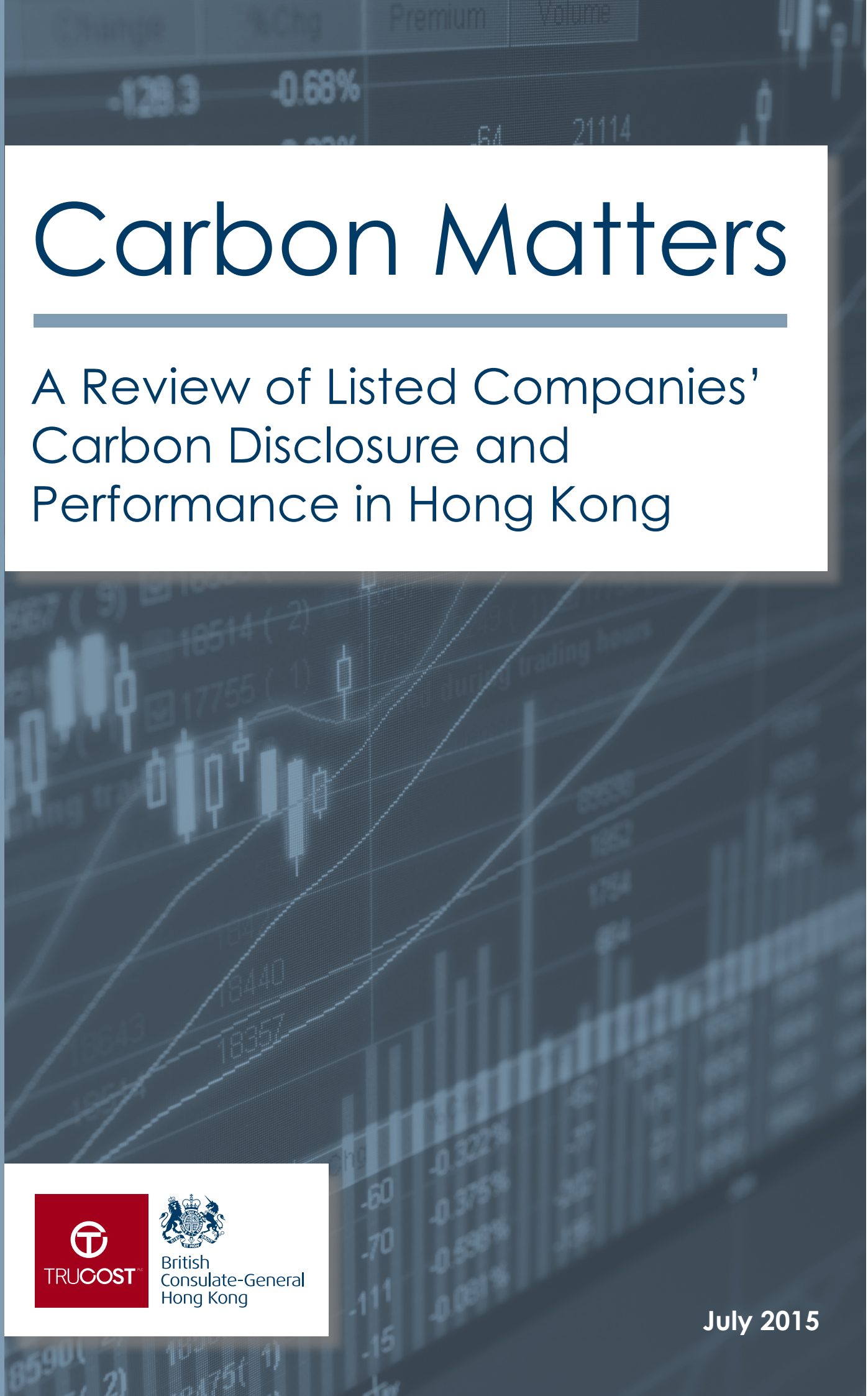
Carbon Matters

A Review of Listed Companies' Carbon Disclosure and Performance in Hong Kong



TRUCOST

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ABOUT BRITISH CONSULATE-GENERAL HONG KONG

Representing the UK government, the British Consulate-General Hong Kong works with the Hong Kong Special Administrative Region Government, businesses, investors and other stakeholders to make progress in tackling climate change and achieving sustainable low carbon growth. We work together with our stakeholders through convening dialogues, fostering collaboration, sharing UK experience and conducting relevant studies.

ABOUT TRUCOST

Trucost has been helping companies, investors, governments, academics and thought leaders to understand the economic consequences of natural capital dependency for over 15 years. Our world leading data and insight enables our clients to identify natural capital dependency across companies, products, supply chains and investments; manage risk from volatile commodity prices and increasing environmental costs; and ultimately build more sustainable business models and brands. Key to our approach is that we not only quantify natural capital dependency, we also put a price on it, helping our clients understand environmental risk in business terms. It isn't "all about carbon"; it's about water; land use; waste and pollutants. It's about which raw materials are used and where they are sourced, from energy and water to metals, minerals and agricultural products. And it's about how those materials are extracted, processed and distributed.

DISCLAIMER

CONTENTS

EXECUTIVE SUMMARY

Climate change is creating global business challenges and putting company profits at risk. It is therefore important for companies to measure and manage their carbon emissions and associated risks and opportunities.

Disclosure and management of company carbon emissions is particularly important to ensuring sustainable growth and attracting long-term investments. This also helps develop sustainable economies where companies' management of their carbon risks exposure and opportunities is directly linked to the climate resilience of the financial markets. Investors, companies, stock exchanges and governments all play important roles in managing climate change challenges and opportunities from financial markets perspectives.

This study, commissioned by the British Consulate-General Hong Kong and conducted by Trucost, reviews how companies listed on the Hong Kong Exchanges and Clearing (HKEx) manage their exposure to climate change risks and opportunities, in light of HKEx's proposal to move the voluntary *Environmental, Social and Governance Reporting Guide* (ESG Guide) towards a more rigorous 'comply or explain' approach by the end of 2015. It examines both the carbon disclosure level and carbon management performance[1] of 100 selected listed companies between 2011 and 2013. The study also makes reference to the experience of other major stock exchanges, reporting companies and investors in other markets. This report concludes with recommendations on how Hong Kong can improve the uptake of carbon disclosure for companies listed on the HKEx.

KEY FINDINGS

Carbon disclosure performance

- 19% of listed companies surveyed disclose GHG emissions in line with the international GHG Protocol standard in 2013. This represents a 27% increase from 2011. However, this is low in comparison to a 45% disclosure rate globally (Trucost, 2013). There was a 42% increase of companies disclosing 'derived' GHG data – data which requires standardization in order to match the GHG Protocol — in 2013 compared to 2011.
- Industrial conglomerates and one bank demonstrate the highest level of disclosure in Hong Kong. Companies which reported for the first time in 2013 are all based in the real estate sector. A number of significant sectors including financial services sector, engineering and construction, lag behind significantly in carbon disclosure.
- 74% of companies disclose some corporate social responsibility (CSR) qualitative information in 2013. While companies are most likely to discuss energy conservation issues in their annual and environment/ CSR reports, no companies specifically disclosed information on climate risk.

Carbon management performance (carbon efficiency rate)

- Total costs of GHG emissions of the 100 companies increased by 16% over the analysis period 2011 to 2013 – in line with global studies on GHG emissions performance. However, the extent to which

1. In this study, carbon management performance of each company was assessed via examining their Carbon Efficiency Rate which is defined as a function of the total cost of GHG emissions divided by revenue.

surveyed companies managed climate change risks and opportunities could not be clearly assessed due to the relatively low carbon disclosure level.

- Companies in the electric utilities sector have the most improved average carbon efficiency rate (defined as a function of cost of GHG emissions divided by company revenue), with an increase of 37% over three years. However companies in this sector consistently had the lowest carbon efficiency rate, so this should be treated with caution.
- China Resources Power Holdings is the only company to 'de-couple' emission reductions and revenue growth – reducing its GHG emissions by a quarter in the period 2011-2013 while its revenue increased by 15%. While the company's coal mining and power generation business activities are carbon intensive, it demonstrated emissions reductions through investment in clean technology.

