The Global Green Finance Index 13

Zurich London Geneva New York Singapore Luxembourg Washington DC Stockholm Los Angeles Montreal

April 2024

Sustainable Futures

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, and more recently with support from Abu Dhabi Global Market. Z/Yen continues this work and is pleased to present the thirteenth edition of the Global Green Finance Index (GGFI 13).

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

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

Contents

Summary

Overview

This is the thirteenth edition of the Global Green Finance Index (GGFI 13). 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. GGFI 13 features 96 financial centres, with Lugano and Kaunas listed for the first time.

There appears to be strong confidence in the development of green finance in financial centres, with every centre's rating in the index moving up in this edition, and the average rating up 4.21% compared with GGFI 12.

The centres which perform well in the GGFI continue to be places that are committed to environmental development across the economy as well as directly in finance, and in building their skills for green finance for the future. Centres such as London, Geneva, Zurich, and New York have a commitment to providing sustainable improvement and continuing to build their green infrastructure.

Among those responding to the GGFI survey, Energy Efficient Investment, Disinvestment From Fossil Fuels, and Green Insurance are rated as the areas of green finance with most impact. Risk Management Frameworks, International Initiatives, and Renewables are listed by respondents as the major drivers of green finance.

On international initiatives, some progress was made at COP 28 in terms of commitments to the Loss And Damage Fund and new commitments to the Green Climate Fund. However, the New Collective Qualitative Goal, which will set the future requirements for adaptation finance, will be taken forward at COP 29 later in 2024.

In the supplement to this edition of the GGFI, we review the current and potential future of the hydrogen economy as an element of the transition to sustainable fuels, and in particular its use in industry and transport. Respondents to the GGFI survey predict that hydrogen is most likely to replace fossil fuels in steel production and the chemical industries.

Index Results
- London retained its first position in the index, while Geneva and Zurich overtook New York to take second and third places.
- Montreal entered the top 10 in this edition of the index, replacing Copenhagen.
- Western European centres take five of the top 10 places, with US centres taking three. Singapore is the only Asia/Pacific centre in this leading group.
- The margins separating centres at the top of the index continue to narrow in GGFI 13. Among the top 10 centres the spread of ratings is only 13 points out of 1,000, compared to 20 points in GGFI 12.
- Only nine centres fell 10 or more places in the rankings, and four rose 10 or more places.

Western Europe
- Five Western European centres feature in the top 10 in GGFI 13 and a further six centres feature in the top 20.
- Frankfurt, Malta, and Monaco gained seven or more rank places.

North America
- New York dropped to fourth place overall, with Washington DC, Los Angeles, and Montreal also in the world top 10.
- All centres in the region maintained or improved their ranking other than New York. Toronto, Vancouver, and Philadelphia gained six or more rank places.

Asia/Pacific
- Singapore rose four rank places to take fifth position overall and leads the region, ahead of Seoul, Sydney, and Shenzhen.
- Almost all centres in the region fell in the rankings, with only Singapore, Guangzhou, Manila, and Bangkok improving.
- The average increase in the ratings in Asia/Pacific was 3.39%, a full percentage point lower than the global average increase.

Middle East & Africa
- Dubai led in the region and rose four rank places to 29th position. Abu Dhabi took regional second place with Casablanca third, retaining its position as the leading GGFI centre in Africa.
- Most centres in the region fell in the rankings, although Doha and Kigali both moved up four rank places.

Latin America & The Caribbean
- Santiago retained its leading position in the Latin America & The Caribbean region, improving nine rank places to take 56th position globally.
- Sao Paulo moved up one ranking place and overtook Rio de Janeiro to take second place in the region. Bermuda rose six rank places.
- The average rating in the region increased by 5.75%.

Eastern Europe & Central Asia
- Astana has a clear lead in the Eastern Europe & Central Asia region.
- The increase in the average rating in this region was the highest of all parts of the world, at 6.04%.
- Prague, Riga, and Sofia each rose 10 rank places.

GGFI 13
GGFI 13 was compiled using 129 instrumental factors. These quantitative measures are provided by third parties including the World Bank, the OECD, and the United Nations. Details can be found in Appendix 5.

The instrumental factors were combined with 5,350 financial centre assessments provided by respondents to the GGFI online questionnaire. A breakdown of the 890 respondents is shown in Appendix 3. Further details of the methodology behind GGFI 13 are in Appendix 4.

The 96 centres listed in GGFI 13 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 13 Ranks And Ratings

Table 1 | GGFI 13 Ranks And Ratings

Centre	GGFI 13		GGFI 12		Change In	Change In
	Rank	**Rating**	**Rank**	**Rating**	**Rank**	**Rating**
London	1	648	1	631	0	▲17
Geneva	2	646	3	623	▲1	▲23
Zurich	3	644	4	618	▲1	▲26
New York	4	642	2	624	▼2	▲18
Singapore	5	641	9	612	▲4	▲29
Luxembourg	6	640	5	616	▼1	▲24
Washington DC	7	639	7	614	0	▲25
Los Angeles	8	637	8	613	0	▲24
Stockholm	9	636	6	615	▼3	▲21
Montreal	10	635	12	609	▲2	▲26
Chicago	11	634	15	606	▲4	▲28
San Francisco	12	631	13	608	▲1	▲23
Copenhagen	13	630	10	611	▼3	▲19
Oslo	14	629	17	604	▲3	▲25
Amsterdam	15	628	11	610	▼4	▲18
Toronto	16	627	22	599	▲6	▲28
Paris	17	626	23	598	▲6	▲28
Lugano	18	625	New	New	New	New
San Diego	19	624	21	600	▲2	▲24
Frankfurt	20	623	29	592	▲9	▲31
Vancouver	21	622	30	591	▲9	▲31
Seoul	22	621	18	603	▼4	▲18
Sydney	23	620	14	607	▼9	▲13
Edinburgh	24	619	19	602	▼5	▲17
Shenzhen	25	618	24	597	▼1	▲21
Boston	26	617	26	595	0	▲22
Madrid	27	616	25	596	▼2	▲20
Shanghai	28	615	20	601	▼8	▲14
Dubai	29	614	33	588	▲4	▲26
Busan	30	613	28	593	▼2	▲20
Beijing	31	612	27	594	▼4	▲18
Melbourne	32	611	16	605	▼16	▲6
Munich	33	610	32	589	▼1	▲21
Hamburg	34	609	38	583	▲4	▲26
Wellington	35	608	31	590	▼4	▲18
Brussels	36	607	39	582	▲3	▲25
Hong Kong	37	606	36	585	▼1	▲21
Abu Dhabi	38	605	35	586	▼3	▲19
Qingdao	39	604	37	584	▼2	▲20
Vienna	40	603	43	578	▲3	▲25
Tokyo	41	602	34	587	▼7	▲15
Berlin	42	601	47	574	▲5	▲27
Casablanca	43	600	40	581	▼3	▲19
Glasgow	44	599	46	575	▲2	▲24
Milan	45	598	49	572	▲4	▲26
Osaka	46	597	41	580	▼5	▲17
Atlanta	47	596	50	571	▲3	▲25
Calgary	48	595	52	569	▲4	▲26

Table 1 (continued) | GGFI 13 Ranks And Ratings

Centre	GGFI 13		GGFI 12		Change In	Change In
	Rank	Rating	Rank	Rating	Rank	Rating
Philadelphia	49	594	59	562	▲10	▲32
Guangzhou	50	593	55	566	▲5	▲27
Lisbon	51	592	51	570	0	▲22
Tel Aviv	52	591	42	579	▼10	▲12
Dublin	53	590	48	573	▼5	▲17
Rome	54	589	56	565	▲2	▲24
Helsinki	55	588	45	576	▼10	▲12
Santiago	56	587	65	551	▲9	▲36
Astana	57	586	53	568	▼4	▲18
Jersey	58	585	44	577	▼14	▲8
Miami	59	584	60	561	▲1	▲23
Doha	60	583	64	552	▲4	▲31
Isle of Man	61	582	57	564	▼4	▲18
Guernsey	62	581	58	563	▼4	▲18
Kuala Lumpur	63	580	62	558	▼1	▲22
Kaunas	64	578	New	New	New	New
Jakarta	65	577	61	560	▼4	▲17
GIFT City-Gujarat	66	576	54	567	▼12	▲9
Johannesburg	67	575	63	553	▼4	▲22
Sao Paulo	68	574	69	542	▲1	▲32
Manila	69	573	74	536	▲5	▲37
Prague	70	572	80	528	▲10	▲44
Riga	71	571	81	527	▲10	▲44
Bangkok	72	570	73	537	▲1	▲33
Rio de Janeiro	73	569	66	550	▼7	▲19
Malta	74	568	82	526	▲8	▲42
New Delhi	75	567	70	540	▼5	▲27
Monaco	76	566	83	523	▲7	▲43
Mexico City	77	565	71	539	▼6	▲26
Mauritius	78	561	68	543	▼10	▲18
Liechtenstein	79	560	79	529	0	▲31
Cape Town	80	559	67	544	▼13	▲15
Kigali	81	558	85	516	▲4	▲42
Sofia	82	556	92	505	▲10	▲51
Riyadh	83	554	76	532	▼7	▲22
Warsaw	84	550	77	531	▼7	▲19
Istanbul	85	549	75	533	▼10	▲16
Cyprus	86	548	78	530	▼8	▲18
Mumbai	87	547	72	538	▼15	▲9
Bermuda	88	543	94	499	▲6	▲44
Moscow	89	542	87	514	▼2	▲28
Almaty	90	541	90	511	0	▲30
British Virgin Islands	91	540	91	509	0	▲31
Cayman Islands	92	537	86	515	▼6	▲22
Lagos	93	536	84	520	▼9	▲16
Bahamas	94	535	93	503	▼1	▲32
Bahrain	95	534	88	513	▼7	▲21
Nairobi	96	531	89	512	▼7	▲19

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. 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. This 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 13 Rank | Centre | GGFI Dimensions | | | |
| | | Green Finance Depth | | Green Finance Quality | |
		Rank	Rating	Rank	Rating
1	London	1	319	1	329
2	Geneva	2	318	2	328
3	Zurich	3	317	3	327
4	New York	3	317	4	325
5	Singapore	5	316	4	325
6	Luxembourg	10	315	4	325
7	Washington DC	5	316	7	323
8	Los Angeles	5	316	9	321
9	Stockholm	10	315	9	321
10	Montreal	5	316	12	319
11	Chicago	14	312	8	322
12	San Francisco	13	313	13	318
13	Copenhagen	17	310	11	320
14	Oslo	5	316	19	313
15	Amsterdam	17	310	13	318

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 Bahrain, Riyadh, and Casablanca for green finance quality are high compared with their scores in depth. On the other side of the line, Shenzhen, Jersey, Guernsey, and the Isle of Man have high relative scores for depth.

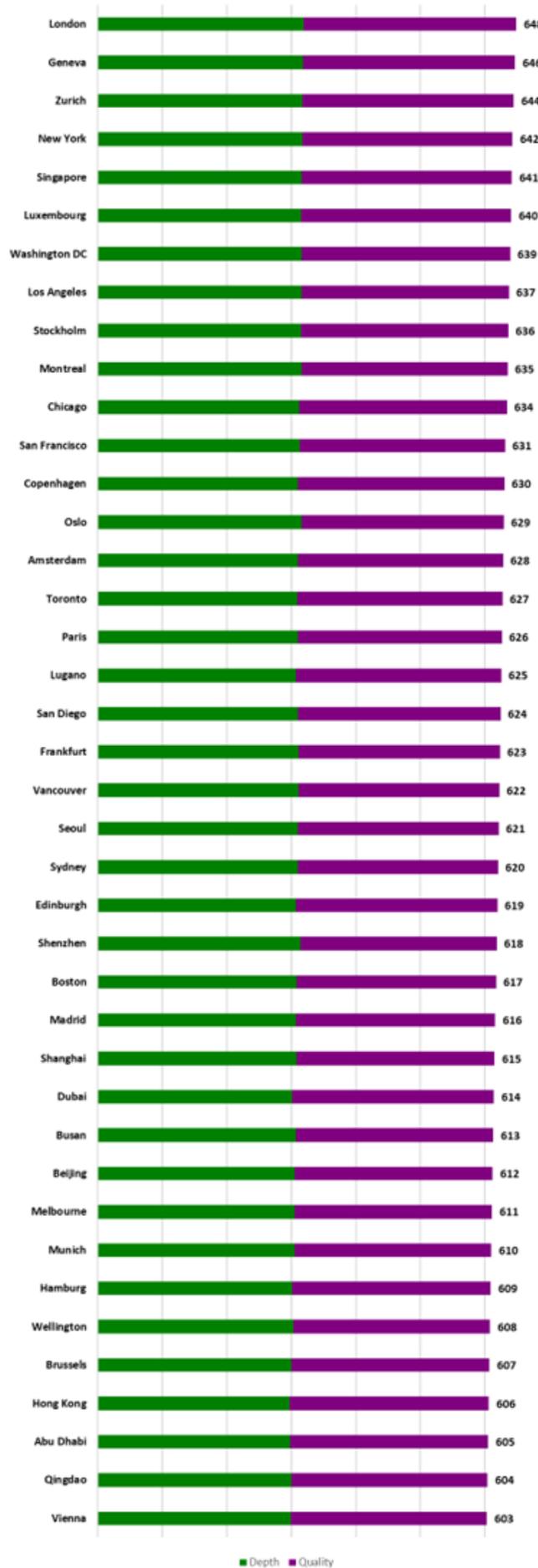**Chart 1 | Relationship Between Ratings Of Depth And Quality**
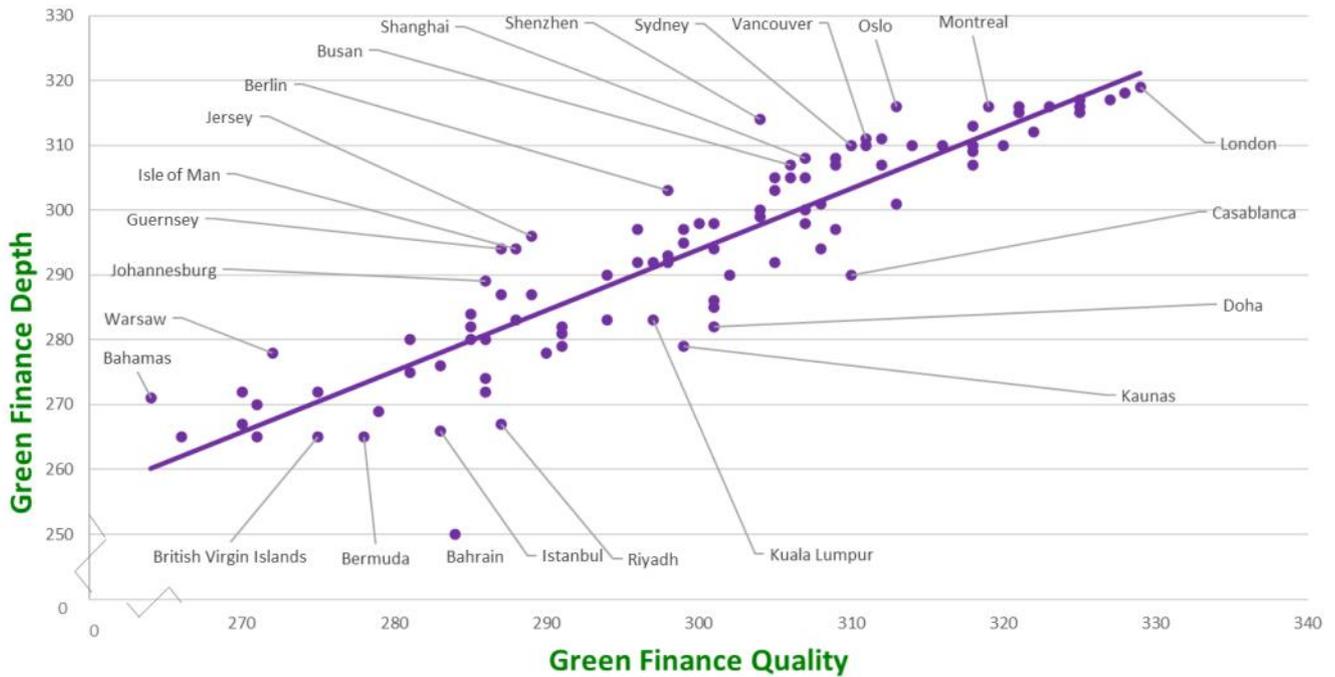
Chart 2 shows the contribution of each of the dimensions to the overall rating for the top 40 centres in the GGFI. London came first for both green finance quality and green finance depth but scores higher for quality. Successful financial centres focused on green finance have both good quality products and services in their green markets, and depth of investment.

> *"Public policy (or lack of) is a key driver on the development and availability in green finance in countries/financial centres. This includes longer-term certainty on public policy and consistent, robust application of public policy."*
>
> **HEAD OF STRATEGIC INITIATIVES & FINANCIAL CRIME, INVESTMENT FIRM, EDINBURGH**

Chart 2 | The Contribution Of The Dimensions To The Overall Rating - GGFI 13 Top 40 Centres

Centre	Rating
London	648
Geneva	646
Zurich	644
New York	642
Singapore	641
Luxembourg	640
Washington DC	639
Los Angeles	637
Stockholm	636
Montreal	635
Chicago	634
San Francisco	631
Copenhagen	630
Oslo	629
Amsterdam	628
Toronto	627
Paris	626
Lugano	625
San Diego	624
Frankfurt	623
Vancouver	622
Seoul	621
Sydney	620
Edinburgh	619
Shenzhen	618
Boston	617
Madrid	616
Shanghai	615
Dubai	614
Busan	613
Beijing	612
Melbourne	611
Munich	610
Hamburg	609
Wellington	608
Brussels	607
Hong Kong	606
Abu Dhabi	605
Qingdao	604
Vienna	603

Depth ■ Quality

Regional Performance

The average rating of the top five centres in all regions rose, with Western Europe just ahead of North America on this measure. The leading Eastern European & Central Asia centres overtook the leading Latin America & The Caribbean centres on this measure.

Chart 3 | **Average Ratings Of The Top Five Centres In Each Region**
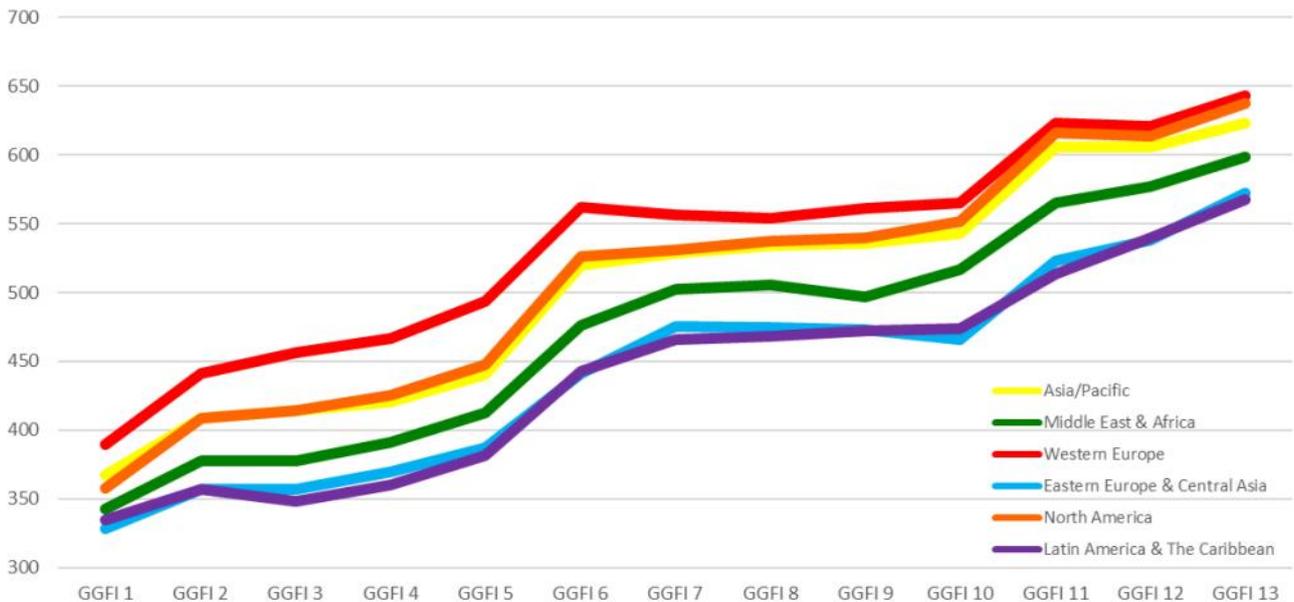
> *"Green elements should be added to all professional qualifications, e.g., as part of CFA, rather than as an optional standalone certificate and into actuarial specialist topics."*

ACTUARY, PROFESSIONAL SERVICES FIRM, EDINBURGH

Examination of the quality and depth dimensions demonstrates that on both measures, the average rating for the top five centres in all regions rose. In the depth scores, the leading centres in Latin America & The Caribbean narrowly retain their lead over the leading Eastern European & central Asia centres.

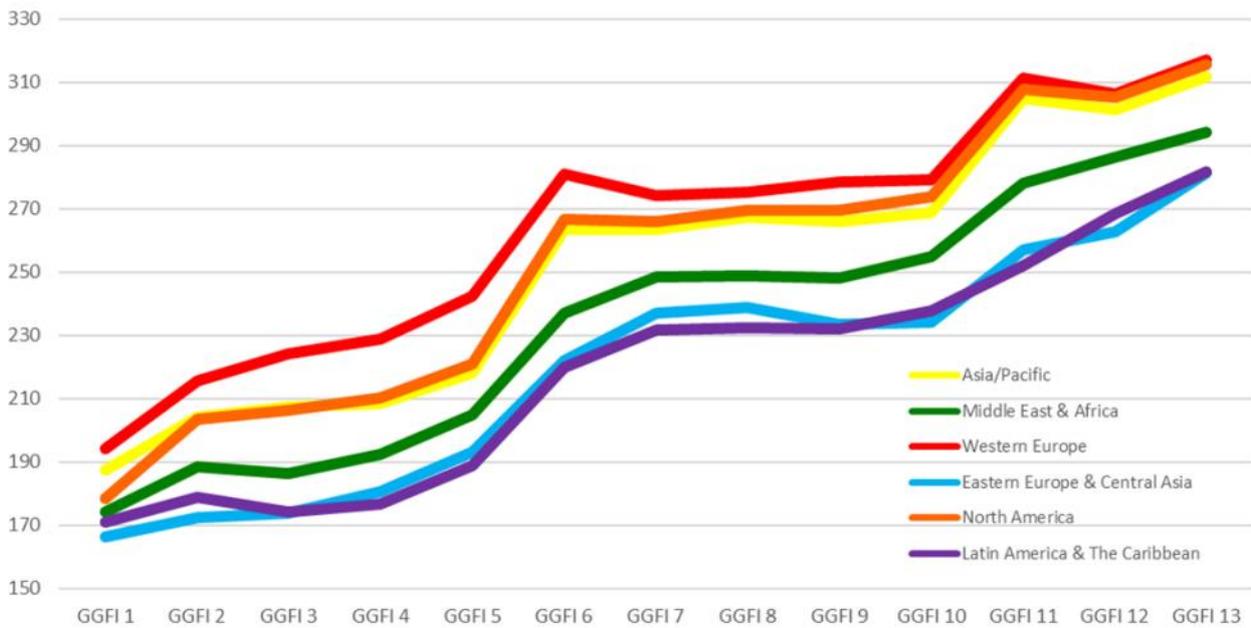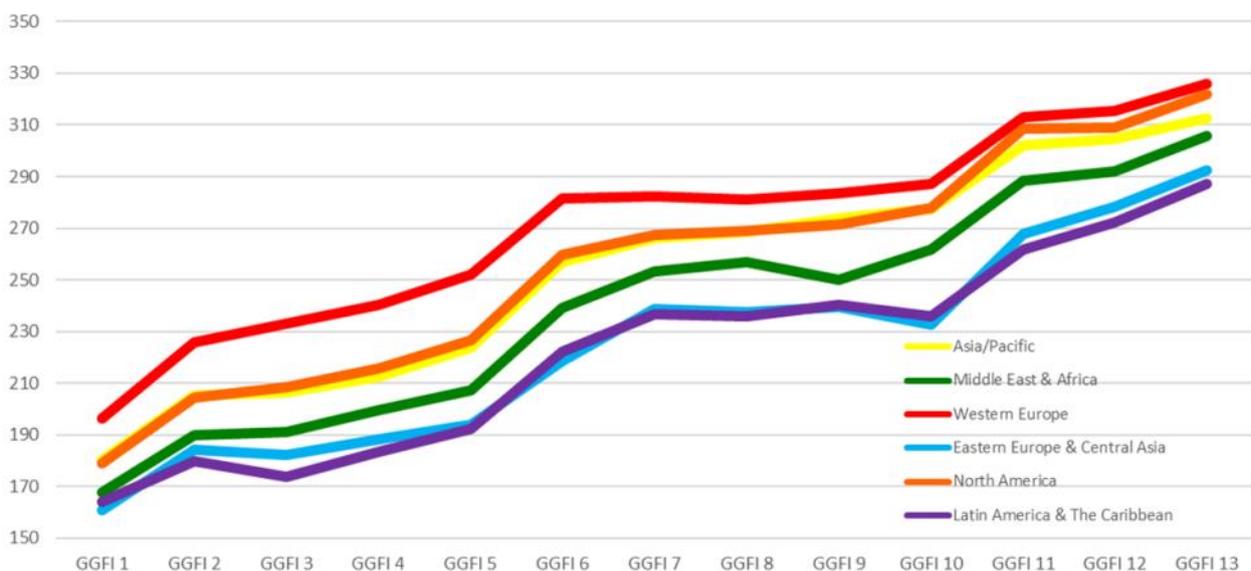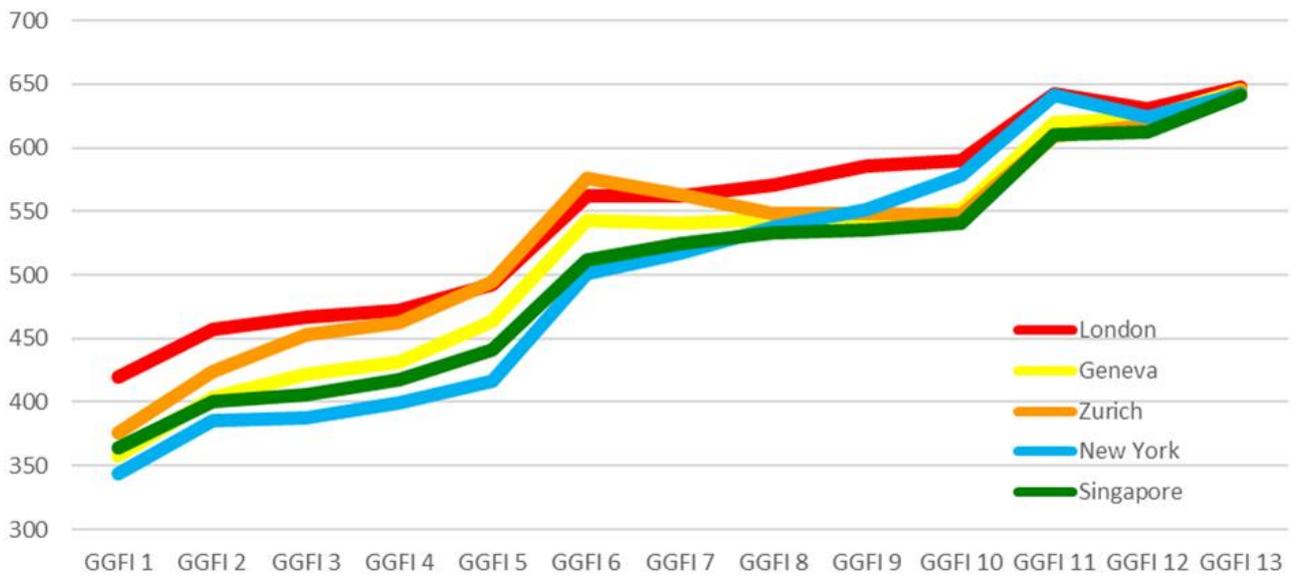**Chart 4 | Average Ratings For Depth Of The Top Five Centres In Each Region**

