adgm.com

Abu Dhabi Global Market is an award-winning international financial centre strategically located in the capital of the United Arab Emirates. Established by UAE Federal Decree, ADGM's jurisdiction extends across the entire 114 hectares of Al Maryah Island. ADGM's four independent authorities together ensure that its business friendly environment operates in line with international best practices, recognised by major financial centres worldwide.

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.

SUSTAINABLE FUTURES



<https://www.longfinance.net/programmes/sustainable-futures/>

The sustainable futures programme focuses on ways in which the financial system supports the transition to a sustainable economic model. Alongside the GGFI, the programme supports the [London Accord](#), a free to access collection of over 700 environmental social and governance research reports from over 120 financial services, NGO, academic and policy making institutions.

PUBLISHED BY LONG FINANCE AND FINANCIAL CENTRE FUTURES



www.longfinance.net

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



www.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.