Review of overseas experience of reporting companies, investors and stock exchanges

- Previous studies discovered that on average the costs to most companies were within a range of £4,000 (DEFRA, 2011) to £75,000 per year depending on the size of companies and number of sites (PricewaterhouseCoopers LLP and Carbon Disclosure Project, 2010). The PwC/CDP study in 2010 surveyed about 180 companies and found that 53% believed that GHG emissions disclosure had resulted in a net benefit, whereas the costs involved were not financially material
- There is growing investor demand for robust data. Investors need companies to be transparent on their management of carbon risks and opportunities to allow them to integrate climate change considerations into their investment decisions (Mercer, 2013). Despite improving responses to the voluntary disclosure process managed by the Carbon Disclosure Project (CDP), further improvement in both disclosure level and quality is needed (CDP, 2011).
- Previous studies — (CDP, 2011) and (Climate Disclosure Standards Board, 2014) — have shown that GHG emissions disclosure rates vary in large stock exchanges worldwide. Stock exchanges have an important role to play, in particular to help address limitations of voluntary disclosure process. Some exchanges with very high levels of absolute market capitalisation such as HKEx, Shanghai, Tokyo and New York were found to have low GHG emissions disclosure rate — in other words, containing hidden risks and opportunities.

RECOMMENDATIONS

Based on the key findings of this study, recommendations for three key groups of stakeholders on how Hong Kong can improve the uptake of carbon disclosure are provided below. Further details of these recommendations can be found at the end of this report.

COMPANIES should measure their GHG emissions, analyse their carbon efficiency, develop improvement plan considering carbon risks and opportunities and disclose relevant information. The benefits of carbon disclosure for companies outweigh the costs.

INVESTORS should consider carbon risks and opportunities within their investment portfolios and set an example by reporting on their own actions. They should step up demand from companies for climate change information. Engaging with investee companies is the key to continual improvement of disclosure performance and portfolio exposure to carbon.

EXCHANGE AND REGULATORS could provide support to further build company capacities in disclosure. HKEx could also consider developing a longer-term phased improvement approach to transit from voluntary, through comply or explain, to mandatory disclosure.

METHODOLOGY

SCOPE

This study looked at 100 HKEx listed companies representing a total of 927 million tonnes of carbon dioxide emissions. If these companies do not manage their greenhouse gas emissions GHG emissions, it could lead to over US$107,000 million in damages to the environment. This study represents 52% of HKEx market cap (FactSet, 2014).

COMPANY SELECTION

Trucost selected a sample of 100 companies listed on the HKEx and analysed their carbon disclosure and performance over three years – 2011, 2012 and 2013.[2] Trucost downloaded the constituents of the HKEx and calculated which were the most material sectors on the exchange based on market cap (a table showing the top 15 sectors ranked by market cap weight can be found in Appendix 1). After consolidating the banking and oil and gas sectors, 11 sectors were used for this analysis. Companies from each of these sectors were then selected to form the sample of 100 based on size, selecting evenly from small, mid and large cap companies.[3] The final company list can be seen in Appendix 2.

COMPANY ANALYSIS

Trucost reviewed public reporting by the 100 selected companies to identify quantitative GHG data which matches best practice reporting and relevant qualitative reporting. For quantitative analysis, Trucost bases its approach on the GHG Protocol[4], differentiating between scope 1 direct and scope 2 indirect emissions as the key approach to GHG accounting. Trucost concentrated on scope 1 and 2 emissions as this best aligns with the HKEx ESG Guide's focus on operational emissions. Where a company does not report GHG data in line with this approach, Trucost used modelling and standardization techniques (see Appendix 4) to calculate comparable data. A number flagging system was also applied to capture the source and calculation approach for all quantitative GHG data.

Trucost applied its proprietary GHG emissions valuation method to the scope 1 and 2 emissions. By putting a monetary value on the unpriced natural resources/damages resulting from GHG emissions, the calculation reflects the damage caused to the environment and society. This was then normalized by revenue to calculate a carbon efficiency rate. This provides an indication of how efficiently a company has generated its revenue in comparison to its carbon exposure, and whether a company has de-coupled its revenue growth from its GHG emissions performance.

For the qualitative review, a keyword search of 20 relevant terms was undertaken to identify patterns in Corporate Social Responsibility (CSR) reporting and annual reports. A full list of keywords can be found in Appendix 3. Results were collated in terms of carbon disclosure, climate change, energy disclosure and energy use.

2. 2014 data were not examined at the time of report writing

3. Companies with a market cap greater than US$10 billion were classified as 'large', companies with a market cap between US$2 and US$10 billion were 'mid', and companies with a market cap below US$2 billion USD were 'small'

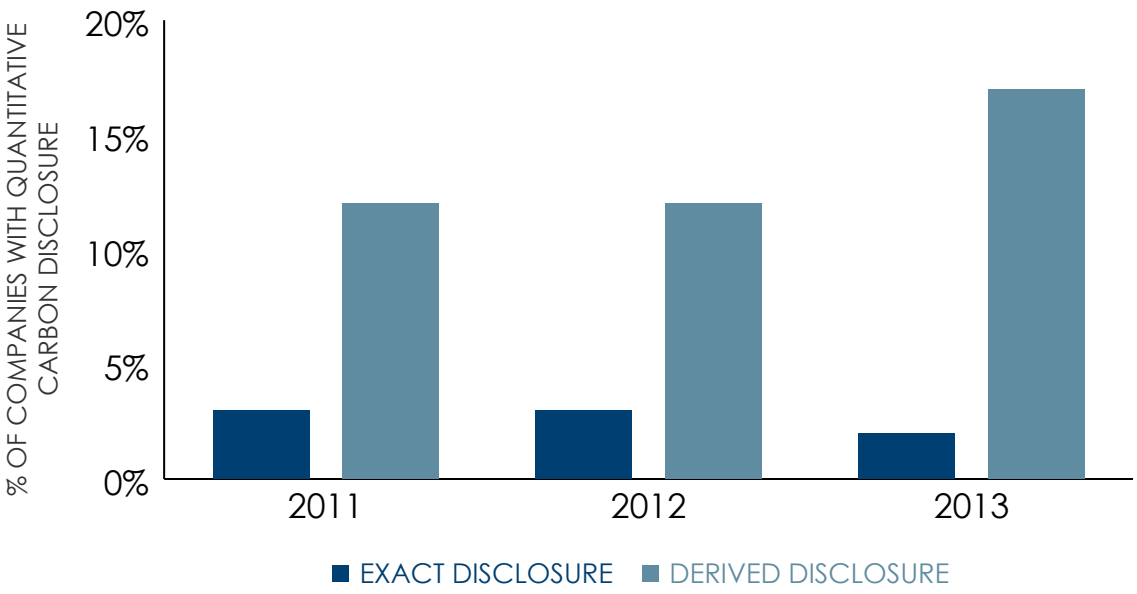
4. The GHG Protocol is the most widely used international GHG accounting tool

RESULTS

QUANTITATIVE CARBON DISCLOSURE ASSESSMENT

Trucost identified companies which disclosed quantitative GHG emissions data either in line ('exact')with the GHG Protocol standard for 2011-2013 or could be standardized to be in line ('derived')[5] with the protocol. Disclosure levels increased by 27% over this period, rising from 15 companies in 2011 to 19 companies in 2013 (Figure 1). However, disclosure is just 19% of the sample size – still at a very low level despite HKEx's introduction of its ESG Guide in 2011.

FIGURE 1: GHG DISCLOSURE LEVELS OVER THREE YEAR PERIOD



There are only two companies in the sample which have reported exact scope 1 or 2 data consistently over the three year period, one of which disclosed comprehensive GHG data in its annual report every year, and the other annually submitted data to the Carbon Disclosure Project (CDP).

Despite an overall increase in the total number of companies disclosing, the number of companies reporting exact data decreased from three to two over the three year period. The third company reported exact data in 2011 and 2012, but only disclosed derived disclosure in 2013. As this company is large-cap and operates in a carbon-intensive sector, it is important that it publishes annual GHG data so that investors can understand year-on-year performance.