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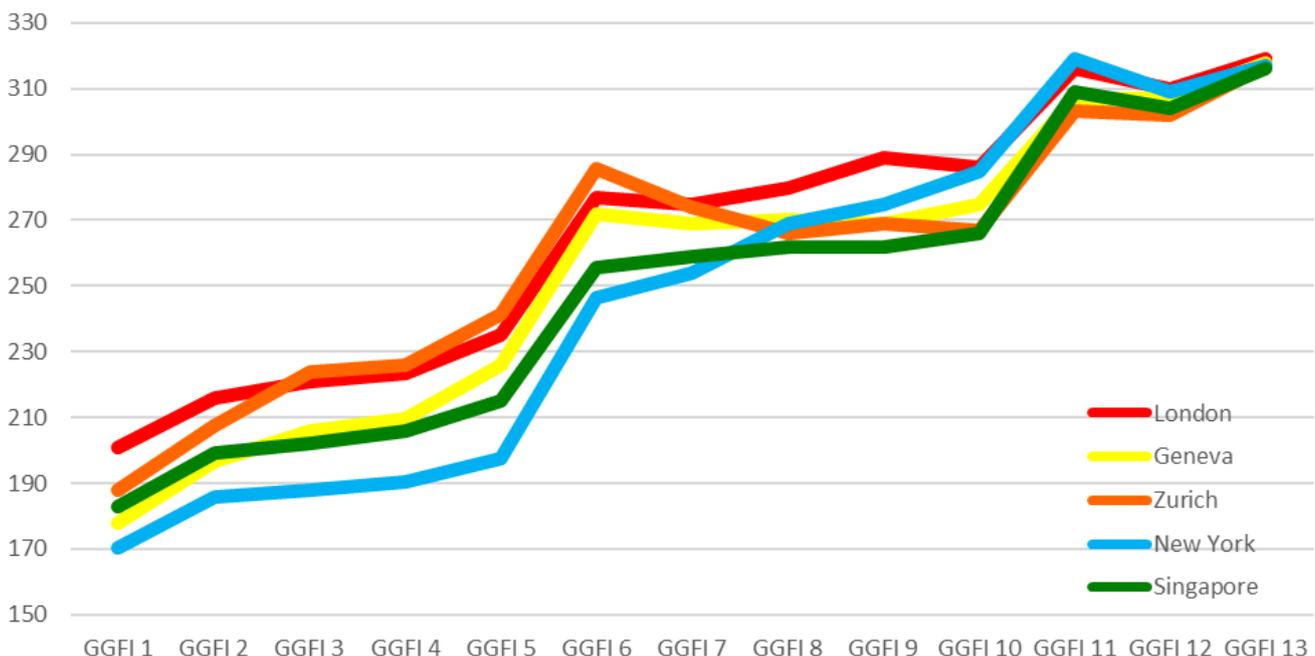
Top Five Centres

The narrowing of the ratings at the top of the index continued. Only seven points now separate London in first position from Singapore in fifth.

**Chart 6 | The Top Five Centres Over Time**

When the depth dimension is examined, London retained its first place on this measure ahead of New York. Again, the leading centres are very closely matched.

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

On the quality measure, Geneva and Zurich came second and third, with New York in fourth position. Only four points separate the top five centres on this measure.

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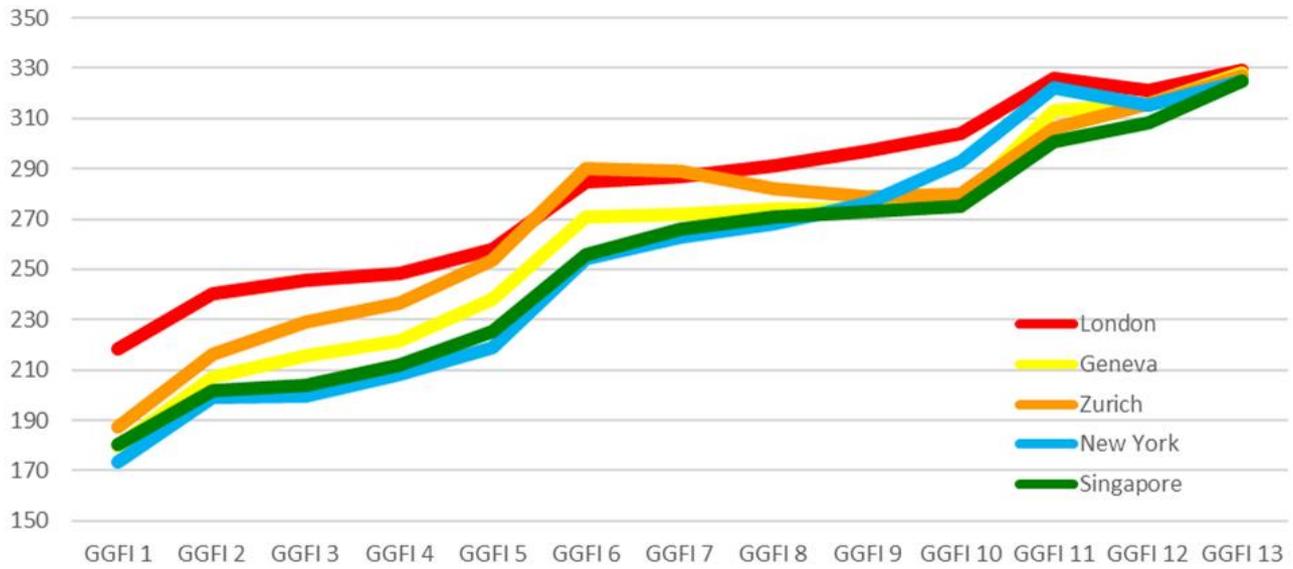
Leading Financial Centres

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, Geneva, New York, Singapore, 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 13	Green Finance Depth	Green Finance Quality	Financial Centre Competitiveness
New York	4	3	4	1
London	1	1	1	2
Singapore	5	5	4	3
Hong Kong	37	43	27	4
San Francisco	12	13	13	5
Shanghai	28	24	32	6
Geneva	2	2	2	7
Los Angeles	8	5	9	8
Chicago	11	14	8	9
Seoul	22	17	23	10
Shenzhen	25	12	41	11
Washington DC	7	5	7	12
Frankfurt	20	15	21	13
Paris	17	17	17	14
Beijing	31	30	32	15
Zurich	3	3	3	16
Luxembourg	6	10	4	17
Sydney	23	17	25	18
Tokyo	41	48	30	19
Dubai	29	35	19	20
Source	**GGFI 13 Rank**	**GGFI 13 Depth Rank**	**GGFI 13 Quality Rank**	**GFCI 35 Rank**

"Taxation is not used efficiently as a tool to penalise international trade for goods and services that do not satisfy certain sustainability criteria."

DIRECTOR, LOCAL GREEN INITIATIVE, ZURICH

GGFI 13 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 New York.

Chart 9 | Top 10 Centres - Expected Change In Green Finance Offering
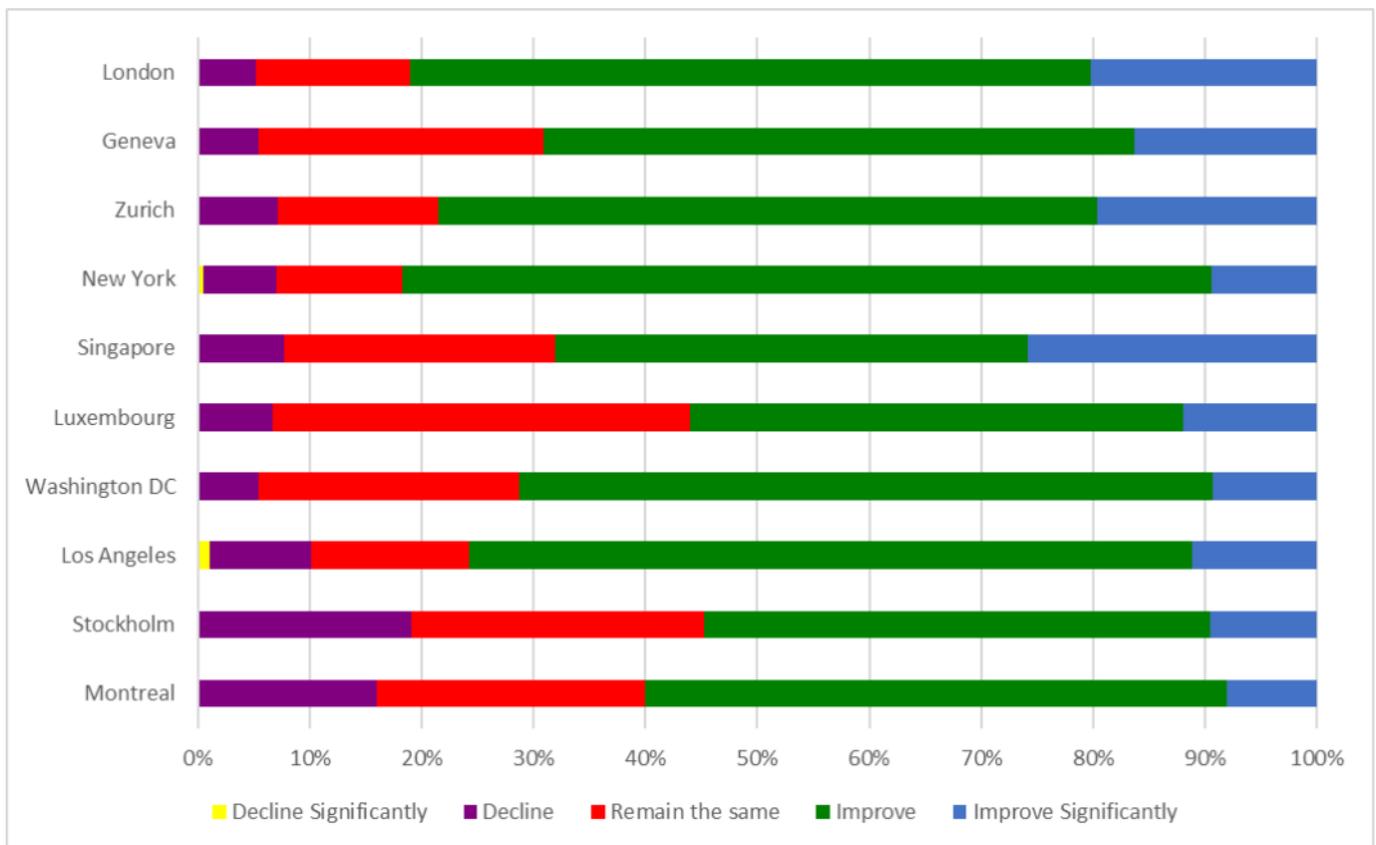
> *"Regulation is of great importance to provide a framework for green finance - more than voluntary disclosures there must be a regulatory requirement."*
>
> **COMPLIANCE OFFICER, PUBLIC POLICY FIRM, MAURITIUS**

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 129 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 Safe Cities Index, Global Innovation Index, and the Urban Mobility Readiness Index.

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

Instrumental Factor	R-Squared
The Global Financial Centres Index	0.731
Safe Cities Index	0.650
Global Innovation Index	0.645
Urban Mobility Readiness Index	0.644
Sustainable Cities Index	0.589
IESE Cities In Motion Index	0.586
Travel & Tourism Development Index	0.576
Quality Of Living City Rankings	0.544
International IP Index	0.543
Logistics Performance Index	0.541
Legatum Prosperity Index	0.538
Corruption Perception Index	0.528
Adjusted Net National Income Per Capita	0.522
JLL Real Estate Transparency Index	0.517
Government Effectiveness	0.495

"Young professionals should be encouraged to study the mechanism of green finance as in the long run it would be beneficial."

CORPORATE ADMINISTRATOR—ACTIVITY LICENCES, PROFESSIONAL SERVICE PROVIDER, LUXEMBOURG

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	0.644
Sustainable Cities Index	0.589
IESE Cities In Motion Index	0.586
Quality Of Living City Rankings	0.544
Energy Transition Index	0.491
Sustainable Economic Development	0.478
World Energy Trilemma Index	0.399
The Green Future Index	0.369
Global Sustainable Competitiveness Index	0.325
The Global Green Economy Index	0.301
Environmental Performance	0.229
Quality Of Life Index	0.204
Buildings Energy Efficiency Policies Database (Y/N)	0.194
Pollution Index	0.184
Proportion Of Population Using Safely-Managed Drinking-Water Services (%)	0.181

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
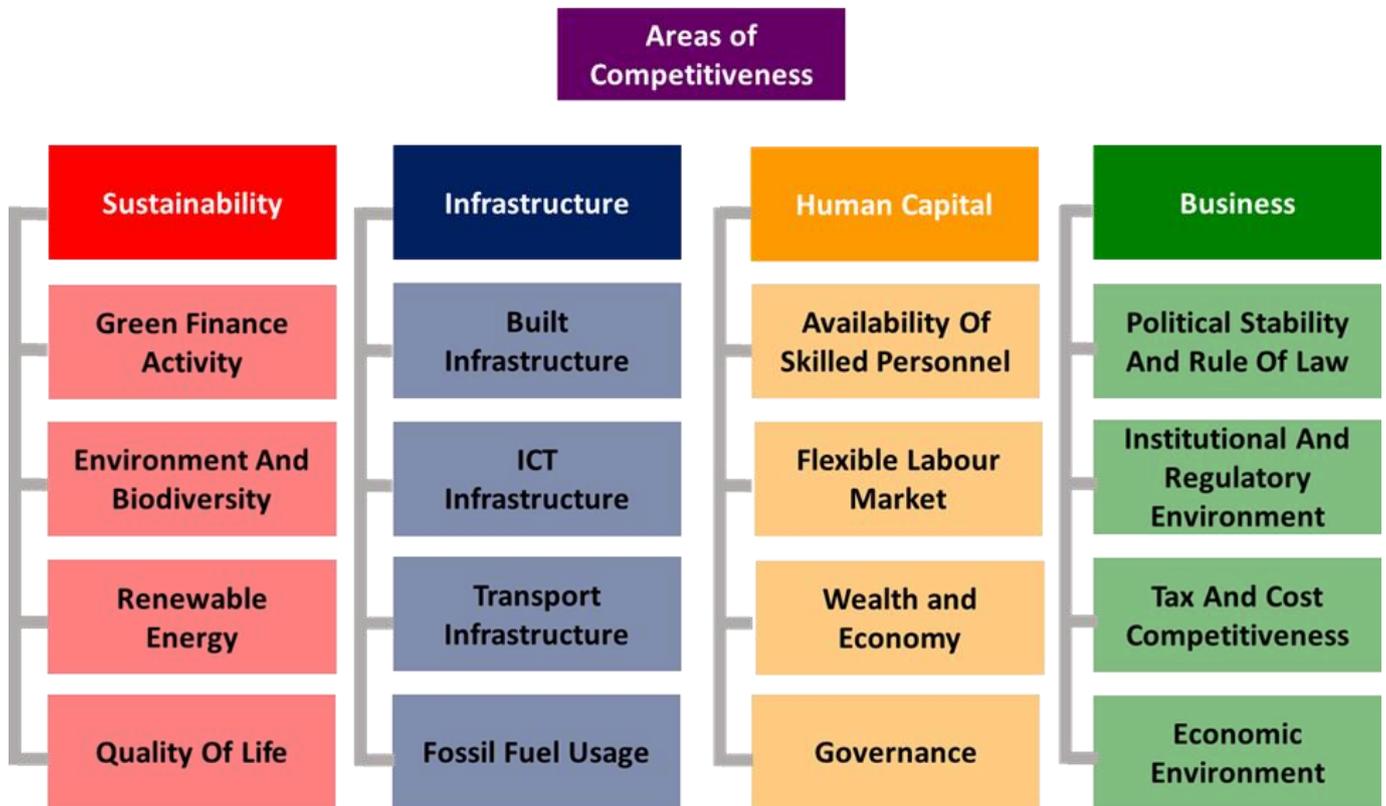
To assess how financial centres' green finance offerings perform against each of these areas, the GGFI statistical model is run for each area of competitiveness separately, allowing a picture to be built of centres' strengths and weaknesses. The performance of the top ranked 15 centres in each of these 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, Luxembourg in Human Capital or Singapore in the sustainability measures.

Table 6 | Top 15 Centres By Area Of Competitiveness

Rank	Sustainability	Business	Human Capital	Infrastructure
1	London	London	Luxembourg	New York
2	Singapore	Luxembourg	London	London
3	New York	Zurich	Zurich	Zurich
4	Geneva	New York	Geneva	Geneva
5	Luxembourg	Geneva	Oslo	Stockholm
6	Montreal	Washington DC	Montreal	Washington DC
7	Zurich	Singapore	New York	San Francisco
8	Washington DC	Stockholm	Stockholm	Singapore
9	San Francisco	Los Angeles	Singapore	Oslo
10	Amsterdam	Oslo	Washington DC	Los Angeles
11	Paris	Copenhagen	Amsterdam	Luxembourg
12	Los Angeles	Chicago	Copenhagen	Amsterdam
13	Oslo	Amsterdam	Chicago	Paris
14	Chicago	Paris	Toronto	Copenhagen
15	Frankfurt	Toronto	Paris	Montreal

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 retains its position. Singapore, Montreal, Amsterdam, Paris, and Frankfurt gain significantly, while Stockholm and Copenhagen 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	Geneva	Singapore (+3)
3	Zurich	New York (+1)
4	New York	Geneva (-2)
5	Singapore	Luxembourg (+1)
6	Luxembourg	Montreal (+4)
7	Washington DC	Zurich (-4)
8	Los Angeles	Washington DC (-1)
9	Stockholm	San Francisco (+3)
10	Montreal	Amsterdam (+5)
11	Chicago	Paris (+6)
12	San Francisco	Los Angeles (-4)
13	Copenhagen	Oslo (+1)
14	Oslo	Chicago (-3)
15	Amsterdam	Frankfurt (+5)

"Emissions and emitters need to be taxed, starting low but with a gradually increasing tax rate."

SCIENTIST, LOCAL GREEN INITIATIVE, LONDON

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	96	• The development of green finance and taxonomies, backed by mandatory regulations driving their use is vital. • Consistency in international standards becoming increasingly important.
The Availability Of Skills In Green Finance	86	• Professional bodies are important in the skills agenda, with both initial and continuing professional education needing to include green finance and sustainability. • There is a continuing shortage of people with appropriate skills and knowledge, with young professionals taking the lead.
Taxation	84	• Carbon taxes are a way to ensure that carbon is priced, although others recommend market solutions through emissions trading schemes. • The Inflation Reduction Act in the US has shown that tax incentives can unlock green investment.
Other	24	• There needs to be a continued and increasing focus on adaptation finance. • Emerging markets are beginning to catch up with the introduction of environmental regulations that are driving action.

We also asked respondents to identify interesting initiatives in green finance. These included:
• Biogas.
• Sustainability-Linked Bonds, e.g., Shiseido.
• Carbon credit exchange platform.
• Active and direct engagement with high level of transparency on reached (or not) outcomes.
• Satellite and remote sensing data for measuring environmental outcomes.
• First Article 6 carbon credit auction - start of the ITMO market.
• Green and sustainable finance taxonomies.
• Green insurance/parametric insurance.
• Blended finance structures that allow a small pot of government concessional capital to act as a catalyst, allowing private capital to enter sectors or regions they might typically perceive as too risky or not offering sufficient returns.
• Utilisation Linked Finance (ULF) is an innovative financial solution that can de-risk investment in charging infrastructure in these identified areas, either through a loan or through asset finance.

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 Shanghai and Kuala Lumpur as examples to contrast the different levels of connectivity that the two centres enjoy. In this example, while both cities are well-connected, Shanghai has a wider spread of connections across all regions of the world than Kuala Lumpur.

