



# The Global Green Finance Index 3



March 2019



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

The GGFI has been developed jointly by Z/Yen, as part of its Long Finance Initiative, and Finance Watch. We are grateful to the MAVA Foundation for its sponsorship of this work.

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

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

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

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

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



## Foreword

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

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

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

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

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



**Nicolas Mackel,**  
**Chief Executive Officer**  
**Luxembourg For Finance**



## Preface

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



**Benoît Lallemand**  
**Secretary General**  
**Finance Watch**



## Summary And Headlines

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

The assessments were combined with 131 Instrumental factors (126 in GGFI 2) to give an overall rating for each centre. These instrumental factors are quantitative measures provided by third parties, including Corporate Knights, the Climate Bonds Initiative, the World Health Organisation, the World Bank, and many others.

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

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

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

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

Our intention is that the GGFI should chart the progress of the world's financial centres towards a financial system that delivers sustainable development, and values people and the planet as much as profit. The combination of instrumental factors and perceptions measured in this index, as in many other areas, can be a leading indicator of future activity. We believe that the index is one element of the work required to measure the development of green finance, by showing how green finance centres are evolving.

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

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



## Index Results

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

## Leading Centres

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

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<sup>1</sup> [https://www.moody.com/research/Moodys-Green-bond-market-poised-to-hit-200-billion-in--PBC\\_1159526?showPdf=true](https://www.moody.com/research/Moodys-Green-bond-market-poised-to-hit-200-billion-in--PBC_1159526?showPdf=true)

## Western Europe

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

## North America

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

## Asia/Pacific

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

## Middle East & Africa

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



## Latin America & The Caribbean

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

## Eastern Europe & Central Asia

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

## Relationship With Instrumental Factor Scores

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

## The Carbon Bubble

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

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

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

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

## Conclusions

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

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

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

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

**Yossi Cadan, 350.Org Global Campaigner on Divestment**

## GGFI 3 Ranks And Ratings

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

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

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

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

**Table 2 | Ranks And Ratings Of Green Finance Quality**

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

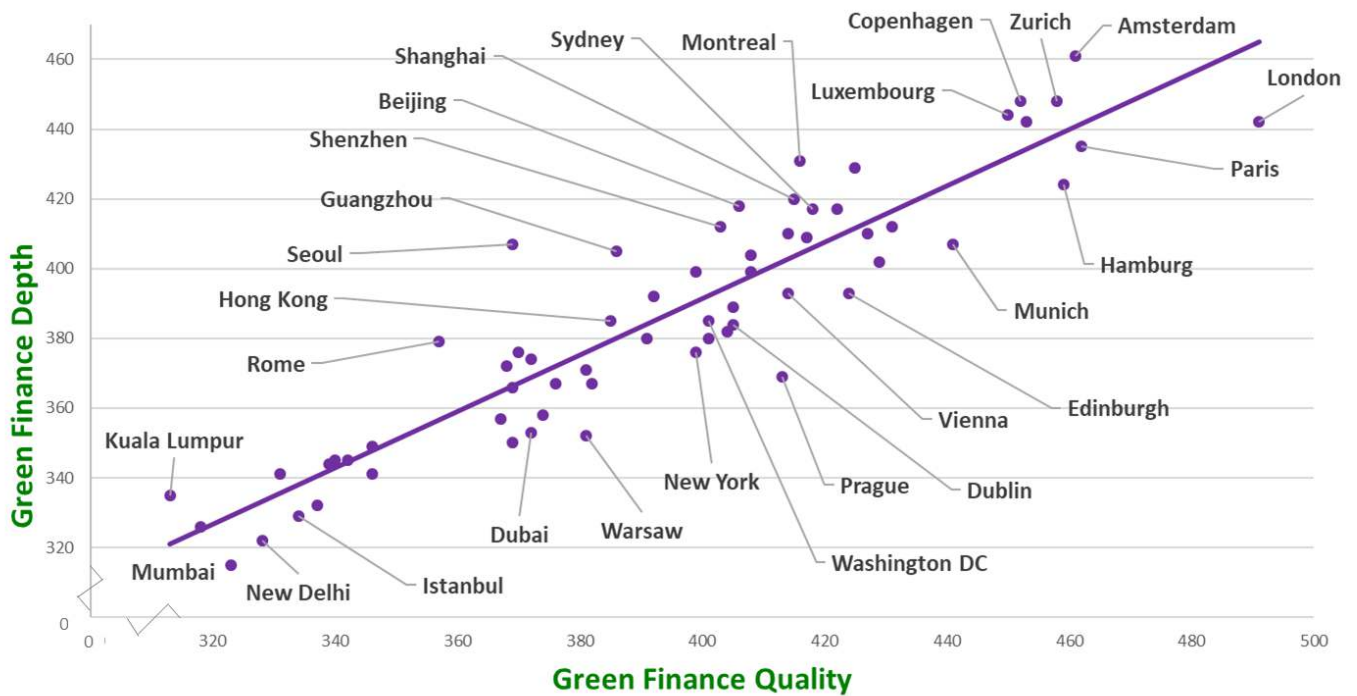
Table 2 (continued) | Ranks And Ratings Of Green Finance Quality

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



Chart 1 shows the relationship between ratings of depth and quality in the index. The ratings are low on both depth and quality. However, this chart shows the generally close correlation between the assessments of each factor by respondents.

**Chart 1 | Relationship Between Ratings Of Depth And Quality**



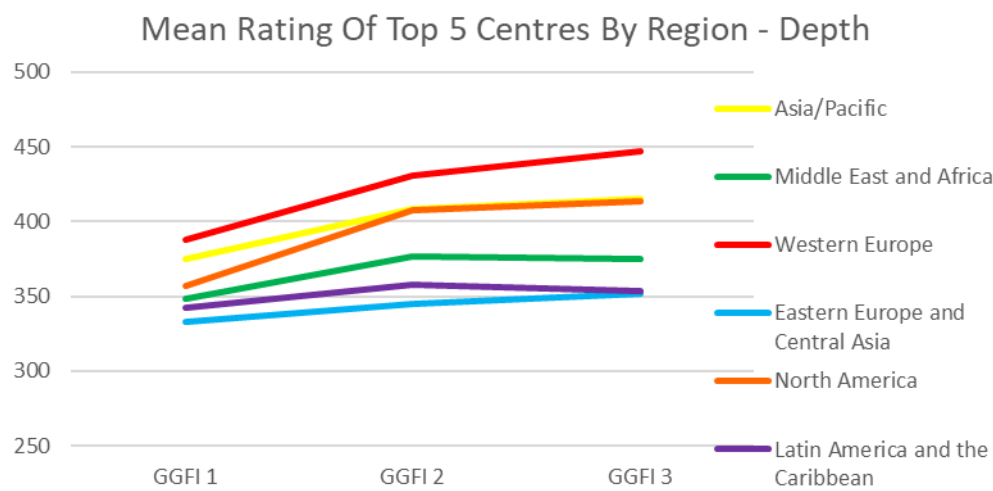
*"It is critical that we see rapid convergence towards agreed standards and definitions so that everyone is talking the same language on investment."*

Head of Global Affairs, Engineering & Design Company, London

# Regional Performance

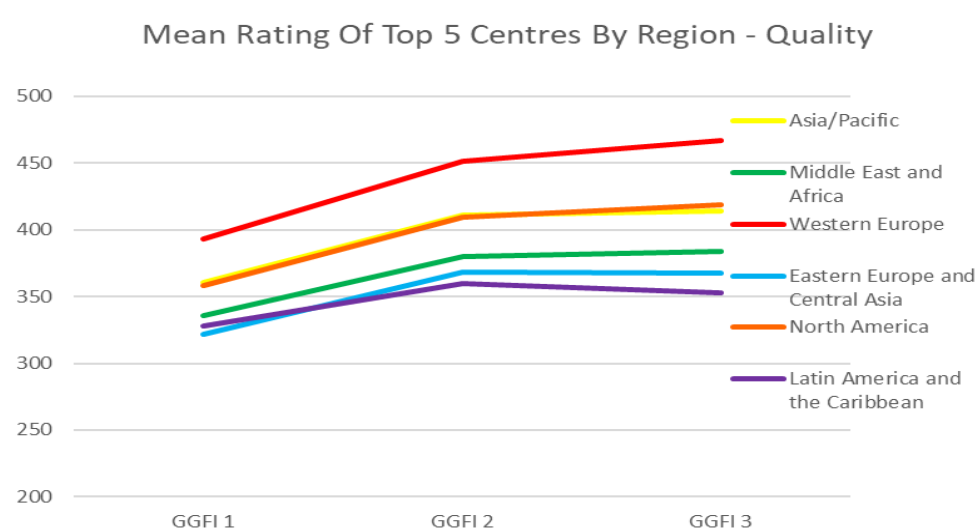
The top five centres in each region on average increased their ratings between GGFI 1 and GGFI 2 for depth. However, the average rating fell slightly for Latin America & The Caribbean and the Middle East & Africa between GGFI 2 and GGFI 3. Some of this is accounted for by new centres entering the index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

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



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

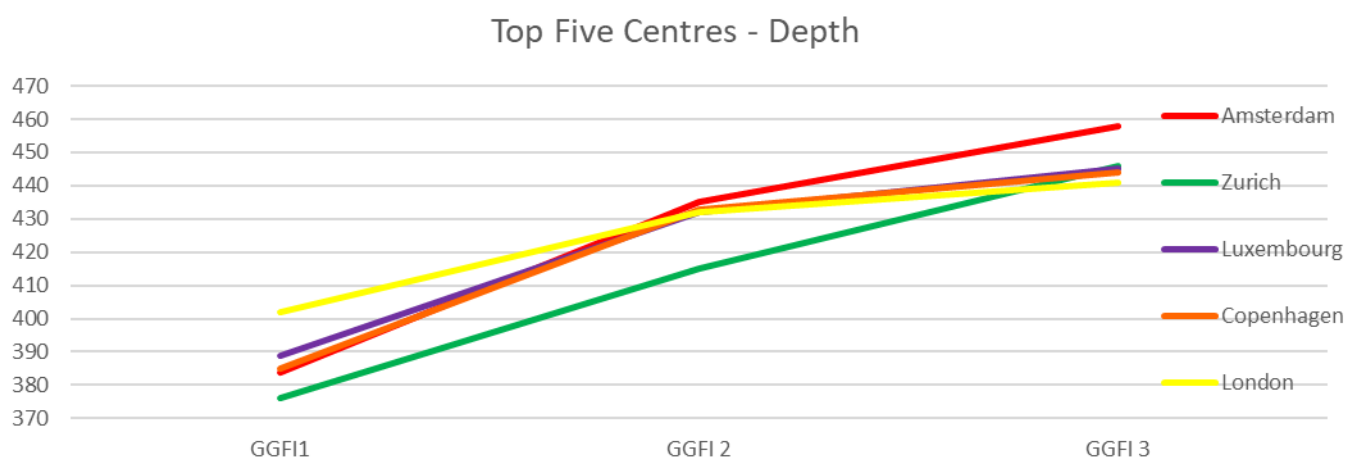
Chart 3 | Average Ratings For Quality Of The Top Five Centres In Each Region



# Top Five Centres

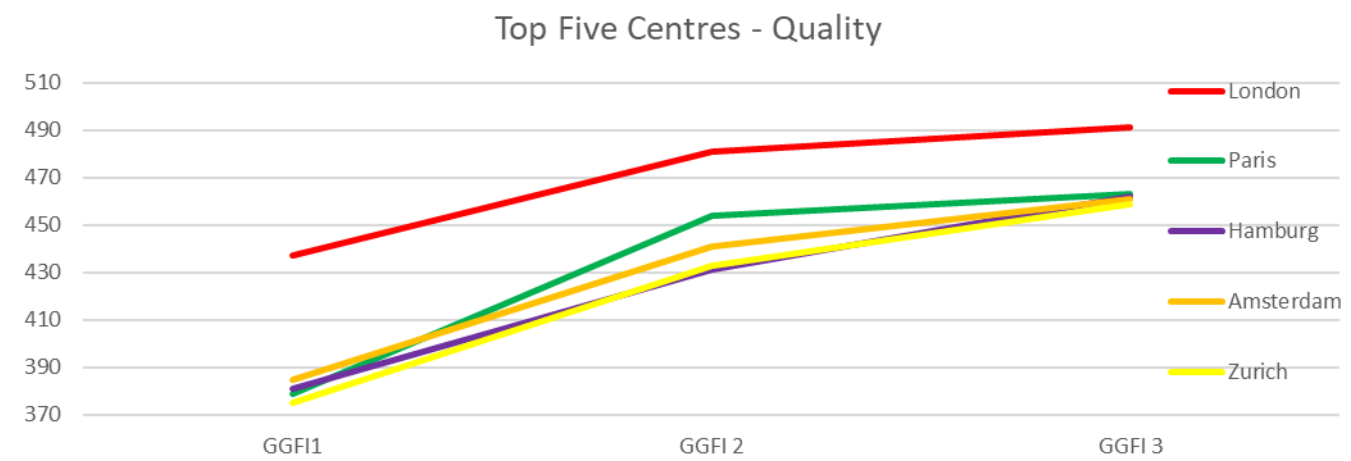
The top five centres in the index for depth improved their ratings in each edition of the GGFI. Zürich has enjoyed the strongest improvement across the three editions of the GGFI.

Chart 4 | The Top Five Centres For Depth Over Time



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

Chart 5 | The Top Five Centres For Quality Over Time

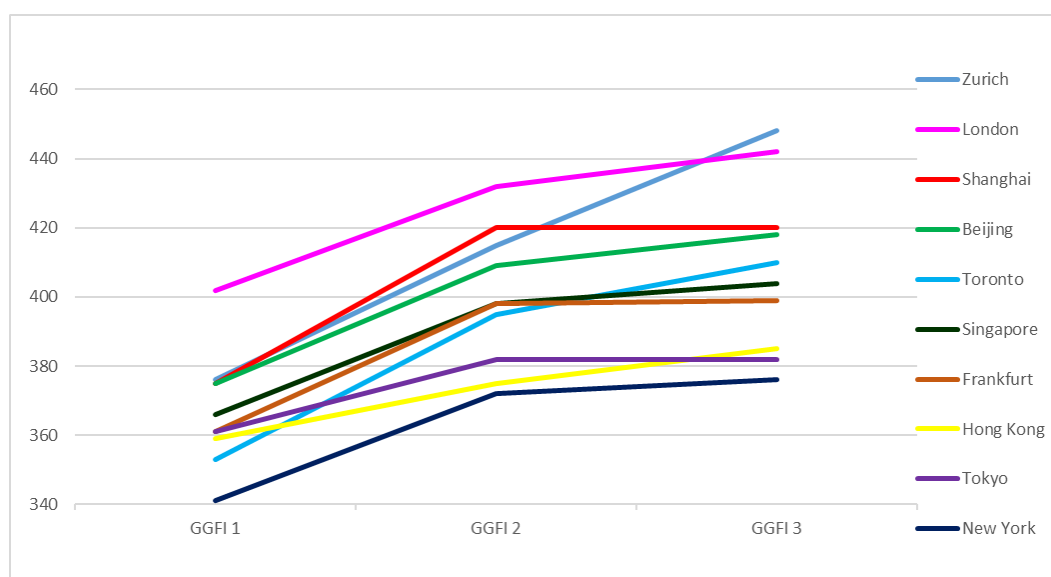


## Leading Financial Centres

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

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

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

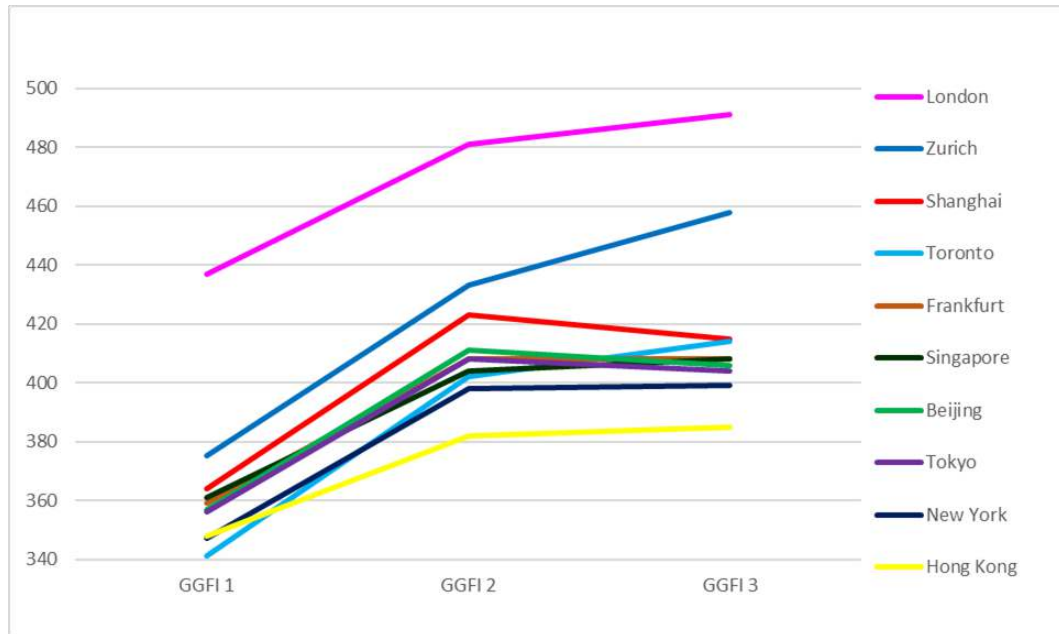


***“Taxation has the potential to be a game changer but governments seem reluctant to act.”***

**Sustainable Finance Lead, Banking, London**

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

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



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

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

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

## GGFI 3 Further Analysis

### Future Prospects

We asked respondents to identify which financial centres they thought would become more significant as green finance centres over the next two to three years. Table 4 shows the centres that were mentioned ten or more times. The only change in the list from GGFI 2 is the inclusion of Beijing. Despite being identified as being likely to become more significant, the centres other than New York and Beijing fell in the depth rankings, although generally their ratings improved. On quality, Paris, Singapore, and London retained their positions and increased their ratings, while Frankfurt, New York, Shanghai, and Beijing fell in the rankings.

#### Expected Change In Centres

We asked respondents whether the centres they rated would improve, decline, or stay the same in relation to their Green Finance offering over the next two to three years. The results are displayed in Chart 8 overleaf.