There was a 42% increase in companies disclosing derived GHG data in 2013 compared to 2011. Companies which reported for the first time were all based in the real estate sector, suggesting there is an increasing uptake in awareness of carbon reporting for this sector. This is likely due to a number of government schemes to increase energy efficiency in commercial buildings, and investor initiatives on green buildings, which have raised awareness in this sector.

Trucost also reviewed quantitative carbon disclosure levels at a sector and company level, as can be seen for 2013 in Table 1 and Figure 2.

5. Exact disclosure means that the company disclosed scope 1 and 2 data in tonnes CO2e, meeting the requirements of the GHG Protocol. Derived disclosure means that the data required additional standardization. For example, if a company only reported energy use data, then Trucost would estimate the likely scope 1 and 2 emissions.

TABLE 1: QUANTITATIVE CARBON DISCLOSURE BY SECTOR IN 2013

SECTOR	EXACT DISCLOSURE	DERIVED DISCLOSURE	NO DISCLOSURE
Banks	9%	0%	91%
Casinos/Gaming	0%	0%	100%
Coal	0%	75%	25%
Electric Utilities	0%	67%	33%
Engineering & Construction	0%	0%	100%
Industrial Conglomerates	17%	17%	67%
Internet Software/Services	0%	0%	100%
Life/Health Insurance	0%	0%	100%
Multi-Line Insurance	0%	0%	100%
Oil & Gas	0%	6%	94%
Real Estate Development	0%	29%	71%
Telecommunications	0%	17%	83%

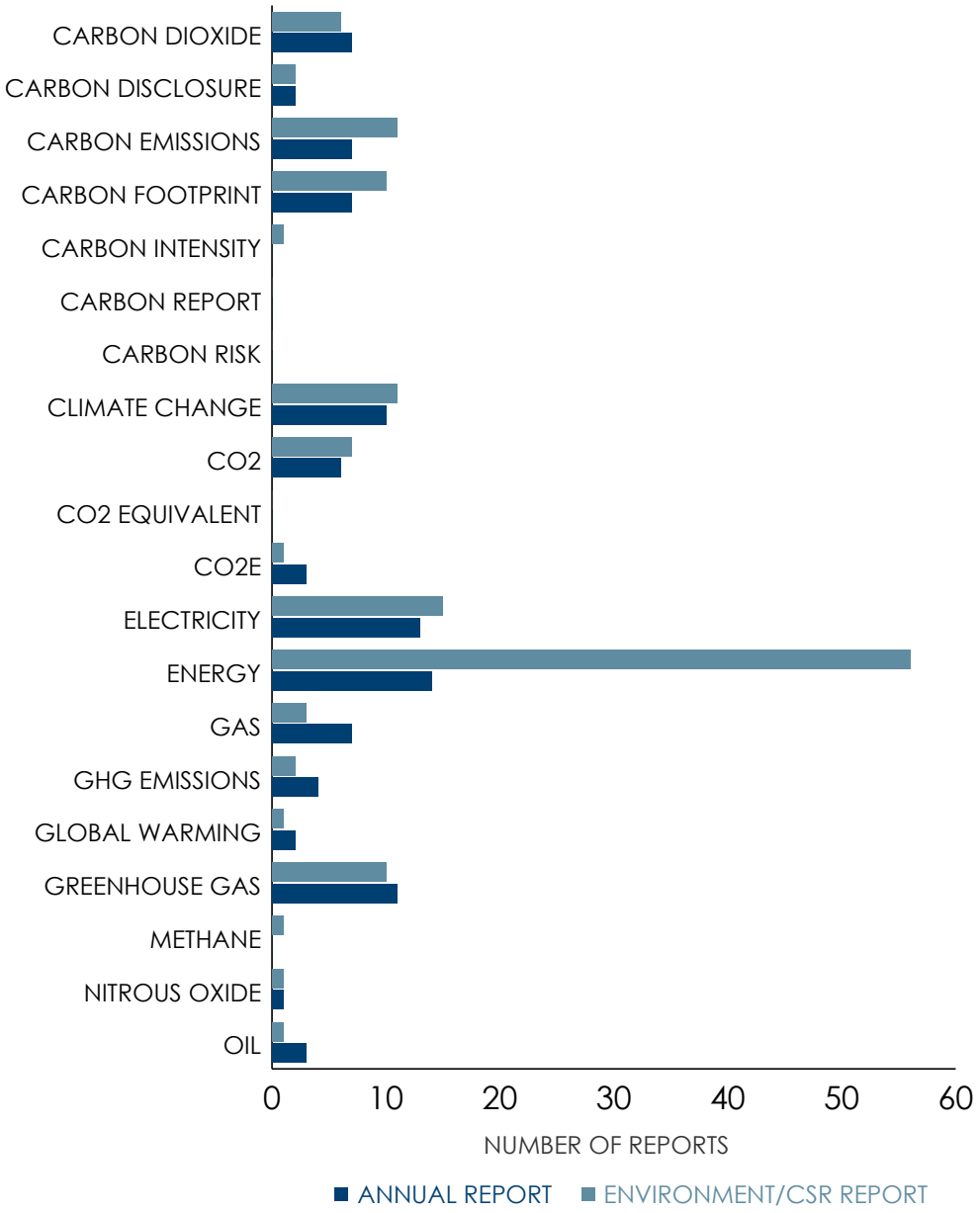
Coal and electric utilities have the highest level of quantitative carbon disclosure across all three years – not unexpected as both are very carbon-intensive sectors which have been increasingly attracting investors' attention. The majority of 'low impact' sectors such as insurance and banks have poor disclosure levels. The level of disclosure remains relatively static over all sectors between 2011 and 2013, with the exception of real estate development where there was a marked increase in derived disclosure in 2013. This is in line with local trends and the Hong Kong government's focus in improving building energy efficiency with a number of incentives schemes and plans announced, as well as initiatives in green building. This has shown that high materiality nature of carbon is critical to companies in making decisions on starting carbon disclosure.

QUALITATIVE CARBON DISCLOSURE ASSESSMENT

Trucost conducted a qualitative review of company reports and websites, searching for 20 words or phrases related to climate. In 2013, 74% of companies disclose some sort of CSR information on their company websites and public reports. Among the 2013 reports reviewed, 61% of annual reports and 88% of environment/CSR reports contain carbon or energy disclosure. Disclosure levels in both report types remain fairly static over the three year period, which suggests that HKEx's ESG Guide has not made a significant impact on companies' qualitative carbon disclosure.

An assessment of the relative levels of disclosure across annual and environment/CSR reports for 2013 can be seen in the chart overleaf.

FIGURE 2: KEYWORD RESULTS FOR ANNUAL AND ENVIRONMENT/CSR REPORTS IN 2013



The most significant result is the high proportion of annual reports including the word 'energy' in an environmental context. Companies are primarily discussing issues of energy conservation and efficiency, as well as renewable sources of power, however, this is often done in the context of cost efficiency rather than the environmental impact of energy use. This is consistent with a similar study conducted by the UK Environment Agency, where the topic 'energy' was the fourth most commonly disclosed out of 25 reviewed topics. This was likely due to high and volatile oil prices, resulting in fluctuating costs in operations and supply chains (Environment Agency, 2013). Companies need to appreciate the added environmental and economic benefits of increasing their energy efficiency.

A high proportion of companies discussing energy in their 2013 annual reports fall into the real estate development sector, where energy efficiency is one of the most material environmental issues. Similarly, the high report count for 'electricity' – another word related to energy use – is primarily among companies in this sector. As mentioned above, this is in line with local trends and the Hong Kong government's focus, as well as initiatives in green building.

The low report count for the phrases 'carbon intensity' and 'carbon risk' suggests that whilst companies are discussing climate change, fewer appear to be referring to, and therefore considering, the future sustainability of their company and setting reduction targets. This is supported by the CDP report finding that while 87% of the 45 responding Chinese companies are implementing, or plan to implement, GHG emissions reduction initiatives in the reporting year, only 16% had set emissions reduction targets (CDP, 2014).