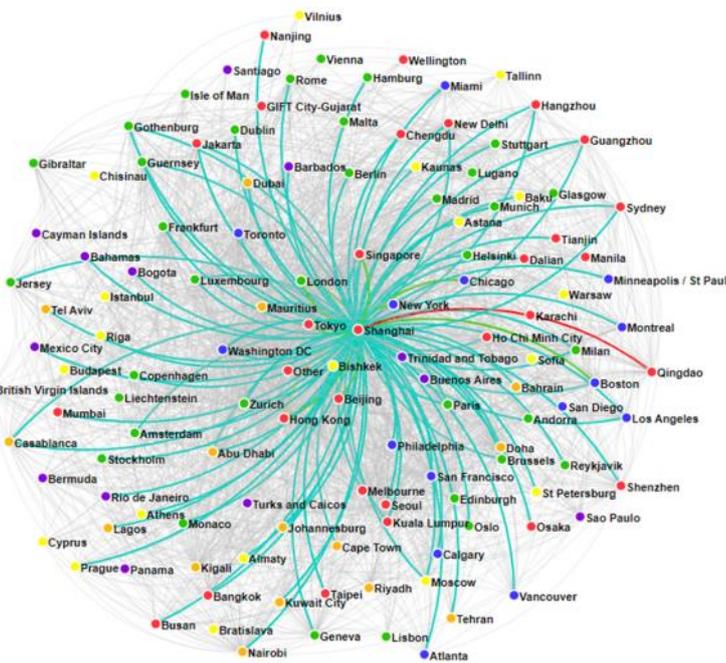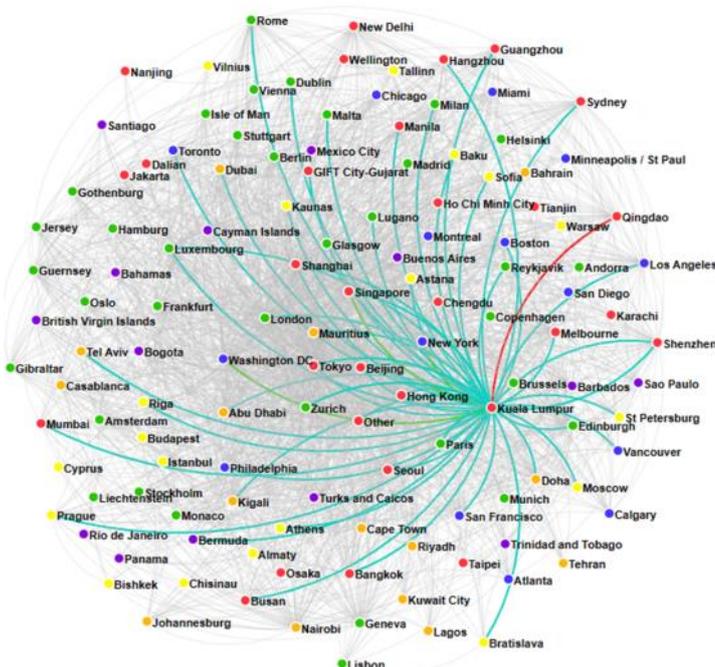**Chart 11 | GGFI 13 Connectivity - Shanghai**

Chart 12 | GGFI 13 Connectivity - Kuala Lumpur

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 96 centres in GGFI 13 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.
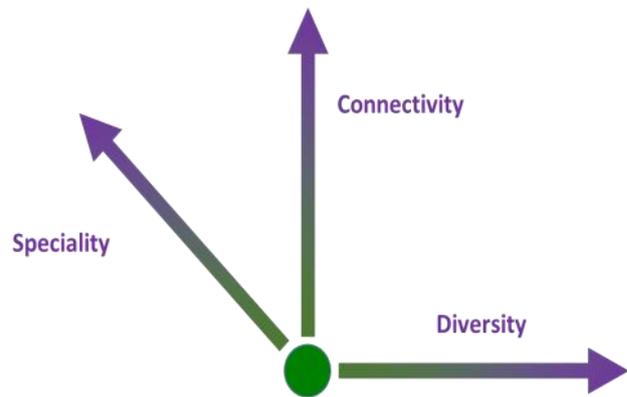
Table 9 | Financial Centre Profiling

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

* An asterisk denotes a change since GGFI 12

The GGFI 13 World - Centres In The Index

For Europe, See Detailed Map Below
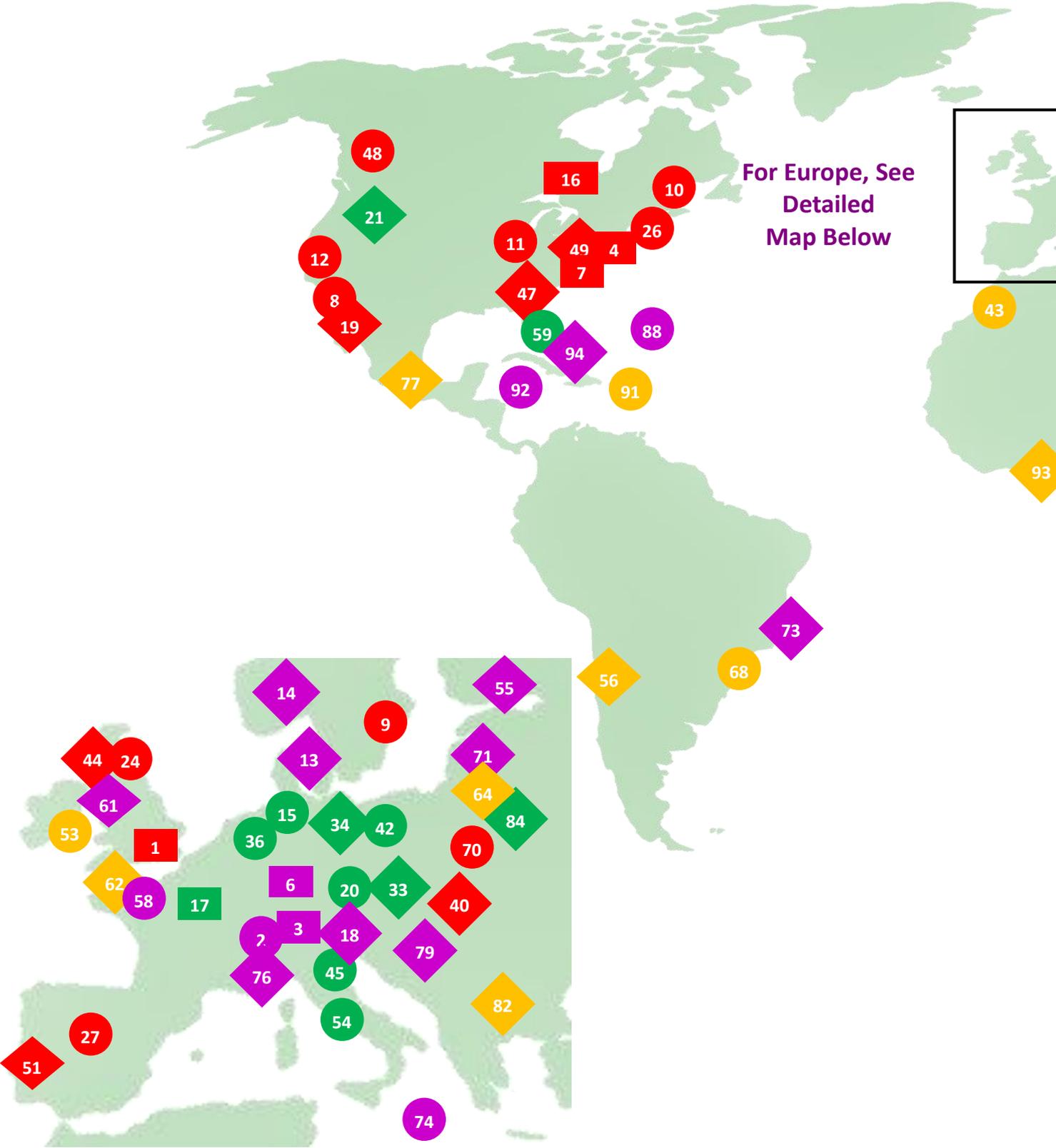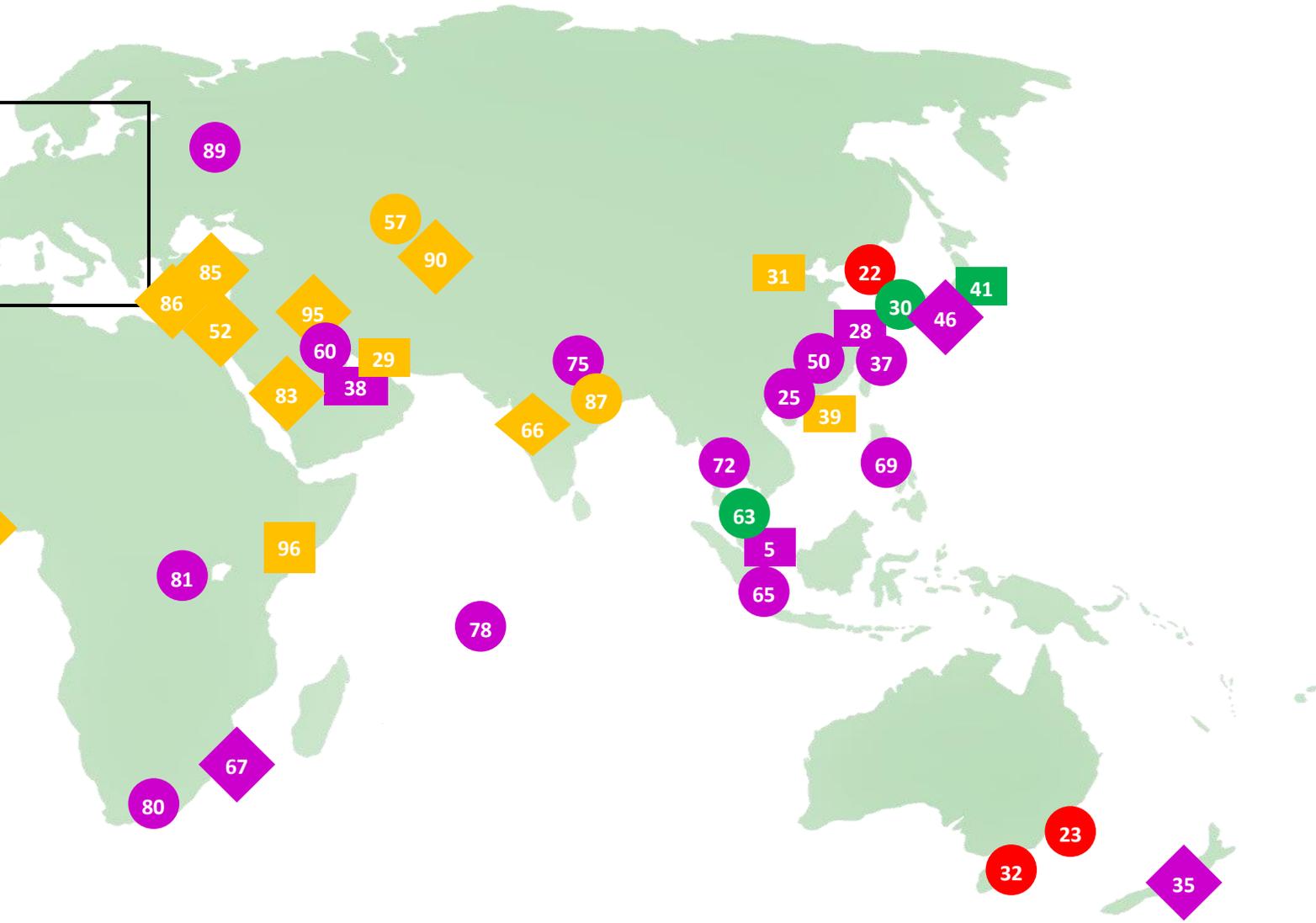
The numbers on the map indicate the GGFI 13 rankings.

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

H2 Go - The Hydrogen Economy, Pipedream Or Panacea?

Introduction

As concern regarding a rapidly changing climate mounts, momentum has been growing to explore whether hydrogen can provide a solution to many of the challenges we face in decarbonising the economy.

Hydrogen has had a long history of use in human activity from powering the first internal combustion engines over 200 years ago[1], to providing the source of the fertilizers that sustain our current population levels. Hydrogen is energy-dense, and its use produces no direct emissions other than water. But for hydrogen to make a significant meaningful contribution to the net zero transition, its use needs to be adopted in sectors where, until now, it has been absent.

This short report provides an overview of the state of play in the hydrogen economy and examines some of the major barriers and opportunities it faces.

Hydrogen

Hydrogen, with an atomic number of 1 is the lightest and most abundant element in the universe. As the basic fuel source of stars, it comprises around 75% of all matter by mass[2]. At room temperature hydrogen is a colourless, odourless gas, and although the means of its artificial production (through the reaction of metals with acids) were discovered by Paracelsus in the 1500's[3], it was only identified as a distinct element by Henry Cavendish in the 18th century, who described its property of producing water when burned (hence its Greek etymology "water maker").

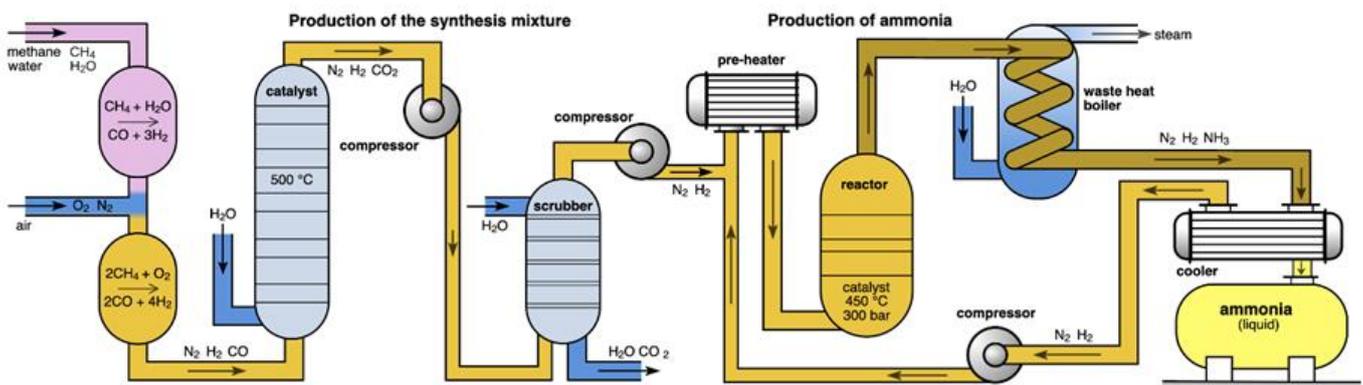**Figure 1 | Henry Cavendish With A Quantum Microscope Image Of A Hydrogen Atom[4]**

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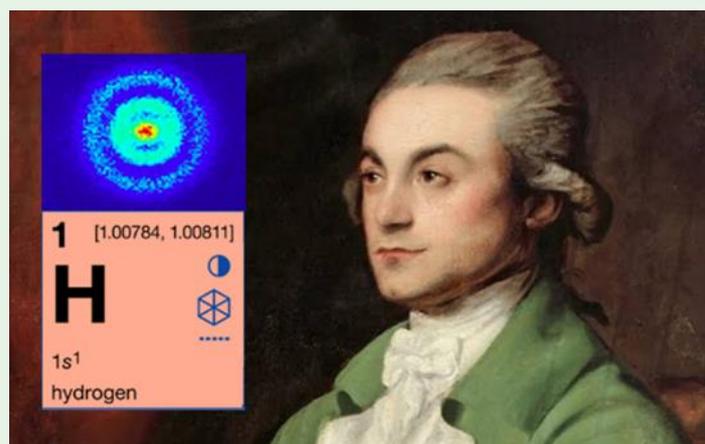
1.   The first internal combustion engine was invented by Swiss engineer Francois Isaac de Rivaz in 1806 and was powered by a mix of hydrogen and oxygen.
2.   Harvard & Smithsonian Centre For Astrophysics (accessed 25.03.24) **Before the Dark Ages** https://www.cfa.harvard.edu/news/dark-ages
3.   Royal Society of Chemistry (accessed 25.03.24) **Periodic Table - Hydrogen** https://www.rsc.org/periodic-table/element/1/hydrogen
4.   Stodolna A. S. et al **Hydrogen Atoms under Magnification: Direct Observation of the Nodal Structure of Stark States**, Phys. Rev. Lett. 110, 213001 – Published 20 May 2013

Uses

Hydrogen has a long history of being utilized in a wide variety of industries, and most hydrogen today is used in fields such as oil refining, methanol production, and ammonia production.

It is worth lingering on the last of these for a moment, as the Haber-Bosch process for ammonia production is credited with averting mass starvation[5] and fuelling the population boom of the 20th century (as well as earning Fritz Haber and Carl Bosch two Nobel prizes). It is estimated that nearly 50% of the nitrogen found in human tissues originates from the Haber-Bosch Process[6].

Figure 2 | The Haber-Bosch Process

More recently, hydrogen has attracted attention as a potential energy storage mechanism for use in transport and as a stepping stone in the transition to net-zero.

The Hydrogen Economy

The hydrogen economy is catch-all term used to refer to an energy delivery infrastructure based on hydrogen as a carbon-free energy carrier. In other words, using hydrogen to replace fossil fuels, particularly for use in transport and heavy industry.

There are three areas where hydrogen could play a role in the transition to net zero.
- The use of hydrogen as a replacement for fossil fuels in domestic heating and cooking (see figure 3).
- The use of hydrogen as a replacement for coal or natural gas in high temperature industrial processes such as steel making.
- The use of hydrogen as a replacement for fossil fuels in transport.

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5. Quraishi M (2020) **The Haber Process: A Simple Discovery that Changed the World** The Oxford Scientist https://oxsci.org/the-haber-process-a-simple-discovery-that-changed-the-world/
6. Solomon C et al 2004 **Role of urea in microbial metabolism in aquatic systems: a biochemical and molecular review** AME Vol. 59, No. 1. https://www.int-res.com/abstracts/ame/v59/n1/p67-88/

Domestic Use

With respect to using hydrogen to replace natural gas in a domestic context, whilst this appears at first glance to be an attractive proposition (indeed in the UK, the Department for Energy and Net Zero in collaboration with OFGEM initiated a trial with gas distribution network companies[7] since discontinued), practical considerations have prevented progress.

Figure 3 | Residential Energy Consumption By Fuel Source In Selected Countries
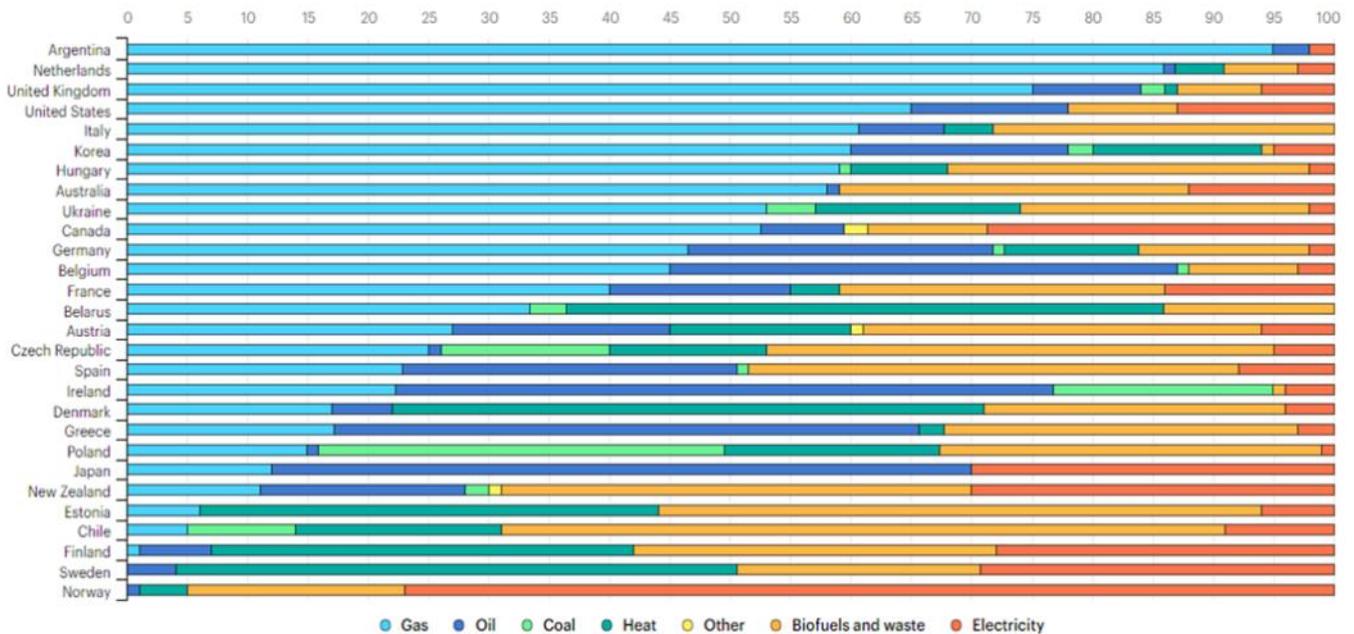
Source IEA[8]

These considerations have included the safety of using hydrogen in a domestic setting, the cost of converting domestic boilers and cookers to run on hydrogen, the availability of a low-cost hydrogen supply, and the need to prioritise the decarbonisation of hydrogen supplies. A recent meta-analysis of 34 independent studies into the viability of hydrogen as a domestic energy source concluded that, despite significant lobbying from gas suppliers and boiler makers, at present the domestic use of hydrogen is not a viable option[9].

Industrial Use

The most promising area for using hydrogen is iron and steel refining. The industry is currently responsible for around 4% of all CO_2 emissions in Europe, and 7% worldwide[10], primarily due to the use of coal in production. Replacing coal with hydrogen would make it possible to significantly reduce emissions from this sector – providing the hydrogen was generated from renewable sources.

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7.   OFGEM 2022 (accessed 26.03.04) https://www.ofgem.gov.uk/publications/hydrogen-village-trial-detailed-design-studies-decision

8.   IEA 2022 *Energy Efficiency 2022* https://www.iea.org/reports/energy-efficiency-2022

9.   Rosenow J 2022 *Is heating homes with hydrogen all but a pipe dream? An evidence review* Volume 6, Issue 10, P2225-2228 https://www.cell.com/joule/fulltext/S2542-4351(22)00416-0?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS2542435122004160%3Fshowall%3Dtrue

10.   IEA 2020 *Iron and Steel Technology Roadmap* https://www.iea.org/reports/iron-and-steel-technology-roadmap

The technology to manufacture iron and steel using hydrogen is well understood and several pilot plants have been constructed, which are further refining the process. Production has already started at H2 Green Steel, the first green steel plant in Boden, northern Sweden[11].

However, hydrogen prices vary. Hydrogen produced from fossil fuel sources costs from USD 5 to 7 per kg in the US, and USD 7 to 11 in Europe and Australia. Green hydrogen produced through electrolysis using renewable power costs USD 10 to 15 per kg, depending on availability.

Replacing coal with hydrogen using currently available infrastructure and technology would drive up the price of a ton of steel by about one third[12], although this gap is likely to narrow as carbon-emission pricing will drive up the cost of using coal, the costs of renewable electricity will fall, and through efficiency gains resulting from larger-scale production of hydrogen (and advances in hydrogen-based steel-making processes progress). More significantly, scaling up hydrogen production for a full decarbonisation of the steel industry will require an increase in renewable electricity production of around 20% over current targets.

Transport Use

Up until the eighteenth century, mankind relied primarily on animal power for transport. All of this changed with the industrial revolution. Initially horsepower was used on canals, but as the revolution gathered pace, coal, which was relatively cheap and eminently portable, took over to fuel ships and trains. Coal contains approximately 29 MJ/kg of energy.

As the twentieth century dawned and technology advanced, coal was replaced for use in transport by oil. Petrol contains 47 MJ/kg of energy.

Coal and oil are both energy sources – they are dug out of the ground and burnt to release energy. However, they can also be considered to be energy storage media – they are compact and portable and the energy that they are storing is chemical energy created by biological processes as a result of sunlight falling on earth hundreds of millions of years ago. The energy density and portability of fossil fuels makes them perfect for use in transport. Unfortunately, fossil fuels release carbon dioxide when they are used which is the primary driver of global warming.

In the twenty-first century two further energy storage media have emerged - batteries and hydrogen. Battery technology has advanced enormously over the last decade. However, batteries are still heavy and expensive and require charging. They also have poor energy density compared with fossil fuels - a lithium-ion battery pack has an energy density of around 0.3MJ/kg. By contrast hydrogen packs a significant punch with an energy density of approximately 120MJ/kg.

