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October 2010

CARBON RISKS & OPPORTUNITIES IN EMERGING MARKETS

Trucost study on the exposure of different regional equity strategies to carbon costs



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ABOUT THE AUTHORS: TRUCOST PLC

Trucost Plc was established in 2000, to help organisations, investors and governments understand and quantify the environmental impacts of business activities. Over the past 10 years Trucost has researched, standardised and validated environmental data from organisations across the world. The result is the world's most comprehensive data on corporate environmental impacts, covering greenhouse gases (GHGs), water, waste and metals.

This enables our clients to access:

- The most efficient approach to measuring GHG emissions and wider environmental impacts across organisations, supply chains and investment portfolios;
- Clear identification of prioritised focus areas for reducing environmental impacts;
- Validation of source data, including completion of gaps in data which are not currently being tracked or reported on;
- Comparison of environmental performance against peers, sectors and investment benchmarks;
- The ability to create environmentally-oriented investment products.

For more information, visit www.trucost.com

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Carbon Risks & Opportunities in Emerging Markets

Key findings

Carbon footprint of the S&P/IFCI LargeMidCap Index	563 tonnes of CO ₂ e/US\$ mn
Number of companies analysed in the S&P/IFCI LargeMidCap Index	788
Carbon footprint of the S&P/IFCI Carbon Efficient Index	440 tonnes of CO ₂ e/US\$ mn
Carbon saving from S&P/IFCI Carbon Efficient Index	22%
Back-test of the financial performance of the S&P/IFCI Carbon Efficient Index against parent Index	1.41% tracking error

EXECUTIVE SUMMARY

This report analyses how equity portfolios following different regional strategies could be exposed to carbon costs, focusing on emerging markets. Carbon-intensive companies will increasingly pay to reduce or emit greenhouse gas (GHG) emissions under government policies and mechanisms such as performance standards, emissions trading and carbon taxes. The analysis covers listed equity portfolios, excluding the implications of carbon-related risks for allocations across other asset classes. Trucost has measured the carbon footprint¹ of a typical emerging markets portfolio benchmarked against the S&P/IFCI LargeMidCap Index. The study examines opportunities for fund managers to manage financial risk from rising carbon costs by tilting their portfolios toward more carbon-efficient companies in emerging markets, whilst maintaining financial performance consistent with the market benchmark. Trucost analysed the carbon footprint of the S&P/IFCI Carbon Efficient Index, which enables investors using the index as a benchmark to shift assets towards carbon-efficient companies. This could help encourage listed companies in emerging markets to compete for capital on carbon efficiency and make the transition towards low-carbon fuels, technologies and processes.

Key findings:

- Companies in the S&P/IFCI LargeMidCap Index emit 563 metric tonnes of GHGs, measured in carbon dioxide equivalent (CO₂e), per US\$ million of revenue on average. Emerging-market equity funds could be more exposed to rising carbon costs than portfolios benchmarked against developed market indices such as the S&P 500 and MSCI Europe. However, the S&P/IFCI Carbon Efficient Index, which contains the same constituents as the S&P/IFCI LargeMidCap, but with index weight adjustments to reduce exposure to carbon emissions, has a smaller carbon footprint at 440 tCO₂e/US\$ mn.
- Based on wide variations in the carbon intensity of companies in sectors in the S&P/IFCI LargeMidCap Index, the S&P/IFCI Carbon Efficient Index overweights carbon-efficient companies and underweights those with relatively high carbon intensities. Investors that use the S&P/IFCI Carbon Efficient Index as a benchmark could reduce the carbon footprints of typical equity portfolios invested in emerging markets by 22%. This would reduce portfolio exposure to carbon costs while maintaining sector and market weights.
- Carbon costs associated with companies in the S&P/IFCI LargeMidCap Index could equate to up to 3% of revenue if emerging market companies had to pay US\$22 per tonne for 4% of their projected direct emissions in 2013. Carbon exposure would vary significantly at a company level. The firm with the greatest profit risk from carbon costs could see earnings fall by more than 97%. At US\$108 per tonne of CO₂e in 2030, carbon costs could equate to 20% of revenue for one company, and more than 100% of EBITDA for 16 firms.
- Carbon costs could equate to more than 5% of earnings for 24 companies in the Utilities, Basic Resources, Oil & Gas, Construction & Materials and Travel & Leisure sectors in 2013, and for 84 companies in 2030. Carbon-intensive companies could find it difficult to pass on carbon costs without losing market share.
- If companies in the five carbon-intensive sectors had to pay for all of their current emissions, portfolios could be exposed to US\$7,964 in carbon costs for every US\$ million invested. However, reweighting holdings based on carbon efficiency in line with the S&P/IFCI Carbon Efficient Index could reduce exposure to carbon costs by 20%, to US\$6,402/US\$ mn.
- A back-test showed that the S&P/IFCI Carbon Efficient Index matches the financial performance of the S&P/IFCI LargeMidCap Index, with an annualised tracking error of 1.41%. Large institutional investors can therefore reduce exposure to carbon costs in emerging markets while replicating the return profile of the underlying Index.