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

**Table 4 | Centres That Will Become More Significant**

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

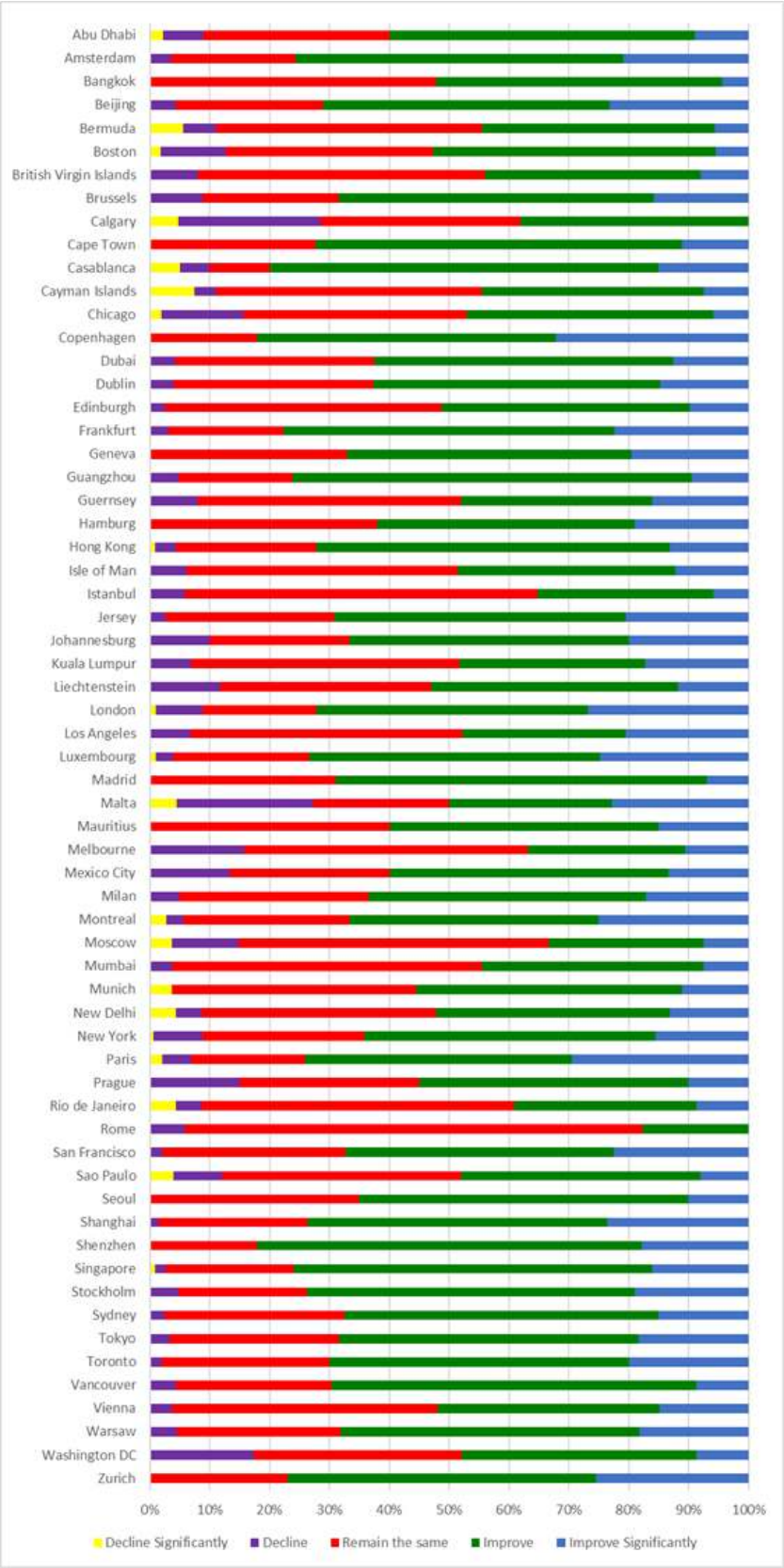
Luxembourg, Shanghai, Beijing, Malta, San Francisco, Frankfurt, Amsterdam, Jersey, Los Angeles, Toronto, and Johannesburg were each cited as likely to improve significantly by 20% or more of those who rated them.

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

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

**Managing Partner, Private Equity, Spain**

Chart 8 | Expected Change In Green Finance Offering





## Instrumental Factors

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

Table 5 shows the top ten instrumental factors in terms of their correlation with the ranking of depth and quality. It is notable that many of these factors are not specifically related to sustainability.

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

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

Focusing only on the instrumental factors which relate to sustainability, the factors most closely correlated in terms of their R Squared relationship with the GGFI rankings are set out in Table 6. Composite measures of quality of life are highly correlated, as is a new measure, Financial Centre Corporate Sustainability Performance.

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

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

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

**Table 7 | City Competitiveness Instrumental Factors By R Squared Correlation**

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

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

When all instrumental factors are taken into account, it is apparent that the factors that are prevalent in high performing green financial centres are similar to those for high performing international financial centres: good governance and regulation, a positive trade environment, and effective infrastructure.

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

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

**Global Head of Resilience and Sustainability, Insurance, London**

## Index Ranking For Sustainability

We have also conducted an analysis of the assessments provided by respondents using only the instrumental factors that have a direct relationship to sustainability. This analysis produces slightly different results to the main index, as shown in the comparison in Table 8. The plus and minus figures show the difference between the main index and the index using only sustainability factors.

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

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

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

**Carla Santos Skandier, The Democracy Collaborative**

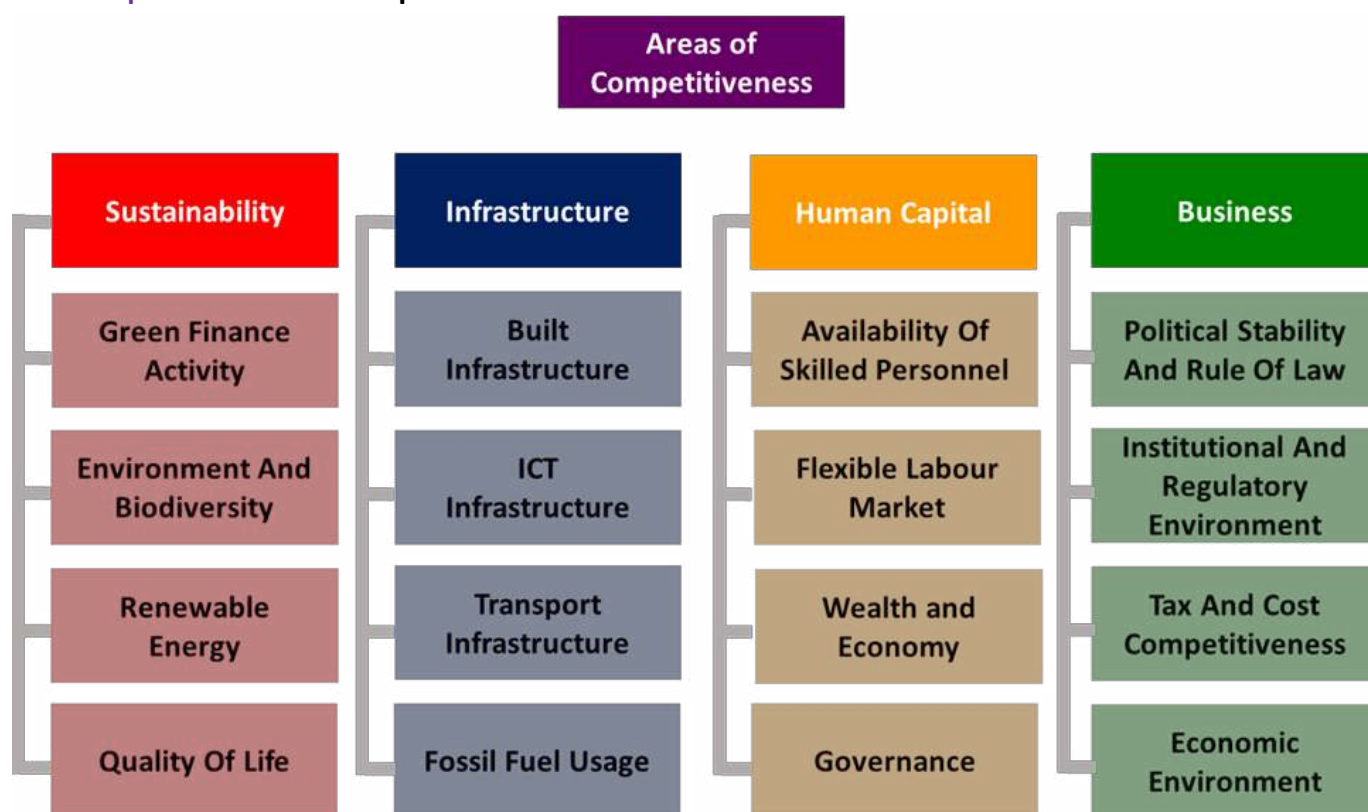
## Areas Of Competitiveness

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

- Sustainability
- Infrastructure
- Human Capital
- Business

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

**Chart 9 | GGFI Areas Of Competitiveness**



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

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

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

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

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

## Regulatory Factors

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

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

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

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

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

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

## Commentary On Factors

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

**Project Manager, Asset Management, Paris**

We asked respondents to the GGFI survey to comment on aspects of competitiveness that have a relationship with the development of green finance. Table 11 gives the areas, the number of comments received, and the main themes which arose.

On regulation, there was overall support for policy and regulatory measures to drive green finance, with some saying that progress should be faster. Action taken by central banks was noted as important and respondents mentioned the EU Action Plan On Sustainable Finance, Article 173 in France and the Task Force On Climate Disclosure as significant. Many respondents favoured mandatory disclosure. There was also significant support for carbon pricing, and the need for the commercial sector to set high standards themselves.

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

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

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

**Table 11 | Commentary On Areas Of Competitiveness**

| Area Of Competitiveness                     | Number Of Mentions | Main Themes   |
|---|--------------------|---|
| Regulatory Environment                      | 219                | <ul style="list-style-type: none"> <li>• Support for regulatory measures to drive the development of green finance</li> <li>• Mandatory disclosure generally supported</li> </ul>   |
| Taxation                                    | 165                | <ul style="list-style-type: none"> <li>• Tax incentives generally seen as useful</li> <li>• A carbon tax or tax incentives aimed towards green technology or green finance instruments might be helpful</li> <li>• Some of those commenting suggested that tax incentives would be detrimental</li> </ul> |
| The Availability Of Skills In Green Finance | 199                | <ul style="list-style-type: none"> <li>• Support for more training and qualifications</li> <li>• Lack of skills may limit the market</li> </ul>   |



## Connectivity

One factor where financial centres' green finance performance differs is the extent to which centres are connected to other financial centres.

One way of measuring this connectivity is to look at the number of assessments given to and received from other centres. Charts 10 and 11 use New York and San Francisco as examples to contrast the different levels of connectivity that the two centres enjoy.

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

**Chart 10 | GGFI 3 Connectivity - New York**

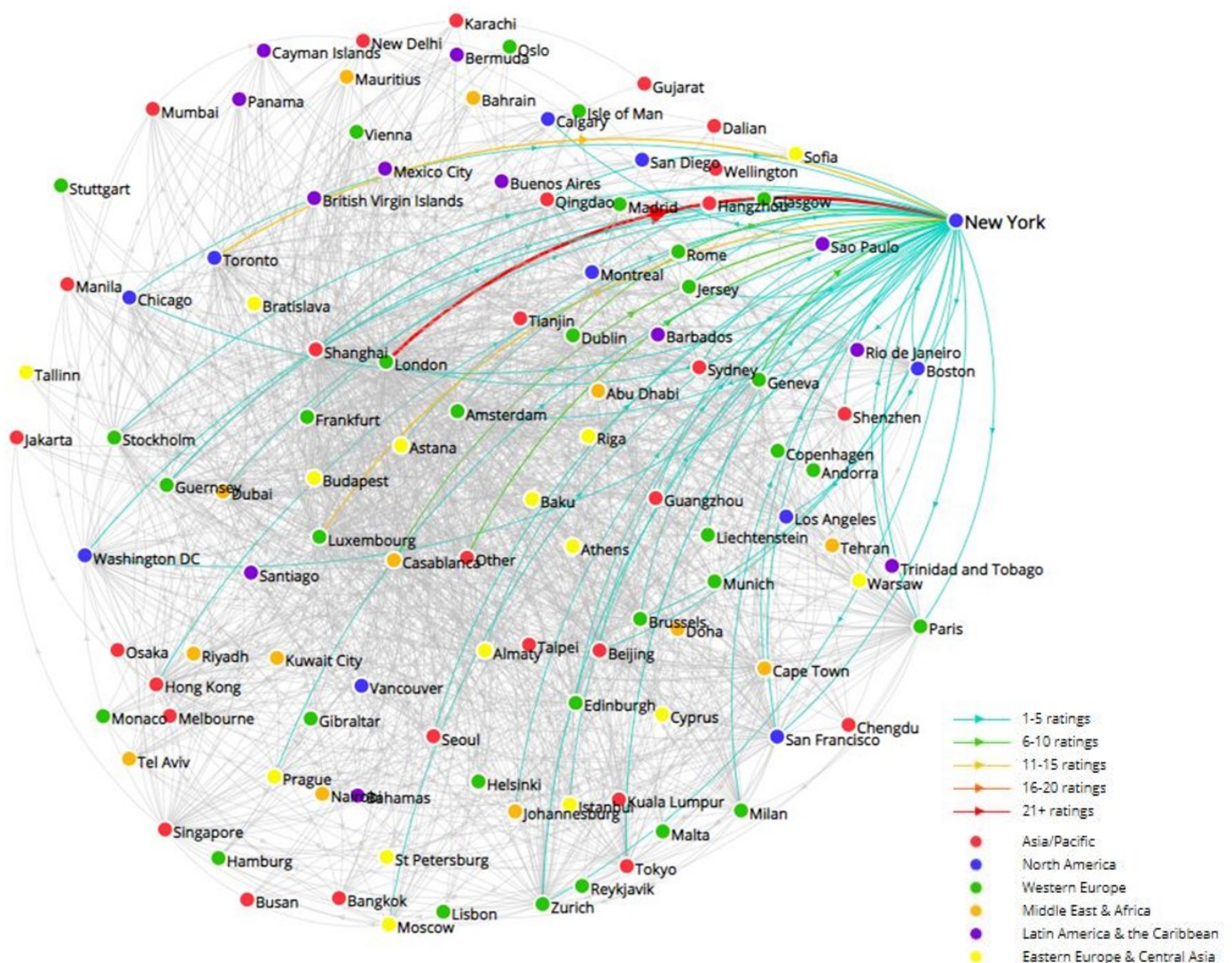
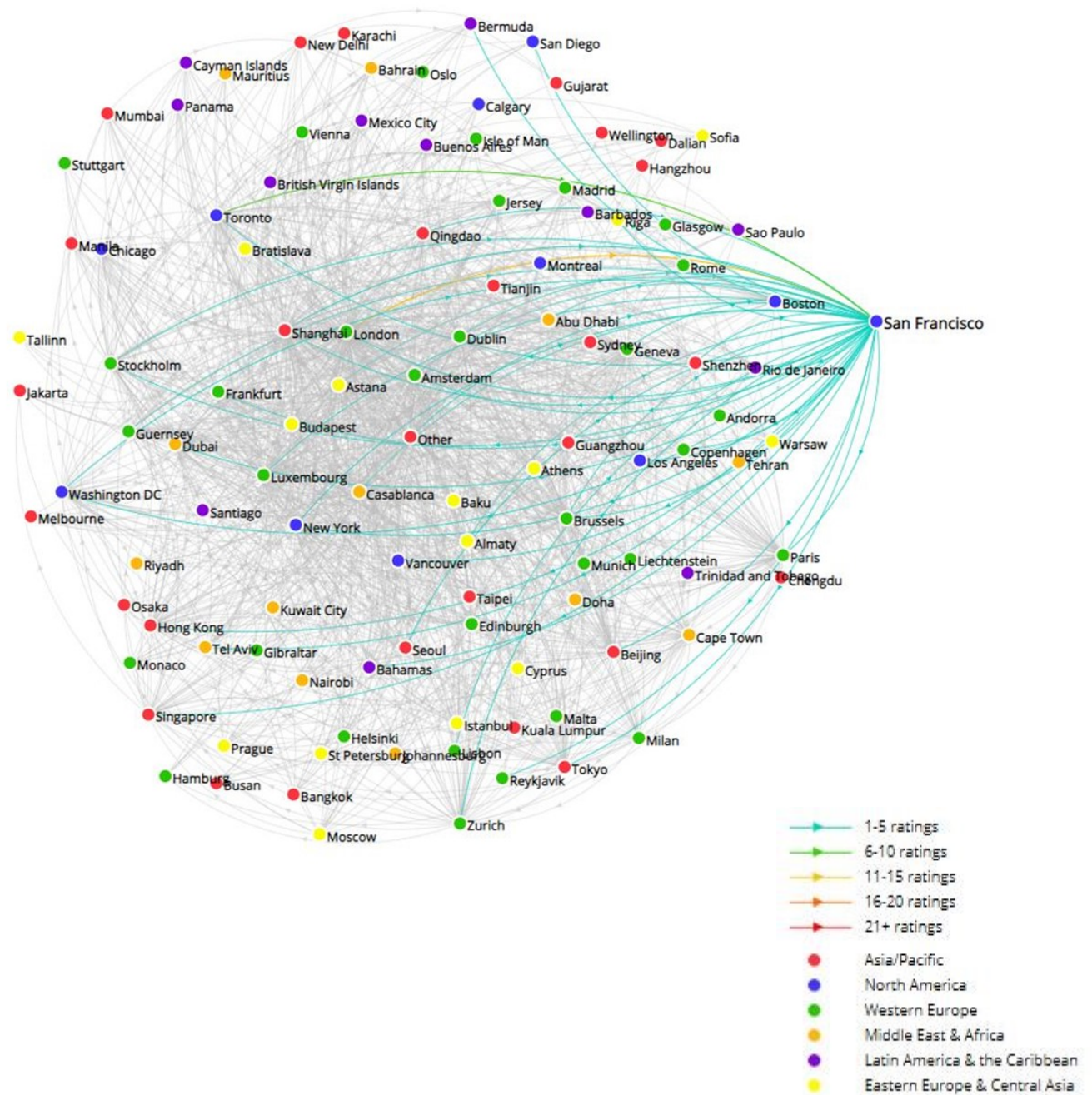


Chart 11 | GGFI 3 Connectivity - San Francisco



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

Analyst, ESG and SRI Consultancy, Beijing

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

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

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

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

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

**Partner, Accountancy, Luxembourg**

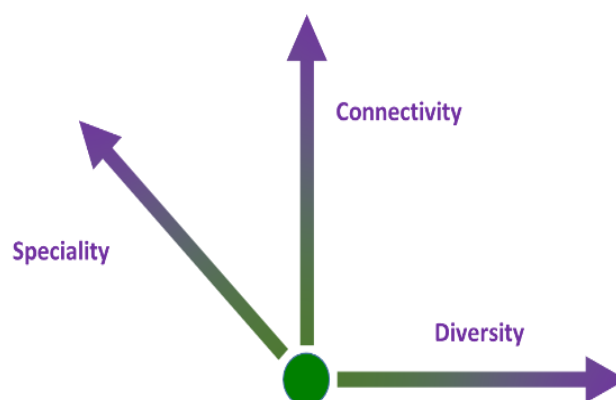
## Financial Centre Profiles

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

**'Connectivity'** – the extent to which a centre is well known among GGFI survey respondents, based on the number of 'inbound' assessment locations (the number of locations from which a particular centre receives assessments) and 'outbound' assessment locations (the number of other centres assessed by respondents from a particular centre).