11.   Mining Technology 2023 *Europe's first commercial green steel plant to open in Sweden* https://www.mining-technology.com/news/green-steel-hydrogen/
12.   European Parliament 2020 *The potential of hydrogen for decarbonising steel production* https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/641552/EPRS_BRI(2020)641552_EN.pdf

Figure 4 | Energy Density
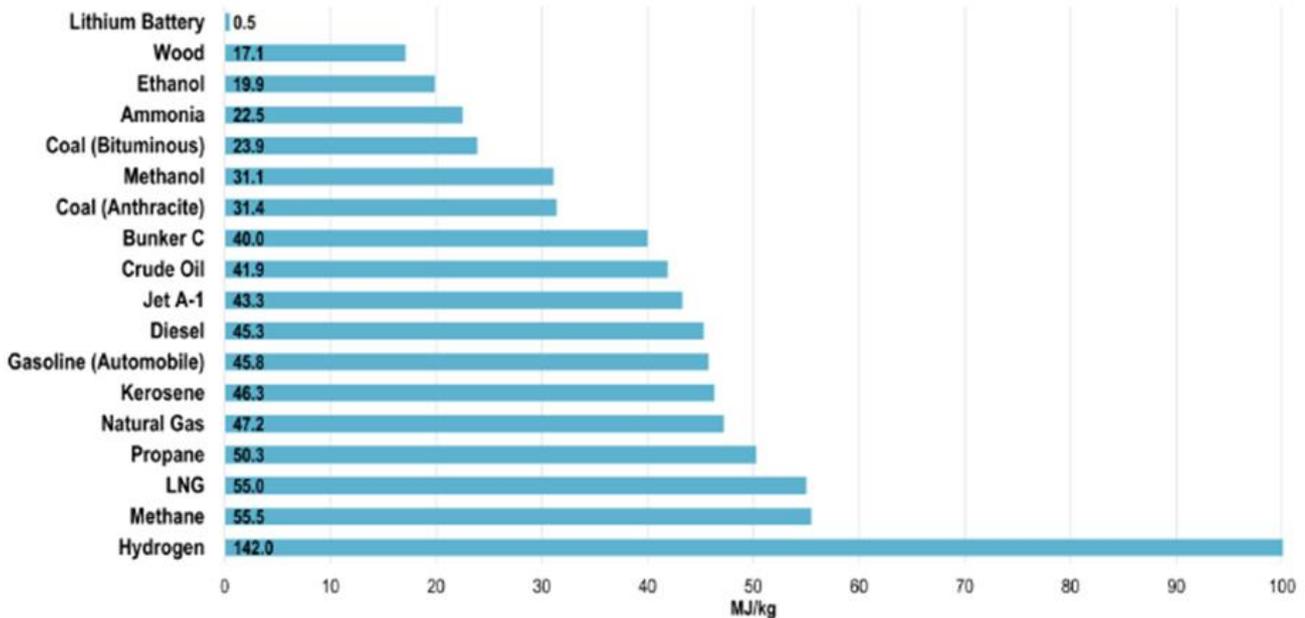
Source: The Geography of Transport Systems[14]

Although, hydrogen is an energy dense storage medium, a note of caution must be inserted. Energy density is not the sole consideration when it comes to fuel sources in transport as energy density is not the same as molar density. A kilogram of petrol does not occupy the same volume as a kilogram of hydrogen:

- 1kg Petrol (@18°C at 1 atmosphere) = ~2 litres
- 1kg Hydrogen (@-239.95^{o}C at 13 atmospheres) = ~14 litres

A small car will achieve a fuel efficiency of around 6 litres per 100km[15]. A hydrogen fuel cell car will achieve a fuel efficiency of 10 litres per 100km[16]. Due to the size and weight of hydrogen storage tanks, this reduces the range available to smaller vehicles, although this is not a major impediment when it comes to road vehicles - the Toyota MIRAI II fuel cell car has a range of up to 650 km - and cars can refill their tanks rapidly at fuel stations much the way internal combustion engine vehicles can.

Fuel cell cars and ships are already a reality, their potential only limited by a lack of investment in refuelling infrastructure and risk aversion by major car manufacturers. At the time of writing, there are only two mainstream hydrogen-powered cars on sale: the Toyota Mirai and Hyundai Nexo. However, there are more hydrogen-powered cars in the pipeline, with firms such as BMW, Land Rover, and Vauxhall all planning new models within the next five years[16].

However, the molar density of hydrogen does present difficulties when it comes to air transport, where range and infrastructure considerations, as well as the economics of fleet renewal, present a complex picture.

13. Rodrigue J 2020 *The Geography of Transport Systems (Fifth Edition)* New York: Routledge, ISBN 978-0-367-36463-2
14. What Car? (accessed 16.03.24) https://www.whatcar.com/news/real-mpg-most-efficient-cars-with-10-litre-engines/n19440
15. Toyota (accessed 16.03.24) https://www.toyota.co.uk/new-cars/mirai
16. Auto Express 2023 *Hydrogen cars: do hydrogen fuel cell or combustion cars have a future?* https://www.autoexpress.co.uk/electric-cars/93180/hydrogen-cars-do-hydrogen-fuel-cell-or-combustion-cars-have-future#:~:text=At%20the%20time%20of%20writing,within%20the%20next%20five%20years.

Airbus is currently working on ZEROe, a project which aims to bring to market the world's first hydrogen-powered commercial aircraft by 2035[17]. To do so, Airbus must surmount significant technical challenges, including aircraft design and technologies, as well as preparing the ecosystem that will produce and supply the hydrogen.

Box 1: The Hydrogen Fuel Cell

A fuel cell uses the chemical energy of hydrogen or other fuels to cleanly and efficiently produce electricity. If hydrogen is the fuel, the only products are electricity, water, and heat.

The first fuel cells were invented by Sir William Grove in 1838. The technology was refined by Francis Thomas Bacon in 1932 who invented the hydrogen–oxygen fuel cell (or alkaline fuel cell), which has been used in NASA space programs since the mid-1960s to generate power for satellites and space capsules.

Fuel cells are unique in terms of the variety of their potential applications; they can use a wide range of fuels and feedstocks and can provide power for systems that range in scale from a utility power stations, through aircraft and cars, to laptop computers.

In recent years significant advances have been made in the efficiency of fuel cells, solid-state electrolysers, proton exchange membrane and fuel cell systems integration have resulted from major investment in R&D from firms such as Toyota, Daimler, Shell, BMW, Air Liquide, and Hyundai.

E.ON's 1.4-MW Fuel Cell Power Plant at Mannheim, Germany

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17.   Airbus (accessed 26.03.24) https://www.airbus.com/en/innovation/low-carbon-aviation/hydrogen/zeroe

Hydrogen Production

There has recently been some discussion in scientific journals of the existence of lithospheric hydrogen reserves. Energy companies such as Shell, BP, and Chevron are joining a consortium created by the U.S. Geological Survey and Colorado School of Mines to study geologic hydrogen[18], but some smaller firms are already joining what may become a new gold rush. HyTerra (hyterra.com)and Natural Hydrogen Energy (nh2e.com) are preparing to drill for it in Nebraska and Kansas, and Gold Hydrogen (goldhydrogen.com.au) is searching for it in Australia.

However, until these firms strike paydirt, hydrogen remains an energy transfer medium rather than an energy source. As a result, hydrogen is made at industrial scale either using fossil fuels or by the application of large amounts of energy. Currently there is a spectrum for hydrogen production (see figure 5):

Grey (or brown) hydrogen, which is still used for the bulk of hydrogen production uses fossil fuels as feedstock and involves combining methane (derived from natural gas or coal) with steam, at high temperatures and pressures to produce syngas, a mixture of hydrogen and carbon monoxide, from which the carbon monoxide is extracted to leave pure hydrogen. The carbon monoxide is then burnt to produce CO_2 which is released to the atmosphere.
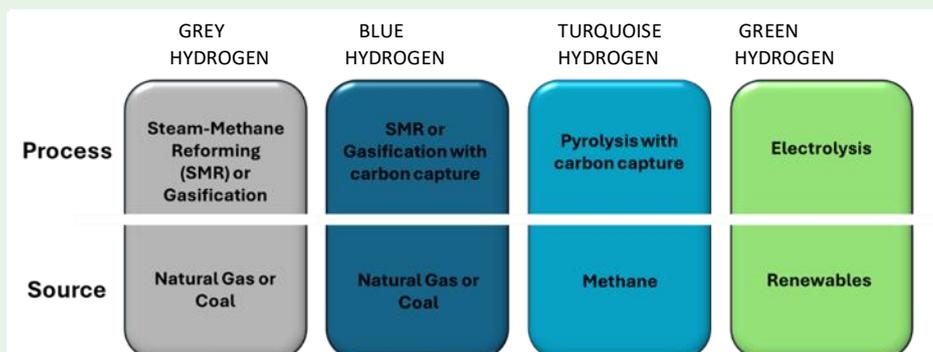
Blue hydrogen uses a similar process and feedstock to grey hydrogen, but the CO_2 is captured and securely stored.

Turquoise hydrogen is a developing technology that uses a process called methane pyrolysis to produce hydrogen and solid carbon. The main technical challenge with turquoise hydrogen is the handling of the solid carbon. If the reaction occurs over a conventional solid catalyst, carbon rapidly deposits on the catalyst surface, deactivating it, so trials are being conducted which form the reaction in a liquid bath of molten metal or salt. The process is energy intensive and has yet to be scaled up to commercial viability.

Green hydrogen is hydrogen produced by splitting water into hydrogen and oxygen using renewable electricity (primarily from hydroelectric sources). Unfortunately, the process of hydrogen production by electrolysis is very energy intensive.

Hydrogen is also produced through electrolysis as a result of chlorine manufacture (purple hydrogen), from nuclear power (pink or red hydrogen) and from solar power (yellow hydrogen).

Figure 5 | The Hydrogen Rainbow

	GREY HYDROGEN	BLUE HYDROGEN	TURQUOISE HYDROGEN	GREEN HYDROGEN
Process	Steam-Methane Reforming (SMR) or Gasification	SMR or Gasification with carbon capture	Pyrolysis with carbon capture	Electrolysis
Source	Natural Gas or Coal	Natural Gas or Coal	Methane	Renewables

18.   Forbes 2024 Forget Oil. New Wildcatters Are Drilling For Limitless 'Geologic' Hydrogen https://www.forbes.com/sites/alanohnsman/2023/06/26/forget-oil-new-wildcatters-are-drilling-for-limitless-geologic-hydrogen/

Currently, 47% of global hydrogen production is from natural gas, 27% from coal, 22% from oil (as a by-product) and only around 4% comes from renewables[19] and other sources.

Global hydrogen production is at present about 120 million tons per year[20], of which two-thirds is pure hydrogen and one-third is mixed with other gases. The global hydrogen generation market size was estimated at USD 170.14 billion in 2023 and is expected to grow at a compound annual growth rate (CAGR) of 9.3% from 2024 to 2030[21].

China is the largest producer and consumer of hydrogen in the world. It currently has an annual production capacity of around 33 million tons[22]. By comparison the US produces 10 million tons and the EU, EFTA, and UK 11.3 million tons in total. China is currently investing heavily in production capacity and technology in anticipation of a rapid expansion in the demand for hydrogen.

Challenges

For hydrogen to take its place in the armoury of tools mankind must have at its disposal to tackle climate change, several significant factors need to align: hydrogen production must increase exponentially, costs per kilogramme must decline, and new infrastructure must be developed. This will require unprecedented levels of investment. In February of this year the EU announced that it has committed USD 7.4bn in state aid to kick start the hydrogen economy[23], but in a recent interview a senior executive at Mitsubishi Heavy Industries estimated that USD 1 trillion is required for building infrastructure to enable widespread use of hydrogen fuel in the US and Europe[24].

Because of the level of investment required and the current scarcity of green hydrogen, careful consideration must be given to prioritising the uses to which green hydrogen is put. As discussed above, domestic uses are not currently feasible, with the money better spent on enhancing energy efficiency. Instead, priority should be given to the decarbonisation of iron and steel production as this is where the greatest carbon efficiency gains can be made, with transport uses coming a close second.

It should be noted that refuelling infrastructure will require cooperation from a reluctant oil industry - Shell is currently closing its hydrogen refuelling stations in California[25].

19. IRENA (accessed 23.03.24) *Hydrogen* https://www.irena.org/Energy-Transition/Technology/Hydrogen#:~:text=As%20at%20the%20end%20of,around%204%5%20comes%20from%20electrolysis.
20. Allianz 2021 *The Hydrogen Economy: Opportunities And Risks In The Energy Transition* https://commercial.allianz.com/news-and-insights/reports/hydrogen-energy.html#:~:text=The%20vast%20majority%20of%20hydrogen,is%20mixed%20with%20other%20gases.
21. Grand View Research (accessed 20.03.24) *Hydrogen Generation Market Size & Trends* https://www.grandviewresearch.com/industry-analysis/hydrogen-generation-market#:~:text=b.-,The%20global%20hydrogen%20generation%20market%20size%20was%20estimated%20at%20USD,the%20hydrogen%20generation%20market%20growth%3F
22. PtX Hub (accessed 20.03.24) *Hydrogen Factsheet – China* https://ptx-hub.org/factsheet-on-china-the-worlds-largest-hydrogen-producer-and-consumer/#:~:text=Hydrogen%20Factsheet%20%E2%80%93%20China&text=China%20is%20the%20largest%20producer%20and%20consumer%20of%20hydrogen%20in%20the%20world.
23. Reuters 2024 *EU approves $7.4 billion in state aid to boost renewable hydrogen* https://www.reuters.com/sustainability/climate-energy/eu-approves-74-bln-state-aid-boost-renewable-hydrogen-2024-02-15/
24. Hydrogen Central 2024 *Hydrogen Economy – Hydrogen adoption will cost Europe, US more than $1 trillion* https://hydrogen-central.com/hydrogen-economy-hydrogen-adoption-will-cost-europe-us-more-than-1-trillion/
25. Autoweek 2024 **Shell Closes Its Hydrogen Stations In California** https://www.autoweek.com/news/a46791348/shell-closes-hydrogen-stations-california/

A critical factor in driving the investment required to overcome the inertia generated by organisations who have heavily invested in legacy infrastructure, is a conducive and stable policy environment.

Politicians are reluctant to add to inflationary pressure by increasing energy costs. Without public investment, the reduction of fossil fuel subsidies and the ramping up of mechanisms such as emissions trading, carbon taxes and carbon accounting, the case for the hydrogen economy is on shaky ground. However, the financial services sector can help. Green products such as green loans, green bonds and sustainability bonds can drive investment into this sector, whilst financial centres can prepare the way by developing market infrastructure for hydrogen.

Functioning markets will greatly assist the successful development of a hydrogen industry. Access to hydrogen as a commodity and the development of secondary markets in derivatives and futures will allow enhanced liquidity and increasing volumes of trade. The European Energy Exchange, located in Leipzig, Germany established HYDRIX – the first market-based hydrogen price index worldwide, in May 2023 and expects cleared trading to begin by 2029[26]. Other financial centres look set to follow.

Conclusions

There is still a mountain to climb before the promise of the hydrogen economy can be fully realised. The technology is ready to go, but massive investment in production and infrastructure is required, which in turn is reliant on nerves of steel by policy makers.

What is certain is that hydrogen will play a critical role in the path to net zero, and that global production of hydrogen will expand exponentially as the century progresses – potentially growing to rival oil as a traded commodity.

Financial centres can assist with progress by developing infrastructure for hydrogen trading and ensuring that the right investment products are available to organisations seeking to push the pace of progress forwards.

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26.   EEX (accessed 26.03.04) https://www.eex.com/en/markets/hydrogen#29899

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 14 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 14 | Example: Assessments Compared With The Mean For A Region
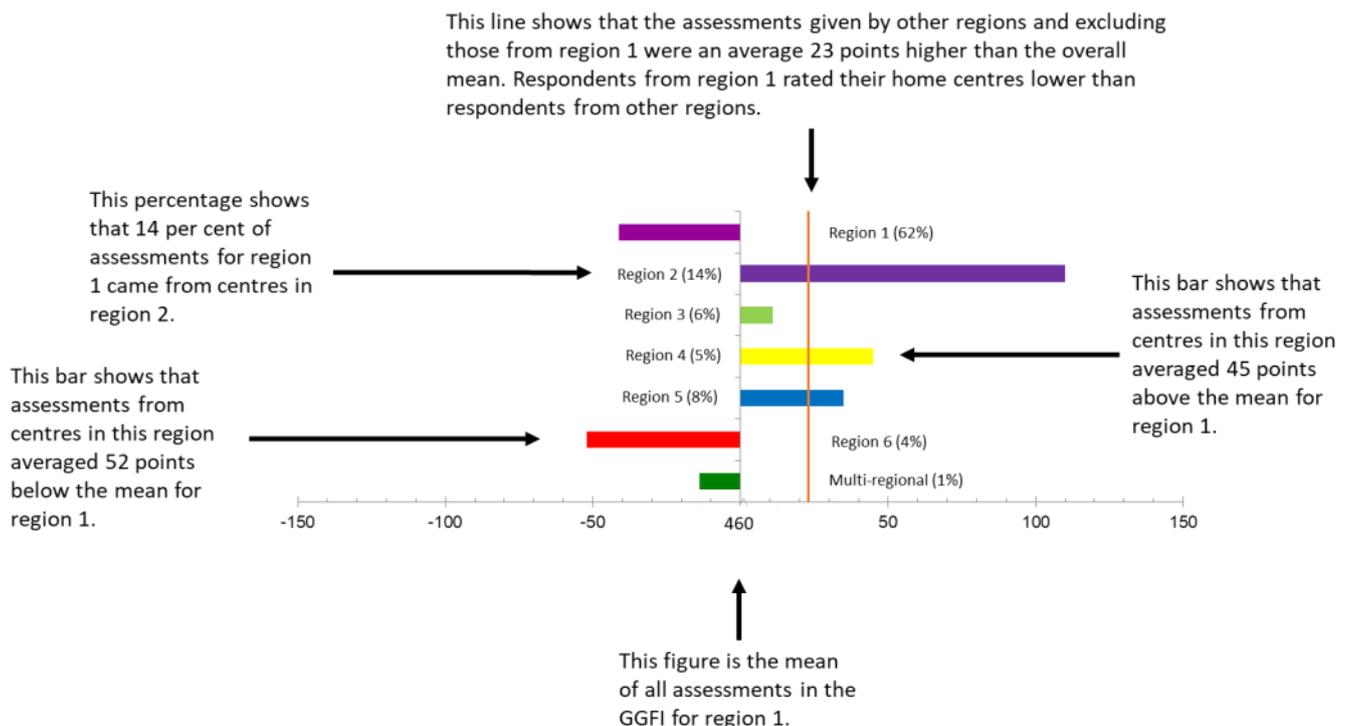
North America

- New York dropped two places in the index and continues to lead in the region, with Washington DC Los Angeles, and Montreal also in the world top 10.
- North American centres were rated significantly above average by people from Asia/Pacific, North America, and those from a multi-regional background; and below average by people in other regions.

Table 10 | North American Centres In GGFI 13

Centre	GGFI 13		GGFI 12		Change In Rank	Change In Rating
	Rank	Rating	Rank	Rating		
New York	4	642	2	624	▼2	▲18
Washington DC	7	639	7	614	0	▲25
Los Angeles	8	637	8	613	0	▲24
Montreal	10	635	12	609	▲2	▲26
Chicago	11	634	15	606	▲4	▲28
San Francisco	12	631	13	608	▲1	▲23
Toronto	16	627	22	599	▲6	▲28
San Diego	19	624	21	600	▲2	▲24
Vancouver	21	622	30	591	▲9	▲31
Boston	26	617	26	595	0	▲22
Atlanta	47	596	50	571	▲3	▲25
Calgary	48	595	52	569	▲4	▲26
Philadelphia	49	594	59	562	▲10	▲32
Miami	59	584	60	561	▲1	▲23

Chart 15 | Top Five North American Centres Ratings Over Time

Chart 16 | North American Regional Assessments - Difference From The Mean

Chart 17 | Regional Assessments For New York - Difference From The Mean

Chart 18 | Regional Assessments For Washington DC - Difference From The Mean
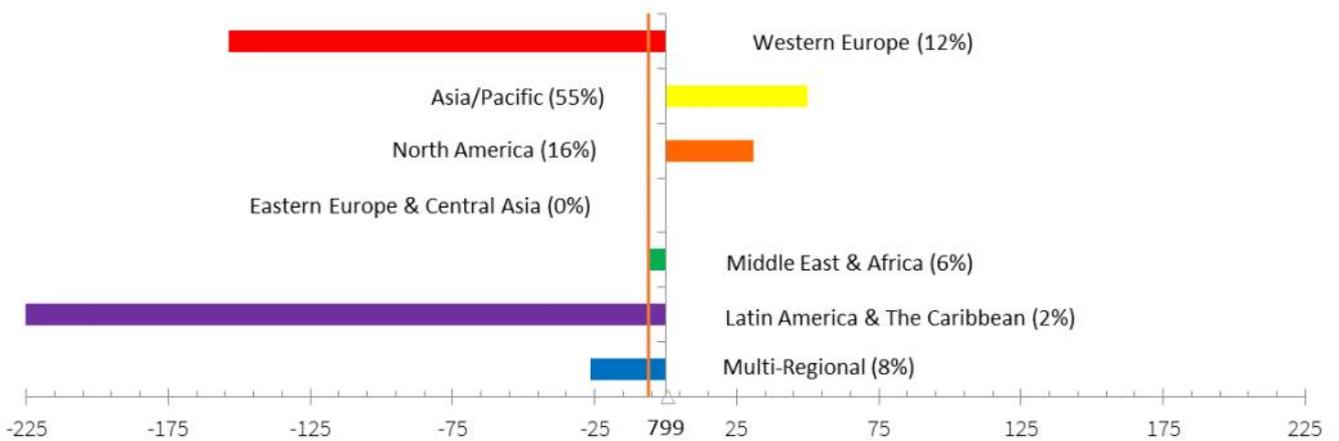
Middle East & Africa

- Dubai leads in the region, and rose four places, with Abu Dhabi in second place and Casablanca leading in Africa.
- Most centres in the region fell in the ranking, while Dubai, Doha, and Kigali rose 4 places each.
- Respondents from Asia/Pacific, North America, Latin America & The Caribbean, and those with a multi-regional background rated Middle East & African centres higher than average.

Table 11 | Middle Eastern & African Centres In GGFI 13

Centre	GGFI 13		GGFI 12		Change In Rank	Change In Rating
	Rank	Rating	Rank	Rating		
Dubai	29	614	33	588	▲ 4	▲ 26
Abu Dhabi	38	605	35	586	▼ 3	▲ 19
Casablanca	43	600	40	581	▼ 3	▲ 19
Tel Aviv	52	591	42	579	▼ 10	▲ 12
Doha	60	583	64	552	▲ 4	▲ 31
Johannesburg	67	575	63	553	▼ 4	▲ 22
Mauritius	78	561	68	543	▼ 10	▲ 18
Cape Town	80	559	67	544	▼ 13	▲ 15
Kigali	81	558	85	516	▲ 4	▲ 42
Riyadh	83	554	76	532	▼ 7	▲ 22
Lagos	93	536	84	520	▼ 9	▲ 16
Bahrain	95	534	88	513	▼ 7	▲ 21
Nairobi	96	531	89	512	▼ 7	▲ 19