¹ Measured as greenhouse gas emissions in carbon dioxide equivalent (CO₂e) per US\$ mn of revenue associated with companies. Carbon footprints of indices and portfolios provide an indicator for exposure to carbon costs.



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CARBON INTENSITY AS A PROXY FOR CARBON RISK

Potential financial exposure to carbon costs at a company or sector level can be assessed based on carbon intensity – measured as emissions relative to revenue. Companies that are less dependent on using fuels and processes that emit high levels of GHGs could face less upward pricing pressure and gain competitive advantage. Throughout this report, carbon risks refer to exposure to carbon costs under regulatory measures such as performance standards and emissions trading, rather than the costs of damages from the physical impacts of climate change.

EXPOSURE TO CARBON RISKS IN EMERGING MARKETS

Emerging markets are becoming a core part of institutional investment funds.² Growing asset flows to developing economies such as China, India and Brazil reflect fund manager expectations that they are well positioned to deliver the required returns, compared to many developed markets with subdued growth prospects. About 60% of European pension plans now have exposure to emerging markets through debt or equity markets.³ Over 42% of large US institutional investors surveyed by Bank of America Merrill Lynch planned to increase exposure to emerging markets equities, seen as the most desirable asset class.⁴

A large share of global production now takes place in emerging markets, where many companies currently have stronger cash flows and greater financial resources than many of their sector peers in developed markets.⁵ Rapid economic growth and high commodity prices have boosted transnational corporations in developing economies – particularly Brazil, the Russian Federation, India and China.⁶

However, a large share of assets are allocated to resource- and carbon-intensive companies. This could present financial risks to investors as many large emerging market countries take action to reverse a trend of rising greenhouse gas (GHG) emissions. The United Nations Copenhagen Accord of December 2009, backed by 114 countries, marks a step towards an international agreement to replace UN Kyoto Protocol carbon reduction targets which cover the commitment period 2008 to 2012.^{7,8} Industrialised countries need to reduce emissions by 25-40% below 1990 levels by 2020 and 80-95% by 2050 to contribute to global emission reduction goals (see “Cuts in emissions to stabilise greenhouse gases” on page 5). However, 70% of projected global emissions will be generated in developing countries by 2050. Many emerging markets are now among the biggest carbon emitters and their emissions are rising rapidly. Pressure is therefore mounting for policy makers in several rapidly growing emerging market countries to limit emissions growth. Developing countries need to reduce emissions by 15-30% below business-as-usual levels by 2020.⁹

The BASIC countries – Brazil, South Africa, India and China – helped shape the Copenhagen Accord and have since set targets to reduce emissions by 2020 (see “National emission reduction targets and policy measures” on page 6). Many climate change policies support wider goals such as energy security, pollution abatement, “green growth”, resource-efficient production and sustainable development.¹⁰ Shifting economies to low-carbon growth will require significant action by high-emitting sectors.

Several planned policy measures will set performance standards and create a monetary cost for carbon in order to create an incentive for energy- and carbon-intensive companies to invest in low-carbon infrastructure, technologies, fuels, materials and processes to reduce emissions. Companies in carbon-intensive industries could also incur carbon costs through proposed border tariffs on imports to developed countries with stricter GHG controls. Carbon-intensive manufacturers that supply companies in developed countries could also lose market share as their customers target “carbon hotspots” to reduce emissions from their supply chains.

Changing cost structures for industries to place the economy on a low-carbon trajectory will see carbon-intensive companies most exposed to rising carbon costs, while carbon-efficient companies gain a competitive edge. This would have financial implications for equity portfolios.

2 <http://www.institutionalinvestor.com/Article.aspx?ArticleID=2585783>, accessed 11 August 2010

3 <http://www.mercer.com/assetallocation>, accessed 9 August 2010

4 <http://www.institutionalinvestor.com/Article.aspx?ArticleID=2585783>, accessed 11 August 2010

5 <http://www.efinancialnews.com/story/2010-02-22/banks-get-emerging-markets-lift>, accessed 11 August 2010

6 http://www.unctad.org/en/docs/wir2010_en.pdf, accessed 11 August 2010

7 As of 19 August 2010, a total of 138 countries have expressed their interest to be listed as agreeing to the Accord.

8 <http://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf>, accessed 20 July 2010

9 <http://www.unep.org/climatepledges/>, accessed 20 August 2010

10 <http://www.greengrowth.org/policies.asp>, accessed 21 July 2010

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CUTS IN EMISSIONS TO STABILISE GREENHOUSE GASES

Global emissions will have to peak by 2020 and fall by 50% below 1990 levels by 2050.¹¹ This 2-3% annual cut in emissions could stabilise GHG concentrations in the atmosphere at 450 parts per million (ppm), and provide a 50% chance of limiting a global average temperature rise to 2°C above pre-industrial levels. Delaying global emission reductions until 2030 would require 4-5% annual emission reductions to stabilise GHG concentrations at 550 parts per million. This would provide a 50% chance of a 3°C average global temperature rise, with the risk of more severe and costly climate change impacts.¹² GHG concentrations are currently 387 ppm and rising at about 2 ppm a year.