CARBON DISCLOSURE BY COMPANY SIZE

In addition to reviewing carbon disclosure by sector, Trucost also conducted this analysis by company size. Across the board, disclosure is significantly lower among small-cap companies (only 3% of these companies disclose quantitative data), probably because they lack both resources and external pressure. Only large-cap companies disclose 'exact' quantitative data, and they also account for the fastest rate of disclosure improvement between 2011-2013. In terms of qualitative information, this is very low for small-cap companies in environment/CSR reports, and highest in large-cap environment/CSR reports.

CARBON EFFICIENCY RATE

Trucost calculated the carbon efficiency rate (defined as a function of total costs deriving from GHG emissions divided by revenue) for each company to assess their efficiency in managing their GHG emissions to generate revenue. A high carbon efficiency rate is an indication of good carbon efficiency, and a low rate relates to carbon-intensive performance. The carbon efficiency rate varies significantly depending on the sector or size of each company, as can be seen in the tables below.

TABLE 2: AVERAGE CARBON EFFICIENCY PER SECTOR

SECTOR	2011	2012	2013	% CHANGE OVER 3 YEARS
Life/Health Insurance	119%	119%	118%	0%
Multi-Line Insurance	117%	116%	116%	-1%
Banks	107%	106%	106%	0%
Internet Software/Services	76%	76%	76%	-1%
Engineering & Construction	72%	73%	73%	1%
Real Estate Development	66%	66%	66%	0%
Telecommunications	53%	52%	53%	1%
Casinos/Gaming	51%	51%	48%	-6%
Oil & Gas	47%	44%	44%	-6%
Industrial Conglomerates	41%	44%	41%	1%
Coal	21%	22%	27%	28%
Electric Utilities	3%	4%	5%	37%

TABLE 2: AVERAGE CARBON EFFICIENCY PER SECTOR

SIZE	2011	2012	2013	% CHANGE OVER 3 YEARS
Large	72%	72%	72%	0%
Mid	58%	59%	60%	3%
Small	54%	53%	52%	-4%

The electric utilities sector is the least carbon efficient, with a carbon efficiency rate of 5% in 2013. This is likely to be due to the fact that many of the companies in this sector are generating electricity using fossil fuels such as coal, although all companies in this sector generate a proportion of their power from renewable sources – the leading company in terms of clean energy generated nearly 70% of its 2013 revenue derived from renewable power.

The electric utilities sector achieved the greatest improvement in its carbon efficiency rate over the three years. However, companies in this sector have consistently the lowest carbon efficiency rate, so this should be treated with caution. Trucost recommends repeating this analysis in a few years to see if uptake of renewable power generation has increased further among companies in this sector.

The most carbon-efficient companies are those which operate in the insurance sectors, which is likely to be because these companies operate in office-based environments with few GHG emission sources. However, it is worth noting that the major source of emissions for the various finance sectors is likely to be in their downstream investments which is not considered in the scope of this analysis.

In terms of company size, small-cap companies are the least carbon efficient and show a decline in performance over time. Mid-cap companies demonstrate the largest improvement, whereas large-cap companies remained fairly static.

As part of this analysis, Trucost aimed to identify companies which could be described as 'de-couplers'; in other words, they have de-coupled their economic growth from their emissions performance by increasing revenue while achieving emission reductions over the three year period. Such companies can be seen as leaders in carbon efficiency, and so would be attractive to long-term investors. Among the sample of 100 companies which disclose GHG emissions data[6], only China Resources Power Holdings achieves this result.[7] The company reduced its GHG emissions by over a quarter in 2011-2013, while its revenue increased by 15%. In addition, Swire Properties is close to achieving de-coupling status. The company grew its revenue by 36% over three years while its GHG emissions only rose by 0.5%. Further details on China Resources Power Holdings and Swire Properties can be found in the case studies section.

It should be noted that the disclosure level of the sampled companies was found to be relatively low. For companies which do not disclose GHG emissions, estimated data using modelling was used for this carbon efficiency rate analysis.

6. In order to assess whether a company is a de-coupler, actual GHG emissions data is needed to identify real emissions reductions. So emissions data modelled by Trucost was not used for identifying de-couplers.

7. Yanzhou Coal Mining and Power Assets Holdings were also flagged as de-couplers. However, their 2013 data is derived from the previous year, so it is difficult to understand their actual performance in 2013.

CASE STUDIES

In this section, Trucost takes an in-depth look at three companies from the sample of 100 – one has a particularly high standard of carbon disclosure compared to its peers, and two could be seen to be moving towards sustainable growth through carbon reduction efforts.

HANG SENG BANK

The company was identified as a strong disclosure of carbon data, and so in addition to our review of public reports Trucost also reviewed its CDP disclosure. Hang Seng Bank has submitted data to the CDP since 2005, reporting GHG and energy use in line with CDP requirements. As part of its CDP submission, the company is also requested to identify its key climate change risks and opportunities, as seen in the snapshots below.

FIGURE 4: HANG SENG BANK CDP RESPONSE (HANG SENG BANK, 2015)

Page: CC5. Climate Change Risks

CC5.1
Have you identified any climate change risks that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

Risks driven by changes in physical climate parameters

CC5.1b
Please describe your risks that are driven by change in physical climate parameters

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Change in temperature extremes	Extreme weather may affect the Bank' s operation time, location, energy consumption, facilities design, corporate responsibility events, and risk and crisis management strategies. The changing climate also affect our clients and supply chain, especially those rely on food and agriculture, transportation, shipping, production and retail sales etc	Increased operational cost		Direct	More likely than not	Medium			
Induced changes in natural resources	Electricity cost is expected to increase in the coming years due to the induced changes in natural resources.	Increased operational cost		Direct	More likely than not	Medium			

Page: CC6. Climate Change Opportunities

CC6.1
Have you identified any climate change opportunities that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

Opportunities driven by changes in physical climate parameters

CC6.1b
Please describe the opportunities that are driven by changes in physical climate parameters

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Other physical climate opportunities	Hang Seng Pan Pearl River Delta Environmental Awards	New products/business services		Direct	Likely	Medium			
Change in mean (average) temperature	Energy saving measures	Reduced operational costs		Direct	Virtually certain	Medium-high			
Induced changes in natural resources	e-statement services	New products/business services		Direct	Likely	Medium			

Identifying material risks and opportunities allows investors to understand how a company is planning for the future, something which seemed to be lacking from the qualitative assessment of companies' public reports as none disclosed information on carbon risk (see Qualitative carbon disclosure assessment section). Hang Seng Bank could further improve its reporting by including estimated financial implication information – for example, the estimated cost of resolving the risk, or the revenue which would be generated from the opportunity. This would allow investors to better judge whether the company's financial performance will be significantly affected by climate change in the future.