Chart 19 | Top Five Middle East & Africa Centre Ratings Over Time
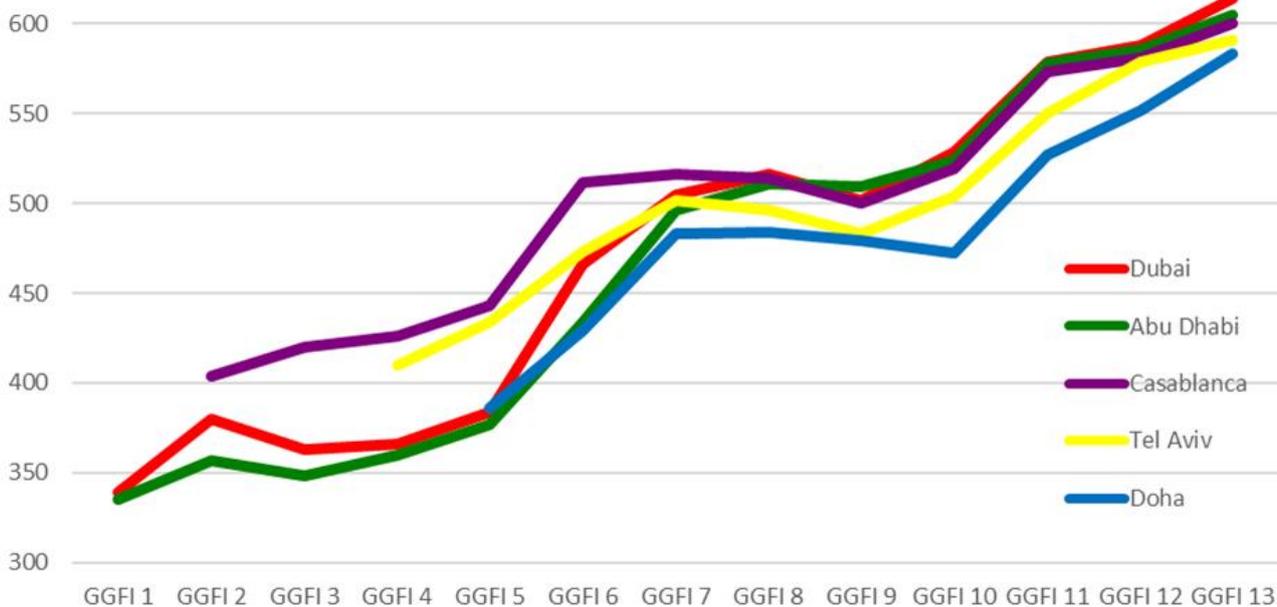
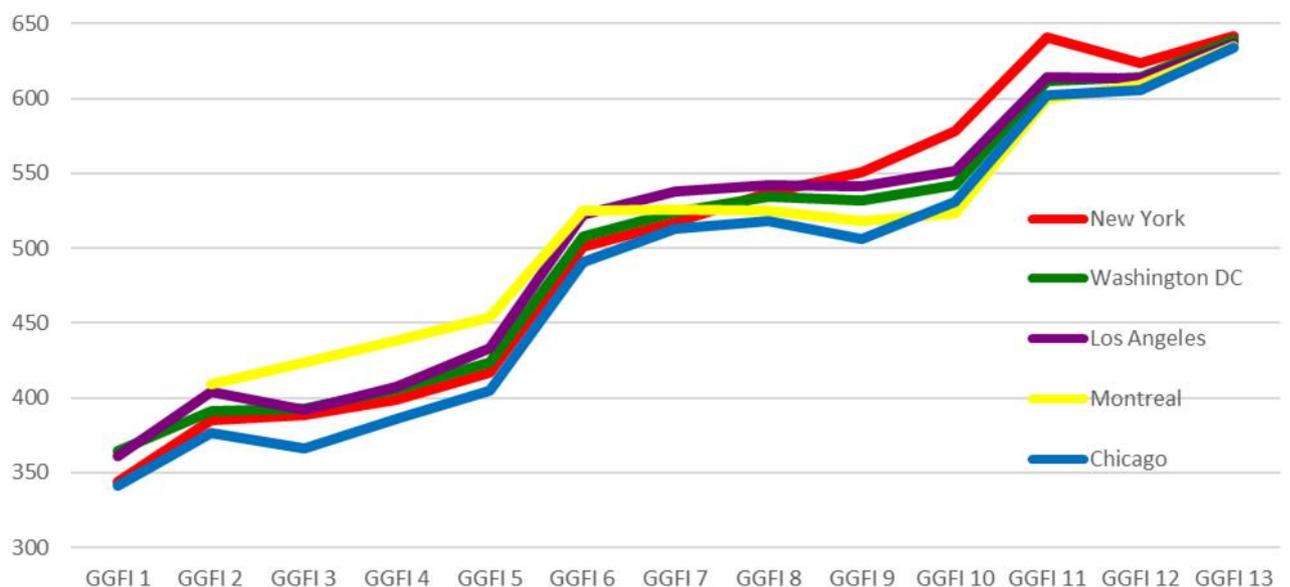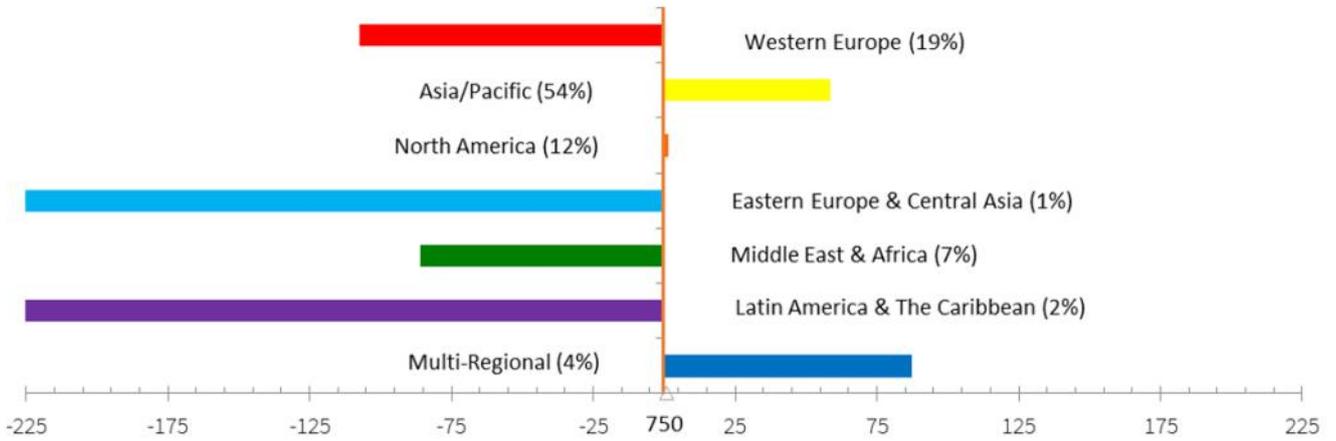**Chart 20 | Middle East & Africa Regional Assessments - Difference From The Mean**
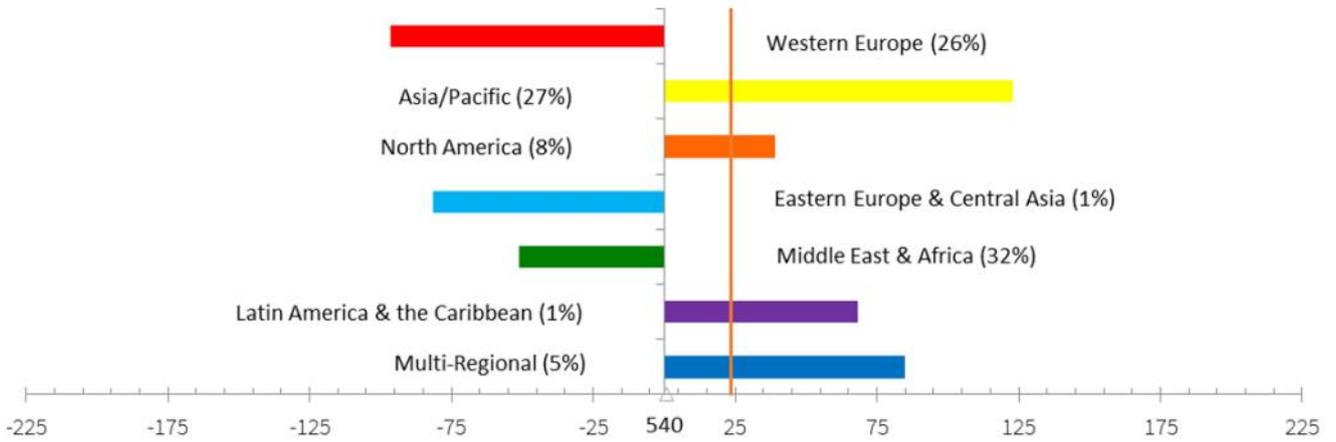
Chart 21 | Regional Assessments For Dubai - Difference From The Mean

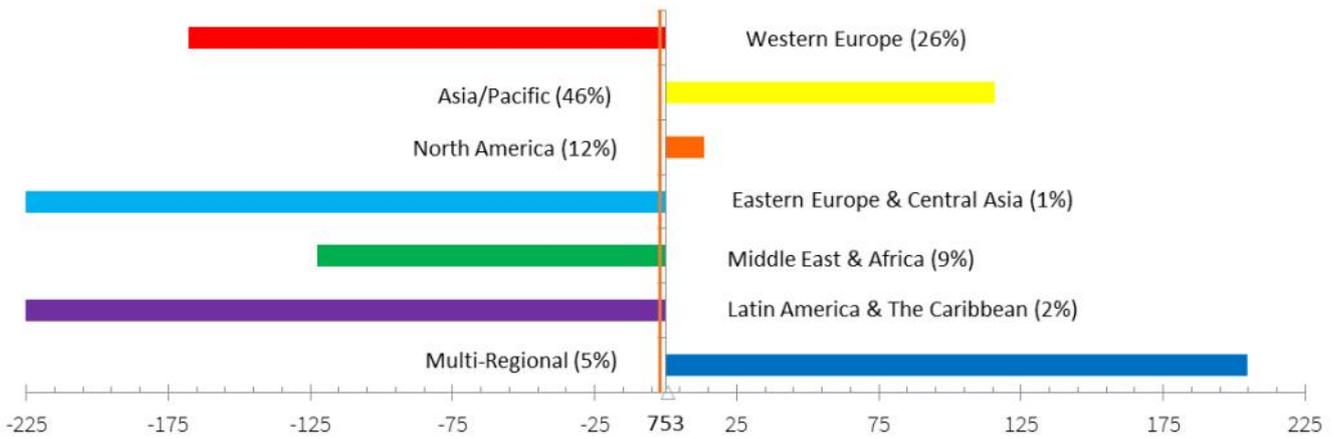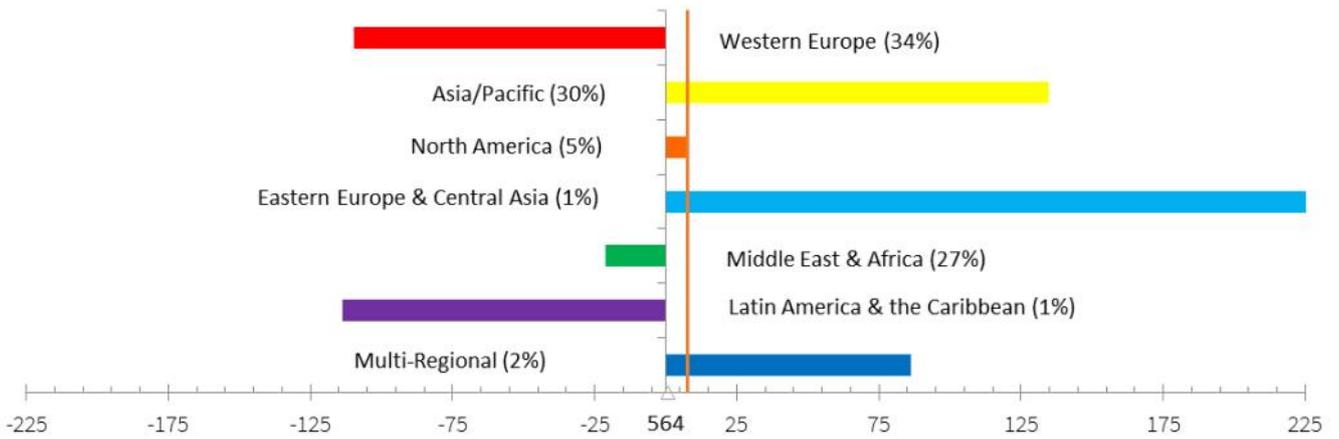**Chart 22 | Regional Assessments For Abu Dhabi - Difference From The Mean**
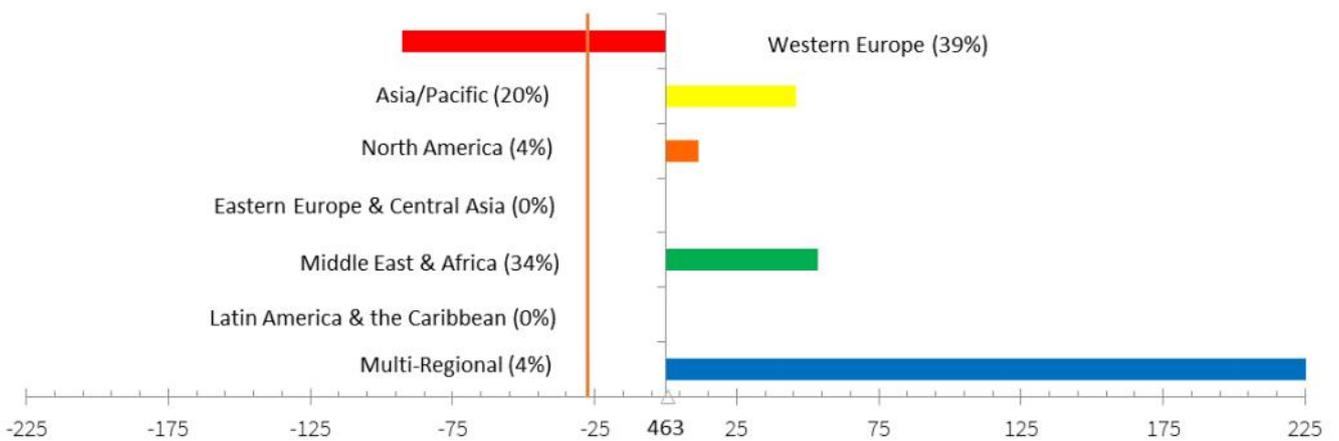
Eastern Europe & Central Asia

- Astana is the clear leader in green finance in the region, and new entrant, Kaunas took second place.
- Respondents from Asia/Pacific, North America, and those from a multi-regional background rated Eastern European & Central Asia centres higher than average.

Table 12 | Eastern European & Central Asia Centres In GGFI 13

Centre	GGFI 13		GGFI 12		Change In Rank	Change In Rating
	Rank	Rating	Rank	Rating		
Astana	57	586	53	568	▼4	▲18
Kaunas	64	578	New	New	New	New
Prague	70	572	80	528	▲10	▲44
Riga	71	571	81	527	▲10	▲44
Sofia	82	556	92	505	▲10	▲51
Warsaw	84	550	77	531	▼7	▲19
Istanbul	85	549	75	533	▼10	▲16
Cyprus	86	548	78	530	▼8	▲18
Moscow	89	542	87	514	▼2	▲28
Almaty	90	541	90	511	0	▲30

Chart 23 | Top Five Eastern Europe & Central Asia Centre Ratings Over Time

Chart 24 | **Eastern Europe & Central Asia Regional Assessments - Difference From The Mean**
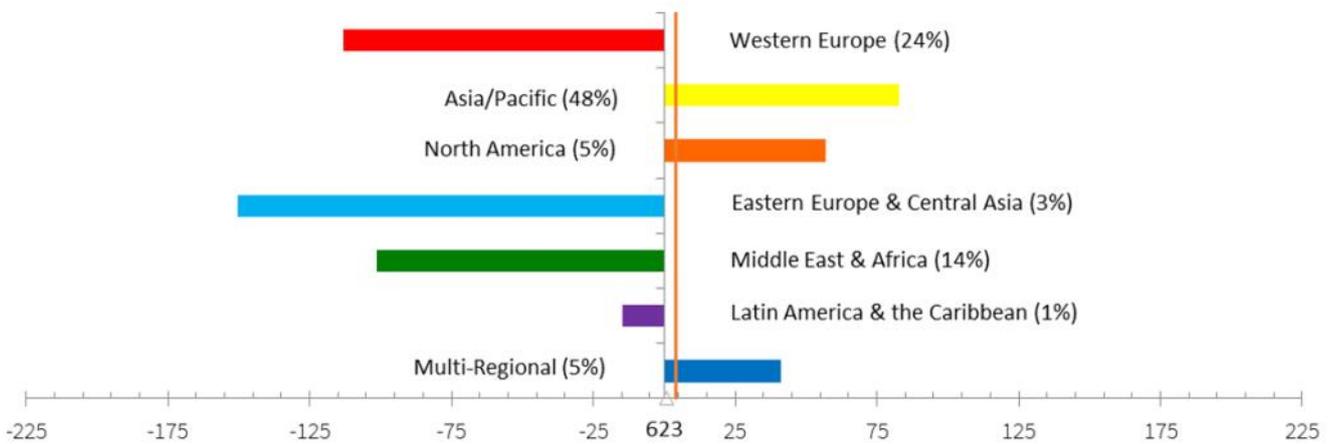
Chart 25 | **Regional Assessments For Astana - Difference From The Mean**
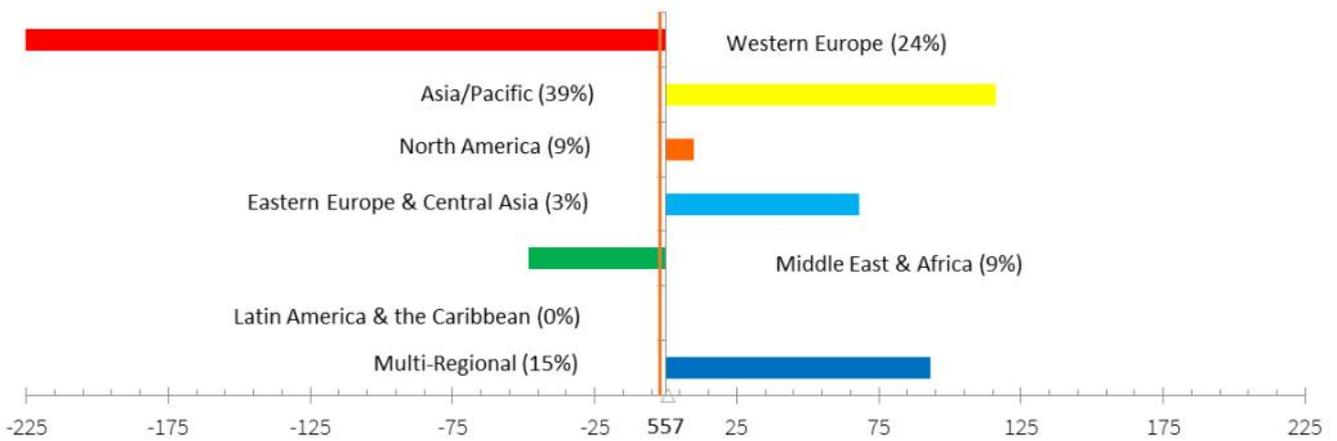
Chart 26 | **Regional Assessments For Kaunas - Difference From The Mean**
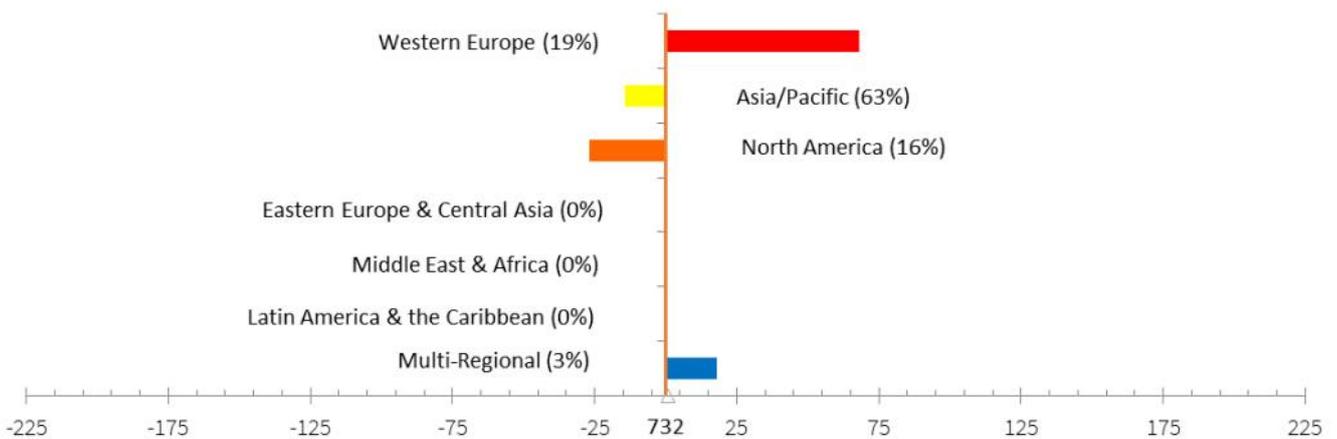
Western Europe

- London led the region, with Geneva in second place in the region, followed by Zurich and Luxembourg. Five Western European centres feature in the world top ten.
- Respondents from Western Europe, Eastern Europe & Central Asia, and the Middle East & Africa rated Western European centres lower than average.

Table 13 | Top 15 Western European Centres In GGFI 13

Centre	GGFI 13		GGFI 12		Change In Rank	Change In Rating
	Rank	Rating	Rank	Rating		
London	1	648	1	631	0	▲17
Geneva	2	646	3	623	▲1	▲23
Zurich	3	644	4	618	▲1	▲26
Luxembourg	6	640	5	616	▼1	▲24
Stockholm	9	636	6	615	▼3	▲21
Copenhagen	13	630	10	611	▼3	▲19
Oslo	14	629	17	604	▲3	▲25
Amsterdam	15	628	11	610	▼4	▲18
Paris	17	626	23	598	▲6	▲28
Lugano	18	625	New	New	New	New
Frankfurt	20	623	29	592	▲9	▲31
Edinburgh	24	619	19	602	▼5	▲17
Madrid	27	616	25	596	▼2	▲20
Munich	33	610	32	589	▼1	▲21
Hamburg	34	609	38	583	▲4	▲26

Chart 27 | Top Five Western European Centre Ratings Over Time
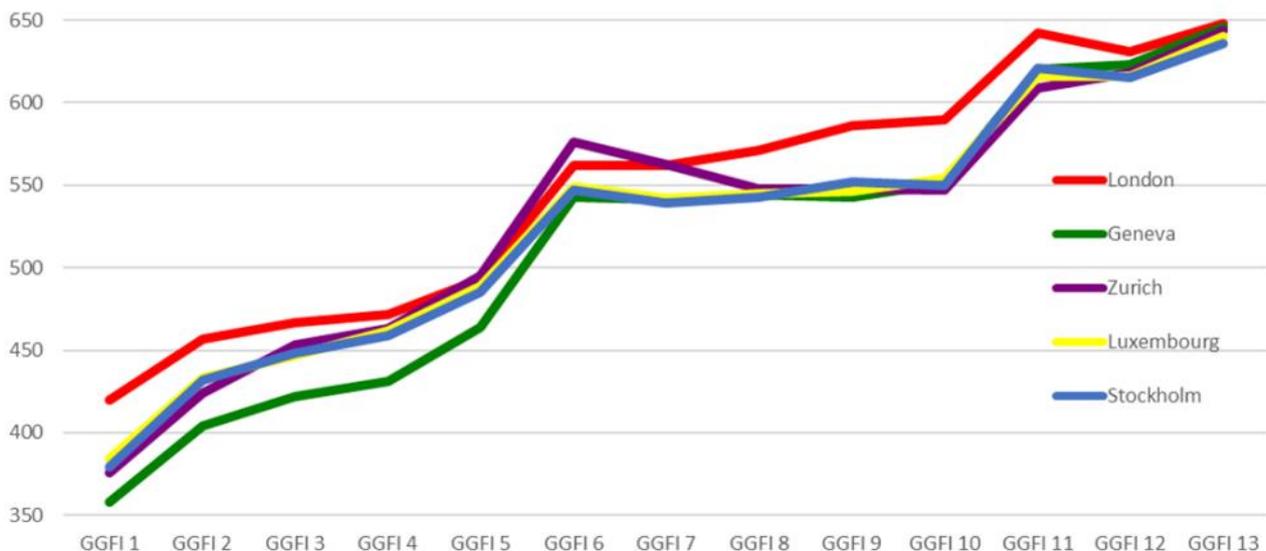
Chart 28 | **Western Europe Regional Assessments - Difference From The Mean**

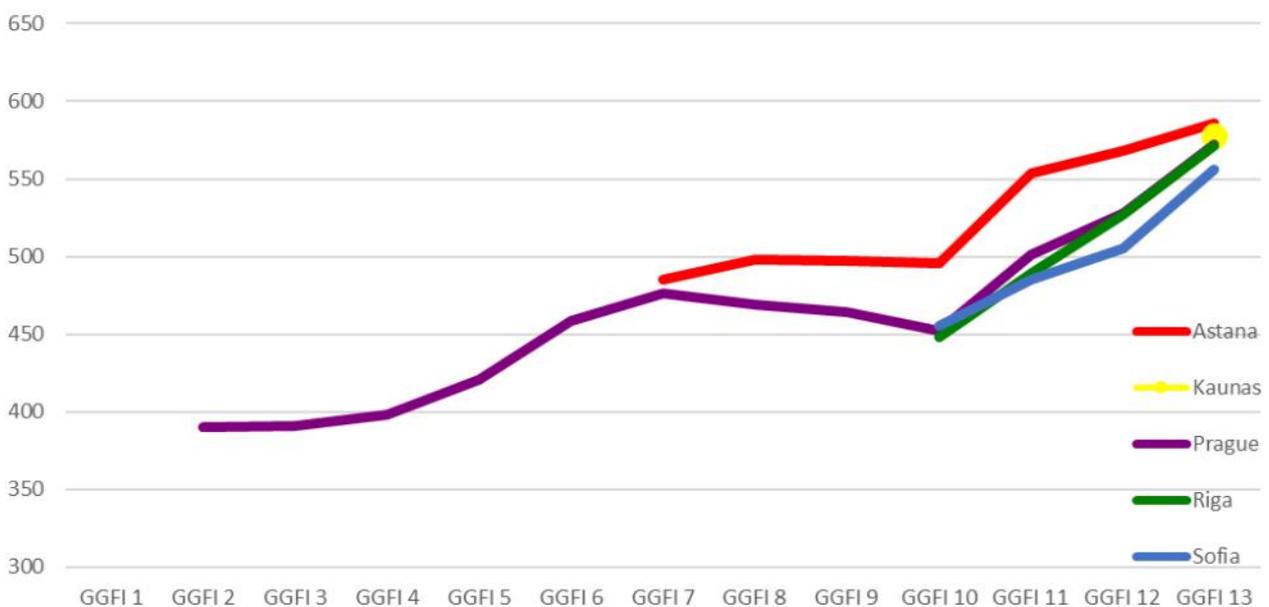**Chart 29 |** **Regional Assessments For London - Difference From The Mean**
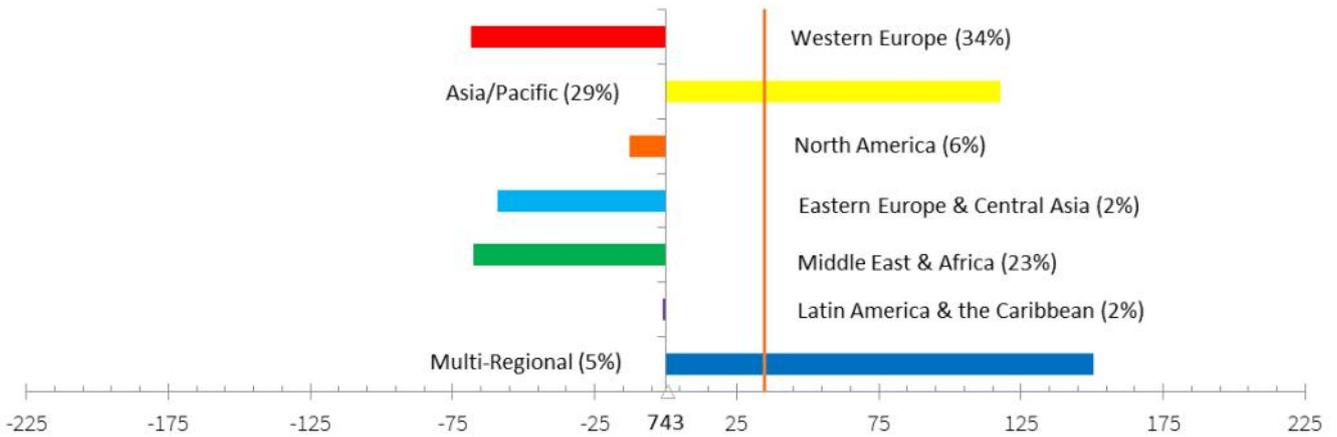
Chart 30 | **Regional Assessments For Geneva - Difference From The Mean**
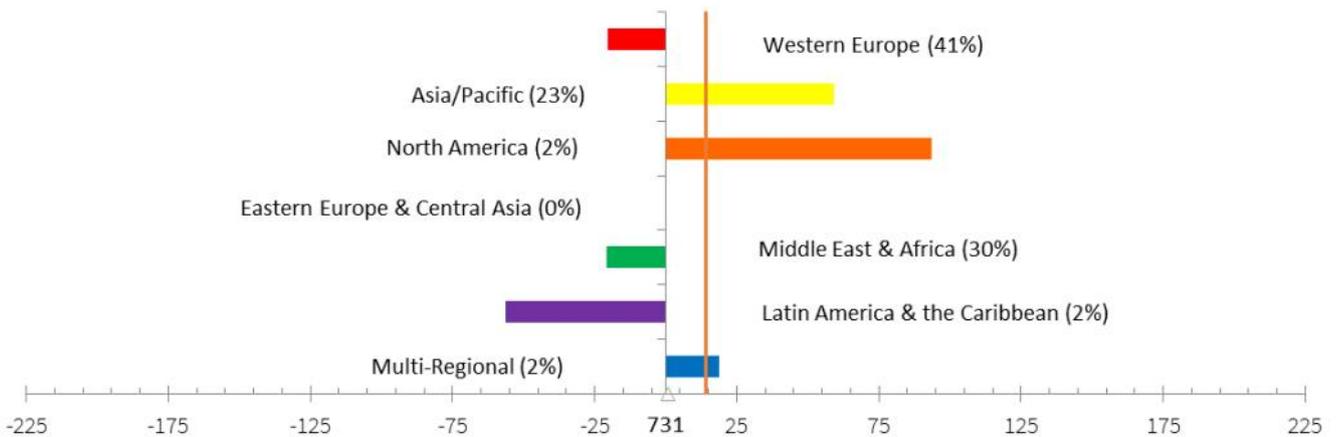
Latin America & The Caribbean

- Santiago leads in the region, with Sao Paulo overtaking Rio de Janeiro to take second position in the region.
- Respondents from Asia/Pacific, and those from a multi-regional background rated Latin America & The Caribbean centres above average.