We classify centres as follows:

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



**'Diversity'** – the instrumental factors used in the GGFI model give an indication of a broad range of factors that influence the richness and evenness of factors that characterise any particular financial centre. We consider this span of factors to be measurable in a similar way to that of the natural environment. We therefore use a combination of biodiversity indices (calculated on the instrumental factors) to assess a centre's diversity, taking account of the range of factors against which the centre has been assessed – the 'richness' of the centre's business environment; and the 'evenness' of the distribution of that centre's scores. A high score means that a centre is well diversified; a low diversity score reflects a less rich business environment.

**'Speciality'** – the depth within a financial centre of green finance and sustainability. A centre's 'speciality' or performance is calculated from the difference between the overall GGFI rating and the ratings when the model is calculated based only on sustainability factors.

In Tables 13 and 14, 'Diversity' (Breadth) and 'Speciality' (Depth) are combined on one axis to create a two dimensional table of financial centre profiles, first for depth and second for quality. The 63 centres in GGFI 3 are assigned a profile on the basis of a set of rules for the three measures: how well connected a centre is, how broad its services are, and how specialised it is.

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



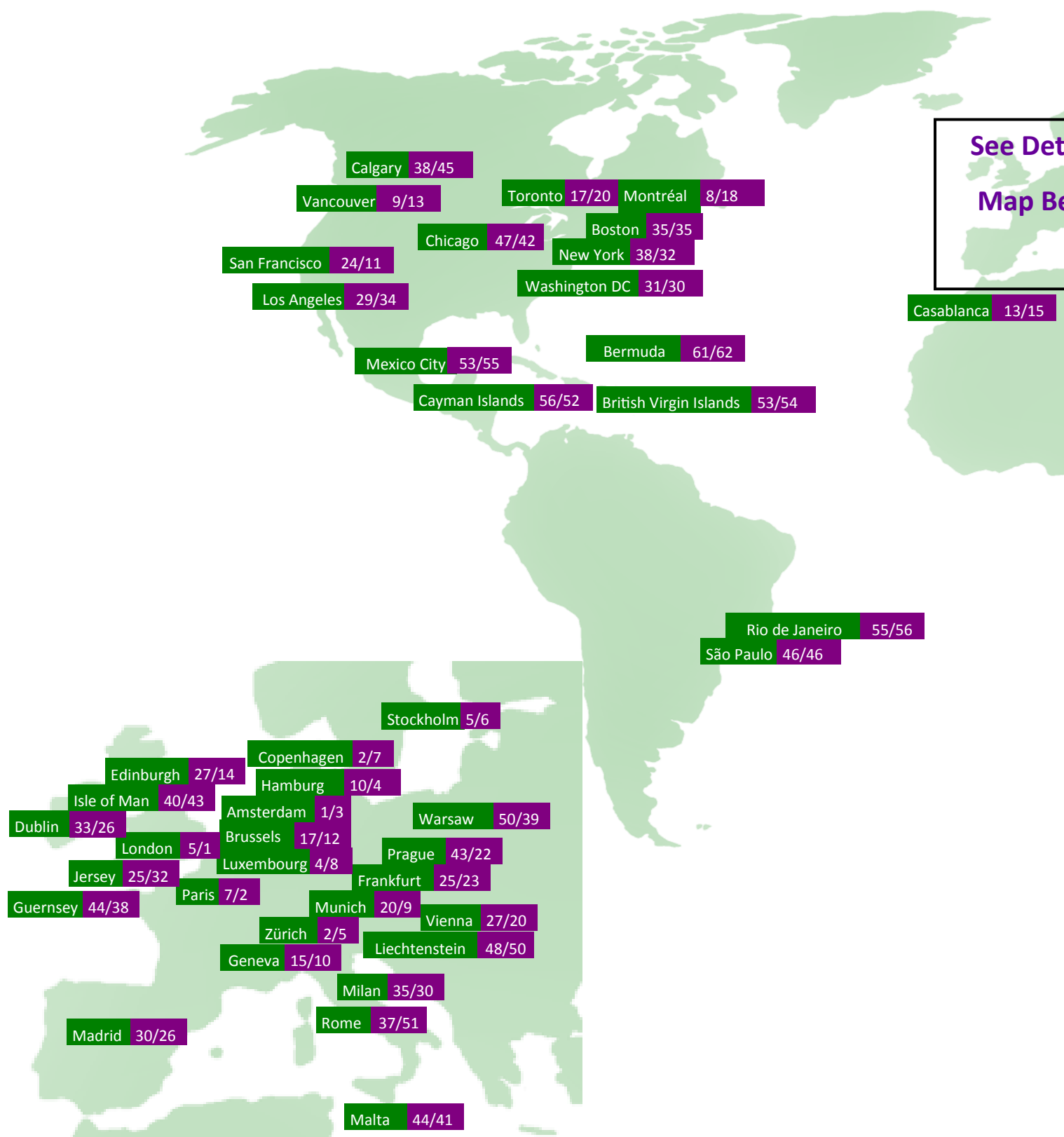
Table 13 | Financial Centre Profiling - Depth

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

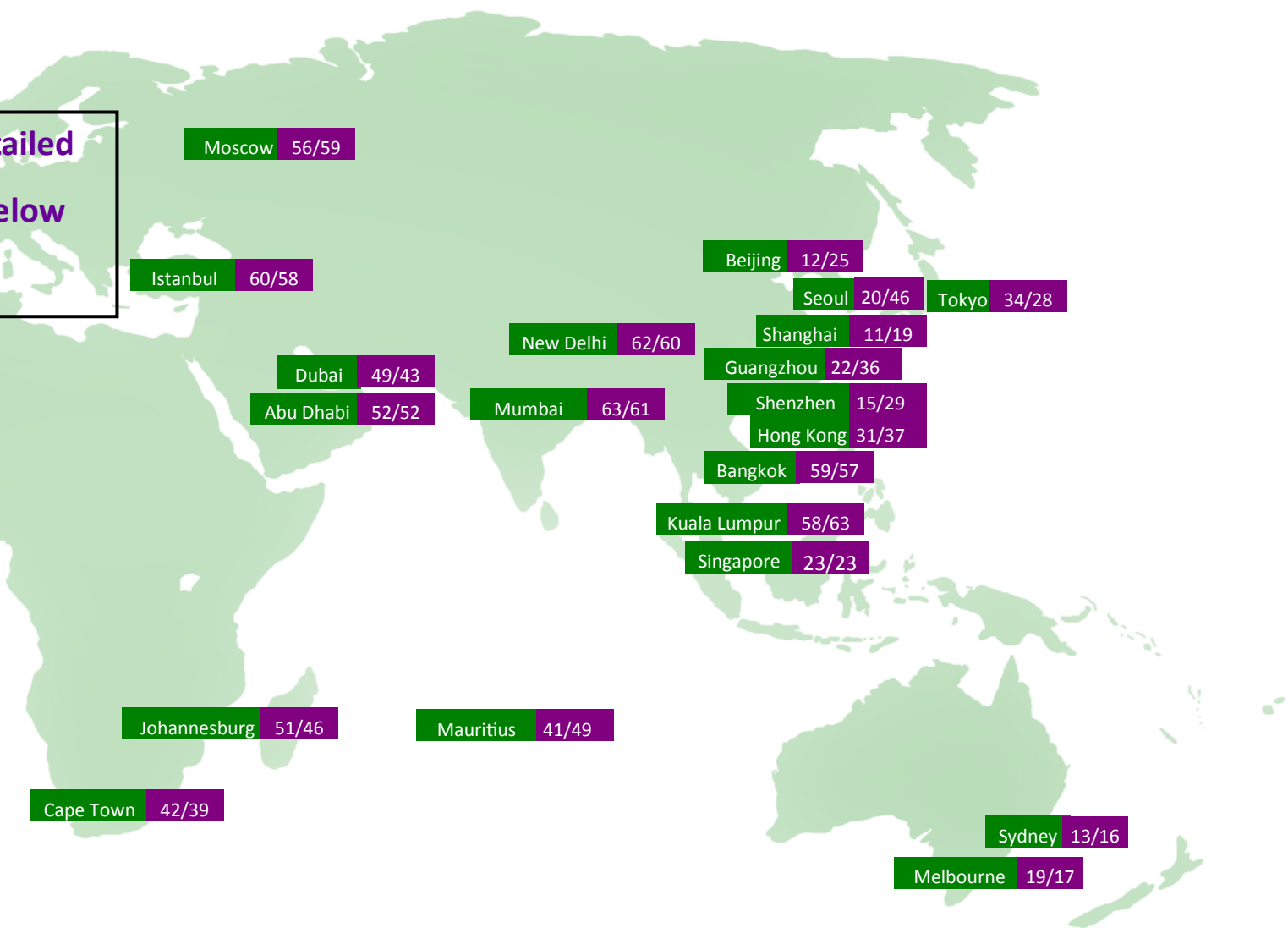
Table 14 | Financial Centre Profiling - Quality

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

## The GGFI 3 World - Centres In The Index







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

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

## Focus On Disinvestment: Value And Values In A Warming World

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

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

### Introduction

The use of investment decisions to support social causes has a long and proud history. From the stance taken on the abolition of slavery by the Society of Friends<sup>2</sup> in the 18<sup>th</sup> and 19<sup>th</sup> Centuries, through "Campaign GM"<sup>3</sup> which forced the General Motors Company to take an active stance on social responsibility in the 1970s<sup>3</sup>, to the Methodist Church's leadership role on socially responsible investment<sup>4</sup>, and the rise of sharia finance in the 1990s and early 21<sup>st</sup> century<sup>5</sup>, investors have sought to use their power for good.

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

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

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

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

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

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

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

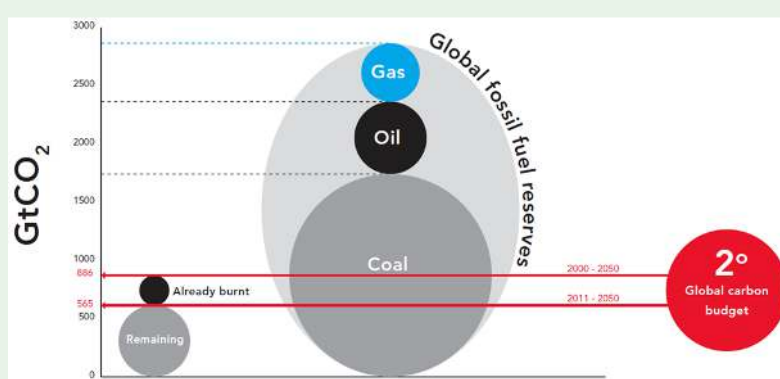
## Spotting The Carbon Bubble

In 2006, the Long Finance team questioned the sense of having fossil fuel assets on balance sheets at full value. Some straightforward calculations at that time, not taking account of fracking or shale gas, showed that burning the total fuel reserves then shown as assets on the balance sheets of listed companies, would result in CO<sub>2</sub> levels in the atmosphere around 1,200 parts per million (ppm). This is well above any 2 degree scenario which at the time projected that CO<sub>2</sub> levels would need to be restricted to around 450 ppm<sup>7</sup>.

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

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

Figure 1: Global 2°C Carbon Budget Vs Fossil Fuel Reserves CO<sub>2</sub> Emissions Potential



Source: Carbon Tracker Initiative 2011<sup>8</sup>

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

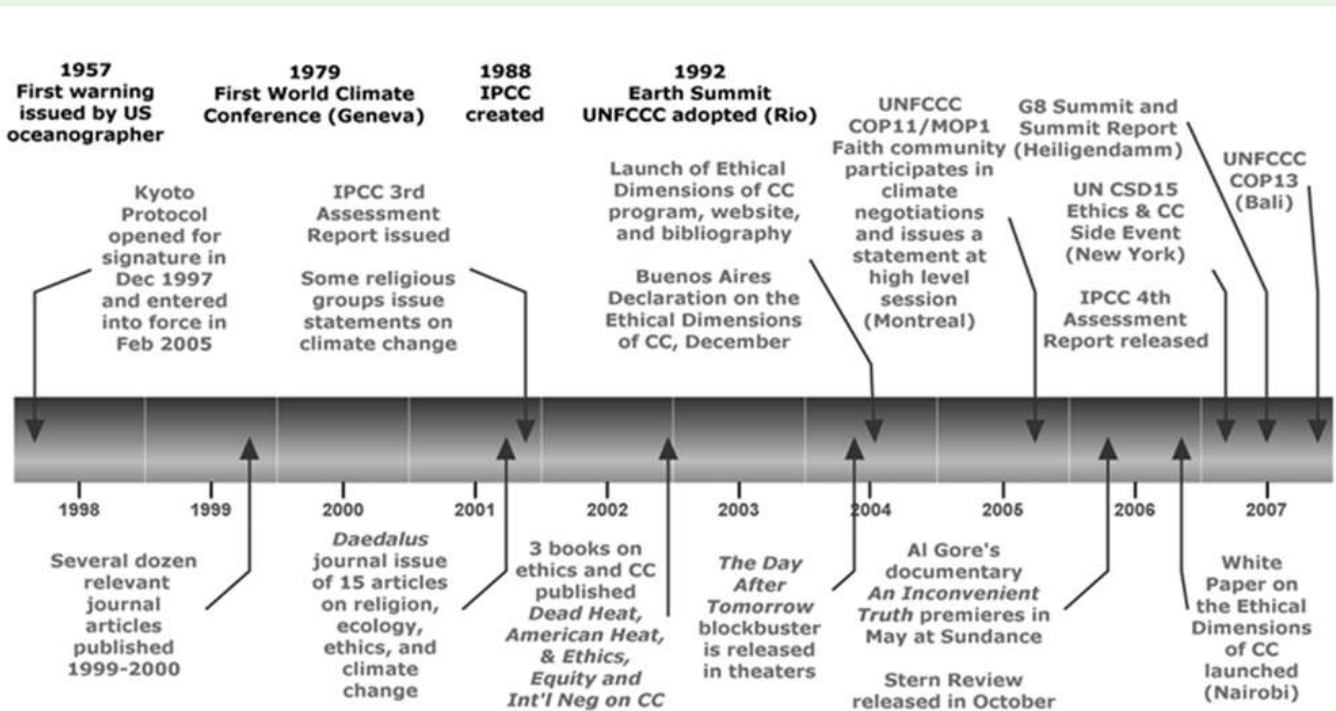
<sup>8</sup> Leaton J 2011 *Unburnable Carbon – Are the world's financial markets carrying a carbon bubble?* <https://www.longfinance.net/programmes/sustainable-futures/london-accord/reports/unburnable-carbon-are-the-worlds-financial-markets-carrying-a-carbon-bubble/>

## A Slow Burn

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

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

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



Source: Posas, P. 2007<sup>9</sup>

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

Beginning as a protest movement on US university campuses in 2011, social momentum for disinvestment began to gather pace following the publication of an article by Bill McKibben in Rolling Stone Magazine<sup>10</sup>, which popularised Carbon Trackers' work and which was widely read and distributed.

Supported by the NGO, 350.org, pressure from students and academic staff initially convinced a number of small liberal arts colleges to divest from fossil fuels. Larger academic institutions began to follow suit. In 2013, the Board of Supervisors of the San Francisco Employees' Retirement Scheme (SFERS) unanimously agreed a resolution to support disinvestment<sup>11</sup>, (although a disinvestment strategy for the \$25.5 billion fund was only approved in October 2018<sup>12</sup>).

This was just the beginning. Today, more than 1,000 institutional investors with \$8 trillion in assets have committed to divest from fossil fuels. These include Norway's recent announcement to exclude oil exploration and production companies from its huge \$1 trillion the Government Pension Fund<sup>14</sup>, and complete disinvestment by the Republic of Ireland, which became the world's first country to sell off its investments in fossil fuel companies held by the €8 billion Irish national investment fund<sup>15</sup>. New York City mayor, Bill De Blasio, has moved to withdraw \$5 billion in carbon-based energy investments from the city's pension funds, and teamed up with London Mayor Sadiq Khan in September 2018 to call on other cities to divest their pension funds from fossil fuels, working through the C40 Climate Leadership Group<sup>16</sup>. Over the past year, several major banks, including the World Bank Group (WBG), have also made high-profile decisions to stop financing new fossil fuel projects.

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

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

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

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

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

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

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

## Divest or engage?

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

The group has obtained some high-profile commitments on climate change from Shell, Total, Glencore and others, although they only go so far. Glencore, for example, still plans to open new coal mining sites<sup>17</sup>, and Shell still plans to invest more than \$20 billion a year in hydrocarbon projects - and only \$1 to 2 billion in its low-carbon business<sup>18</sup>.

Some Climate Action 100+ investors have sought to combine engagement and disinvestment, treating them as complementary approaches. For example, the Church of England agreed in 2018 that its investment bodies could continue to engage with fossil fuel companies but should disinvest from any that are not on track to be Paris compliant by 2023<sup>19</sup>. The Norwegian government opted to disinvest only from pure Exploration & Production oil companies, while keeping its stakes in much larger integrated oil majors such as Shell and BP, which it hopes will drive renewable energy investment in future. The approach means selling \$8bn worth of E&P stocks rather than Norway's entire oil holding of \$37bn and has attracted some criticism<sup>20</sup>.

## Fossil Fuel Companies Under Pressure

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

- Electric vehicles are beginning to take a substantial bite out of fossil fuel demand, particularly in China, where consumer demand for electric vehicles is soaring<sup>21</sup>;
- The price of renewables technology has fallen precipitously<sup>22</sup> in the last few years, and on-shore wind and solar energy generation are now cheaper than some coal and gas plants in the United States<sup>23</sup>.