The longer action is delayed, the more rapidly emissions will need to be reduced and the higher the cost of mitigation. Greater energy efficiency, demand management and deployment of existing low-carbon electricity sources could deliver about half of the required emission reductions as well as financial savings. Industry and the power sector could reduce energy consumption by 20-30%, using existing technologies and best practice.¹³ The expansion or replacement of capital stock provides an opportunity to invest in low-carbon equipment and infrastructure. This can minimise mitigation costs and avoid lock-in to a high-carbon trajectory that would be more expensive to adjust in the future.

Environmental data provider Trucost assessed potential carbon risks and opportunities for listed equity portfolios following different regional strategies, but excluded an assessment of carbon-related risks associated with allocations across various asset classes. The analysis focuses on exposure to carbon costs among typical emerging market portfolios, based on the carbon performance of companies in the S&P/IFCI LargeMidCap Index as a benchmark. Trucost also analysed the S&P/IFCI Carbon Efficient Index, which aims to replicate the return profile of the S&P/IFCI LargeMidCap, but with lower exposure to carbon emissions than the parent index. Market weights within the S&P/IFCI Carbon Efficient Index are greatest for China, India, Brazil, the Republic of Korea and Taiwan. Shifting investment to carbon-efficient companies could help reduce their cost of capital. Providing a financial incentive for listed companies in emerging markets to improve their carbon efficiency could promote uptake of low-carbon fuels, technologies and processes as emerging-market companies compete for capital on carbon efficiency.

MANAGING FUND EXPOSURE TO CARBON COSTS

Mitigation policies present new opportunities and risks for investors. Investors can benefit from emission reductions in emerging markets through financial products including investment in climate change-themed funds and green bonds. Many institutional investors are increasing exposure to equity indices and investment tools focused on companies delivering low-carbon, energy-efficient infrastructure and technologies such as renewable energy.

However, the relatively small size and liquidity of many of these companies limits the size of investments in them. In addition, niche investment strategies can only make up a proportion of assets owned by institutional investors who have a fiduciary duty to diversify investments in order to reduce financial risk and achieve broad market returns. A greater share of mainstream assets therefore continues to be allocated to carbon-intensive, long-lived infrastructure such as fossil fuel-based power stations, energy-intensive buildings and high-carbon industrial plants. This leaves asset owners invested in broad, carbon-intensive funds exposed to rising carbon costs under government policies that price carbon. The S&P/IFCI Carbon Efficient Index provides long-term investors with access to carbon-efficient companies to help manage financial risk from corporate greenhouse gas emissions.

¹¹ http://ec.europa.eu/environment/climat/future_action.htm, accessed 20 July 2010

¹² World Bank, World Development Report 2010, Development and Climate Change, 2010

¹³ World Bank, World Development Report 2010, Development and Climate Change, 2010



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“Brazil, the Republic of Korea and South Africa plan to cut emissions by at least 30% from business-as-usual levels.”

National emission reduction targets and policy measures

Copenhagen Accord pledges		Climate change policies include:
China	Reduce CO ₂ emissions per unit of GDP by 40-45% by 2020 compared to 2005 levels.	Pilot carbon trading programmes in several cities and provinces. ¹⁴ Possible carbon tax on fossil fuels. ¹⁵ Penalties or closure of energy-wasting and polluting plants. ¹⁶
India	Reduce the emissions intensity of GDP by 20-25% from 2005 levels by 2020.	Carbon tax on coal. Mandatory fuel efficiency standards. ¹⁷
Brazil	Reduce GHG emissions by 36.1-38.9% from projected 2020 levels. This equates to about a 20% cut in emissions from 2005 levels.	Reduce deforestation in the Amazon. Improve energy efficiency. Increase use of biofuels. Develop alternative energy sources. ¹⁸
Republic of Korea	Reduce GHG emissions by 30% below business-as-usual levels by 2020. This equates to a 4% cut in emissions from 2005 levels.	Planned emissions trading programme and possible carbon tax. ²⁰
South Africa	Reduce GHG emissions by 34% below business-as-usual levels by 2020 and 42% below by 2025. This equates to a 1% emission reduction from 1990 levels.	Feed-in tariff where prices paid to generators of renewable electricity are higher than those paid to fossil fuel-based suppliers. ²¹ Carbon taxes. ²² Fuel efficiency standards. ²³
Taiwan	Reduce GHG emissions to 2005 levels by 2020, and to 2000 levels by 2025.	Levies on energy and carbon dioxide emissions. ²⁴ Feed-in-tariff. Planned emissions trading system. ²⁵

14 Carbon exchanges key in China low carbon plan, Point Carbon; Govt selects pilot carbon reduction locations, China Daily, 19 August 2010