CHINA RESOURCES POWER HOLDINGS

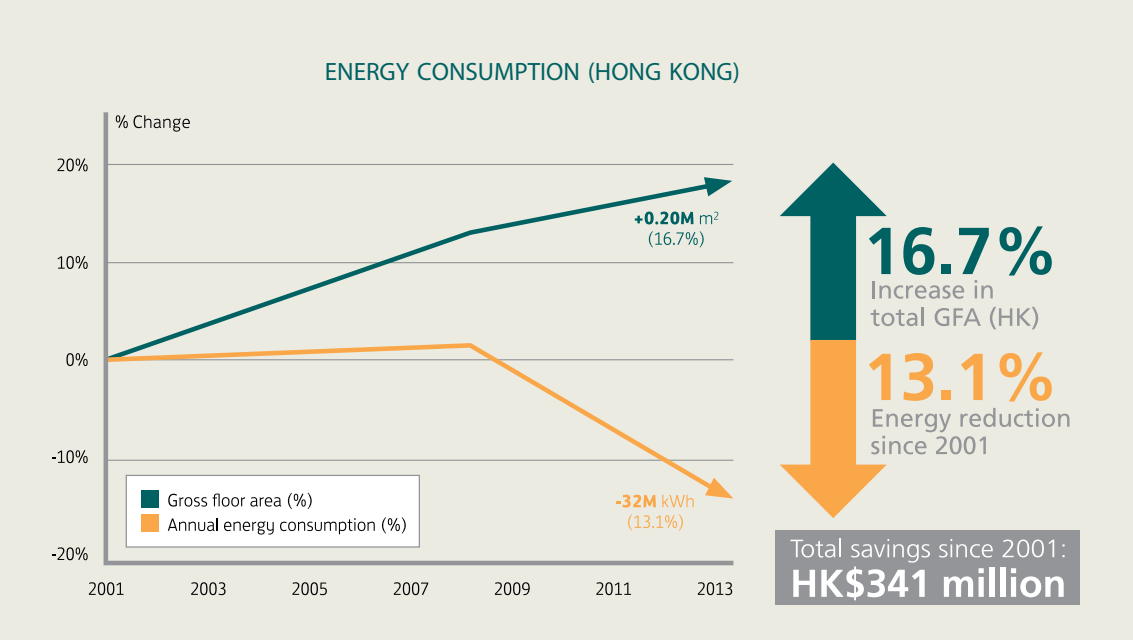
This company's operations comprise power generation and coal mining, yet despite operating in a carbon-intensive sector it is the only company in the sample to demonstrate de-coupling of its emissions and revenue growth — reducing its GHG emissions by over 25% in 2011-2013, while its revenue increased by 15%. China Resources Power Holdings is taking a proactive approach to reducing its carbon emissions through technological investment, which has increased 17.8% since the previous year, and enabled the company to reduce its carbon emissions rate from 761g/KWh in 2011 to 483g/KWh in 2013 (China Resources Power Holdings Company Limited, 2014).

China Resources Power Holdings also generated 8% of its revenue from coal mining in 2013, which means it could be at risk from owning assets which could become stranded in the future. This could occur if regulations were introduced to ensure that counries do not exceed a 2°C temperature rise making the company's coal reserves 'unburnable' (Carbon Tracker, 2011).

SWIRE PROPERTIES

This company, a separately-listed subsidiary of Swire Pacific, is also advanced in its environmental reporting and performance. The company has identified that, as a real estate development company, its major impact will be the emissions from energy use. The company's achievement in energy reduction in Hong Kong can be seen in the snapshot below.

FIGURE 3: SWIRE PROPERTIES ENERGY DISCLOSURE (SWIRE PROPERTIES LIMITED, 2014)



The company has an energy management plan which sets challenging reduction targets and monitors progress. The company saved HK$341 million in 2001-2013 from its energy reductions (Swire Properties Limited, 2014).

CONCLUSIONS: DISCUSSION AND RECOMMENDATIONS

DISCUSSION

Key findings of this study are discussed below with reference to a literature review of the experience of investors and reporting companies in other markets and other major stock exchanges.

1. **Overall carbon disclosure level:** This analysis found that 19% of companies among the sample of 100 disclosed quantitative GHG emissions in 2013. Trucost's research for the Shanghai Stock Exchange also discovered that only 9% of 153 companies listed on this exchange were disclosing quantitative GHG data that matched the GHG Protocol standard, compared to 45% globally (Trucost, 2013).

   There are a number of drivers of carbon disclosure, including to meet the information needs of key stakeholders such as investors. Many previous studies and recent global developments show that investors are beginning to take climate change impacts into serious consideration in making their investment decisions, and are requesting this information from companies. A recent survey of global investors found that 56% of asset owners stated that they conducted climate risks assessments of their portfolios, and 25% have made changes to their investment decisions as a result of these assessments (Mercer, 2013). There has been a recent increase in the number of shareholder proposals filed which relate to climate change issues. Low-carbon investment is beginning to take hold in Asia as well: LCA Asia – a private equity fund – is investing in low carbon projects in Southeast Asia (Eco Business, 2015), and the recent launch of a US$400 million joint venture founded in Hong Kong called Asia Climate Partners to mobilise private equity low carbon investment across Asia (blue & green tomorrow, 2015). This global trend is further supported by the recent stranded assets debate and divestment movement of fossil fuel assets ((Carbon Tracker, 2011) and (Bank of England, 2015)).

   In addition to intangible benefits resulting from investor communication, it is evident from our literature review that the benefits of carbon reporting for companies outweigh the costs. As part of a UK government policy impact assessment[8], previous studies discovered that on average the costs to most companies were within a range of £4,000[9] (DEFRA, 2011) to £75,000 per year depending on the size of companies and number of sites (PricewaterhouseCoopers LLP and Carbon Disclosure Project, 2010). The PwC/CDP study in 2010 surveyed approximately 180 companies and found that 53% believed that GHG emissions disclosure had resulted in a net benefit, whereas the costs involved were not financially material. Benefits included cost savings, better risk management, brand building and stakeholder communications. Previous studies show that companies demonstrating positive action on tackling climate change and good disclosure outperform peers in performance of financial return and long-term value creation (CDP, 2011).

2. **Disclosure performance by sector in 2013:** This study found that the industrial conglomerates are leading in disclosure performance by demonstrating exact disclosure in line with the GHG Protocol; and electric utilities and coal sectors are demonstrating good performance in derived disclosure (data standardization is required to match GHG Protocol requirements). First time reporting companies are all based in the real estate sector. A number of significant sectors including financial services, and engineering and construction sectors lag behind in terms of carbon disclosure.

   In Hong Kong, buildings consume the largest amount of electricity and are therefore responsible for a large share of Hong Kong's GHG emissions. Both government and the real estate sector have launched incentive schemes,

8. A policy impact assessment was conducted in 2012 prior to legislating the mandatory carbon disclosure requirements for UK quoted companies.

9. Costs exclude overseas emissions, process emissions and non-freight transport emissions.

released tightened building regulations and made commitments to improve building energy efficiency. The increase in uptake observed in the real estate sector in this study was likely due to raised awareness in benefits of reporting. GHG emissions were assessed as material to the sector in Hong Kong and globally. GHG emissions disclosure would potentially deliver value and competitive benefits (Business Environment Council, 2014). The real estate sector is the third largest sector by market cap in HKEx, hence the potential outcome of better reporting and its carbon performance are significant.

3. **Carbon disclosure by company size:** Disclosure by small-cap companies is significantly lower than large-cap companies. The results of this analysis aligned with anecdotes Trucost has received from investors. For example, a Hong Kong-based firm noted the lag between Asian companies and those based in Europe and North America where ESG is more firmly integrated into business strategy. The company found that many small and mid-cap companies were eager to disclose GHG data but were constrained by a lack of capacity and knowledge.

4. **Disclosure scope:** 17% of companies assessed in this study disclose GHG emissions data which required additional standardization in order to match the GHG Protocol standard. In addition, among companies participating in the Environment Protection Department's Carbon Footprint Repository initiative[10], only 34% are reporting on their global emissions data. The lack of consistency in disclosure – for example, whether it covers all global operations — makes it difficult to clearly assess overall company exposure to climate risks. It indicates that there is still a long way to go in terms of quantitative carbon disclosure.

   In addition, financial services companies should also disclose their impacts from their Scope 3 downstream investments, something which is currently lacking among companies globally. Previous studies found that GHG emissions was material to financial sector ((Trucost, 2012) and (Business Environment Council, 2014)). In the latest CDP survey, only 20 companies reported this information (out of the 331 which disclosed scope 3 emissions data), and only 3 were from Asia (CDP, 2015). These insurance and banking companies represent a total of 31% contribution by market cap of HKEx. If these companies start measuring and practising carbon disclosure, they have potential to deliver significant benefits in tackling climate change.

5. **Carbon management performance (carbon efficiency rate):** Total costs associated with GHG emissions of the 100 companies increased by 16% over the analysis period from 2011 to 2013 (See Appendix 5 for Trucost's valuation model) — in line with other global studies on GHG emissions performance. However, the efficacy of how these listed companies were managing climate change risks and opportunities could not be assessed due to the relatively low carbon disclosure level. Modelling was used for the purpose of this study where data was not available.

   This study found that insurance and banking companies are the most carbon efficient (the carbon efficiency rate is defined as a function of total cost of GHG emissions divided by revenue). However, these results do not take into account downstream emissions (See item 4 above).