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

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

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

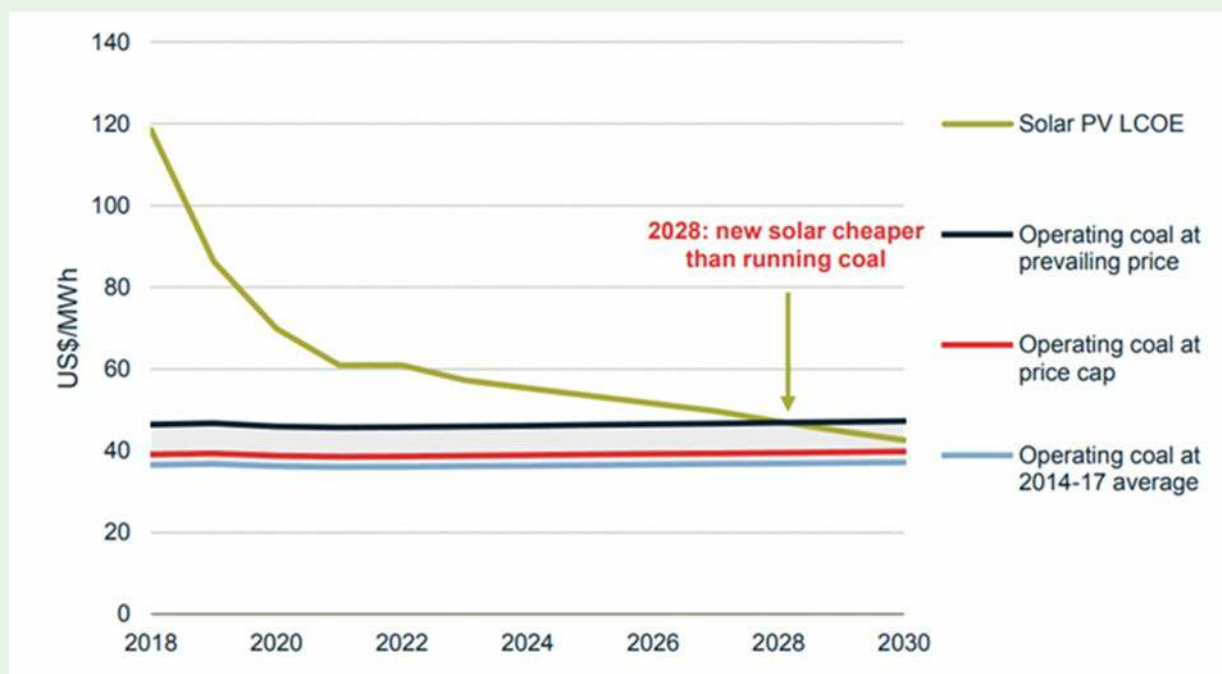
20 <https://www.bloomberg.com/opinion/articles/2019-03-08/norway-s-sovereign-wealth-fund-oil-divestment-descends-into-farce>

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

22 IRENA 2018 Renewable Power Generation Costs in 2017 [https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Jan/IRENA\\_2017\\_Power\\_Costs\\_2018.pdf](https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Jan/IRENA_2017_Power_Costs_2018.pdf)

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

**Figure 3: The Changing Costs Of Renewable Energy**



**Source: Bloomberg New Energy Finance – New Energy Outlook 2018**

Fossil fuel companies are beginning to wake up to the threat that divestment may hold: climate change featured prominently in Shell's 2017 annual report and sustainability report, where the oil and gas major acknowledged that, along with other climate-related risks, fossil fuel divestment could materially affect the price of Shell's shares and its ability to access equity capital markets<sup>24</sup>.

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

Shareholders have not yet suffered, according to a 2018 study that found little price impact from eleven divestment announcements on oil and gas shares. The study noted that the divesting entities are typically small and that, so long as oil and gas companies remain profitable, they can attract other investors<sup>25</sup>. However, these conditions could change in future, as they did with coal, and the study ended before the Norwegian Government Pension Fund's 8 March 2019 announcement, when the shares of companies affected fell around 3%.

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

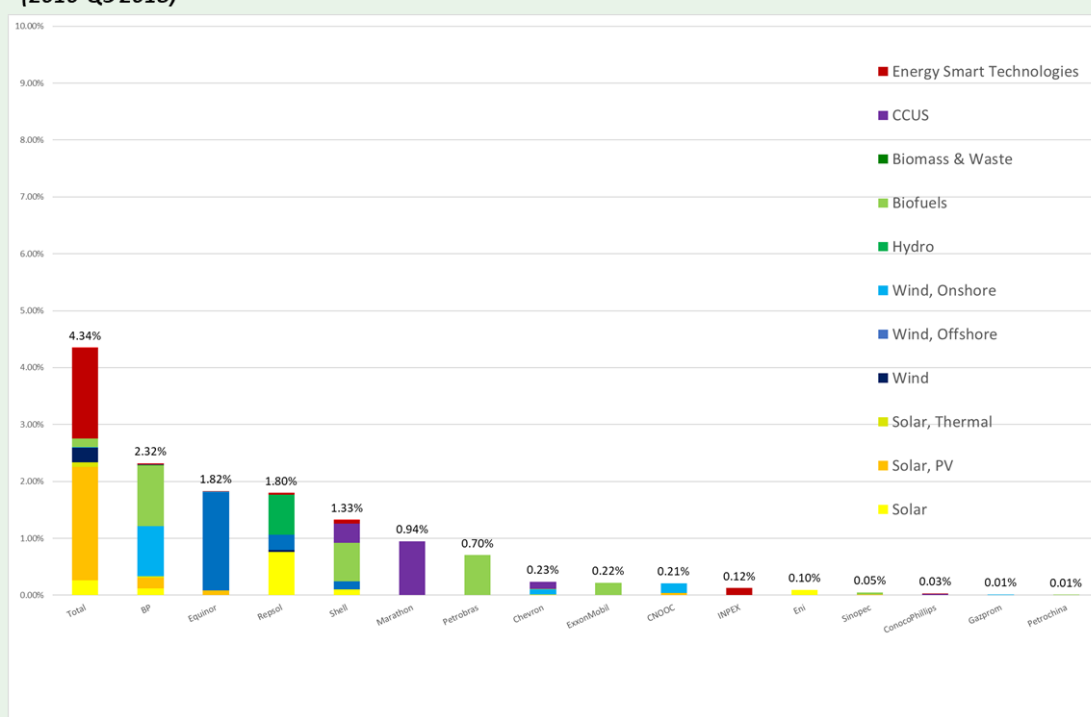
<sup>25</sup> Pollin R and Hansen T 2018 *Economics and Climate Justice Activism: Assessing the Fossil Fuel Divestment Movement* <https://www.peri.umass.edu/economists/robert-pollin/item/1076-economics-and-climate-justice-activism-assessing-the-fossil-fuel-divestment-movement>



This relative lack of share price impact may help to explain why transition plans within the oil and gas sector as a whole have been so disappointing. The world's top 24 publicly-listed oil and gas companies spent *only* 1.3% of their combined \$260 billion capital expenditure on low carbon energy in 2018<sup>26</sup>.

Even Norway's Equinor, the oil and gas company judged by CDP as most business-ready for a low carbon transition, plans to devote only 15 to 20% of its capital expenditure on low carbon energy by 2030 while Shell, which has the biggest plans for low carbon investment in its peer group at \$1 to 2 billion a year, will continue allocating most of its \$25 to \$30 billion capital expenditure budget to hydrocarbons<sup>27</sup>.

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



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

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

Source: CDP, company reports, BNEF

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

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



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

### A Risk For Financial Centres

The share of fossil fuels in global energy supply investment increased slightly to 59% in 2017, according to the International Energy Agency<sup>28</sup>. Global subsidies for fossil fuels were still around 6.5% of GDP in 2015<sup>29</sup>, three times the 1 to 2% of world GDP that Lord Stern estimated would be needed to avert climate catastrophe<sup>30</sup>.

The longer such hydrocarbon investment continues, the more fossil fuel companies will be exposed to losses if their assets cannot be exploited commercially due to technological progress in renewable energy, policy interventions designed to limit climate change, or the physical impacts of climate change. The global financial exposure of such stranded assets has been estimated in the range \$1 to 4 trillion on the basis of the technological trajectory alone, with Russia, the US or Canada among the countries most at risk<sup>31</sup>.

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

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

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

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

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

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

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

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

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

**Table 1: Percentage of Listed Companies' Revenues Derived From Fossil Fuels<sup>33</sup>**

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

**Source:** Corporate Knights / Finance Watch

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

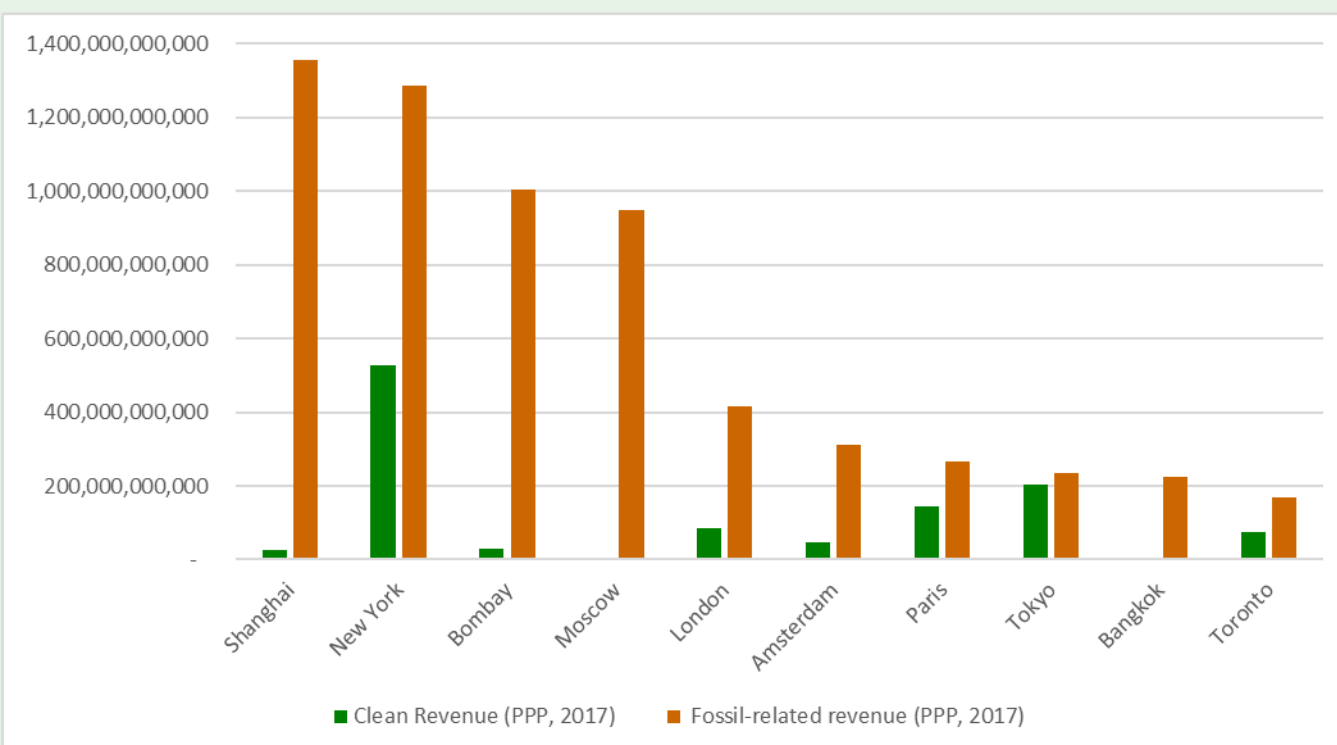
Much of this fossil fuel revenue often comes from a handful of companies; Gazprom, Rosneft, and Lukoil in Moscow; PTT in Bangkok; PKN Orlen in Warsaw; Royal Dutch Shell in Amsterdam; KOC Holding in Istanbul; and OMV in Vienna. Each account for more than 10% of total corporate revenue

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

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

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

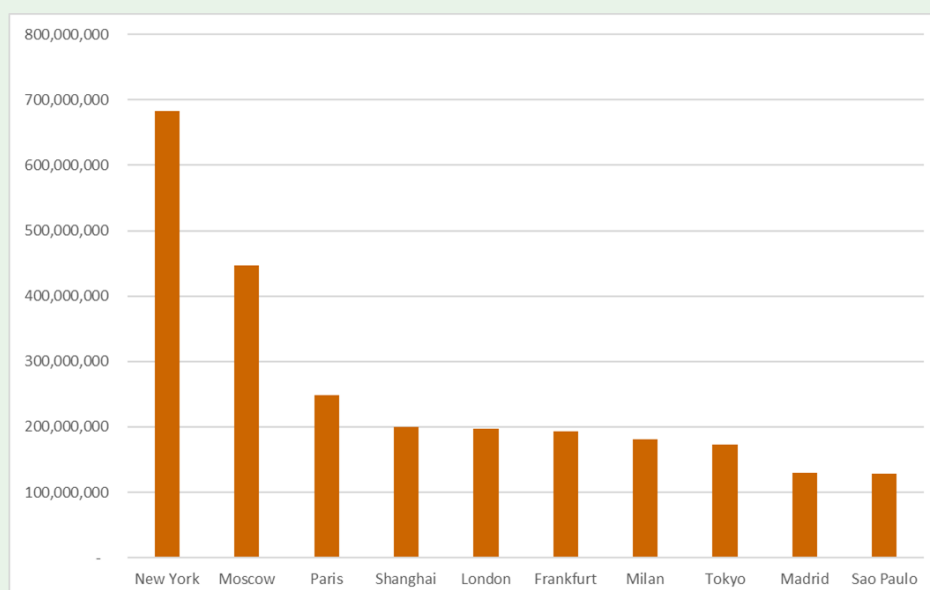
**Figure 5: Fossil-Fuel Related vs Clean Company Revenues, By Primary Listing Location<sup>34</sup>**



*Source: Corporate Knights*

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

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

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

Source: Corporate Knights

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

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

**Table B: Comparison of Green and Brown Lending USDm, 2014-2018<sup>36</sup>**

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

Source: Corporate Knights

<sup>35</sup> Based on Corporate Knights data series “Financial centre carbon intensity”.

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

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

**Table C: Top 10 Institutions Financing Brown Energy**

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

*Source: Corporate Knights*

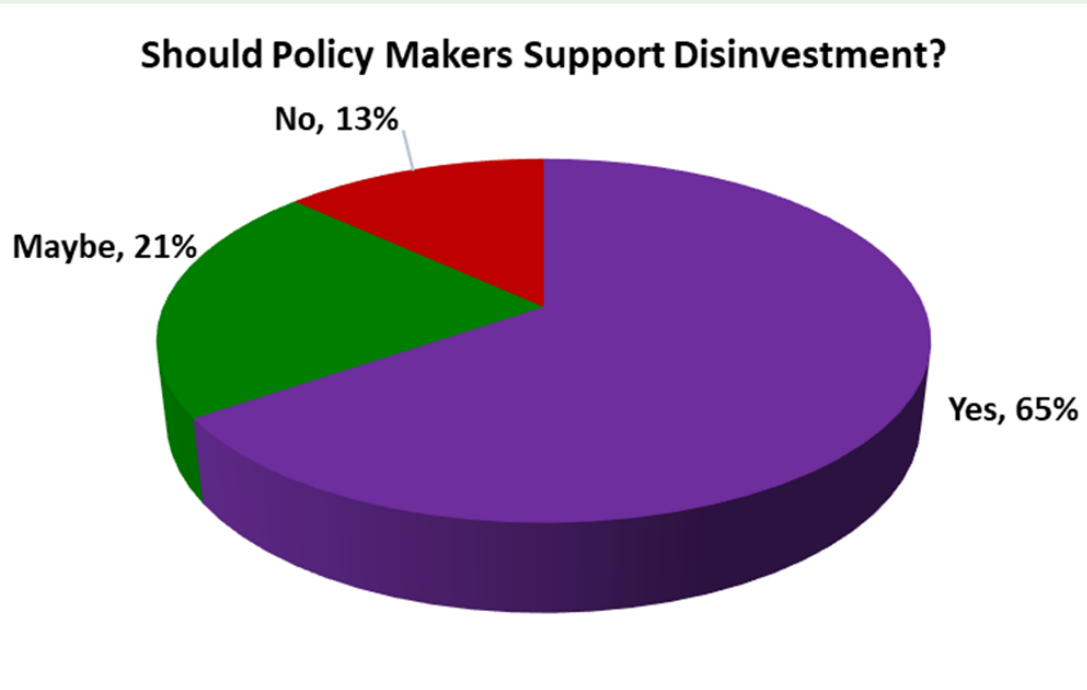
The data in this section also make an interesting contrast to the GGFI rankings. In some cases, the centres perceived as having high quality and depth of green finance are also the ones with the highest fossil revenue or GHG emissions.

### What GGFI Respondents Think

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

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

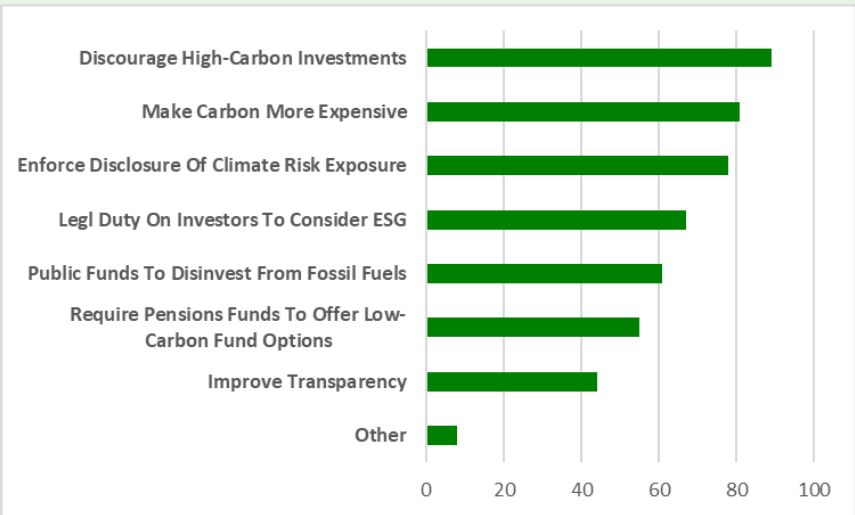
Figure 7: Do You Think Policymakers Should Support Disinvestment From Fossil Fuels?



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

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

Figure 8: Most Frequently Mentioned Policy Interventions



## Getting Warmer

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

Recent research by the Grantham Institute seems to indicate that portfolios do not suffer harm to long-term returns by divesting from fossil fuels<sup>37</sup>, which may indicate that the momentum to divest will continue, especially if the financial impacts of climate change on broader investment portfolios are considered.