15 Carbon tax likely, expert forecasts, China Daily, 10 May 2010

16 China orders heavy industry to shut old plants, Point Carbon, 9 August 2010

17 <http://moef.nic.in/downloads/public-information/India%20Taking%20on%20Climate%20Change.pdf>, accessed 20 August 2010

18 http://unfccc.int/files/meetings/application/pdf/brazilcphaccord_app2.pdf, accessed 20 August 2010

19 Factbox – S.Korea moves toward cap-and-trade, Thomson Reuters, 4 May 2010

20 South Korea mulls carbon tax, Point Carbon, 17 February 2010

21 <http://www.renewableenergyworld.com/rea/news/article/2009/04/south-africa-introduces-aggressive-feed-in-tariffs>, accessed 20 August 2010

22 South Africa may benefit from carbon tax: OECD, Point Carbon, 20 July 2010

23 Motlanthe backs carbon tax, Mail & Guardianonline, 10 August 2010, <http://www.mg.co.za/article/2010-08-10-motlanthe-backs-carbon-tax>, accessed 20 August 2010

24 Taiwan plans taxes for energy and CO₂ emissions by 2011, Business Green, 20 October 2009

25 Taiwan starts regulatory ETS process, Point Carbon, 3 September 2010

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TRUCOST METHODOLOGY TO MEASURE CARBON FOOTPRINTS

The carbon footprints of the indices are calculated by allocating tonnes of CO₂e emissions from each constituent company to each index. The analysis includes emissions from operations as well as those from direct (first-tier) suppliers such as electricity and logistics providers. Carbon footprints are measured as tonnes of CO₂e per million US Dollars of revenue. The weighted GHG emissions and revenues from companies in each index are summed up to calculate the total carbon footprints of indices. This approach to assess carbon footprints allows for comparison of all indices and portfolios, regardless of size. To find out more about Trucost's methodology, see Appendix 1 on page 19. Trucost and Standard & Poor's (S&P) use different methodologies to measure carbon footprints of indices.²⁷ Other organisations may use different methodologies to measure portfolio and index carbon footprints.

SCOPE OF STUDY

Trucost analysed the GHG emissions of 788 of almost 800 companies listed in the S&P/IFCI LargeMidCap Index, based on constituent data as of 30 June 2010.²⁶ Their market capitalisation of more than US\$8 trillion represents over 99% of the value of the Index. Trucost analysed the latest available data in its database of corporate GHG emissions, measured in carbon dioxide equivalent (CO₂e). Data analysed in this report is not free-float adjusted. The carbon performance of indices is measured as quantities of GHG emissions relative to revenue. This is the standard metric used to assess the "carbon footprints" of portfolios (see "Trucost methodology to measure carbon footprints").

The analysis includes:

- Comparison of the carbon efficiency of portfolios benchmarked against the S&P/IFCI LargeMidCap Index, S&P/IFCI Carbon Efficient Index, MSCI All Country World Index, MSCI Europe, S&P 500 and MSCI Asia ex-Japan Index. Equity portfolios with regional strategies that track these indices or use them as benchmarks could face similar levels of exposure to carbon costs, indicated by the size of carbon footprints.
- Assessment of variations in the carbon efficiency of sectors across different geographies.
- Breakdown of absolute emissions from companies in the S&P/IFCI LargeMidCap Index by source.
- Analysis of potential exposure to carbon costs.
- Overview of opportunities to reduce carbon exposure in emerging market funds based on the variation in the carbon intensity of companies within sectors.
- Historical analysis of the financial performance of the S&P/IFCI Carbon Efficient Index compared with the underlying S&P/IFCI LargeMidCap Index.
- Analysis of company disclosures of GHG emissions in different regions.
- Overview of major environmental impacts of companies in the S&P/IFCI LargeMidCap Index.

²⁶ Data on market capitalisation was not available for the remaining Index constituents, which were therefore excluded from the analysis. They represent less than 1% of the value of the Index.

²⁷ <http://www.standardandpoors.com/indices/sp-ifici-carbon-efficient/en/us/?indexId=sp-ifici-carbon-efficient>, accessed 5 October 2010



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“Equity portfolios with smaller carbon footprints could be less exposed to carbon costs.”

CARBON EFFICIENCY OF EMERGING MARKET STRATEGIES

The S&P/IFCI LargeMidCap Index had a carbon footprint of 563 tonnes of CO₂e per US\$ million. The range in the carbon footprints of indices shown in Table 1 indicates that typical emerging market equity portfolios would have larger carbon footprints than those invested in developed markets.