Table 14 | **Latin American & Caribbean Centres In GGFI 13**

Centre	GGFI 13		GGFI 12		Change In Rank	Change In Rating
	Rank	Rating	Rank	Rating		
Santiago	56	587	65	551	▲9	▲36
Sao Paulo	68	574	69	542	▲1	▲32
Rio de Janeiro	73	569	66	550	▼7	▲19
Mexico City	77	565	71	539	▼6	▲26
Bermuda	88	543	94	499	▲6	▲44
British Virgin Islands	91	540	91	509	0	▲31
Cayman Islands	92	537	86	515	▼6	▲22
Bahamas	94	535	93	503	▼1	▲32

Chart 31 | **Top Five Latin American & Caribbean Centre Ratings Over Time**
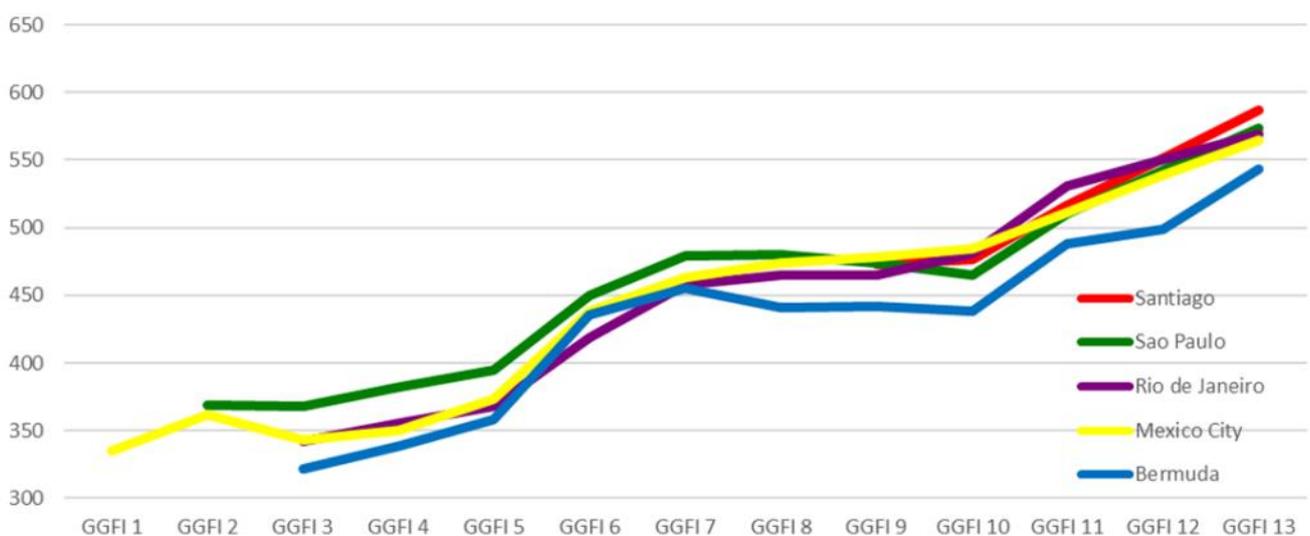
Chart 32 | **Latin America & The Caribbean Regional Assessments - Difference From The Mean**
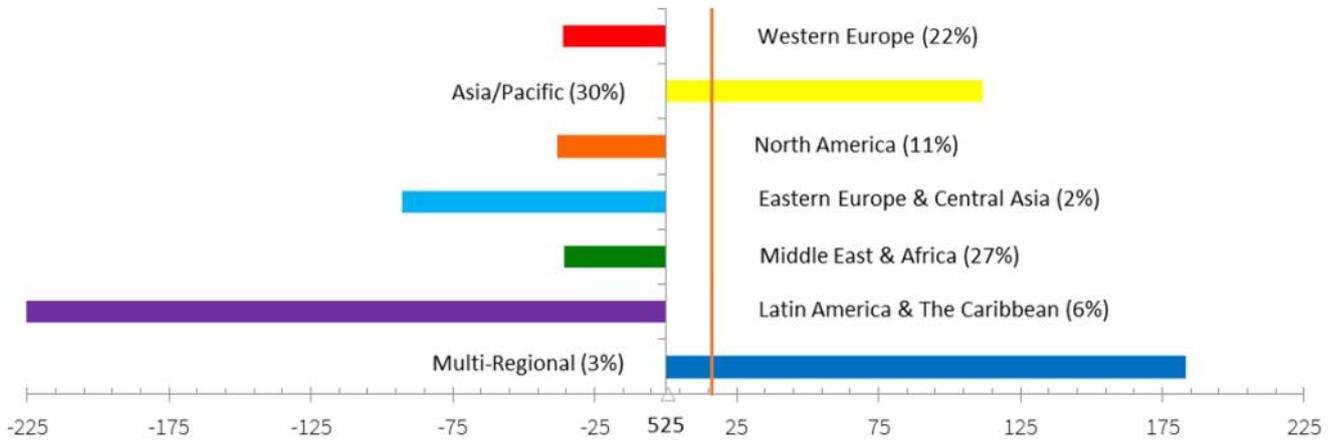
Chart 33 | **Regional Assessments For Santiago - Difference From The Mean**
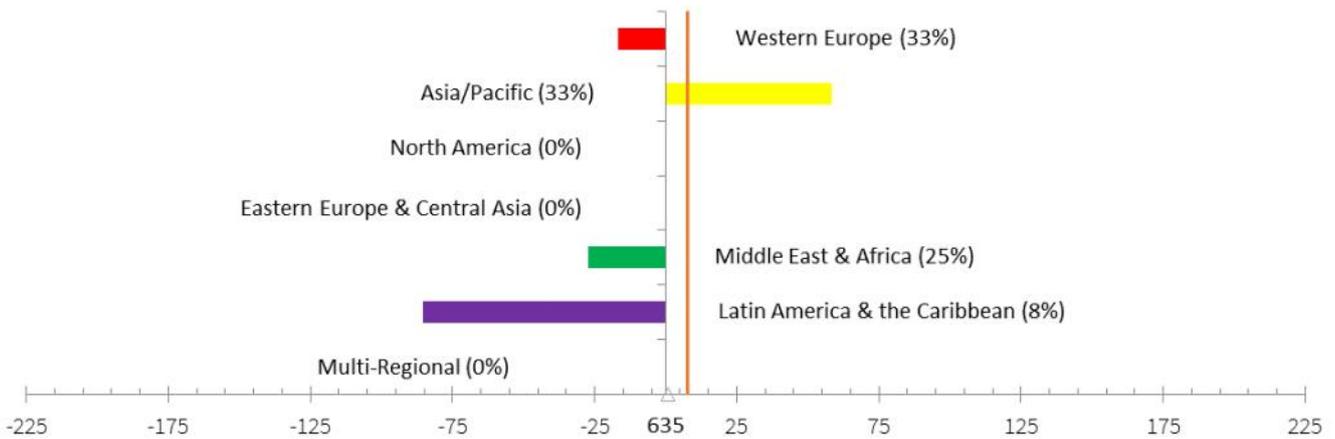
Chart 34 | **Regional Assessments For Sao Paulo - Difference From The Mean**
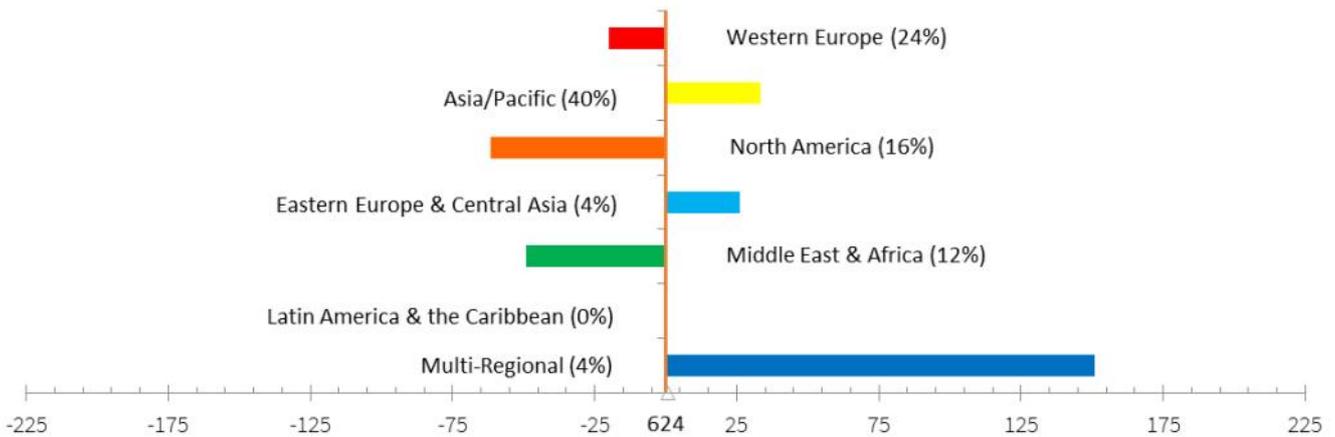
Asia/Pacific

- Singapore continued to lead the region and rose four places. Seoul took second place in the region.
- Most centres fell in the rankings, other than Singapore and Guangzhou.
- Respondents from Asia/Pacific and people operating across more than one region rated these centres above average.

Table 15 | Top 15 Asia/Pacific Centres In GGFI 13

Centre	GGFI 13		GGFI 12		Change In Rank	Change In Rating
	Rank	Rating	Rank	Rating		
Singapore	5	641	9	612	▲ 4	▲ 29
Seoul	22	621	18	603	▼ 4	▲ 18
Sydney	23	620	14	607	▼ 9	▲ 13
Shenzhen	25	618	24	597	▼ 1	▲ 21
Shanghai	28	615	20	601	▼ 8	▲ 14
Busan	30	613	28	593	▼ 2	▲ 20
Beijing	31	612	27	594	▼ 4	▲ 18
Melbourne	32	611	16	605	▼ 16	▲ 6
Wellington	35	608	31	590	▼ 4	▲ 18
Hong Kong	37	606	36	585	▼ 1	▲ 21
Qingdao	39	604	37	584	▼ 2	▲ 20
Tokyo	41	602	34	587	▼ 7	▲ 15
Osaka	46	597	41	580	▼ 5	▲ 17
Guangzhou	50	593	55	566	▲ 5	▲ 27
Kuala Lumpur	63	580	62	558	▼ 1	▲ 22

Chart 35 | Top Five Asia/Pacific Centre Ratings Over Time

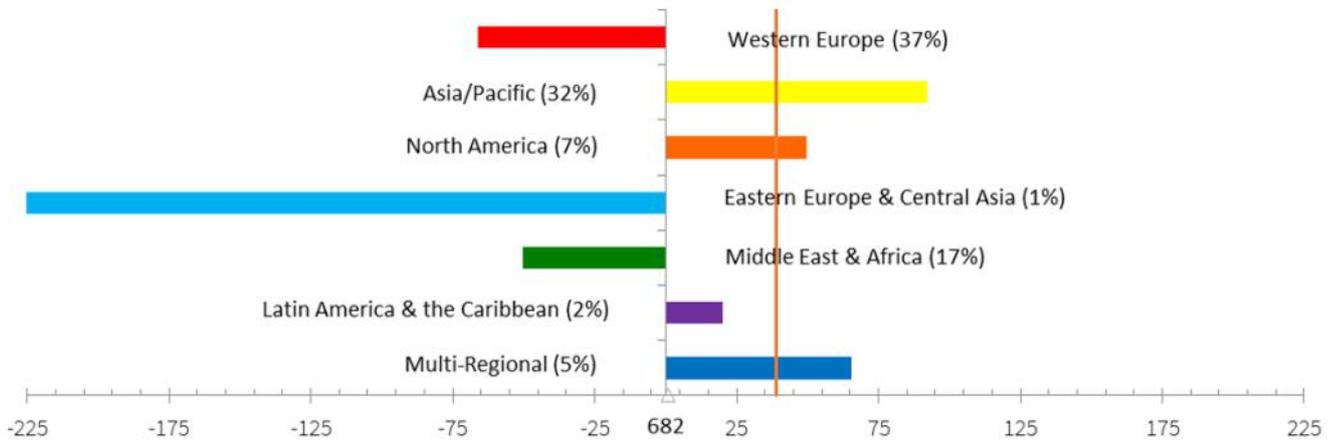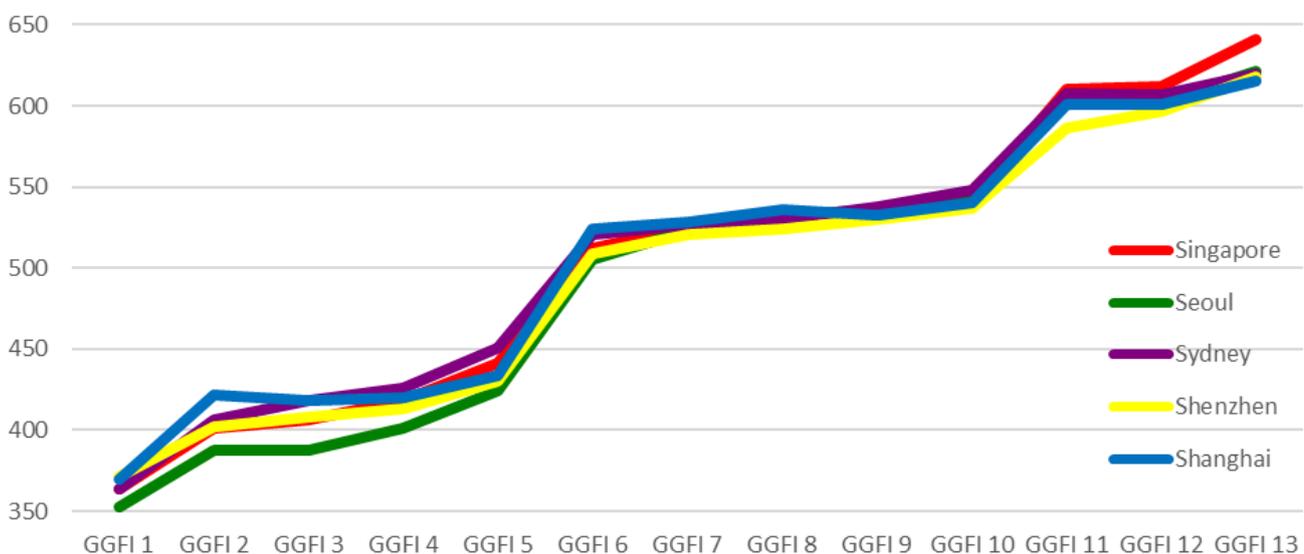**Chart 36 | Asia/Pacific Regional Assessments - Difference From The Mean**
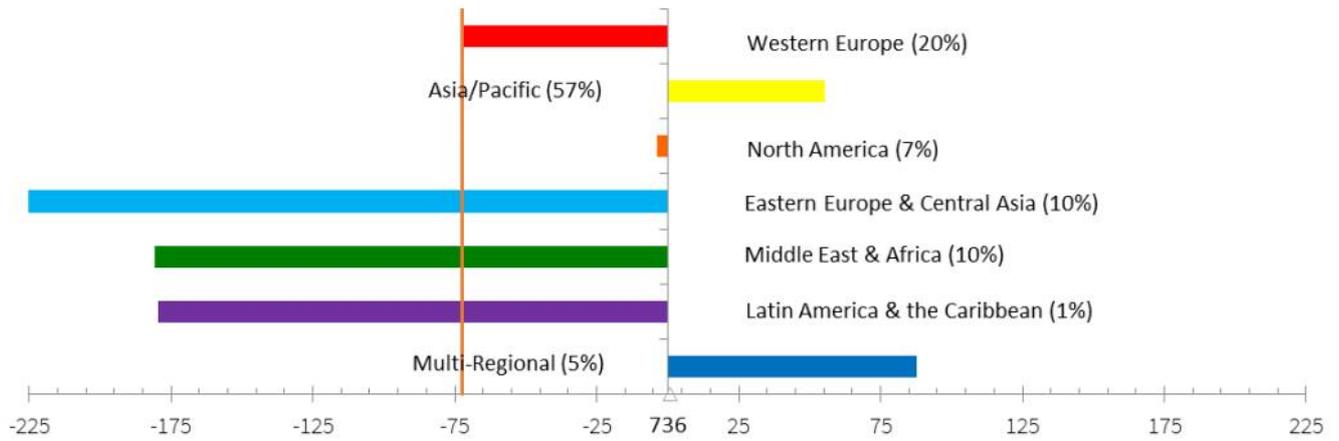
Chart 37 | Regional Assessments For Singapore - Difference From The Mean
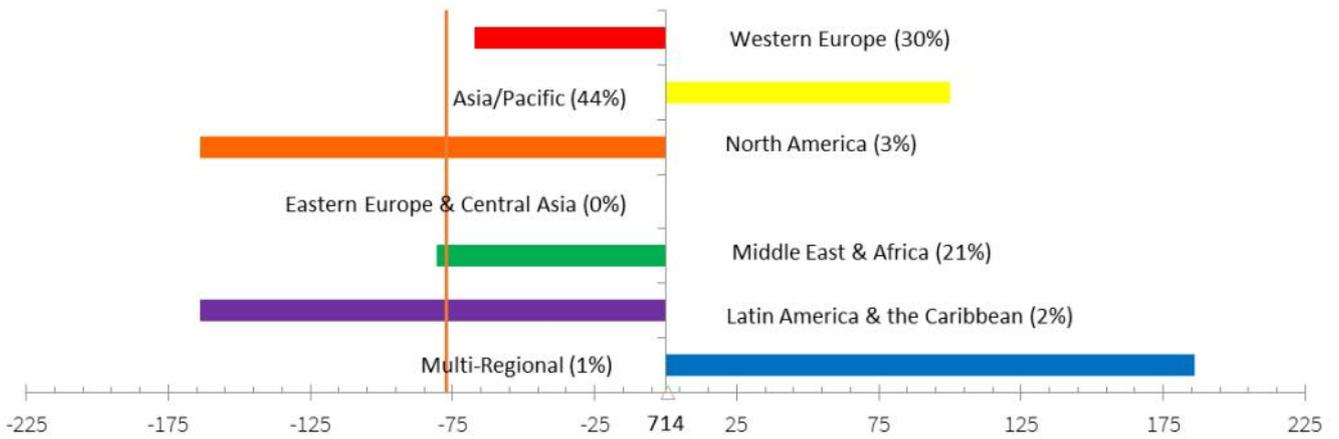
Chart 38 | Regional Assessments For Seoul - Difference From The Mean
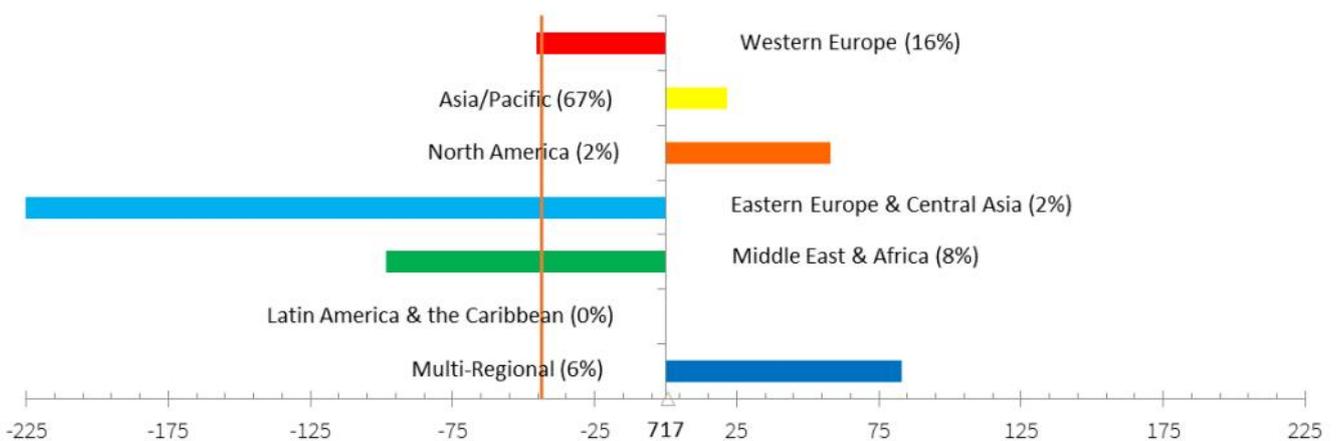
Stability

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 39 contrasts the 'spread' or variance of the individual assessments given to the top 40 centres in GGFI 13, with sensitivity to changes in the instrumental factors.

The chart shows three bands of financial centres. In the top right segment, New York, Abu Dhabi, Beijing, Hong Kong, and Shanghai have a higher sensitivity to changes in the instrumental factors and a higher variance of assessments than other centres. Centres in this area have the highest potential for future movement in their ranking. The stable centres in the bottom left have a lower sensitivity to change and demonstrate greater consistency in their GGFI ratings.

Chart 39 | 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), Investment, and Professional Services 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, New York ranks only 11th in the Policy sub-index, Luxembourg is first in the investment sub-index, and Montreal is fourth in the Policy sub-index.