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

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



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

## Regional Analysis

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

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

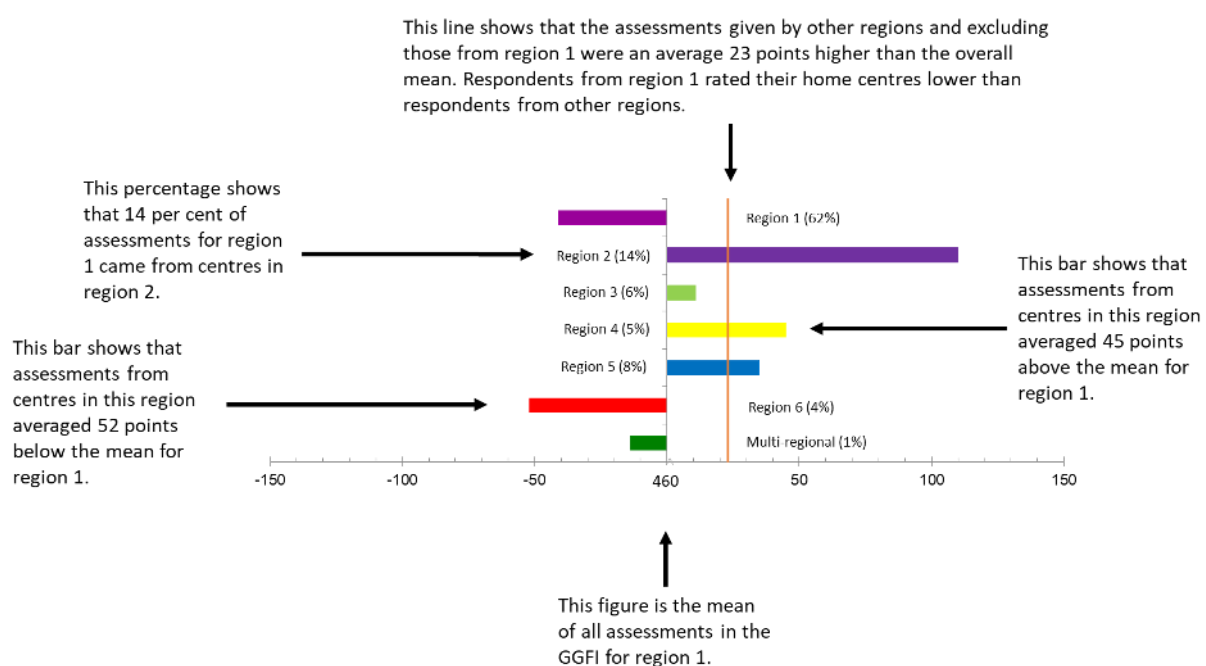
We display this analysis in charts, either for a region or an individual centre. These charts show:

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

Chart 12 shows an example of this analysis. Coloured bars to the left of the vertical axis indicate that respondents from that region gave lower than average assessments. Bars to the right indicate respondents from that region gave higher than average assessments. Assessments given to a centre by people based in that centre are excluded to remove 'home' bias.

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

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





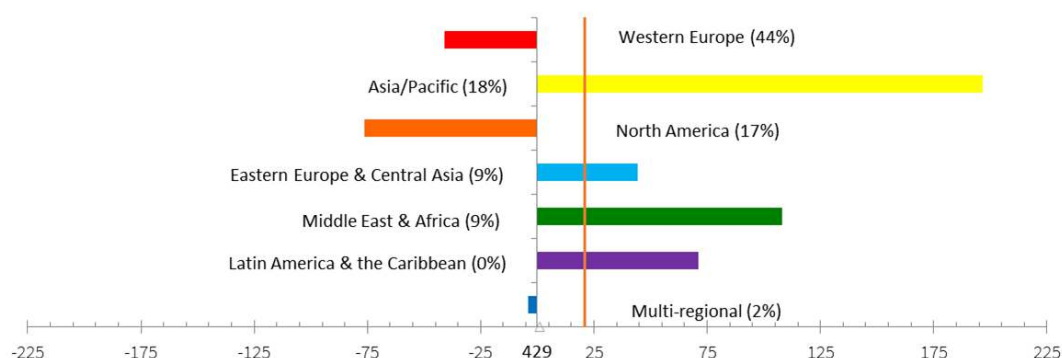
## North America

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

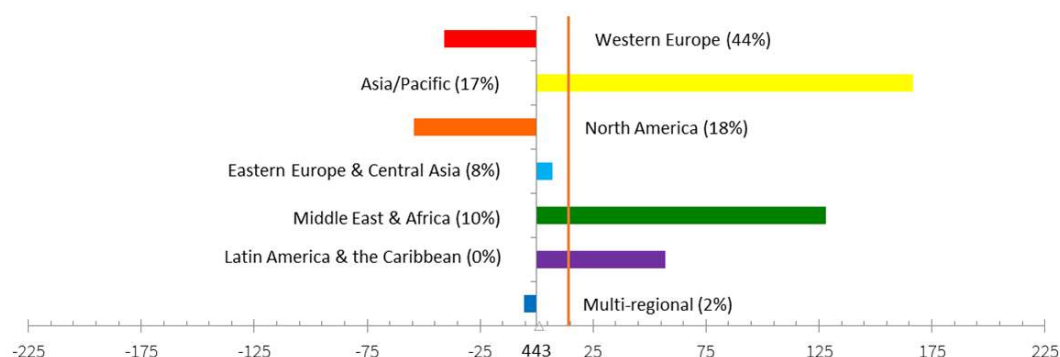
**Table 15 | North America Centres In GGFI 3**

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

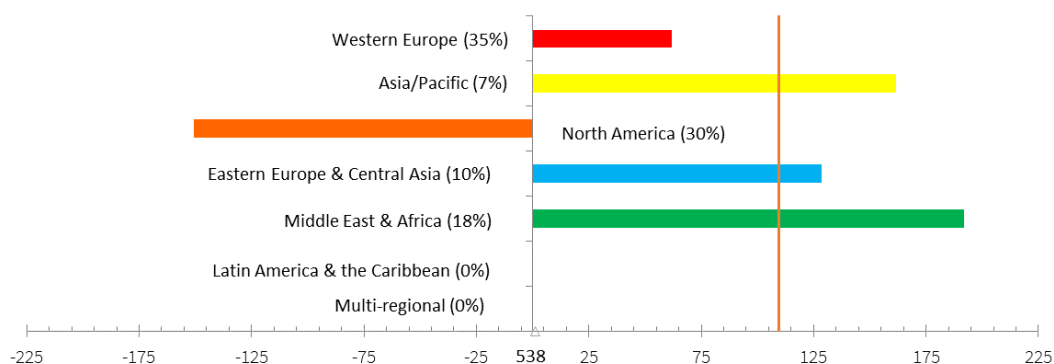
**Chart 13 | North American Regional Assessments For Depth – Difference From The Mean**



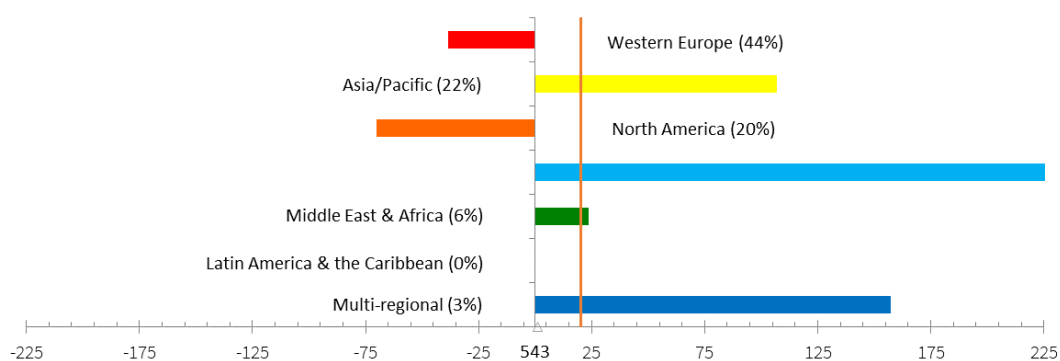
**Chart 14 | North American Regional Assessments For Quality – Difference From The Mean**



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



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



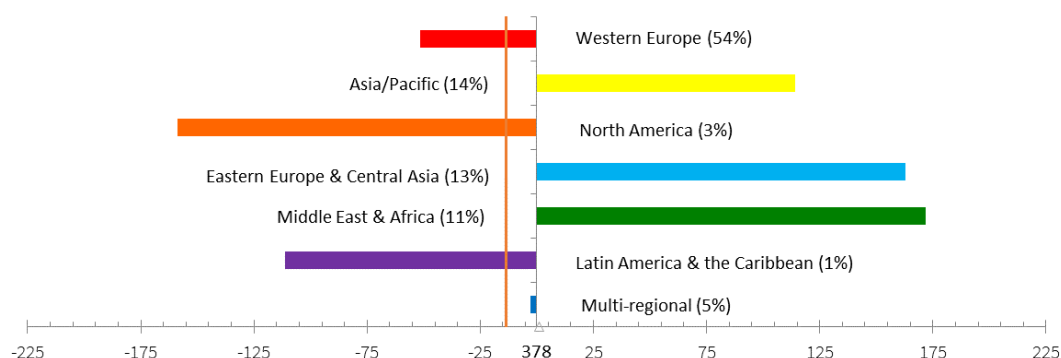
## Middle East & Africa

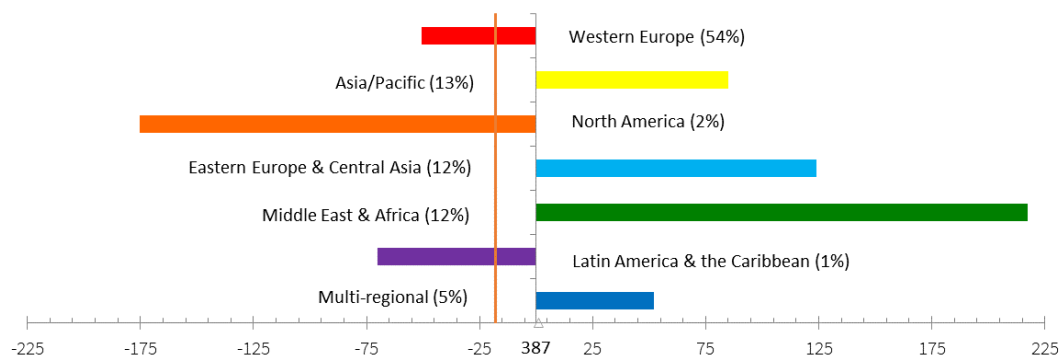
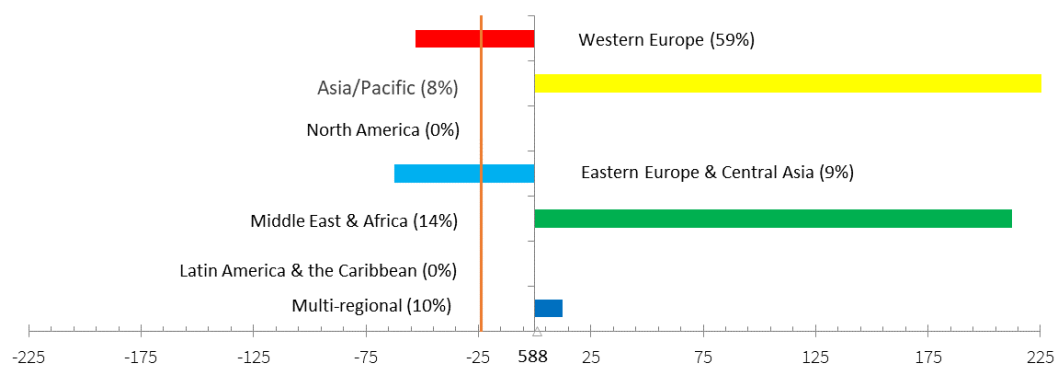
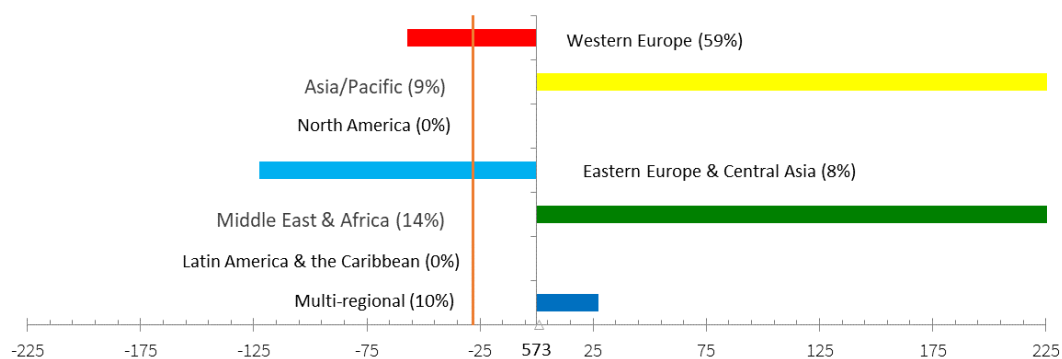
- Casablanca retained its position as the leading centre in the Middle East & Africa, gaining three places in the rankings for depth, and 13 for quality;
- Dubai fell in the rankings for both depth and quality with Abu Dhabi also being overtaken by other centres on depth;
- Respondents from Asia/Pacific,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

**Table 16 | Middle Eastern & African Centres In GGFI 3**

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

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



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

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

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


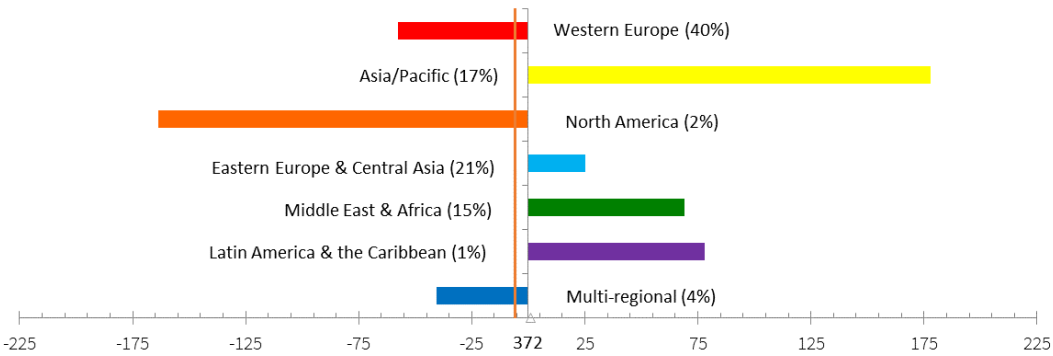
## Eastern Europe & Central Asia

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

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

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

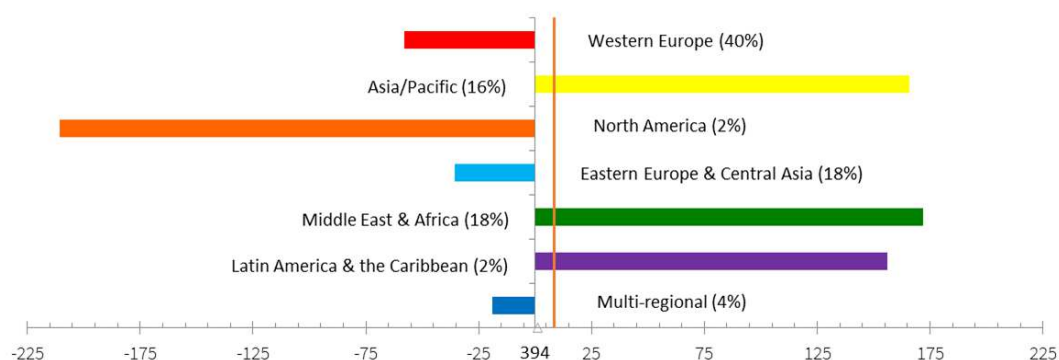
Chart 21 | Eastern European & Central Asian Regional Assessments For Depth – Difference From The Mean



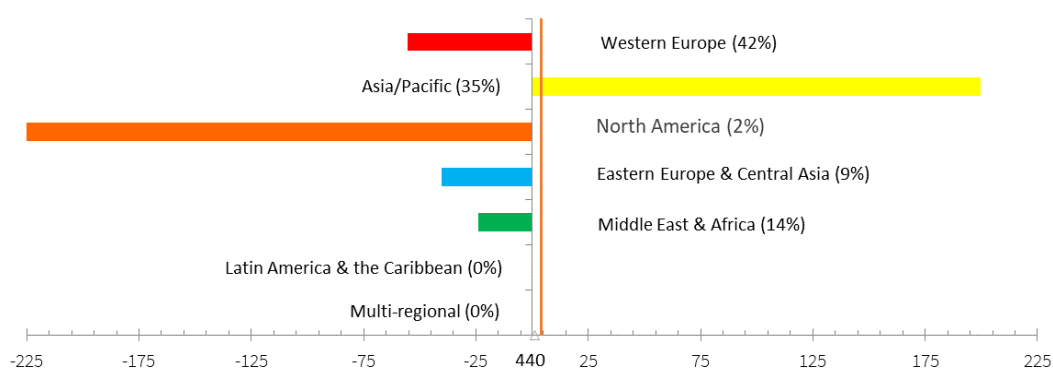
*“The bureau for CPD of Astana International Finance Centre are training green finance experts in partnership with the Climate Bonds Initiative.”*

Senior Manager, Financial Development, Astana

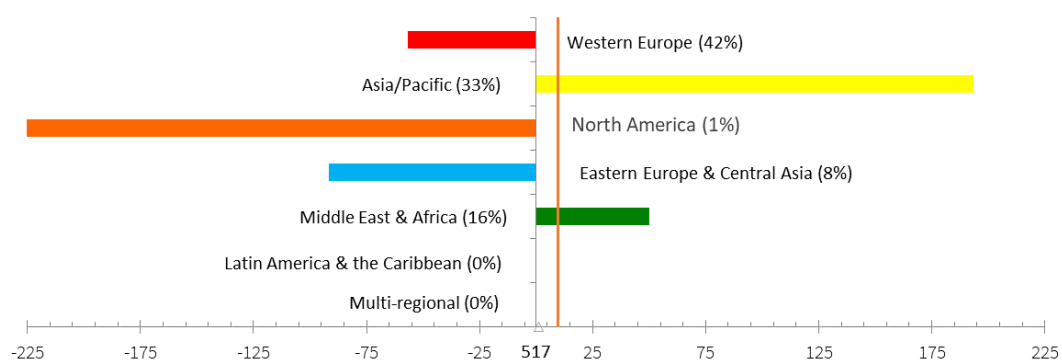
**Chart 22 | Eastern European & Central Asian Regional Assessments For Quality – Difference From The Mean**