Table 1: Ranking of indices by carbon footprint

Typical regional equity strategy	Benchmark Index	Carbon footprint (tonnes of CO ₂ e/US\$ mn)
US large cap	S&P 500	354
Europe large cap	MSCI Europe	356
Developed and emerging market large cap	MSCI All Country World	360
Emerging market carbon-efficient large and mid cap	S&P/IFCI Carbon Efficient	440
Developed and emerging markets in Asia	MSCI Asia ex-Japan	533
Emerging market large and mid cap	S&P/IFCI LargeMidCap	563

Funds with emerging markets strategies could be more exposed to carbon costs under policy measures and mechanisms such as energy efficiency standards, emissions trading and carbon taxes. However, the carbon footprint of the S&P/IFCI Carbon Efficient Index is 22% smaller than that of the S&P/IFCI LargeMidCap Index, used as its benchmark. The S&P/IFCI Carbon Efficient Index is constructed around substantial variations in the carbon intensity of companies within sectors in the underlying S&P/IFCI LargeMidCap Index (see page 15). To create the S&P/IFCI Carbon Efficient Index, stocks in sectors that include both high and low polluters were reweighted based on their carbon intensities. Holdings were rebalanced within each sector by overweighting companies that are carbon efficient relative to industry peers, and underweighting those that are more carbon intensive. The proportional market weights of the underlying Index were maintained.

Equity portfolios that are associated with less carbon emitted by holdings could be less exposed to carbon costs. However, screening out carbon-intensive sectors is not an option for institutional investors that have a fiduciary responsibility to achieve market returns. By reducing exposure to carbon through stock effects while maintaining sector weightings, the S&P/IFCI Carbon Efficient Index allows for a broad market strategy with diversification.²⁸

Stock and sector allocation effects on carbon performance

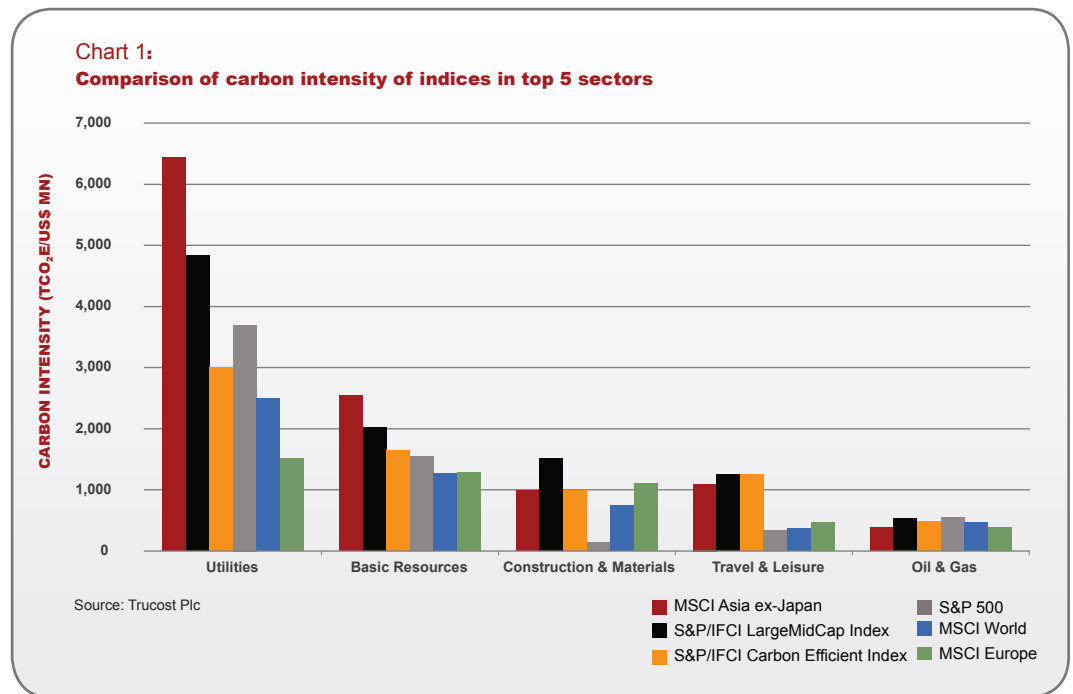
Stock effects drive the greater carbon efficiency of the S&P/IFCI Carbon Efficient Index relative to its benchmark Index. The inclusion of relatively low-carbon stocks in the S&P 500, MSCI Europe and MSCI All Country World Index (ACWI) would also contribute to portfolios in developed markets being more carbon efficient than typical passive emerging market strategies. Indices and funds with larger carbon footprints include companies that are relatively carbon intensive. Companies in emerging markets have a higher average carbon intensity than their developed market peers in several sectors. For instance, Basic Resources stocks in the S&P/IFCI

²⁸ <http://www.ifc.org/climatechange>, accessed 4 October 2010

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“Reweighted utilities in the S&P/IFCI Carbon Efficient Index are more carbon efficient than sector peers.”

LargeMidCap Index emitted 2,021 tCO₂e/ US\$ mn on average, whereas sector peers in the S&P 500 Index emitted 1,554 tCO₂e/US\$ mn. Chart 1 below compares the average carbon intensity of the five most carbon-intensive sectors in the S&P/IFCI LargeMidCap Index against sector peers in the other indices analysed.