Table 16 | GGFI 13 Industry Sector Sub-Indices - Top 15

Rank	Industry Sub-Sector			
	Policy	**Knowledge**	**Investment**	**Professional Services**
1	London	London	Luxembourg	New York
2	Luxembourg	New York	Singapore	Luxembourg
3	Geneva	Singapore	Geneva	London
4	Montreal	Geneva	Zurich	Washington DC
5	Singapore	Los Angeles	London	Los Angeles
6	Washington DC	Luxembourg	New York	Chicago
7	Zurich	San Francisco	Stockholm	Zurich
8	Los Angeles	Amsterdam	Los Angeles	San Francisco
9	Paris	Stockholm	Copenhagen	Geneva
10	Stockholm	Chicago	Oslo	Montreal
11	New York	Washington DC	Washington DC	Stockholm
12	Chicago	Zurich	Amsterdam	Oslo
13	Oslo	Copenhagen	Chicago	Frankfurt
14	Amsterdam	Paris	San Francisco	Singapore
15	San Francisco	Oslo	Montreal	Copenhagen

"Regulation - at least related to climate risk - in developed markets is now very much moving from evolving to implementation via supervisory mechanisms."

CEO, PROFESIONAL ASSOCIATION, EDINBURGH

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 13 Using Responses Only From Respondents Working Directly In Green Finance

Centre	Rating	Adjusted Rank	GGFI 13 Rank	Difference
London	643	1	1	0
Geneva	616	16	2	-14
Zurich	630	6	3	-3
New York	629	7	4	-3
Singapore	622	10	5	-5
Luxembourg	640	2	6	4
Washington DC	634	4	7	3
Los Angeles	619	13	8	-5
Stockholm	627	8	9	1
Montreal	633	5	10	5
Chicago	618	14	11	-3
San Francisco	620	12	12	0
Copenhagen	621	11	13	2
Oslo	635	3	14	11
Amsterdam	617	15	15	0
Toronto	623	9	16	7
Paris	608	28	17	-11
Lugano	605	31	18	-13
San Diego	600	38	19	-19
Frankfurt	610	24	20	-4
Vancouver	602	34	21	-13
Seoul	609	27	22	-5
Sydney	612	23	23	0
Edinburgh	616	16	24	8
Shenzhen	610	24	25	1
Boston	599	39	26	-13
Madrid	601	36	27	-9
Shanghai	615	19	28	9
Dubai	615	19	29	10
Busan	616	16	30	14
Beijing	604	32	31	-1
Melbourne	614	21	32	11
Munich	597	42	33	-9
Hamburg	598	40	34	-6
Wellington	613	22	35	13
Brussels	597	42	36	-6
Hong Kong	604	32	37	5
Abu Dhabi	610	24	38	14
Qingdao	570	60	39	-21
Vienna	582	51	40	-11
Tokyo	606	30	41	11
Berlin	593	45	42	-3
Casablanca	608	28	43	15
Glasgow	581	53	44	-9
Milan	595	44	45	1
Osaka	602	34	46	12
Atlanta	582	51	47	-4
Calgary	568	65	48	-17

Centre	Rating	Adjusted Rank	GGFI 13 Rank	Difference
Philadelphia	564	70	49	-21
Guangzhou	570	60	50	-10
Lisbon	598	40	51	11
Tel Aviv	588	47	52	5
Dublin	581	53	53	0
Rome	574	56	54	-2
Helsinki	585	49	55	6
Santiago	589	46	56	10
Astana	601	36	57	21
Jersey	560	80	58	-22
Miami	588	47	59	12
Doha	574	56	60	4
Isle of Man	566	67	61	-6
Guernsey	570	60	62	2
Kuala Lumpur	579	55	63	8
Kaunas	563	72	64	-8
Jakarta	560	80	65	-15
GIFT City-Gujarat	572	59	66	7
Johannesburg	567	66	67	1
Sao Paulo	570	60	68	8
Manila	550	93	69	-24
Prague	564	70	70	0
Riga	554	86	71	-15
Bangkok	552	87	72	-15
Rio de Janeiro	561	77	73	-4
Malta	559	83	74	-9
New Delhi	583	50	75	25
Monaco	562	75	76	1
Mexico City	563	72	77	5
Mauritius	573	58	78	20
Liechtenstein	566	67	79	12
Cape Town	570	60	80	20
Kigali	561	77	81	4
Sofia	560	80	82	2
Riyadh	561	77	83	6
Warsaw	566	67	84	17
Istanbul	563	72	85	13
Cyprus	555	85	86	1
Mumbai	552	87	87	0
Bermuda	551	91	88	-3
Moscow	551	91	89	-2
Almaty	562	75	90	15
British Virgin Islands	552	87	91	4
Cayman Islands	540	96	92	-4
Lagos	552	87	93	6
Bahamas	547	94	94	0
Bahrain	556	84	95	11
Nairobi	547	94	96	2

GGFI 13 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. Among 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, Energy Efficient Investment is the leading issue mentioned by our respondents, ahead of Environment, Social And Governance (ESG) Analytics, and Green Insurance. The areas considered least interesting are Greentech Venture Capital and Green Loans.

Chart 40 | Interest - Percentage Of Total Mentions

Carbon Disclosure
5.1%

Carbon Markets
8.0%

Sustainable Infrastructure Finance
7.7%

Climate Risk Stress Testing
5.1%

SRI Investment
6.6%

Disinvestment From Fossil Fuels
7.0%

Social and Impact Investment
6.6%

Renewable Energy Investment
8.3%

Energy Efficient Investment
9.4%

Natural Capital Valuation
5.5%

Environment, Social And Governance (ESG) Analytics
8.7%

Greentech Venture Capital
3.2%

Green Bonds
5.8%

Green Loans
4.7%

Green Insurance
8.4%

With respect to impact, Energy Efficient Investment, Disinvestment from Fossil Fuels, and Green Insurance are rated as the areas of green finance with most impact. GreenTech Venture Capital, Carbon Disclosure, and Green Bonds are ranked lowest on this measure by our respondents.

Chart 41 | Impact - Percentage Of Total Mentions
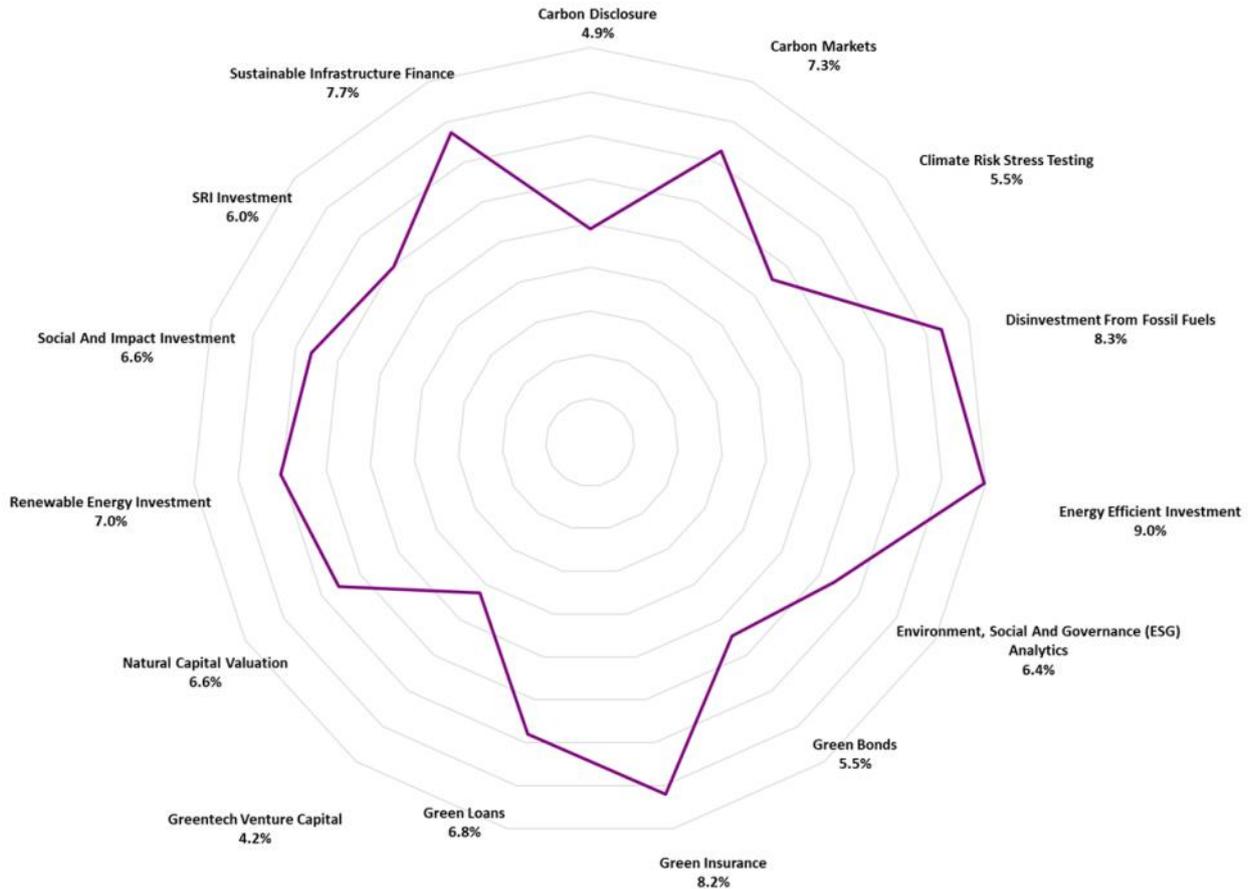
Chart 42 | The Correlation Between Interest And Impact
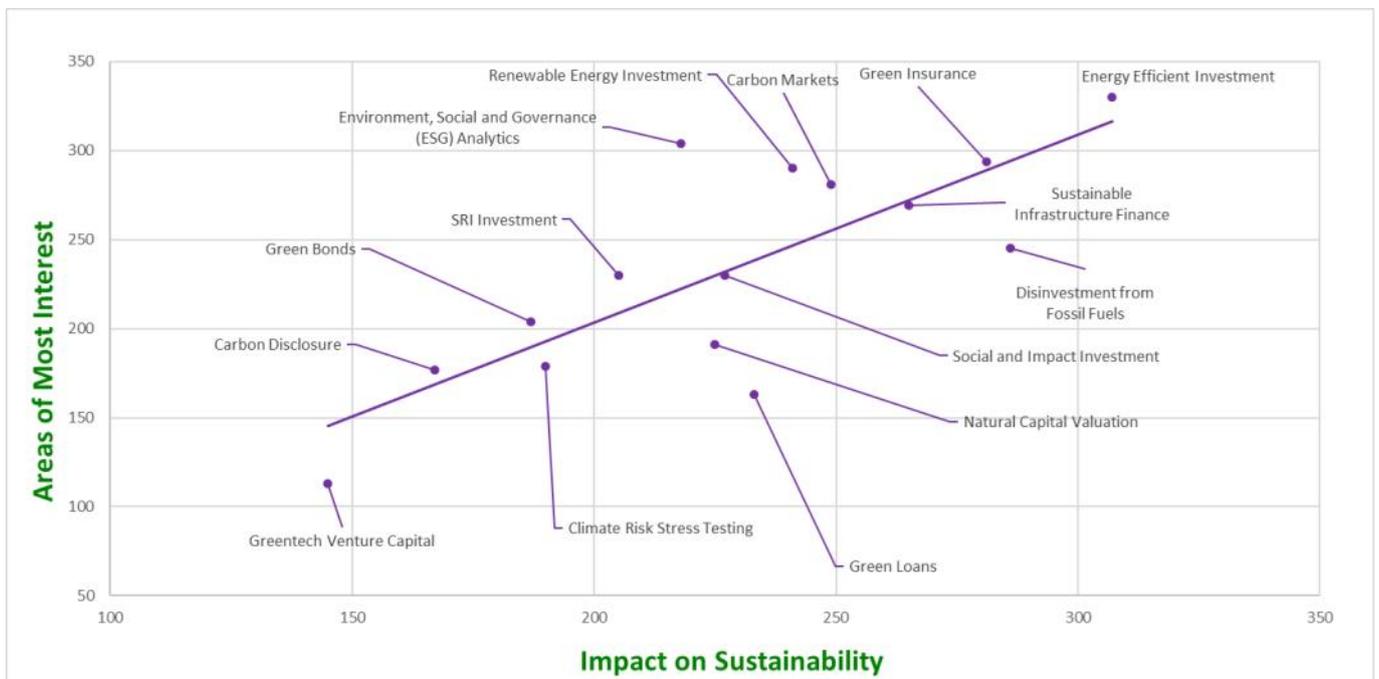
With respect to drivers, Risk Management Frameworks, International Initiatives, and Renewables are seen as the most important drivers of green finance. Air Quality, NGO Activism, and Loss Of Biodiversity are mentioned least frequently. These results underline the continuing importance of international cooperation in the development of green finance, alongside risk management as, for example, insurance risks rise.

Chart 43 | Drivers - Percentage Of Total Mentions
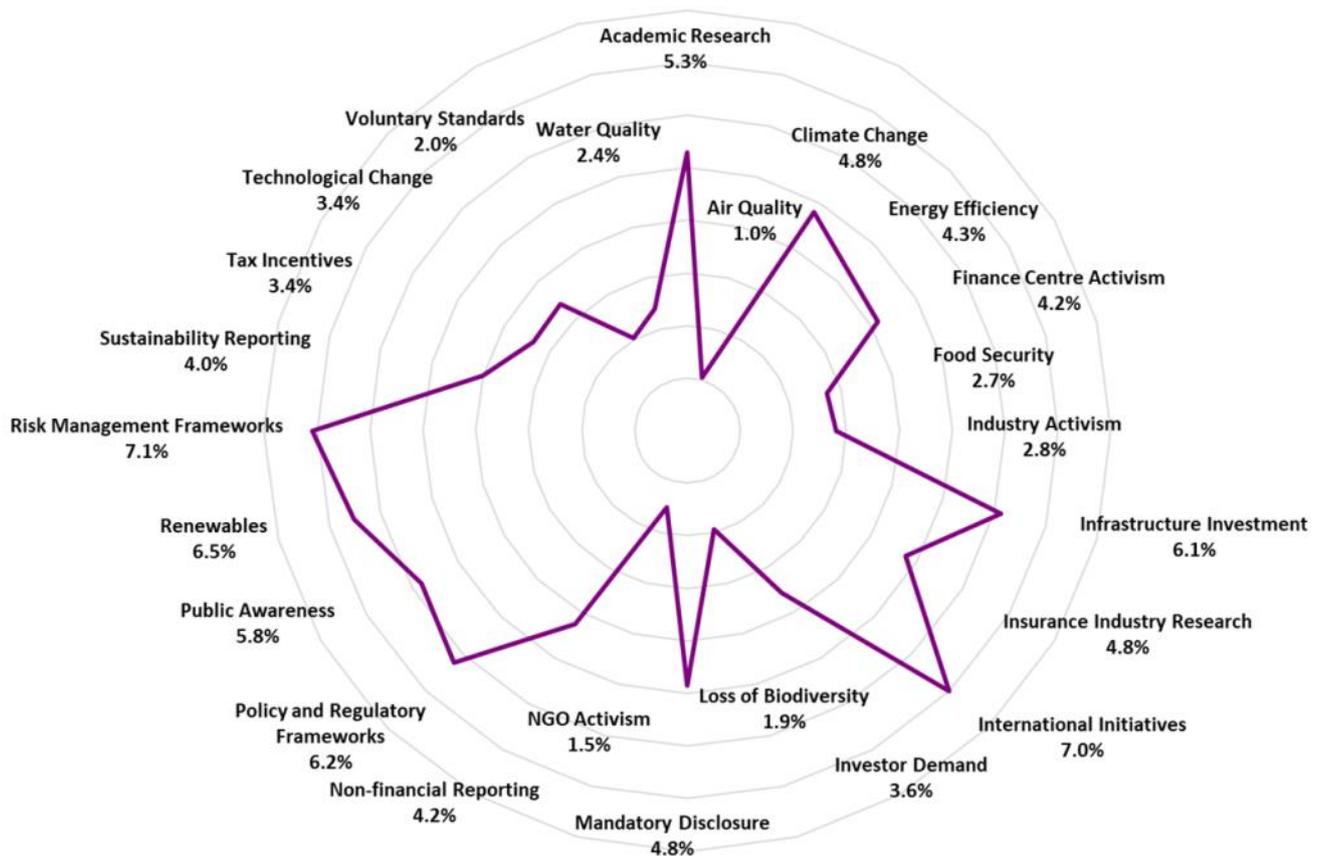
We also asked respondents to the GGFI survey to indicate in which sectors hydrogen is likely to replace fossil fuel as a primary fuel source. The results are shown in chart 44, with steel production and chemical industries mentioned most frequently.

Chart 44 | Hydrogen Futures
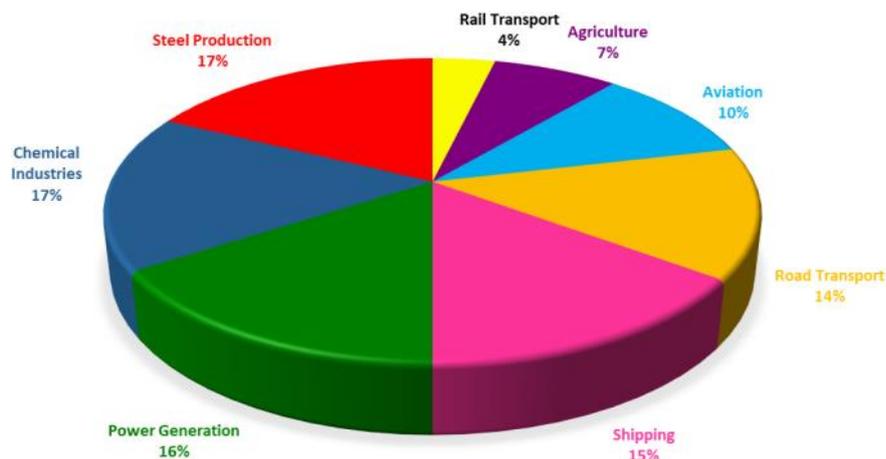
Appendix 1: Assessment Details

Table 18 | Details Of GGFI 13 Assessments By Centre

Centre	GGFI 13 Rank	Rating	Assessments Number	Average	Std Dev
London	1	648	154	743	203
Geneva	2	646	56	731	161
Zurich	3	644	56	705	232
New York	4	642	214	753	238
Singapore	5	641	117	714	189
Luxembourg	6	640	76	708	175
Washington DC	7	639	129	799	184
Los Angeles	8	637	99	789	156
Stockholm	9	636	42	718	170
Montreal	10	635	50	796	189
Chicago	11	634	80	739	174
San Francisco	12	631	65	781	164
Copenhagen	13	630	25	713	146
Oslo	14	629	20	786	122
Amsterdam	15	628	58	666	223
Toronto	16	627	79	718	170
Paris	17	626	83	668	218
Lugano	18	625	27	717	173
San Diego	19	624	24	798	192
Frankfurt	20	623	78	676	196
Vancouver	21	622	61	735	125
Seoul	22	621	51	717	114
Sydney	23	620	73	721	169
Edinburgh	24	619	40	682	153
Shenzhen	25	618	36	770	146
Boston	26	617	67	691	204
Madrid	27	616	58	699	135
Shanghai	28	615	79	739	224
Dubai	29	614	111	564	247
Busan	30	613	29	638	199
Beijing	31	612	98	684	218
Melbourne	32	611	35	744	214
Munich	33	610	32	681	217
Hamburg	34	609	25	677	214
Wellington	35	608	10	765	172
Brussels	36	607	49	679	213
Hong Kong	37	606	79	560	222
Abu Dhabi	38	605	56	463	238
Qingdao	39	604	588	861	53
Vienna	40	603	19	579	216
Tokyo	41	602	75	702	185
Berlin	42	601	47	661	224
Casablanca	43	600	23	517	227
Glasgow	44	599	33	707	217
Milan	45	598	32	659	195
Osaka	46	597	24	678	195
Atlanta	47	596	36	685	192
Calgary	48	595	56	722	156

Centre	GGFI 13 Rank	Rating	Assessments Number	Average	Std Dev
Philadelphia	49	594	34	753	125
Guangzhou	50	593	25	670	193
Lisbon	51	592	23	679	186
Tel Aviv	52	591	21	621	180
Dublin	53	590	60	606	213
Rome	54	589	45	682	183
Helsinki	55	588	19	725	172
Santiago	56	587	12	635	178
Astana	57	586	33	557	226
Jersey	58	585	31	586	205
Miami	59	584	27	572	240
Doha	60	583	41	579	233
Isle of Man	61	582	31	635	246
Guernsey	62	581	34	581	200
Kuala Lumpur	63	580	40	609	194
Kaunas	64	578	32	732	105
Jakarta	65	577	29	574	227
GIFT City-Gujarat	66	576	16	688	286
Johannesburg	67	575	50	552	225
Sao Paulo	68	574	25	624	225
Manila	69	573	26	561	202
Prague	70	572	35	620	184
Riga	71	571	31	723	132
Bangkok	72	570	26	559	226
Rio de Janeiro	73	569	13	567	206
Malta	74	568	35	644	179
New Delhi	75	567	23	627	297
Monaco	76	566	25	662	220
Mexico City	77	565	24	533	197
Mauritius	78	561	44	560	252
Liechtenstein	79	560	20	635	199
Cape Town	80	559	42	563	182
Kigali	81	558	40	544	244
Sofia	82	556	24	723	129
Riyadh	83	554	15	462	218
Warsaw	84	550	29	512	229
Istanbul	85	549	29	565	166
Cyprus	86	548	29	508	209
Mumbai	87	547	38	453	215
Bermuda	88	543	28	566	202
Moscow	89	542	35	607	251
Almaty	90	541	14	575	210
British Virgin Islands	91	540	44	474	198
Cayman Islands	92	537	34	449	181
Lagos	93	536	39	475	224
Bahamas	94	535	32	451	204
Bahrain	95	534	22	499	180
Nairobi	96	531	43	499	198

Table 19 | Details Of Ratings For The GGFI Dimensions By Centre

Centre	Overall Rank	Depth Rating	Quality Rating	Centre	Overall Rank	Depth Rating	Quality Rating
London	1	319	329	Philadelphia	49	295	299
Geneva	2	318	328	Guangzhou	50	297	296
Zurich	3	317	327	Lisbon	51	290	302
New York	4	317	325	Tel Aviv	52	293	298
Singapore	5	316	325	Dublin	53	292	298
Luxembourg	6	315	325	Rome	54	292	297
Washington DC	7	316	323	Helsinki	55	292	296
Los Angeles	8	316	321	Santiago	56	286	301
Stockholm	9	315	321	Astana	57	285	301
Montreal	10	316	319	Jersey	58	296	289
Chicago	11	312	322	Miami	59	290	294
San Francisco	12	313	318	Doha	60	282	301
Copenhagen	13	310	320	Isle of Man	61	294	288
Oslo	14	316	313	Guernsey	62	294	287
Amsterdam	15	310	318	Kuala Lumpur	63	283	297
Toronto	16	309	318	Kaunas	64	279	299
Paris	17	310	316	Jakarta	65	283	294
Lugano	18	307	318	GIFT City-Gujarat	66	287	289
San Diego	19	310	314	Johannesburg	67	289	286
Frankfurt	20	311	312	Sao Paulo	68	287	287
Vancouver	21	311	311	Manila	69	282	291
Seoul	22	310	311	Prague	70	281	291
Sydney	23	310	310	Riga	71	283	288
Edinburgh	24	307	312	Bangkok	72	279	291
Shenzhen	25	314	304	Rio de Janeiro	73	284	285
Boston	26	308	309	Malta	74	278	290
Madrid	27	307	309	New Delhi	75	282	285
Shanghai	28	308	307	Monaco	76	280	286
Dubai	29	301	313	Mexico City	77	280	285
Busan	30	307	306	Mauritius	78	280	281
Beijing	31	305	307	Liechtenstein	79	274	286
Melbourne	32	305	306	Cape Town	80	276	283
Munich	33	305	305	Kigali	81	272	286
Hamburg	34	301	308	Sofia	82	275	281
Wellington	35	303	305	Riyadh	83	267	287
Brussels	36	300	307	Warsaw	84	278	272
Hong Kong	37	297	309	Istanbul	85	266	283
Abu Dhabi	38	298	307	Cyprus	86	269	279
Qingdao	39	300	304	Mumbai	87	272	275
Vienna	40	299	304	Bermuda	88	265	278
Tokyo	41	294	308	Moscow	89	272	270
Berlin	42	303	298	Almaty	90	270	271
Casablanca	43	290	310	British Virgin Islands	91	265	275
Glasgow	44	298	301	Cayman Islands	92	267	270
Milan	45	298	300	Lagos	93	265	271
Osaka	46	292	305	Bahamas	94	271	264
Atlanta	47	297	299	Bahrain	95	250	284
Calgary	48	294	301	Nairobi	96	265	266