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



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



## Western Europe

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

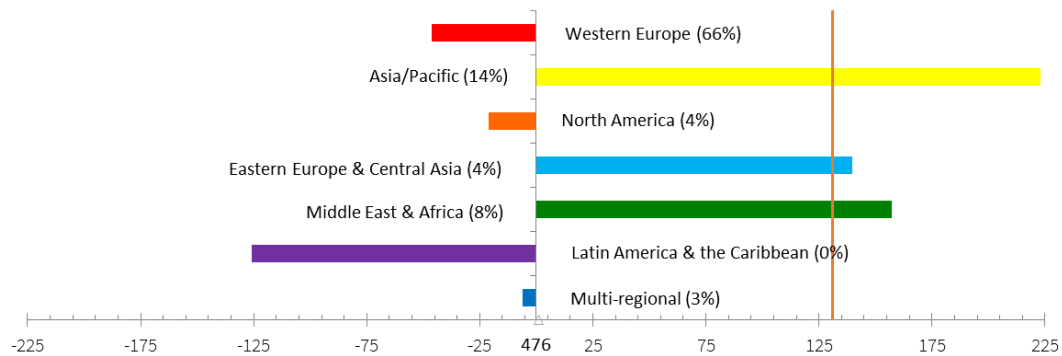
**Table 18 | Western European Top 10 Centres In GGFI 3**

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

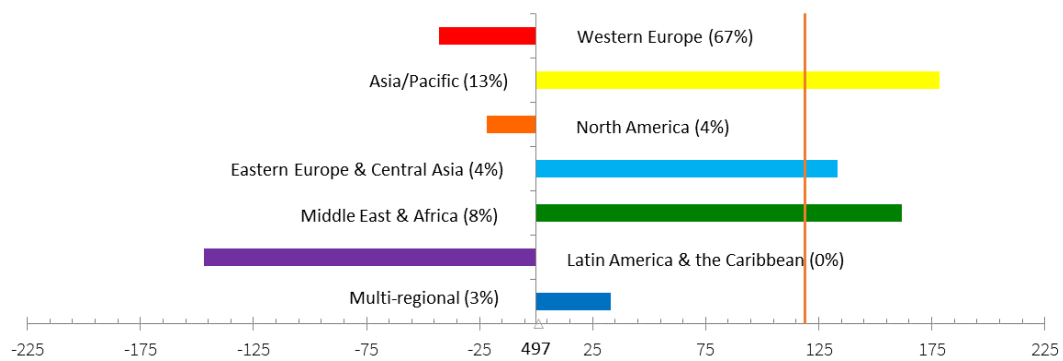
***“The Action Plan on sustainable growth of the EU Commission will have a major influence, especially the development of a common taxonomy.”***

**Group Sustainability Manger, Banking, Liechtenstein**

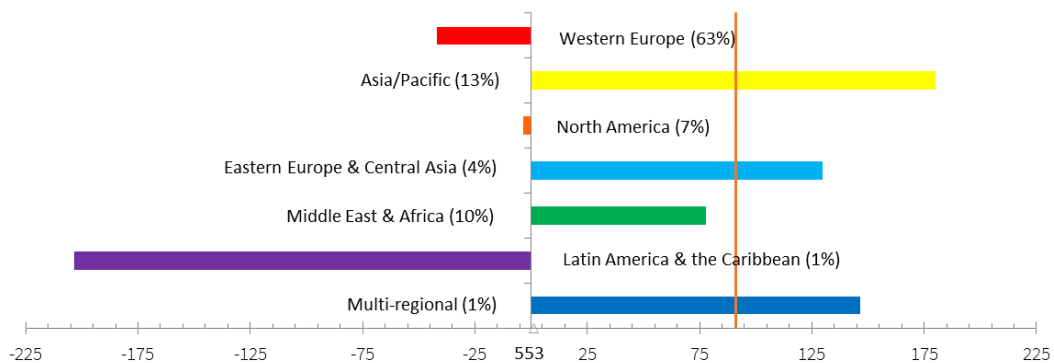
**Chart 25 | Western Europe Regional Assessments For Depth – Difference From The Mean**



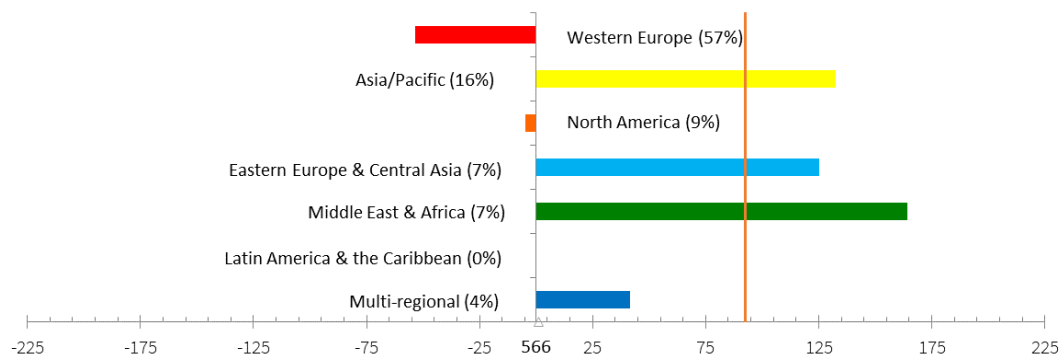
**Chart 26 | Western Europe Regional Assessments For Quality – Difference From The Mean**



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



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





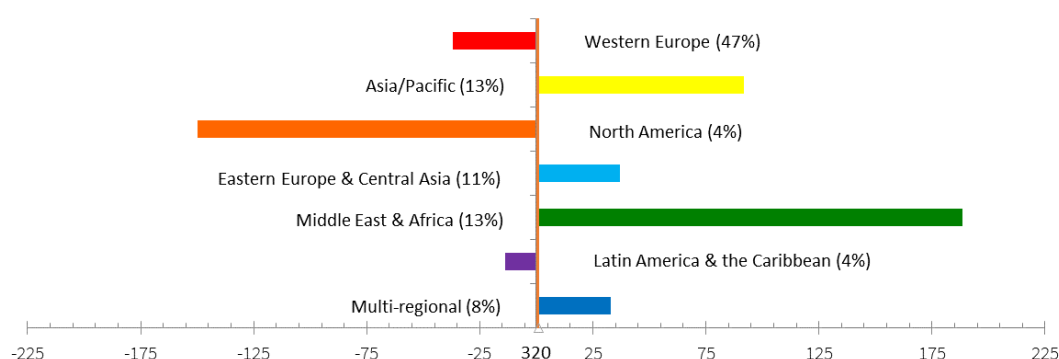
## Latin America & The Caribbean

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

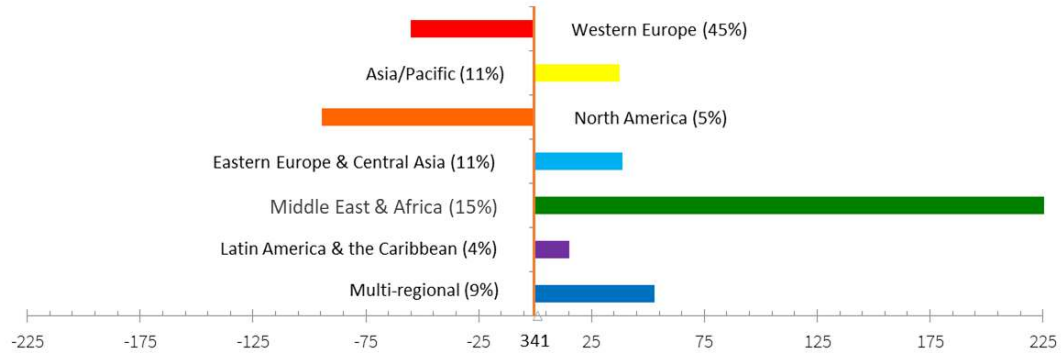
**Table 19 | Latin American & Caribbean Centres In GGFI 3**

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

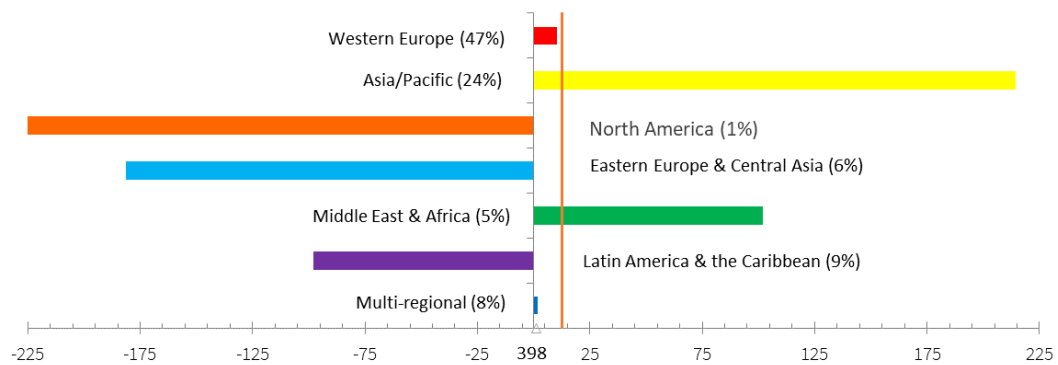
**Chart 29 | Latin American & Caribbean Regional Assessments For Depth – Difference From The Mean**



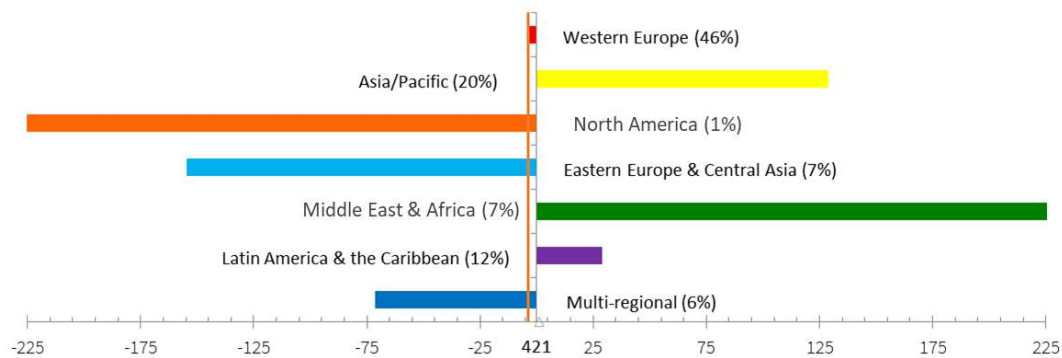
**Chart 30 | Latin America & The Caribbean Regional Assessments For Quality – Difference From The Mean**



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



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



## Asia/Pacific

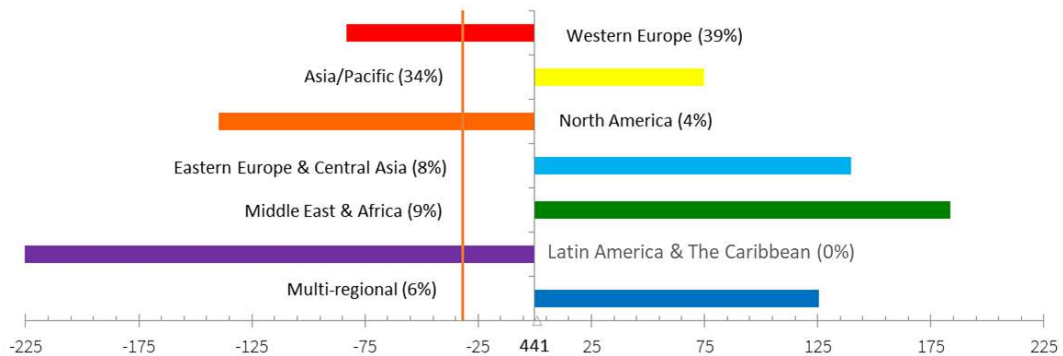
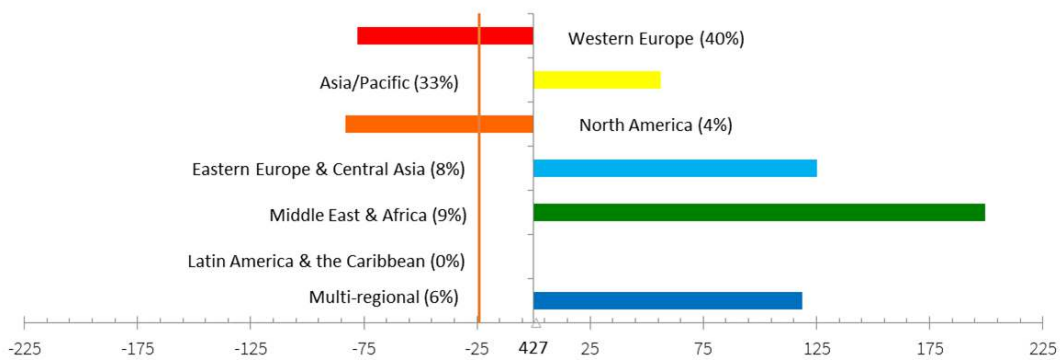
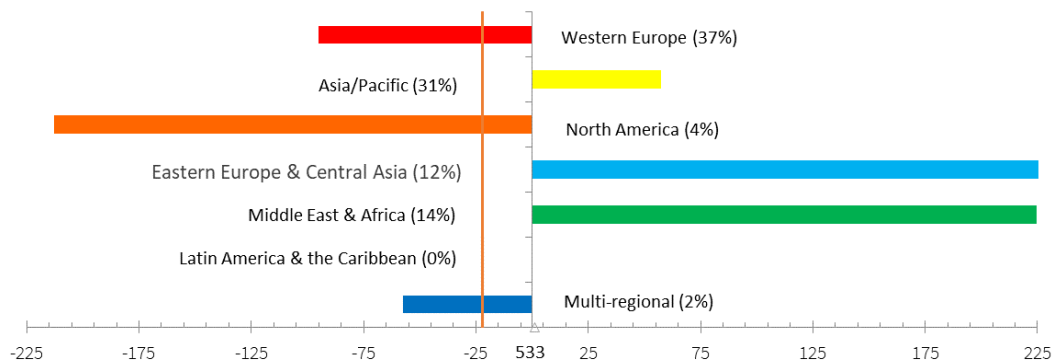
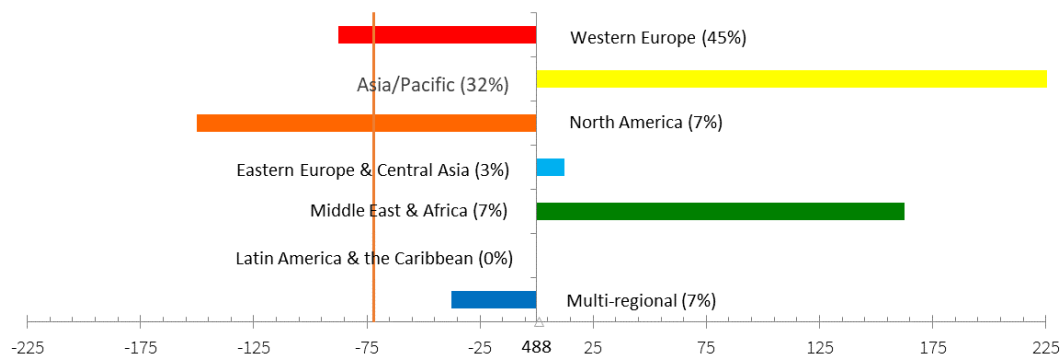
- Shanghai retained its leading position in the region for depth, although Sydney overtook Shanghai to take first place in the quality index;
- Melbourne entered the index for the first time, coming second in the region for quality and fifth for depth;
- Seoul fell in both the depth and quality rankings,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

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

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

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

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

**Chart 33 | Asia/Pacific Regional Assessments For Depth – Difference From The Mean****Chart 34 | Asia/Pacific Regional Assessments For Quality – Difference From The Mean****Chart 35 | Regional Assessments For Shanghai For Depth – Difference From The Mean****Chart 36 | Regional Assessments For Sydney For Quality – Difference From The Mean**

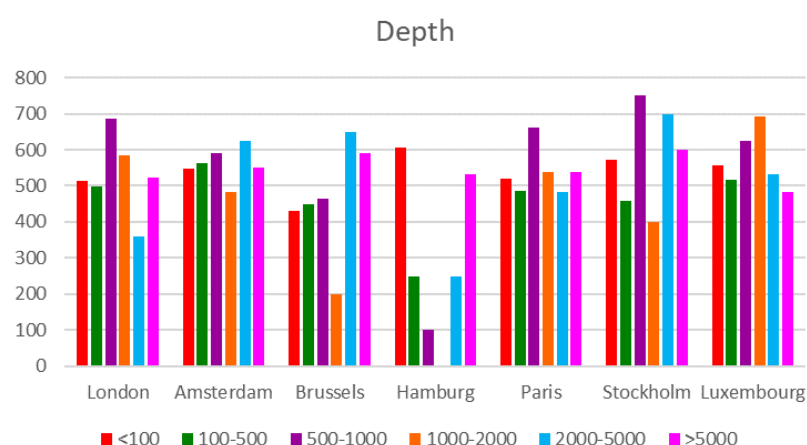
## Organisation Size

There is variation in how the leading centres are viewed by respondents working for different sizes of organisation. Taking the seven centres that appear in the top five of the rankings for both depth and quality, charts 37 and 38 show the average of the assessments given by respondents in different sizes of organisation.

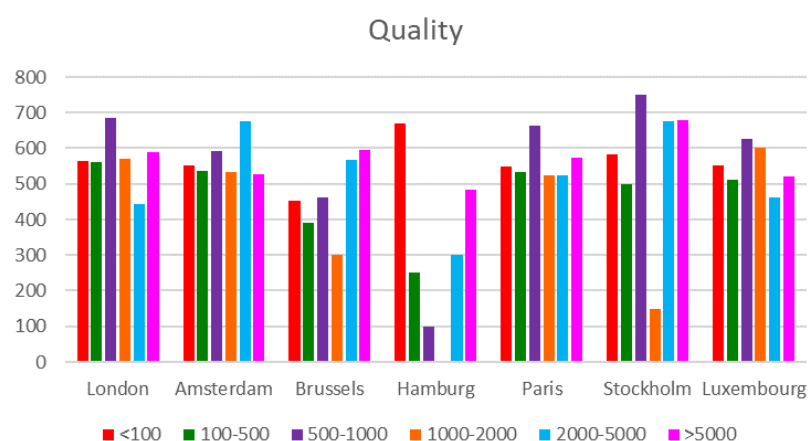
The results show that respondents from the smallest organisations gave higher assessments to Hamburg, Amsterdam, Stockholm, and Luxembourg for depth than those from larger organisations. Amsterdam, Stockholm, and Brussels scored higher in relation to larger organisations.