Reweighted securities in the Utilities, Basic Resources and Construction & Materials sectors in the S&P/IFCI Carbon Efficient Index are significantly more carbon efficient than sector peers in the underlying Index. For instance, Utilities have an average carbon intensity of 3,001 tCO₂e/ US\$ mn in the Carbon Efficient Index, compared with 4,832 tCO₂e/ US\$ mn in the benchmark sector.

Utilities have the greatest range in average carbon intensity across the indices (1,510 tCO₂e/ US\$ mn in the MSCI Europe vs. 6,433 tCO₂e/ US\$ mn in the MSCI Asia ex-Japan Index). Although variations between Oil & Gas companies in different indices appear relatively small given the scale of the carbon intensity axis, there is a 40% difference between the highest and lowest average carbon intensities (390 tCO₂e/ US\$ mn in the MSCI Europe vs. 546 tCO₂e/ US\$ mn in the S&P 500 Index).

Some variations in carbon intensity may be due to diversified sources of revenue for companies in certain sectors. For instance, the India-based conglomerate ITC Ltd has a large carbon footprint relative to the average for Personal & Household Goods companies in the MSCI ACWI due to multiple business activities ranging from paper manufacturing to cigarette production.

The high average carbon intensity of Utilities and Basic Resources companies in the MSCI Asia ex-Japan Index reflects a high dependence on coal in the energy mixes of countries such as China and India. Companies in the MSCI Asia ex-Japan Index are more carbon-intensive than those in the S&P/IFCI LargeMidCap Index overall. This has a negative effect on its carbon performance against the emerging markets index. Portfolios invested in Asian markets (excluding Japan) could therefore include more carbon-intensive stocks than those invested in the wider emerging markets, with holdings in regions including South America, Africa, Eastern Europe and the Middle East.



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However, a lower weighting of constituents in carbon-intensive sectors in the MSCI Asia ex-Japan Index results in a positive sector allocation effect on its carbon performance against the S&P/IFCI LargeMidCap Index. An underweight position in carbon-intensive sectors also contributes to the carbon efficiency of the S&P 500 and MSCI ACWI relative to the S&P/IFCI LargeMidCap Index. This reflects the tendency for investors in emerging markets to increase diversification and exposure to natural resource and production sectors.²⁹

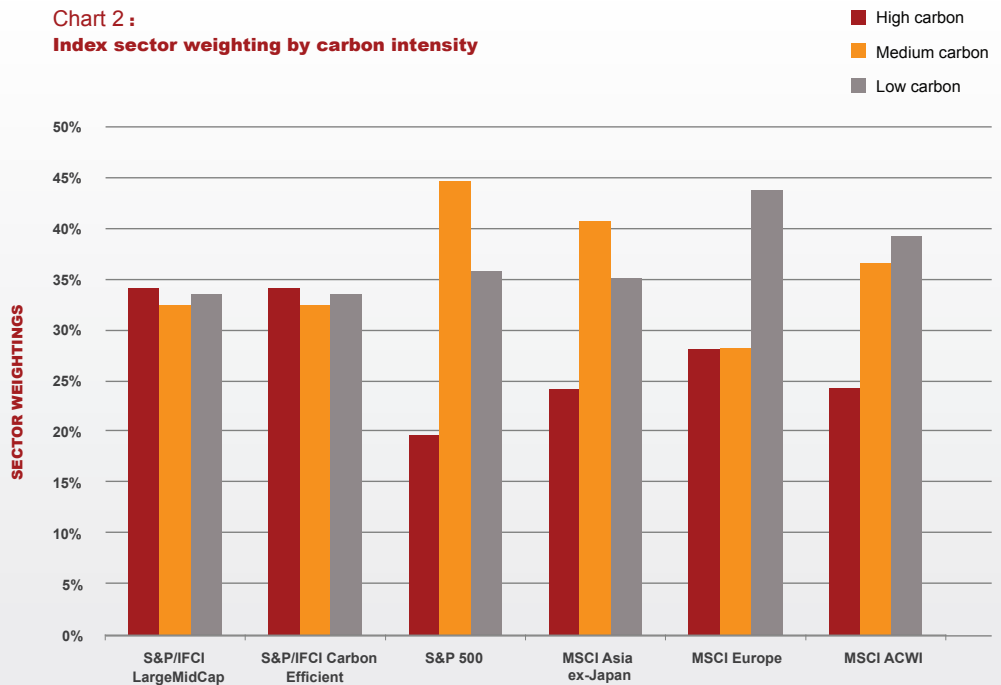
The over-representation of carbon-intensive sectors in the S&P/IFCI LargeMidCap Index is shown in Chart 2. The Index is overweight in relatively high-carbon sectors such as Basic Resources and Oil & Gas compared with the other indices analysed. For instance, the value of Basic Resources securities is greater in the S&P/IFCI LargeMidCap Index than in the MSCI All Country World Index (12% vs. 4%).