   Among companies which disclose quantitative GHG emissions data, only China Resources Power Holdings achieves a de-coupling[11] of financial and carbon management performance. The company reduced its GHG emissions by a quarter in 2011-2013, while its revenue increased by 15%. The result illustrates the importance of clean technology investment to fossil fuel companies in terms of long-term sustainable growth.

6. **Disclosure trends worldwide and the role of stock exchanges:** Investors need companies to be transparent on how they are managing climate risks and opportunities and have been demanding robust data. The Carbon Disclosure Project (CDP) has been managing a voluntary carbon disclosure process for the last 14 years on behalf of investors representing 822 institutional investors holding US$95 trillion in assets (CDP, 2015). Companies and stock exchanges are responding positively. A 2011 study by CDP showed that 48% of companies by market capitalisation on the largest 31 exchanges worldwide disclosed GHG emissions (CDP, 2011). The disclosure rates of the world's largest companies were found to be high across all regions and sectors. Although ESG reporting (including GHG emissions) remains largely voluntary, increasing pressure for transparency, accuracy and

10. Carbon footprint repository for Hong Kong listed companies.

11. A de-coupler is a company that demonstrate an increase in revenue and decrease in GHG emissions overtime.

consistency has led some governments and stock exchanges to adopt regulations requiring ESG reporting. A number of countries, mostly European countries, have announced regulations to mandate disclosure at various level (Business Environment Council, 2014).

Stock exchanges have a role to play to address these limitations to increase disclosure levels and improve disclosure quality. It is commended that HKEx is committed to raising its voluntary ESG guideline to a more rigorous 'comply or explain' approach by the end 2015. A previous study stated that exchanges have a 'crucial role in building transparent, regulated markets and promoting best practice in financial and corporate governance', and proposed that reporting guidelines have an important role to play in raising disclosure standards (Climate Disclosure Standards Board, 2014).

The CDP 2011 study also found that among 31 large stock exchanges, GHG emissions disclosure rates vary, and developed markets generally perform better than emerging markets (CDP, 2011). However, when positioned against total market capitalisation, some exchanges demonstrated very high levels of absolute market capitalisation but low GHG emissions disclosure rate. Examples of these exchanges are Shanghai, Hong Kong, Bombay, Tokyo and New York in ascending order of hidden risks. This implies that there are hidden risks and opportunities.

RECOMMENDATIONS

Based on the key findings of this analysis, Trucost's recommendations for companies, investors and exchange and regulators on how Hong Kong can improve the uptake of carbon disclosure for listed companies are provided below:

COMPANIES

- All listed companies should consider the likely financial benefits of carbon reporting, both tangible – through cost savings from energy efficiency – and intangible – through brand building and stakeholder communications. Large companies should continue to improve their disclosure quality, and small-cap companies should build their capacity and start to disclose as soon as possible.
- Companies should measure their GHG emissions, analyse their carbon efficiency, develop improvement strategies considering carbon risks and opportunities, and disclose information which is considered to be significant (material) to their businesses, taking into account investors' specific interests in their sectors. For example, in Hong Kong the real estate sector should build on its first time reporting initiative, continuing to improve its disclosure performance to be in line with the GHG Protocol or other internationally recognised reporting standards.
- Financial services companies, although identified as carbon-efficient in this analysis, are not currently reporting on their own impacts from downstream investment. The sector should investigate their risks through lending and financing as this would present a more complete picture.

INVESTORS

- Set an example by reporting on their own actions. Investors should follow the recent Montreal Carbon Pledge initiative by agreeing to measure and publicly disclose the carbon footprint of their investment portfolios. This initiative allows investors to formalize their commitment to the goals of the Portfolio Decarbonization Coalition, which aims to mobilize investors to significantly reduce their carbon footprints in 2015 (UN PRI, 2015).

- Step up their demand for robust data and engage with investee companies that are not disclosing their carbon performance. Investors should particularly focus on those companies in sectors with low carbon efficiency, as well as companies that could further improve the quality of their disclosure according to internationally recognised reporting standards.
- Consider carbon opportunities as well as risks. Investors such as Low Carbon Asia and the Asia Climate Partners are working to direct capital towards clean energy and natural resource efficiency projects.

EXCHANGE AND REGULATORS

- Consider providing further support and guidance to companies, in particular small-cap companies.
- Consider creating sector-specific reporting guidelines to support companies. Support for financial institutions would be useful in the Hong Kong context where insurance and banking companies represent a significant contribution by market cap (31%) as the sector lags behind in carbon disclosure. The Stock Exchange of Thailand has produced sector-specific environmental reporting guidance, and distributes an 'SD Focus' newsletter to continue communication between the Exchange and listed companies (Sustainable Stock Exchanges Initiative, 2015).
- Regularly monitor carbon disclosure to assess progress over time. Selected companies should be informed that this will be done, and be actively encouraged to respond in a timely manner.
- Encourage companies to disclose global emissions to enable investors to understand exposure from both domestic and overseas carbon risks and opportunities.
- HKEx has committed to conducting consultation on a 'comply or explain' approach in 2015. Building on the momentum, HKEx could consider a longer-term plan of moving to mandatory disclosure in order to keep up with global trend while continuing monitoring company response to this 'comply or explain' approach.

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APPENDICES

APPENDIX 1: TABLE SHOWING THE TOP 15 SECTORS RANKED BY MARKET CAP WEIGHT

FACTSET INDUSTRY SECTORS	% CONTRIBUTION BY MARKET CAP
Regional Banks	15%
Major Banks	10%
Real Estate Development	10%
Integrated Oil	7%
Wireless Telecommunications	5%
Life/Health Insurance	4%
Internet Software/Services	3%
Casinos/Gaming	3%
Electric Utilities	2%
Multi-Line Insurance	2%
Industrial Conglomerates	2%
Major Telecommunications	2%
Engineering & Construction	2%
Coal	2%
Oil & Gas Production	2%

APPENDIX 2: 100 COMPANIES ANALYZED

NAME	FS AGGREGATED SECTOR	MARKET CAP SIZE
AIA Group Limited	Life/Health Insurance	Large
AVIC Joy Holdings (HK) Limited	Oil & Gas	Small
Bank of China Limited	Banks	Large
Bank of East Asia Ltd.	Banks	Mid
Beijing Enterprises Holdings Limited	Industrial Conglomerates	Mid
Beijing North Star Company Limited	Real Estate Development	Small
BOC Hong Kong (Holdings) Limited	Banks	Large
Boyaa Interactive International Ltd.	Internet Software/Services	Small
Capinfo Co. Ltd.	Internet Software/Services	Small
CGN Meiya Power Holdings Co., Ltd.	Electric Utilities	Small
Champion Technology Holdings Limited	Internet Software/Services	Small
Cheung Kong (Holdings) Limited	Real Estate Development	Large
China Aluminum International Engineering Corp. Ltd.	Engineering & Construction	Small
China Citic Bank Corporation Limited	Banks	Large
China Coal Energy Company Limited	Coal	Mid
China Communications Construction Co. Ltd.	Engineering & Construction	Large
China Life Insurance Co. Ltd.	Life/Health Insurance	Large
China LotSynergy Holdings Limited	Casinos/Gaming	Small
China Merchants Bank Co., Ltd.	Banks	Large
China Mobile Limited	Telecommunications	Large