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

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



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



## Stability

The GGFI model allows for an analysis of the stability of financial centres in the index, which can be useful for centres when assessing their marketing strategies. Charts 39 and 40 contrast the 'spread' or variance of the individual assessments given to each of the centres in GGFI 3, with the sensitivity to changes in the instrumental factors: first for depth and second for quality assessments.

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

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

**Chart 39 | Stability In Depth Assessments And Instrumental Factors**

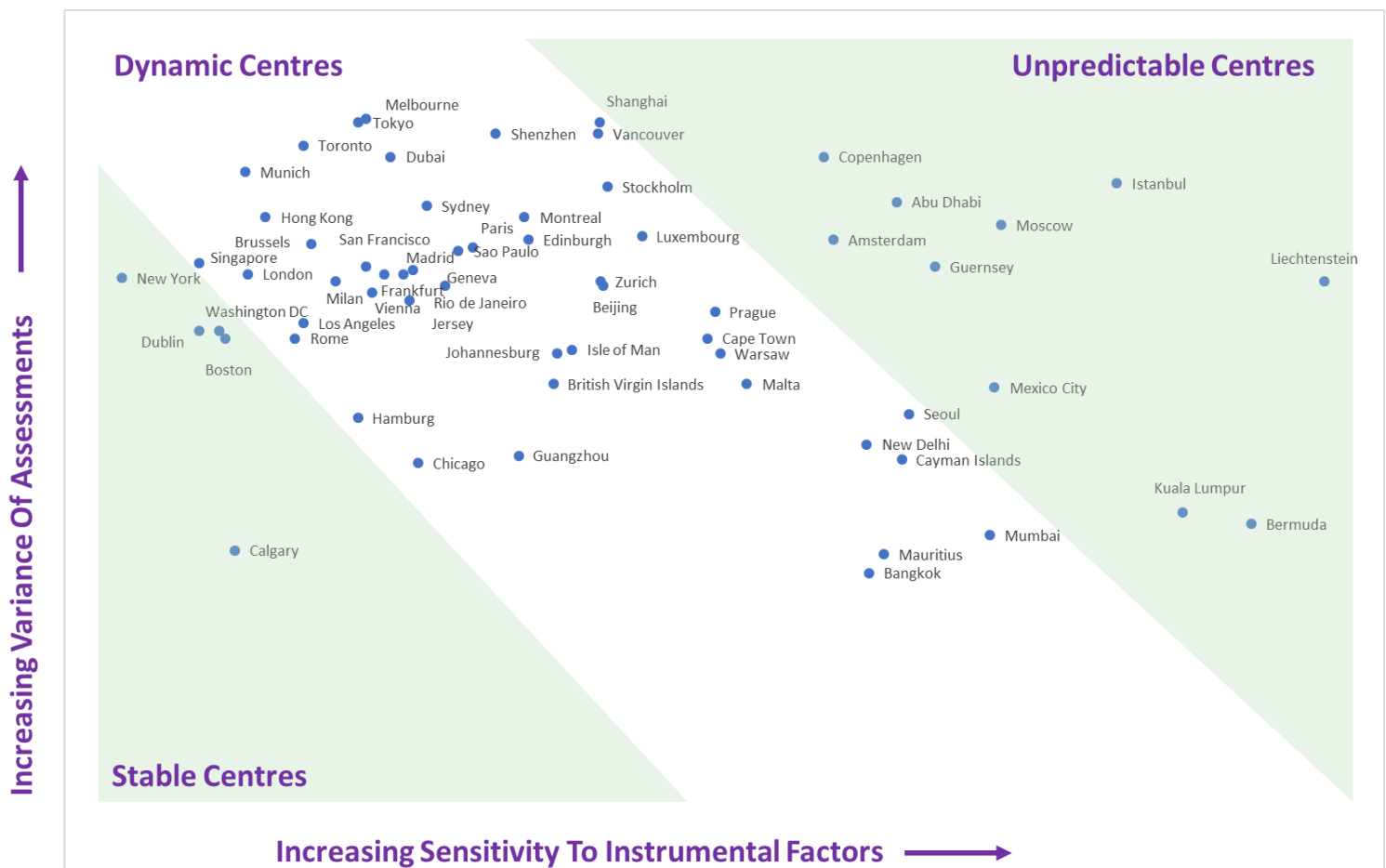
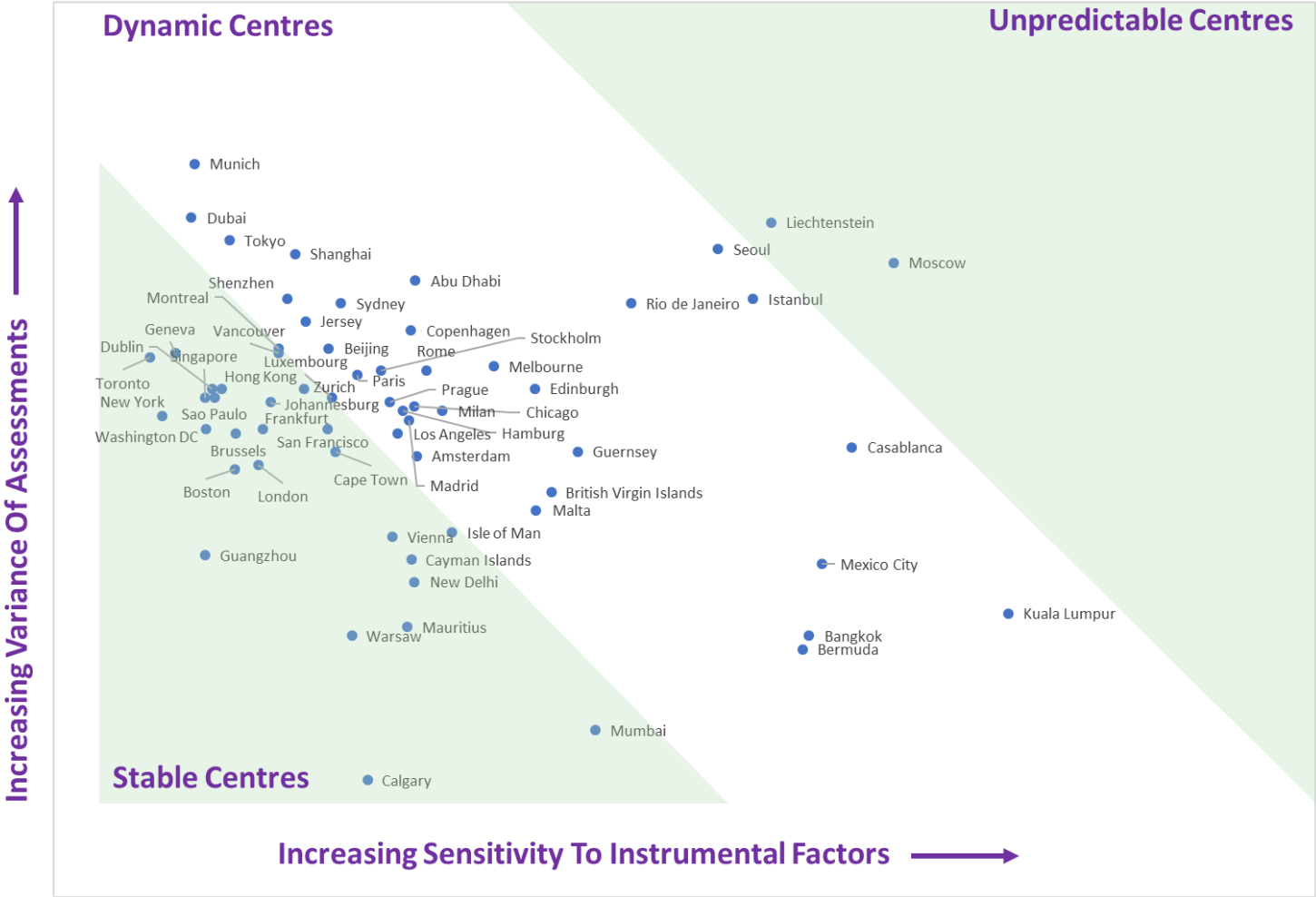


Chart 40 | Stability In Quality Assessments And Instrumental Factors



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

**Director and NED, Wealth Managers, London**

## Reputation

In the GGFI model, we look at reputation by examining the difference between the weighted average assessment given to a centre and its overall rating. The first measure reflects the average score a centre receives from finance professionals around the world. The second measure is the GGFI score itself, which represents the average assessment adjusted to reflect the instrumental factors.

If a centre has a higher average assessment than its GGFI rating, this indicates that respondents' perceptions of a centre are more favourable than the quantitative measures alone suggest.

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

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

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

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

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



Tables 23 and 24 show the 15 centres with the greatest reputational disadvantage – an indication that respondents’ perceptions of a centre are less favourable than the quantitative measures alone would suggest.

**Table 23 | Bottom 15 Centres – Reputational Disadvantage For Depth In GGFI 3**

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

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

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

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

**Business Development Adviser, Luxembourg**

## Industry Sectors

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

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

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

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

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

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

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

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

**Chief Sustainability Officer, Private Equity Investment Manager, London**

## GGFI 3 Interest, Impact, And Drivers of Green Finance

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

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

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

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

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

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

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

**Chart 41 | Most Interesting Areas Of Green Finance**

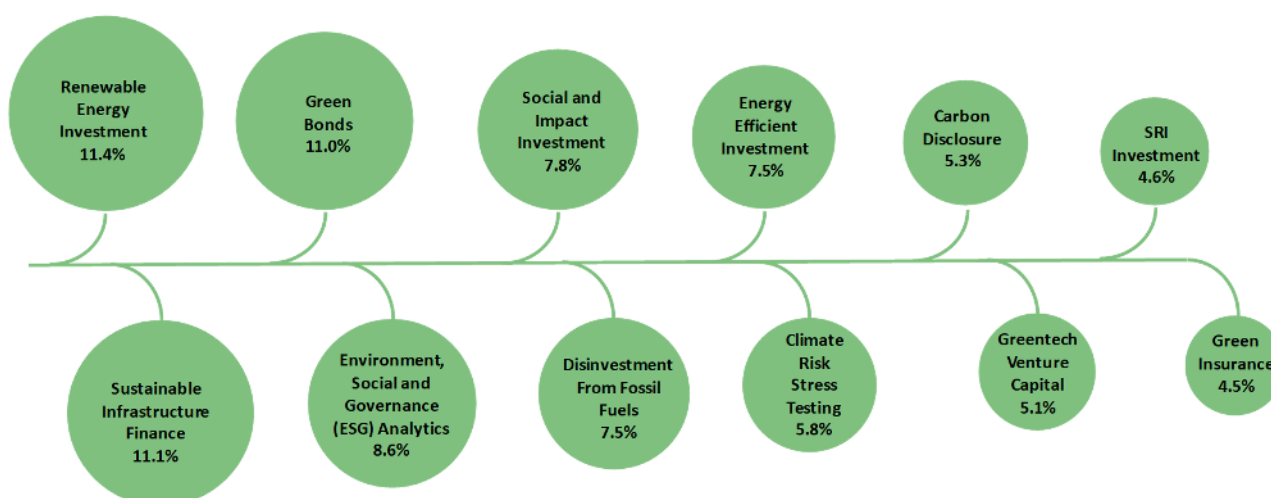
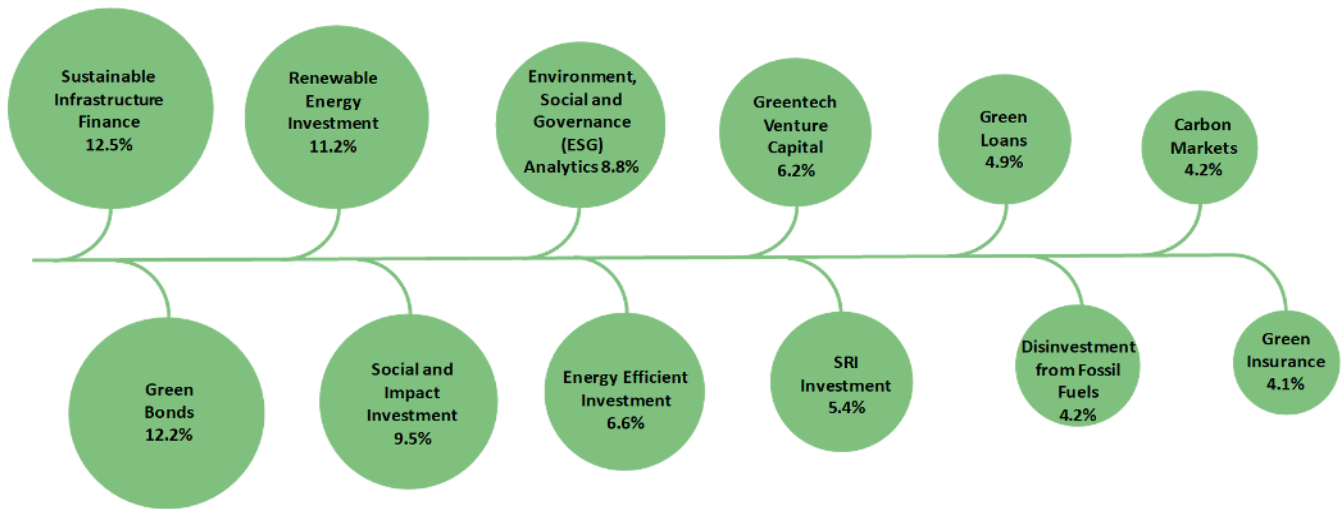


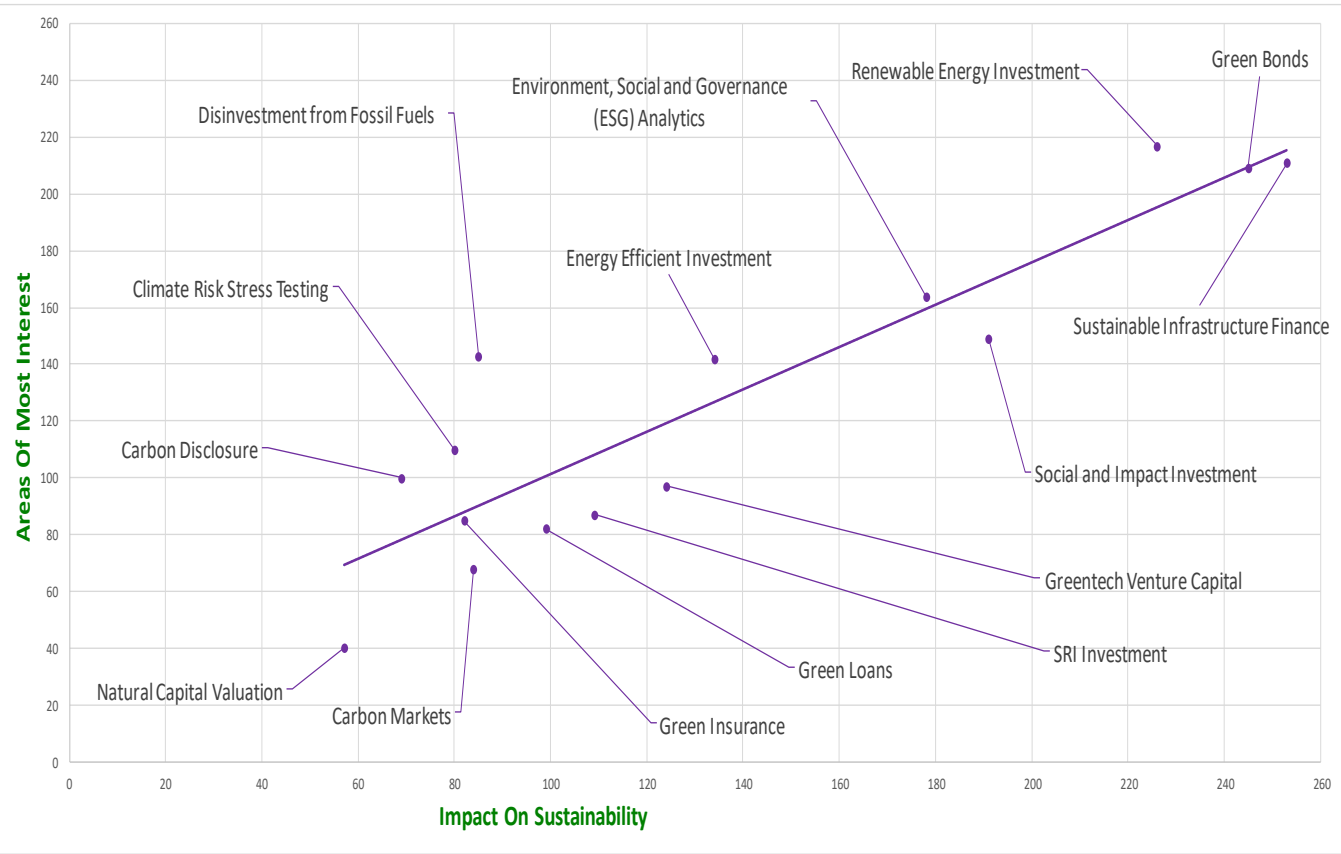
Chart 42 | Green Finance Activities With Most Impact On Sustainability



Relationship Between Areas Of Interest And Impact

Looking at the areas of Green Finance that respondents identified as interesting and those they considered had most impact, we see a close correlation, as shown in chart 43. Disinvestment from Fossil Fuels stands out as further from the trendline, indicating that disinvestment is seen as having greater impact than the interest shown in it.