Index equity funds invested in emerging markets would be more exposed to carbon-intensive sectors than developed market equities. For institutional investors that need to maintain sector weights, this increases the importance of the carbon intensity of holdings within sectors and related exposure to carbon costs.

Key: Classification of sectors by carbon intensity

High carbon (>475 tCO ₂ e/US\$ mn)	Basic Resources Chemicals Construction & Materials Oil & Gas Travel & Leisure Utilities
Medium carbon (88-475 tCO ₂ e)	Automobiles & Parts Financial Services ³⁰ Food & Beverage Industrial Goods & Services Personal & Household Goods Technology
Low carbon (<88 tCO ₂ e/US\$ mn)	Telecommunications Banks Healthcare Insurance Media Real Estate Retail

Chart 2 : Index sector weighting by carbon intensity



Source: Trucost Plc

²⁹ Source; State Street Global Advisors (2010) the Appeal of Emerging Markets Equities in an Asset Allocation Framework

³⁰ Financial Services has a higher carbon footprint than banks because some firms in the sector have more diversified operations and are much more carbon intensive than any of the banks. For instance, Bradespar S.A. is a holding company with investments in mining and has a carbon footprint of over 870 tCO₂e/US\$ mn. The most carbon-intensive bank has a footprint of 83 tCO₂e/US\$ mn.

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“78% of greenhouse gases were directly emitted by the operations of companies in the S&P/IFCI LargeMidCap Index.”

COMPANIES DIRECTLY EMIT SIGNIFICANT GHGS

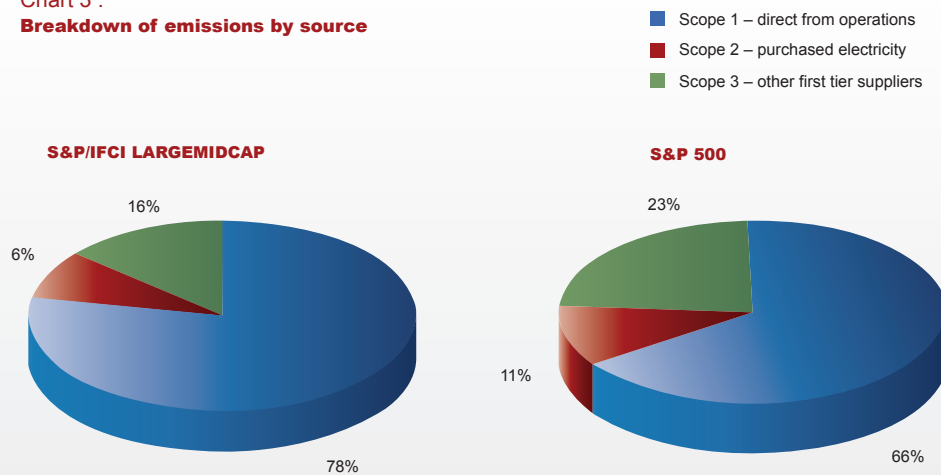
Companies analysed in the S&P/IFCI LargeMidCap Index together emitted a total of 3.8 billion tonnes of CO₂e annually. This equates to 43% of the total GHG emissions from companies in the MSCI ACWI. The analysis includes gases emitted from the worldwide operations of multinational companies, not just those released in emerging markets.

As shown in Chart 3, 78% of emissions (2.98 billion tCO₂e) were directly from operations. These GHGs – known as Scope 1 under the Greenhouse Gas Protocol corporate accounting standard³¹ – are largely emitted through fuel combustion and industrial processes owned or controlled by the companies. This reflects the rise in heavy industry and other manufacturing in countries such as China and India.

The remaining 22% of emissions were from purchased electricity (Scope 2) and other direct (first-tier) suppliers, such as transport and logistics providers. Service-based firms were mainly responsible for emissions through purchases of electricity and other outsourced goods and services.

Many of the GHGs analysed were likely to be generated from the production of goods for export, and therefore represent the supply chain emissions of many companies in industrialised countries. This is reflected in the breakdown of GHG emissions from companies in the S&P 500 Index, where a larger share of emissions (23%) were from first-tier direct suppliers.