Appendix 2: Interest, Impact, And Drivers Details

Table 20 | Areas Of Green Finance With The Greatest Impact

Area of Green Finance	Number Of Mentions	Percentage Of Total
Energy Efficient Investment	307	9.0%
Disinvestment From Fossil Fuels	286	8.3%
Green Insurance	281	8.2%
Sustainable Infrastructure Finance	265	7.7%
Carbon Markets	249	7.3%
Renewable Energy Investment	241	7.0%
Green Loans	233	6.8%
Social And Impact Investment	227	6.6%
Natural Capital Valuation	225	6.6%
Environment, Social And Governance (ESG) Analytics	218	6.4%
SRI Investment	205	6.0%
Climate Risk Stress Testing	190	5.5%
Green Bonds	187	5.5%
Carbon Disclosure	167	4.9%
Greentech Venture Capital	145	4.2%
Totals	**3,426**	**100.0%**

Table 21 | Areas Of Green Finance Of Most Interest To Respondents

Area of Green Finance	Number Of Mentions	Percentage Of Total
Energy Efficient Investment	330	9.4%
Environment, Social And Governance (ESG) Analytics	304	8.7%
Green Insurance	294	8.4%
Renewable Energy Investment	290	8.3%
Carbon Markets	281	8.0%
Sustainable Infrastructure Finance	269	7.7%
Disinvestment From Fossil Fuels	245	7.0%
Social and Impact Investment	230	6.6%
SRI Investment	230	6.6%
Green Bonds	204	5.8%
Natural Capital Valuation	191	5.5%
Climate Risk Stress Testing	179	5.1%
Carbon Disclosure	177	5.1%
Green Loans	163	4.7%
Greentech Venture Capital	113	3.2%
Totals	**3,500**	**100.0%**

Table 22 | Drivers Of Green Finance

Driver	Number of Mentions	Percentage Of Total
Risk Management Frameworks	244	7.1%
International Initiatives	241	7.0%
Renewables	225	6.5%
Policy and Regulatory Frameworks	215	6.2%
Infrastructure Investment	211	6.1%
Public Awareness	200	5.8%
Academic Research	182	5.3%
Mandatory Disclosure	167	4.8%
Climate Change	165	4.8%
Insurance Industry Research	164	4.8%
Energy Efficiency	148	4.3%
Non-financial Reporting	146	4.2%
Finance Centre Activism	143	4.2%
Sustainability Reporting	138	4.0%
Investor Demand	123	3.6%
Technological Change	117	3.4%
Tax Incentives	116	3.4%
Industry Activism	97	2.8%
Food Security	94	2.7%
Water Quality	83	2.4%
Voluntary Standards	70	2.0%
Loss of Biodiversity	67	1.9%
NGO Activism	52	1.5%
Air Quality	36	1.0%
Totals	**3,444**	**100.0%**

Appendix 3: Respondents' Details

Table 23 | Respondents By Industry Sector

Industry Sector	Number Of Respondents	Percentage Of Respondents
Banking	64	7.19%
Debt Capital Market	34	3.82%
Equity Capital Markets	55	6.18%
Insurance	24	2.70%
Investment	76	8.54%
Knowledge	85	9.55%
Local Green Initiatives	45	5.06%
Policy and Public Finance	165	18.54%
Professional Services	99	11.12%
Trading	197	22.13%
Other	46	5.17%
Total	**890**	**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	133	14.94%
Working Part-time On Green Finance	354	39.78%
Interested in Green Finance	363	40.79%
Other/not given	40	4.49%
Total	**890**	**100.00%**

Table 25 | Respondents By Region

Region	Number Of Respondents	Percentage Of Respondents
Asia/Pacific	438	49.21%
Western Europe	200	22.47%
Eastern Europe & Central Asia	10	1.12%
North America	76	8.54%
Middle East & Africa	102	11.46%
Latin America & The Caribbean	18	2.02%
Multi-Regional	46	5.17%
Total	**890**	**100.00%**

Table 26 | Respondents By Size Of Organisation

Size of Organisation	Number Of Respondents	Percentage Of Respondents
<100	188	21.12%
100-500	78	8.76%
500-1000	66	7.42%
1000-2000	128	14.38%
2000-5000	113	12.70%
>5000	272	30.56%
Other/not given	45	5.06%
Total	**890**	**100.00%**

Table 27 | Respondents By Gender

Gender	Number Of Respondents	Percentage Of Respondents
Female	256	28.76%
Male	381	42.81%
Other	3	0.34%
Prefer not to say/not given	250	28.09%
Total	**890**	**100.00%**

Table 28 | Respondents By Age

Age Band	Number Of Respondents	Percentage Of Respondents
18-30	161	18.09%
30-45	281	31.57%
45-60	161	18.09%
60+	42	4.72%
Other/not given	245	27.53%
Total	**890**	**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 rating.

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 129 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 127 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 13. This means that not all 127 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
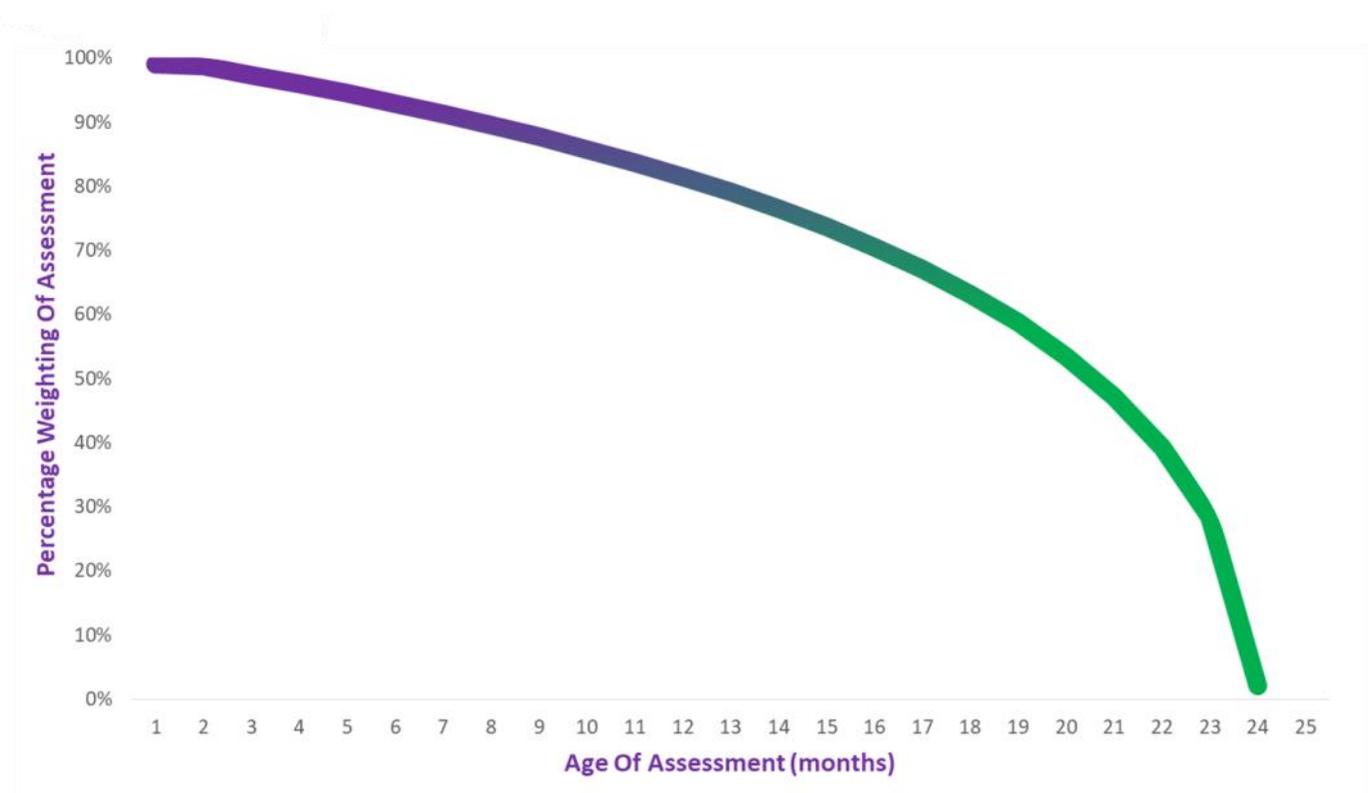
Instrumental Factor Data

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.
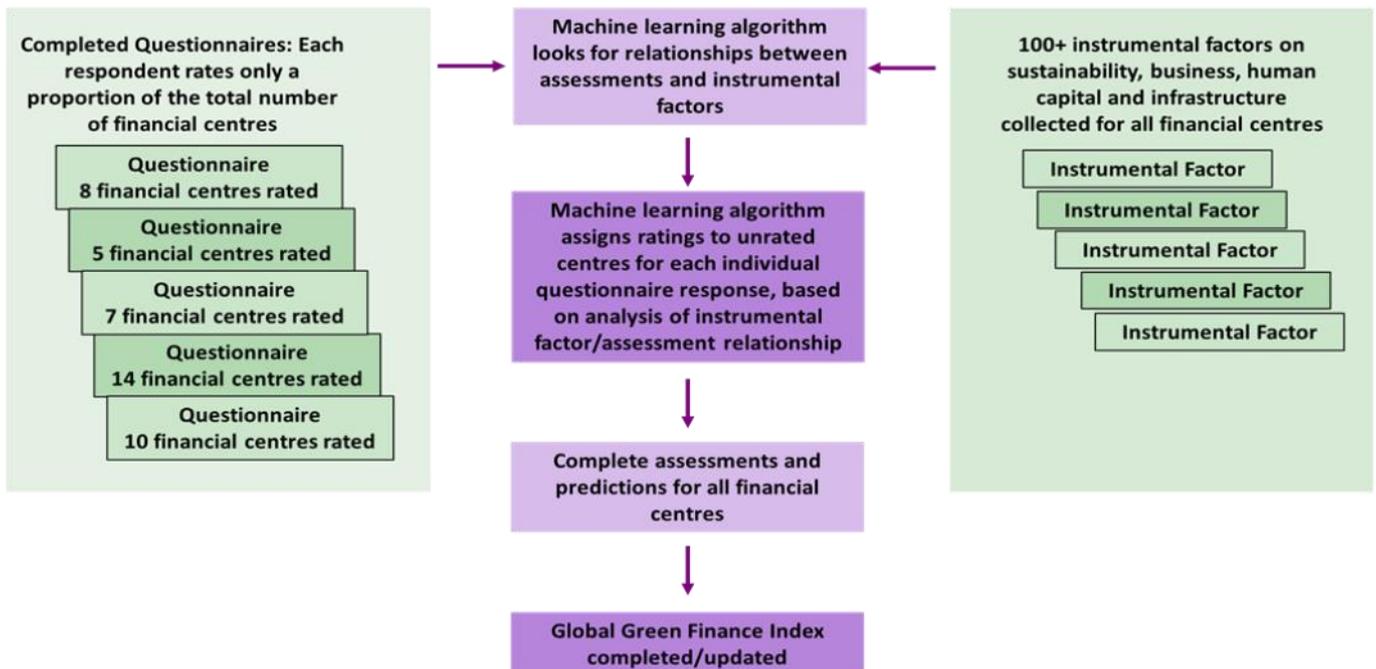
The rules on the use of instrumental factor data in the model are as follows:
- updates to the indices are collected and collated every six months;
- no weightings are applied to indices;
- indices are entered into the GGFI model as directly as possible, whether this is a rank, a derived score, a value, 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

Instrumental Factors	R-squared
Urban Mobility Readiness Index	0.644
Sustainable Cities Index	0.589
IESE Cities In Motion Index	0.586
Quality Of Living City Rankings	0.544
Energy Transition Index	0.491
Sustainable Economic Development	0.478
World Energy Trilemma Index	0.399
The Green Future Index	0.369
Global Sustainable Competitiveness Index	0.325
The Global Green Economy Index	0.301
Environmental Performance	0.229
Quality of Life Index	0.204
Buildings Energy Efficiency Policies Database (Y/N)	0.194
Pollution Index	0.184
Proportion Of Population Using Safely-Managed Drinking-Water Services (%)	0.181
Global Green Growth Index	0.171
Share Of Wind And Solar In Electricity Production	0.137
City Commitment To Carbon Reduction (Cooperative Action)	0.098
CO2 Emissions Per Capita	0.074
Stock Exchanges With A Green Bond Segment (Y/N)	0.073
Share Of Renewables In Electricity Production	0.051
Energy Intensity Of GDP	0.037
Sovereign Green Bond (Y/N)	0.032
City Commitment To Carbon Reduction (Individual Action)	0.016
Forestry Area	0.016
Protected Land Area % Of Land Area	0.015
Sustainable Stock Exchanges (Y/N)	0.009
Average Precipitation In Depth (mm Per Year)	0.003
Average Precipitation In Depth (mm Per Year)	0.001

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

Instrumental Factors	R-squared
The Global Financial Centres Index	0.731
Safe Cities Index	0.650
Global Innovation Index	0.645
Urban Mobility Readiness Index	0.644
Sustainable Cities Index	0.589
IESE Cities In Motion Index	0.586
Travel & Tourism Development Index	0.576
Quality Of Living City Rankings	0.544
International IP Index	0.543
Logistics Performance Index	0.541
Legatum Prosperity Index	0.538
Corruption Perception Index	0.528
Adjusted Net National Income Per Capita	0.522
JLL Real Estate Transparency Index	0.517
Government Effectiveness	0.495
Energy Transition Index	0.491
Business Environment Rankings	0.491
OECD Country Risk Classification	0.486
Smart City Index	0.483
Global Competitiveness Index	0.481
Sustainable Economic Development	0.478
Internation Construction Cost Index	0.453
Fintech Activity Index	0.449
Cost Of Living City Rankings	0.440
Innovation Cities Global Index	0.438
Quality Of Road Infrastructure	0.436
Quality Of Domestic Transport Network	0.426
World Talent Rankings	0.426
World Competitiveness Scoreboard	0.413
Purchasing Power Index	0.409

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	N
Buildings Energy Efficiency Policies Database (Y/N)	IEA	https://www.iea.org/policies	N
City Commitment To Carbon Reduction (Cooperative Action)	UNFCCC	https://climateaction.unfccc.int/	N
City Commitment To Carbon Reduction (Individual Action)	UNFCCC	https://climateaction.unfccc.int/	N
Co2 Emissions Per Capita	World Bank	https://databank.worldbank.org/reports.aspx?source=2&series=EN.ATM.CO2E.PC&country=#	N
Energy Intensity Of GDP	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	N
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	N
Forestry Area	World Bank	http://databank.worldbank.org/data/reports.aspx?source=2&series=AG.LND.FRST.ZS&country=	N
Global Green Growth Index	GGGI	https://greengrowthindex.gggi.org/wp-content/uploads/2022/12/2021-Green-Growth-Index-1.pdf	N
Global Sustainable Competitiveness Index	Solability	http://solability.com/the-global-sustainable-competitiveness-index/the-index	Y
IESE Cities In Motion Index	IESE	http://citiesinmotion.iese.edu/indicecim/?lang=en	N
Pollution Index	Numbeo	https://www.numbeo.com/pollution/rankings.jsp	N
Proportion Of Population Using Safely-Managed Drinking-Water Services (%)	WHO	https://www.who.int/data/gho/publications/world-health-statistics	N
Protected Land Area % Of Land Area	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=2&series=ER.LND.PTLD.ZS&country=	N
Quality Of Life Index	Numbeo	http://www.numbeo.com/quality-of-life/rankings.jsp	Y
Quality Of Living City Rankings	Mercer	https://mobilityexchange.mercer.com/Insights/quality-of-living-rankings	N
Share Of Renewables In Electricity Production	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	N
Share Of Wind And Solar In Electricity Production	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	N
Sovereign Green Bond (Y/N)	Climate Bonds	https://www.climatebonds.net/2021/11/cop26-briefing-sovereign-green-bond-issuance-takes-start-long-boom	N
Stock Exchanges With A Green Bond Segment (Y/N)	CBI	https://www.climatebonds.net/green-bond-segments-stock-exchanges	N
Sustainable Cities Index	Arcadis	https://www.arcadis.com/en/global/our-perspectives/sustainable-cities-index-2018/citizen-centric-cities/	N
Sustainable Economic Development	Boston Consulting Group	https://www.bcg.com/en-gb/publications/2021/prioritizing-societal-well-being-seda-report	N
Sustainable Stock Exchanges (Y/N)	UN Sustainable Stock Exchange Initiative	https://sseinitiative.org/members/	N
World Energy Trilemma Index	World Energy Council	https://trilemma.worldenergy.org/	Y
Urban Mobility Readiness Index	Oliver Wyman	https://www.oliverwymanforum.com/mobility/urban-mobility-readiness-index/rankings.html	Y
The Green Future Index	MIT Technology Review	https://www.technologyreview.com/2023/04/05/1070581/the-green-future-index-2023/	N
The Global Green Economy Index	Dual Citizen	https://dualcitizeninc.com/global-green-economy-index/	N

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	N
Corruption Perception Index	Transparency International	https://www.transparency.org/en/cpi/2023	Y
Cost Of Living City Rankings	Mercer	https://www.mercer.com/our-thinking/career/cost-of-living.html	N
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	N
Employees Working Very Long Hours	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	N
English Proficiency	Education First	https://www.ef.com/wwen/epi/	Y
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/2023	Y
Global Health Security Index	Nuclear Threat Initiative, Johns Hopkins Center for Health Security, and Economist Impact	https://www.ghsindex.org/	N
Global Innovation Index	INSEAD	http://www.globalinnovationindex.org/content.aspx?page=GII-Home	Y
Global Peace Index	Institute for Economics & Peace	https://www.visionofhumanity.org/maps/#/	N
Global Skills Index	Coursera	https://www.coursera.org/skills-reports/global	N
Global Terrorism Index	Institute for Economics & Peace	https://www.visionofhumanity.org/wp-content/uploads/2022/03/GTI-2022-web-09062022.pdf	N
Good Country Index	Good Country Party	https://www.goodcountry.org/index/results	N
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/dp-intentional-homicide-victims	Y
Household Net Financial Wealth	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	N
Human Development Index	UN Development Programme	https://hdr.undp.org/content/human-development-report-2021-22	N
Human Freedom Index	Cato Institute	https://www.cato.org/human-freedom-index	N
Individual Income Tax Rates	KPMG	https://home.kpmg/vg/en/home/services/tax1/tax-tools-and-resources/tax-rates-online/individual-income-tax-rates-table.html	N
Innovation Cities Global Index	2ThinkNow Innovation Cities	https://innovation-cities.com/world-city-rankings/	Y
International Ip Index	GIPC	https://www.uschamber.com/intellectual-property/2023-international-ip-index	N
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	N
Linguistic Diversity	Ethnologue	https://www.ethnologue.com/guides/countries-most-languages	N
Number Of High Net Worth Individuals	Capgemini	https://www.worldwealthreport.com/	N
Number Of International Association Meetings	World Economic Forum	http://reports.weforum.org/travel-and-tourism-competitiveness-report-2019/rankings/#series=NRFAIREX	Y
OECD Country Risk Classification	OECD	http://www.oecd.org/trade/topics/export-credits/documents/cre-crc-current-english.pdf	Y
Open Government	World Justice Project	http://worldjusticeproject.org/rule-of-law-index	Y
Patent Applications, Residents	The World Bank	https://data.worldbank.org/indicator/IP.PAT.RESD?end=2020&start=1980	N
People Near Services	ITDP	https://pedestriansfirst.itdp.org/	N
Personal Tax Rates	OECD	https://stats.oecd.org/index.aspx?DataSetCode=TABLE_I6	N
Political Stability And Absence Of Violence/Terrorism	The World Bank	http://info.worldbank.org/governance/wgi/	N

Table 32 | (Continued) Human Capital Factors

Instrumental Factor	Source	Website	Updated
Press Freedom Index	Reporters Without Borders (RSF)	https://rsf.org/en/index?year=2023	N
Prime International Residential Index	Knight Frank	https://www.knightfrank.com/research/report-library/the-wealth-report-2023-10000.aspx	Y
Purchasing Power Index	Numbeo	https://www.numbeo.com/quality-of-life/rankings.jsp?title=2023&displayColumn=1	N
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=#	N
Top Tourism Destinations	Euromonitor	https://go.euromonitor.com/white-paper-travel-211202-top-100-city-destinations-index.html	N
Travel & Tourism Development Index	WEF	https://www3.weforum.org/docs/WEF_Travel_Tourism_Development_2021.pdf	New
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
Bilateral Tax Information Exchange Agreements	OECD	http://www.oecd.org/ctp/exchange-of-tax-information/taxinformationexchangeagreementstieas.htm	N
Broad Stock Index Levels	The World Federation of Stock Exchanges	https://focus.world-exchanges.org/issue/september-2023	Y
Business Environment Rankings	EIU	http://country.eiu.com/All	N
Capitalisation Of Stock Exchanges	The World Federation of Stock Exchanges	https://focus.world-exchanges.org/issue/september-2023	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
Country Brand Ranking	Bloom Consulting	https://www.bloom-consulting.com/en/pdf/rankings/Bloom_Consulting_Country_Brand_Ranking_Tourism.pdf	N
Democracy Index	The Economist	https://www.eiu.com/n/campaigns/democracy-index-2022/	N
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
Economic Freedom	The Heritage Foundation	https://www.heritage.org/index/ranking	N
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	N
FDI Inward Stock (In Million Dollars)	UNCTAD	https://unctad.org/publication/world-investment-report-2023	Y
Financial Secrecy Index	Tax Justice Network	http://www.financialsecrecyindex.com/	N
Fintech Activity Index	World Bank	https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099735504212234006/p1730060695b370090908c0bf80ed27eba6	N
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/2023/global-business-complexity-index/	Y
Global Connectedness Index	DHL	https://www.dhl.com/global-en/spotlight/globalization/global-connectedness-index.html	N
Global Services Location	AT Kearney	https://www.kearney.com/service/digital/gsli	N

Table 33 | (Continued) Business Factors

Instrumental Factor	Source	Website	Updated
Government Debt As % Of GDP	IMF	https://www.imf.org/external/datamapper/ GG_DEBT_GDP@GDD/SWE	Y
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	Y
Level Of Internet Freedom	Freedom House	https://freedomhouse.org/countries/freedom-net/scores	Y
Net External Positions Of Banks	The Bank for International Settlements	http://www.bis.org/statistics/annex_map.htm	Y
Office Occupancy Cost	CBRE Research	https://www.cbre.com/research-and-reports/Global-Prime-Office-Occupancy-Costs-2019	N
Open Budget Survey	International Budget Partnership	http://survey.internationalbudget.org/#download	N
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
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/	N
Trace Bribery Risk Matrix	Trace International	https://matrixbrowser.traceinternational.org/	Y
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/september-2023	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/centers/wcc/world-competitiveness-center/rankings/world-competitiveness-ranking/2023/	N

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/	Y
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
Internation Construction Cost Index	Arcadis	https://www.arcadis.com/en/knowledge-hub/perspectives/global/international-construction-costs	New
JLL Real Estate Transparency Index	Jones Lang LaSalle	https://www.jll.co.uk/en/trends-and-insights/research/global-real-estate-transparency-index	N
Liner Shipping Connectivity Index	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=2&series=IS.SHP.GCNW.XQ	N
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	N
Quality Of Domestic Transport Network	World Economic Forum	https://www.weforum.org/reports/travel-and-tourism-development-index-2021/	N
Quality Of Road Infrastructure	World Economic Forum	https://www.weforum.org/reports/travel-and-tourism-development-index-2021/	N
Railways Per Land Area	CIA	https://www.cia.gov/the-world-factbook/field/railways/country-comparison	N
Refined Oil Products Production	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	N
Roadways Per Land Area	CIA	https://www.cia.gov/the-world-factbook/field/roadways/country-comparison	N
Smart City Index	IMD	https://www.imd.org/smart-city-observatory/smart-city-index/	Y
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/	N

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

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

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

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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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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

DIFC

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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SEOUL METROPOLITAN GOVERNMENT

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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Busan Finance Center

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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G T
Global Times Consulting

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

Global Times Consulting Co. adopts a research and knowledge-based approach. With extensive contacts and deep insights into China's political and economic landscape, we develop and execute integrated programs for stakeholder relations and reputation management. Our extensive relationship with media and government organizations in China and worldwide helps us successfully execute programs and achieve desired goals.

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

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

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

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Approved by the China's State Council, China Development Institute (CDI) was founded in 1989 with 116 representatives from the government, academia and business in China. Being an independent think tank, CDI is committed to develop policy solutions via research and debates that help to advance China's reform and opening-up. After years of development, CDI has become one of the leading think tanks in China. CDI focuses on the studies of open economy and innovation-driven development, regional economy and regional development, industrial policies and industrial development, urbanization and urban development, business strategies and investment decision-making. Via conducting research, CDI provides policy recommendations for the Chinese governments at various levels and develops consultation for corporate sectors at home and abroad. CDI organizes events in different formats that evokes dialogue among scholars, government officials, business people and civil society members around the globe. Based in Shenzhen, Southern China, CDI has one hundred and sixty staff, with an affiliated network that consists of renowned experts from different fields.

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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.

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

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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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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.

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

www.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.