Chart 43 | Relationship Between Areas Of Interest And Impact



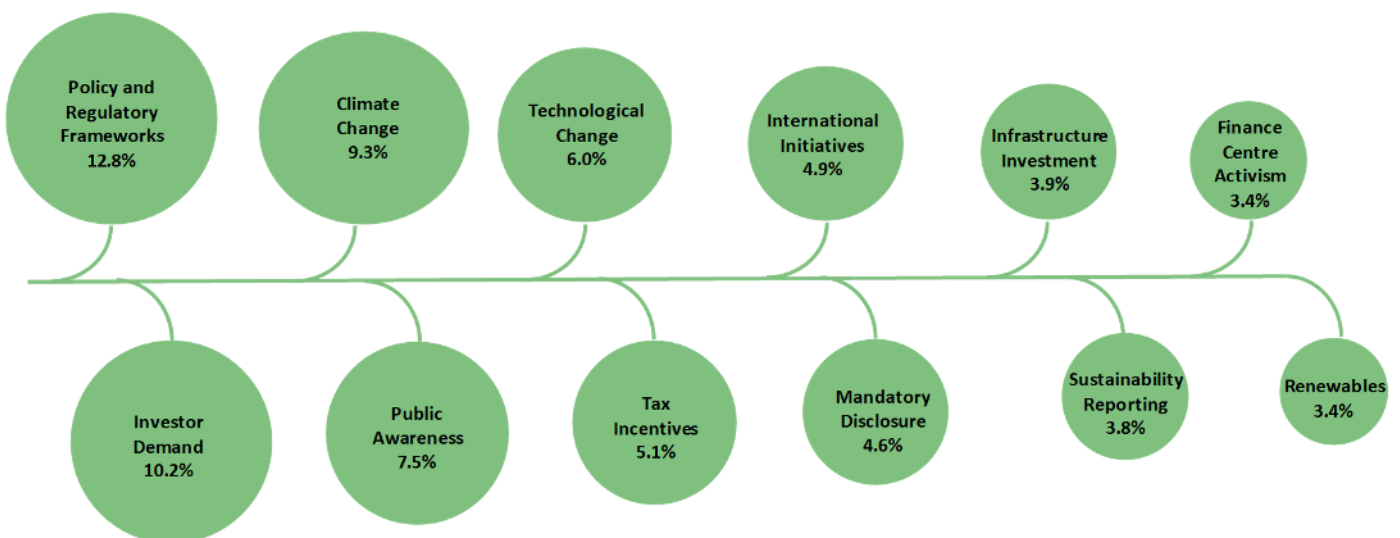
## Drivers Of Green Finance

Finally, we asked respondents to identify the four areas that they considered were driving the development of Green Finance. The results are shown in chart 44 below. The top drivers identified were:

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

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

**Chart 44 | Leading Drivers Of Green Finance**



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

President, Conservation NGO, Boston

# Notes

## Appendix 1: Assessment Details

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

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

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



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

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

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

## Appendix 2: Interest, Impact, And Drivers Details

**Table 29 | Interesting Areas Of Green Finance**

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

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

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

**Table 31 | Drivers Of Green Finance**

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

## Appendix 3: Respondents' Details

**Table 32 | Respondents By Industry Sector**

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

**Table 33 | Respondents By Region**

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

**Table 34 | Respondents By Engagement In Green Finance**

**a. All Respondents**

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

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

| Engagement In Green Finance        | Number Of Respondents |
|------------------------------------|-----------------------|
| Working Full-time On Green Finance | 53                    |
| Working Part-time On Green Finance | 92                    |
| Interested in Green Finance        | 83                    |
| Other/not given                    | 22                    |
| <b>Total</b>                       | <b>250</b>            |

**Table 35 | Respondents By Size Of Organisation**

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

**Table 37 | Respondents By Age**

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

**Table 36 | Respondents By Gender**

| Gender                      | Number Of Respondents |
|-----------------------------|-----------------------|
| Female                      | 220                   |
| Male                        | 397                   |
| Other                       | 1                     |
| Prefer not to say/not given | 28                    |
| <b>Total</b>                | <b>646</b>            |

## Appendix 4: Methodology

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

For the first set of ratings, the **financial centre assessments**, respondents use an online questionnaire to rate the depth and quality of each financial centre's green finance offering, using a ten point scale ranging from little depth/very poor to mainstream/excellent. Responses are sought from a range of individuals drawn from the financial services sector, non-governmental organisations, regulators, universities, and trade bodies.

For the second set of ratings, a support vector engine uses a database of indicators, or **Instrumental Factors**, that contains quantitative data about each financial centre, to predict how each respondent would have rated the financial centres they do not know. These instrumental factors draw on data from 131 different sources covering sustainability, comprising green finance activities as well as the physical attributes of a centre, such as air quality and local carbon emissions; business, including legal and policy factors and statistics on economic performance; human capital, reflecting educational development and social factors; and infrastructure, including telecommunications and public transport. A full list of the instrumental factors used in the model is in Appendix 6.

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

### Factors Affecting The Inclusion Of Centres In The GGFI

The questionnaire lists a total of 110 financial centres which can be rated by respondents. The questionnaire also asks whether there are financial centres that will improve their green finance offering significantly over the next two to three years. Centres which are not currently within the questionnaire and which receive a number of mentions in response to this question will be added to the questionnaire for future editions.

We give a financial centre a GGFI rating and ranking if it receives a statistically significant minimum number of assessments from individuals based in other geographical locations - at least 18 in GGFI 3. This means that not all 110 centres in the questionnaire will receive a ranking. We will keep this number under review for further editions of the index as the number of assessments increases.

We will also develop rules as successive indices are published as to when a centre may be removed from the rankings, for example, if over a 24 month period, a centre has not received a minimum number of assessments.

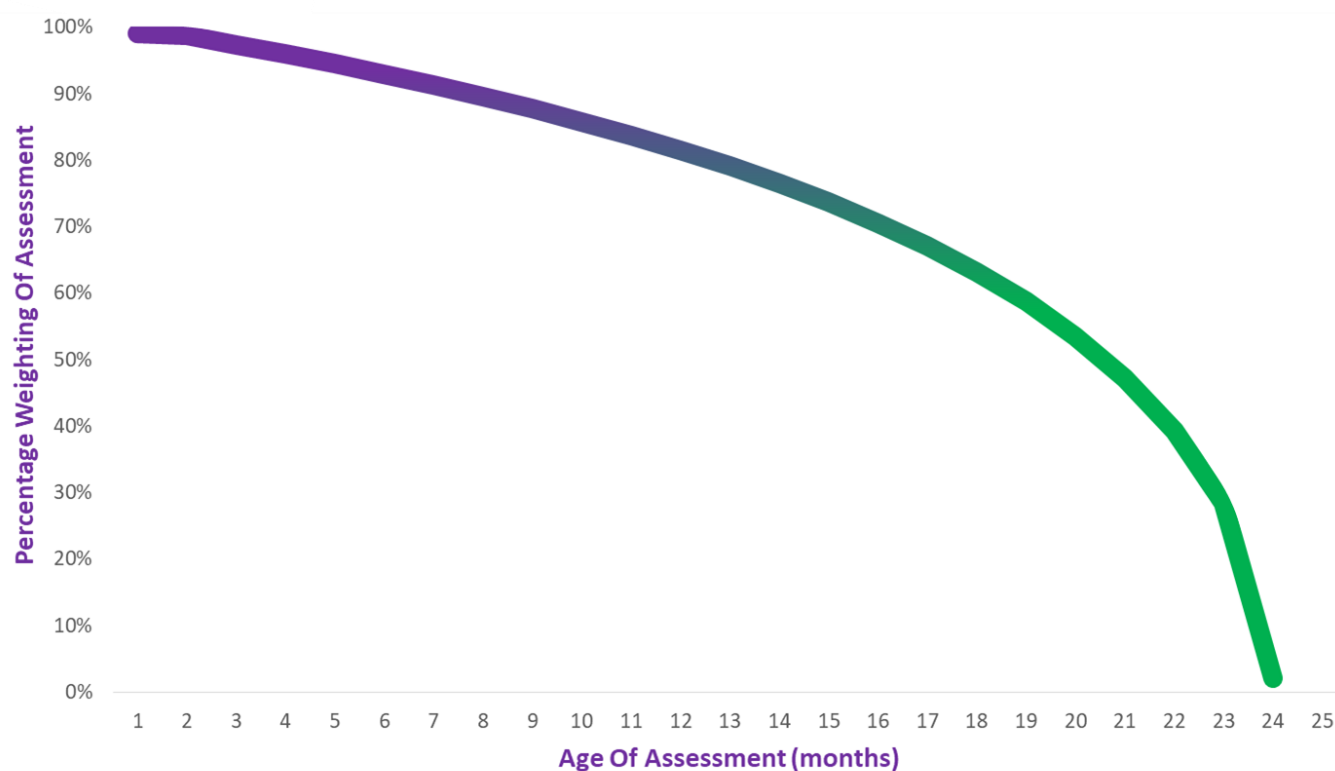
## Financial Centre Assessments

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

In calculating the GGFI:

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

**Chart 45 | Reduction In Weighting As Assessments Get Older**



### Instrumental Factor Data

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

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

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

- Updates to the indices are collected and collated every six months;
- No weightings are applied to indices;
- Indices are entered into the GGFI model as directly as possible, whether this is a rank, a derived score, a value, a distribution around a mean or a distribution around a benchmark;
- If a factor is at a national level, the score will be used for all centres in that country; nation-based factors will be avoided if financial centre (city)-based factors are available;
- If an index has multiple values for a city or nation, the most relevant value is used;
- If an index is at a regional level, the most relevant allocation of scores to each centre is made (and the method for judging relevance is noted);
- If an index does not contain a value for a particular financial centre, a blank is entered against that centre (no average or mean is used).

### Factor Assessment

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

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

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



The instrumental factors are based on a range of different models. Using just these factors would require some system of totaling or averaging scores across instrumental factors. Such an approach would involve a number of difficulties:

- Indices are published in a variety of different forms: an average or base point of 100 with scores above and below this; a simple ranking; actual values, e.g., \$ per square foot of occupancy costs; or a composite 'score';
- Indices would have to be normalised, e.g., in some indices, a high score is positive while in others a low score is positive;
- Not all centres are included in all indices;
- The indices would have to be weighted.

Given these issues, the GGFI uses a statistical model to combine the financial centre assessments and instrumental factors.

This is done by conducting an analysis to determine whether there is a correlation between the financial centre assessments and the instrumental factors we have collected about financial centres. This involves building a predictive model of the rating of centres' green financial offerings using a support vector machine (SVM).

The details of the methodology can be accessed at <http://www.longfinance.net/programmes/the-global-green-finance-index/methodology.html>. The statistical model is developed in R, an open source language and environment for statistical computing and graphics.

An SVM is a supervised learning model with associated learning algorithms that analyses data used for classification and regression analysis. SVMs are based upon statistical techniques that classify and model complex historic data in order to make predictions on new data. SVMs work well on discrete, categorical data but also handle continuous numerical or time series data.

The SVM used for the GGFI provides information about the confidence with which each specific rating is made and the likelihood of other possible ratings being made by the same respondent.

The model then predicts how respondents would have assessed centres with which they are unfamiliar, by answering questions such as:

*If a respondent gives Singapore and Sydney certain assessments then, based on the instrumental factors for Singapore, Sydney, and Paris, how would that person assess Paris?*

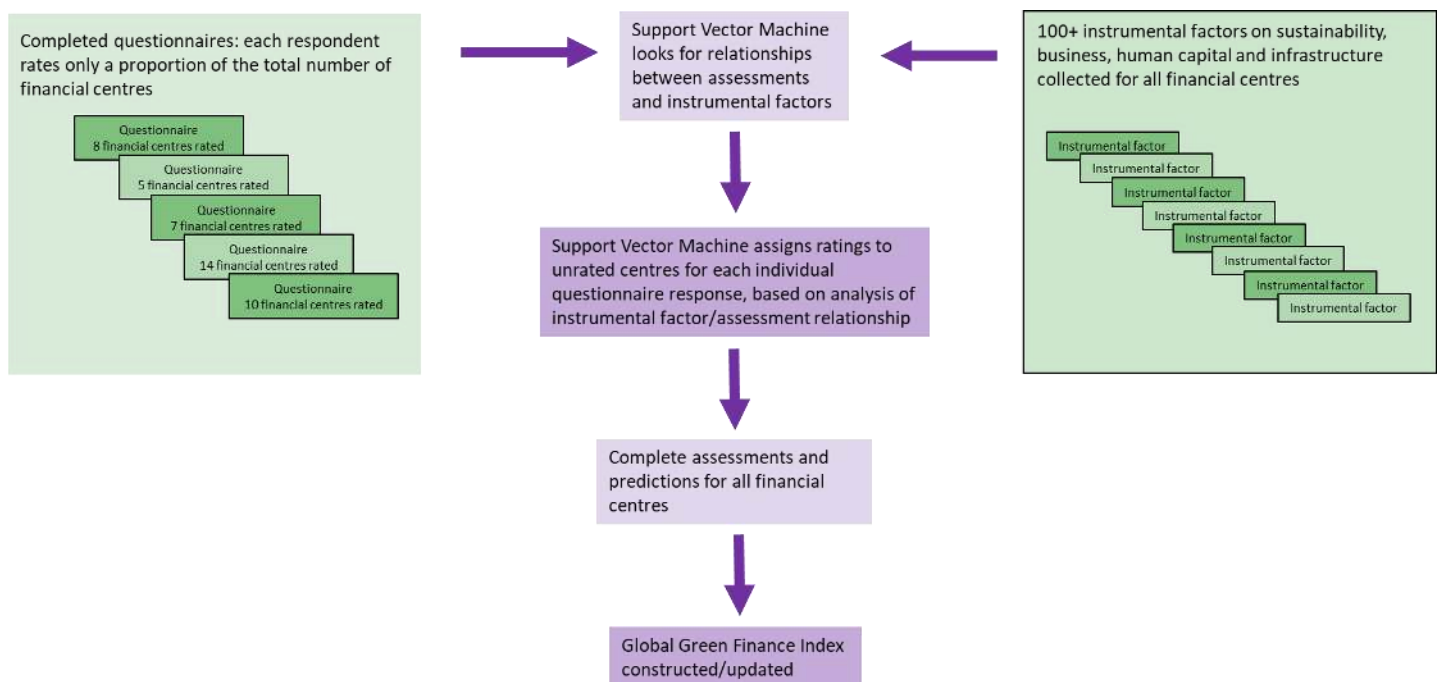
Or

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

Financial centre rating predictions from the SVM are re-combined with actual financial centre assessments to produce the GGFI – a set of ratings for financial centres’ green finance performance.

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

**Chart 46 | The GGFI Process**



## Appendix 5: Data Annex

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

### General notes

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

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

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

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

**Table 38 | Sum Of GHG Emissions**

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

**Sum Of GHG Emissions: Notes**

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

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

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

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

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

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

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

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

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

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

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

**Table 40 | Financial Centre Carbon Intensity**

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

**Financial Centre Carbon Intensity: Notes**

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

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

**Revenue reported (USD) per tonne CO2 equivalent**

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

**Table 41 | Financial Centre Sustainability Disclosure**

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

**Financial Centre Sustainability Disclosure: Notes**

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

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

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

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

**Table 42 | Financial Centre Corporate Sustainability Performance**

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

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



### Financial Centre Corporate Sustainability Performance: Notes

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

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

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

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

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

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

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

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

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

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

Sources: "Financial system signals", CK Research

**Table 44 | Sustainable Stock Exchanges (Y/N)**

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

**Sustainable Stock Exchanges: Notes**

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

Source: SSE Initiative

**Table 45 | Stock Exchanges With A Green Bond Segment**

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

**Stock Exchanges With A Green Bond Segment: Notes**

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

Source: Climate Bonds Initiative

**Table 46 | GRESB Green Real Estate And Infrastructure Investment Score**

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

**GRESB Green Real Estate And Infrastructure Investment Score: Notes**

A per-city assessment of the energy intensities of real estate assets owned or managed by GRESB members for which energy consumption was reported to GRESB's database. A score for each city is calculated based on the energy intensity in kWh/m<sup>2</sup> of the relevant assets within the city's administrative boundary. Cities are % ranked.

Source: "Buildings Intensity Score", GRESB

**Table 47 | Labelled Green Bonds Outstanding By Country Of Issuer**

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

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

#### Labelled Green Bonds Outstanding By Country Of Issuer: Notes

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

Source: "CBI - Country of risk\_Climate aligned & Labelled green bonds", CBI

**Table 48 | Labelled Green Bonds Outstanding By Listing Location**

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

**Labelled Green Bonds Outstanding By Listing Location:**  
**Notes**

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

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

Source: "CBI - Stock Exchange", CBI

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

| Total Number Of Labelled Green Bonds By Listing Location |  |
|--|--|
| City   | Level: City<br>Provider: CBI<br>Updated: 12 February 2019<br>Unit: Number of Deals |
| Amsterdam  | 18   |
| Brussels   | 2  |
| Copenhagen   | 1  |
| Dublin   | 27   |
| Frankfurt  | 194  |
| London   | 102  |
| Luxembourg   | 334  |
| Madrid   | 1  |
| Milan  | 62   |
| Oslo   | 21   |
| Paris  | 52   |
| Stockholm  | 125  |
| Vienna   | 5  |
| Zurich   | 71   |
| New York   | 19   |
| Dubai  | 1  |
| Hong Kong  | 23   |
| Mumbai   | 9  |
| Seoul  | 1  |
| Shanghai   | 47   |
| Singapore  | 38   |
| Sydney   | 5  |
| Tokyo  | 2  |
| Wellington   | 4  |
| Jersey   | 1  |
| Johannesburg   | 4  |
| Sao Paulo  | 5  |
| Munich   | 22   |
| Jakarta  | 1  |
| Taipei   | 15   |
| Buenos Aires   | 4  |
| Shenzhen   | 7  |
| Mexico City  | 4  |
| Reykjavik  | 1  |
| Riga   | 3  |
| Hamburg  | 1  |
| Stuttgart  | 111  |
| <i>R Squared depth</i>                                   | <i>0.138</i>   |
| <i>R Squared quality</i>                                 | <i>0.103</i>   |

**Total Number Of Labelled Green Bonds By Listing Location: Notes**

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

Source: "CBI - Stock Exchange", CBI



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

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

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

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

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

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

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

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

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

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

Source: "CBI - Stock Exchange", CBI

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

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

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

### Climate-Aligned Bonds Outstanding by Country of Issuer: Notes

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

Source: "CBI - Country of risk\_Climate aligned & Labelled green bonds", CBI

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

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

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

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

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

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

## Appendix 6: Instrumental Factors

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

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

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

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

**Table 56 | Sustainability Factors**

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

Table 56 (continued) | Sustainability Factors

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

**Table 57 | Human Capital Factors**

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



**Table 57 (continued) | Human Capital Factors**

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

**Table 58 | Business Factors**

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

**Table 58 (continued) | Business Factors**

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

**Table 59 | Infrastructure Factors**

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

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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.

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

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

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

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

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[www.seoul.go.kr/main/index.jsp](http://www.seoul.go.kr/main/index.jsp)**



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

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

**[IFSireland@finance.gov.ie](mailto:IFSireland@finance.gov.ie)**



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

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

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

**[www.difc.ae](http://www.difc.ae)**



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

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

**[info@finance-Montréal.com](mailto:info@finance-Montréal.com)  
[www.finance-Montréal.com/en](http://www.finance-Montréal.com/en)**



## PRODUCED BY Z/YEN GROUP AND FINANCE WATCH



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



[www.finance-watch.org](http://www.finance-watch.org)

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

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



[www.greenfinanceindex.net](http://www.greenfinanceindex.net)

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