NAME	FS AGGREGATED SECTOR	MARKET CAP SIZE
China Overseas Land & Investment Limited	Real Estate Development	Large
China Petroleum & Chemical Corporation	Oil & Gas	Large
China Power International Development Limited	Electric Utilities	Mid
China Power New Energy Development Co., Ltd.	Electric Utilities	Small
China Railway Group Limited	Engineering & Construction	Large
China Resources Land Limited	Real Estate Development	Large
China Resources Power Holdings Co. Ltd.	Electric Utilities	Large
China Shenhua Energy Company Limited	Coal	Large
China Suntien Green Energy Corp.	Oil & Gas	Small
China Taiping Insurance Holdings Co., Ltd.	Multi-Line Insurance	Mid
China Telecom Corp. Ltd.	Telecommunications	Large
China Tian Lun Gas Holdings Limited	Oil & Gas	Small
China Unicom (Hong Kong) Limited	Telecommunications	Large
China Vanke Co., Ltd	Real Estate Development	Large
China Zenith Chemical Group Limited	Oil & Gas	Small
Chinese Estates (Holdings) Ltd.	Real Estate Development	Mid
Chong Hing Bank Limited	Banks	Small
Chongqing Rural Commercial Bank Co. Ltd.	Banks	Mid
Chu Kong Petroleum & Natural Gas Steel Pipe Holdings Ltd.	Oil & Gas	Small
CNOOC Limited	Oil & Gas	Large
Dah Sing Banking Group Limited	Banks	Mid
Dah Sing Financial Holdings Limited	Banks	Small
DX.com Holdings Limited	Internet Software/Services	Small
Galaxy Entertainment Group Limited	Casinos/Gaming	Large
Greentown China Holdings Ltd.	Real Estate Development	Mid
Guangdong Investment Limited	Industrial Conglomerates	Mid
Hang Lung Group Limited	Real Estate Development	Mid
Hang Lung Properties Limited	Real Estate Development	Large
Hang Seng Bank, Limited	Banks	Large
Hans Energy Co. Ltd.	Oil & Gas	Small
HC International, Inc.	Internet Software/Services	Small
Henderson Land Development Co. Ltd.	Real Estate Development	Large
Hopewell Holdings Limited	Real Estate Development	Mid
Hopson Development Holdings Limited	Real Estate Development	Small
Huadian Power International Corp. Ltd.	Electric Utilities	Mid
Hutchison Telecommunications Hong Kong Holdings Ltd.	Telecommunications	Small
Hutchison Whampoa Limited	Industrial Conglomerates	Large
Hysan Development Co., Ltd.	Real Estate Development	Mid
Industrial and Commercial Bank of China Limited	Banks	Large
Jutal Offshore Oil Services Ltd.	Oil & Gas	Small
Kerry Properties Limited	Real Estate Development	Mid
KunLun Energy Co. Ltd.	Oil & Gas	Mid
KWG Property Holding Limited	Real Estate Development	Small
Melco Crown Entertainment Limited	Casinos/Gaming	Large
Melco International Development Limited	Real Estate Development	Mid
Metallurgical Corporation of China Ltd.	Engineering & Construction	Mid
MGM China Holdings Limited	Casinos/Gaming	Mid
MIE Holdings Corp.	Oil & Gas	Small
Pacific Online Ltd.	Internet Software/Services	Small
Paradise Entertainment Limited	Casinos/Gaming	Small
PCCW Limited	Telecommunications	Mid

NAME	FS AGGREGATED SECTOR	MARKET CAP SIZE
PetroChina Company Limited	Oil & Gas	Large
Petro-king Oilfield Services Ltd.	Oil & Gas	Small
Ping An Insurance (Group) Company of China, Ltd.	Multi-Line Insurance	Large
Power Assets Holdings Limited	Electric Utilities	Large
Renhe Commercial Holdings Co. Ltd.	Real Estate Development	Small
Sands China Ltd.	Casinos/Gaming	Large
Shanghai Prime Machinery Co., Ltd.	Industrial Conglomerates	Small
Shougang Fushan Resources Group Limited	Coal	Small
Shui On Land Ltd.	Real Estate Development	Small
Shun Tak Holdings Limited	Real Estate Development	Small
Sino Land Co. Ltd.	Real Estate Development	Mid
Sino Oil & Gas Holdings Ltd.	Oil & Gas	Small
SJM Holdings Limited	Casinos/Gaming	Mid
SmarTone Telecommunications Holdings Limited	Telecommunications	Small
Sun Hung Kai Properties Limited	Real Estate Development	Large
SUNeVision Holdings Ltd.	Internet Software/Services	Small
Swire Pacific Limited	Industrial Conglomerates	Large
Swire Properties Limited	Real Estate Development	Large
Tencent Holdings Ltd.	Internet Software/Services	Large
The Wharf (Holdings) Ltd.	Real Estate Development	Large
Tian Ge Interactive Holdings Ltd.	Internet Software/Services	Small
Tianjin Jinran Public Utilities Co. Ltd.	Oil & Gas	Small
United Energy Group Limited	Oil & Gas	Small
Wynn Macau Ltd.	Casinos/Gaming	Large
Xinjiang Tianye Water Saving Irrigation System Co., Ltd.	Industrial Conglomerates	Small
Yanchang Petroleum International Limited	Oil & Gas	Small
Yanzhou Coal Mining Co. Ltd.	Coal	Mid
Yuexiu Property Co., Ltd.	Real Estate Development	Mid
Zall Development Group Ltd.	Real Estate Development	Small

APPENDIX 3: KEYWORDS FOR QUALITATIVE CARBON ASSESSMENT

- Climate change
- Global warming
- GHG emissions
- Greenhouse gas
- Carbon emissions
- Carbon dioxide
- Carbon risk
- Carbon footprint
- Carbon disclosure
- Carbon report
- CO_2 equivalent
- CO_2
- CO_2e
- Methane

- Nitrous oxide
- Carbon intensity
- Energy
- Electricity
- Gas
- Oil

APPENDIX 4: TRUCOST MODEL

Environmental impacts directly attributable to a business are calculated according to Trucost's environmental matrix, which contain environmental intensities per unit of output per type of bsuiness activity. The impacts are then modelled across the economy using a customized environmentally extended input-output model. Trucost has been collecting environmental data since 2000, and is therefore able to test this model based on 14 years' of data on quantitative environmental disclosures, from thousands of companies, which analysts engage with annually. The key components of Trucost's environmentally-extended input-output model can be seen below.

COMPONENT	JUSTIFICATION
Direct Model	**Environmental Matrix** The environmental impacts of sectors are calculated using country-specific impact factors. Market traded commodities extracted and water resources are measures at a local level.
Indirect Model	**Input-Output (IO) Factors** IO factors for the flow of goods and services between sectors are created from the U.S. Bureau of Economic Analysis (BEA) benchmark make and use tables.

Direct Model

Each sector within the environmental matrix contains an average impact per dollar of output for over 100 impacts which are derived from government, life cycle assessment and academic data. Trucost tests this data against the many thousands of disclosures it collects from companies during the annual engagement programme.

For primary sectors, Trucost calculated environmental pollutant intensities per unit of production multiplied by the price of each commodity. For all other sectors, impact factors were linked with economic output. Trucost customized its standard model by making use of China-specific estimation factors where available, and also re-adjusted the Scope 2 estimations to match the power generation mix of China. Otherwise, Trucost applied global average factors weighted by production value.

Indirect Model

Indirect or supply chain impacts are calculated according to Trucost's indirect model. This is constructed from supply and use tables published by the United States Department of Commerce, Bureau of Economic Analysis (BEA). BEA compiles data from a wide range of sources including the Economic Census (conducted every 5 years) and annual surveys for specific industries including the agricultural; mining; manufacturing; wholesale trade; retail trade; transportation, communications, and utilities; finance, insurance, and real estate surveys. Data is collated and homogenised so that each industry's inputs reflect as far as possible, a unique set of inputs for around 426 industries.

Input-output tables are created detailing the ratio of expenditure from one sector with every other sector of the economy, termed "intermediate demands". It is largely due to this level of detail that Trucost has chosen to use the U.S. economy as a proxy for the world economy as a starting point for the creation of its indirect model. Additionally, the U.S. economy has the advantage of being highly diversified so that major commodities can be included.

However, some sectors which are important from an environmental perspective, such as power generation, are highly aggregated, and the U.S. BEA data have insufficient detail on many sectors within the agricultural industry. In these cases, Trucost has disaggregated the input-output tables proportionally. For example, power generation is represented by seven separate sectors within the Trucost model. Over the past six months, Trucost has further

extended the indirect model to create indirect input-output factors for an additional 80 sectors, as well as incorporating life cycle analysis and process benchmark data. Finally, the indirect model is refined by disclosures to Trucost from its universe of over 4,500 companies which is collected through an annual engagement program.

Strengths and Weaknesses

IO modelling assumes generic flows behind sectors, as described in the indirect model above. On a global basis, this can be adjusted using multi-regional IO modelling, or a hybrid approach as suggested by Trucost for this project.

Multi-regional IO modelling adjusts for trade between regions to estimate embedded impacts in products more accurately. Trucost recommends adopting a hybridised approach to adjust for regional variations in environmental impacts as described above. This is because single region IO models have greater granularity: Trucost's IO model includes 531 sectors whereas most multi-regional IO models usually include 80 sectors.

APPENDIX 5: TRUCOST GHG EMISSIONS VALUATION

A GHG is a gas in the atmosphere that absorbs and emits radiation within the thermal infrared range. The primary GHGs are water vapour, carbon dioxide, methane, nitrous oxide and ozone. GHG emissions can be valued using a marginal abatement cost, a market price or the social cost of carbon (SCC). This section defines these three methods and justifies why the SCC is the preferred valuation method. It then describes the valuation study used to derive the natural capital valuation applied in this analysis.

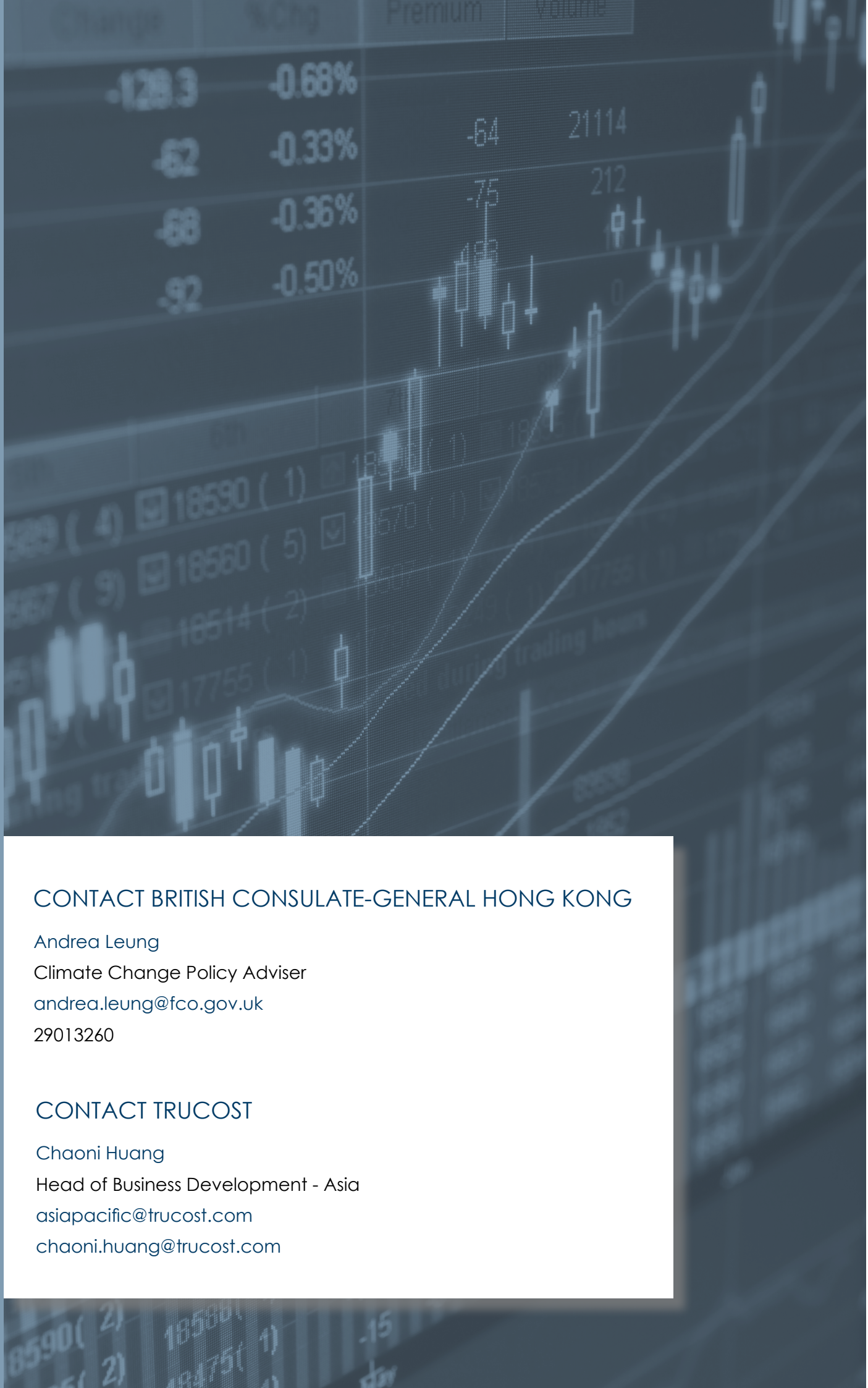
Three approaches for valuing the marginal or incremental cost of an additional tonne of GHG emitted are summarised in the table below:

VALUATION TYPE	DEFINITION	ADVANTAGES	DISADVANTAGES
Marginal abatement cost (MAC)	Valuing carbon using the known costs to reduce carbon to achieve an emissions reduction target, for example through energy efficiency improvements, renewable energy, materials substitution and/or carbon capture and storage technology.	Based on the known actual costs of existing reduction efforts.	Costs of reduction will fluctuate over time, by sector and by geography. Different reduction targets will translate into different MACs for each country. Estimates of the costs or benefits of increasing energy efficiency or switching to renewable energy are influenced by fossil fuel prices, carbon prices and other policy measures. The policies and technologies used to support carbon abatement will therefore influence pricing.
Market price	The value of traded carbon emissions rights under policies which constrain the supply of emissions permits, credits or allowances. The market price should be equal to the MAC for a given target, if the carbon market covers all emissions sources and is competitive. In the absence of a comprehensive international emissions trading scheme, a cap consistent with the optimal stabilization goal would result in a market price of carbon equal to both the MAC and social cost of carbon (Department of Energy & Climate Change, 2011).	Market prices are easily accessible.	Market-based mechanisms have been slow and fragmented so companies are unlikely to pay market prices for emissions across global operations. Traded market prices do not reflect non-traded carbon costs, nor the impact of other market-based mechanisms such as carbon/fuel taxes, subsidies for removal of fossil fuels, or support for low carbon technologies (i.e. feed-in-tariffs for renewable energy supplies). Current market prices are too low to induce the level of emissions reductions required and are not representative of future abatement costs of the expected costs of damages from climate change impacts.

CONTINUED OVERLEAF

VALUATION TYPE	DEFINITION	ADVANTAGES	DISADVANTAGES
Social Cost of Carbon (SCC)	The global cost of damages resulting from GHG emission-induced climate change. The value is based on the present value of each metric tonne of carbon dioxide equivalent (CO_2e) emitted now, taking into account the full global cost of the damage that it imposes during its time in the atmosphere.	The SCC signals what society should be willing to pay now to avoid the future damage caused by GHG emissions and therefore best reflects the total damage caused by emitting one tonne of CO_2e. In theory, climate policy would set emissions reduction targets that result in a MAC equal to the SCC and, in perfect markets the price of carbon should equal the SCC.	SCC valuations are highly contingent on assumptions, in particular the discount rate chosen, emission scenarios and equity weighting.

Trucost uses the Social Cost of Carbon (SCC) method as it best reflects the total damage by the emission of one tonne of CO_2e. In theory, optimal climate policies would set emissions reduction targets that result in a MAC equal to the SCC. Furthermore, in perfect markets, the price of carbon should be equal to its damage cost (i.e. to the SCC). Therefore, the SCC is the most complete measure of the damage generated by GHG emissions. A social cost of USD 115 per metric tonne of CO_2e was used to value GHG emissions, which is the value identified in the UK Government's Stern report (Stern, 2006) as the central, business-as-usual scenario, adjusted for inflation to 2013 prices using a global weighted average consumer price index (CPI).



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