Chart 3 :
Breakdown of emissions by source



Source: Trucost Plc

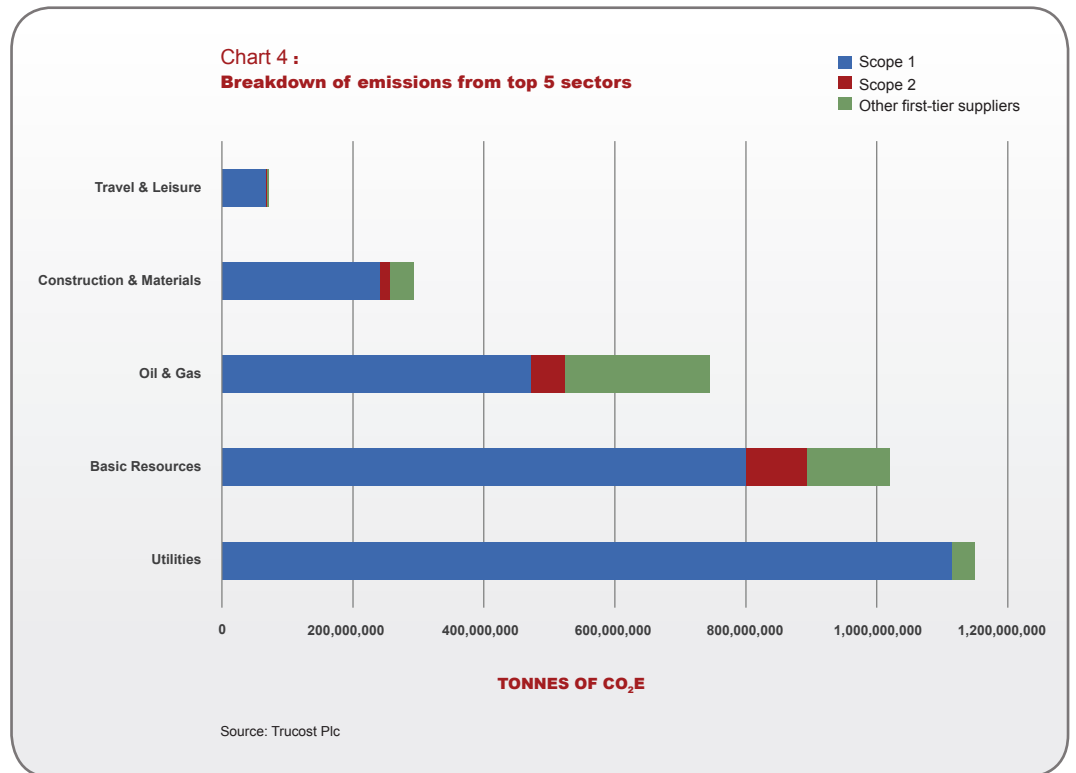
³¹ Developed by the World Resources Institute and World Business Council for Sustainable Development



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“Companies in five sectors emitted 86% of greenhouse gases from the Index.”

Five sectors emitted 86% of emissions from the Index: Utilities, Basic Resources, Oil & Gas, Construction & Materials and Travel & Leisure. The majority of GHGs from companies in these sectors were emitted directly from operations (see Chart 4).



“Carbon costs could equate to 97% of earnings in 2013 for the most exposed company analysed.”

EARNINGS AT RISK FROM DIRECT CARBON COSTS

The findings suggest that emissions-intensive companies in emerging markets are mainly exposed to carbon costs internalised through their operations, rather than those passed on by suppliers in higher prices. To model potential exposure to carbon costs among the 788 companies analysed in the S&P/IFCI LargeMidCap Index, Trucost therefore applied carbon prices to their direct Scope 1 GHG emissions.

Future carbon costs incurred by the companies are likely to reflect emission reduction targets in emerging markets. Several emerging market countries aim to reduce emissions by at least 30% below BAU levels by 2020 (see page 6). To achieve the 30% cut, BAU emissions would need to fall by 4% annually from 2013 onwards.

In line with this, Trucost assumed companies would only pay a carbon price or abatement costs for 4% of their projected annual emissions under climate change policies in emerging markets. The analysis assumes that companies’ direct emissions could rise by 59% from 2007 levels by 2030. This is in line with the increase in carbon dioxide emissions from energy use in non-OECD countries projected by the US Energy Information Administration (May 2010).³² Trucost modelled carbon exposure using two scenarios:

Scenario A in 2013:

- Assumes a 10% increase in projected emissions from companies in the Index to 3,276,784,869 tonnes of CO₂e by 2013.
- Applies a traded carbon price of US\$22 per tonne of CO₂e. This is based on the average price of EU Allowances for 2013 under the EU Emission Trading System over the three months to 7 September 2010.³³

Scenario B in 2030:

- Assumes a 57% increase in projected emissions from companies in the Index to 4,676,865,677 tCO₂e by 2030.
- Applies a carbon price of US\$108 per tonne based on valuations used in UK Government policy appraisals from June 2010.³⁴ This is the central estimated traded price of carbon, assuming the development of a global carbon market. Carbon price estimates range from US\$53-US\$162 per tonne.

Table 2: Potential exposure to carbon costs – S&P/IFCI LargeMidCap Index

	Carbon costs (US\$ mn)	Carbon costs as % of revenue			Carbon costs as % of EBITDA		
		Lowest	Average	Highest	Lowest	Average	Highest
Scenario A – 2013 (US\$22/tCO ₂ e)	2,884	<0.01	0.05	2.79	<0.01	0.32	>97
Scenario B – 2030 (US\$108/tCO ₂ e)	20,204	<0.01	0.36	19.56	<0.01	2.21	>100

As shown in Table 2, carbon costs for 4% of the projected Scope 1 emissions of companies in the Index at US\$22/tCO₂e could total almost US\$3 billion in 2013. This could equate to 0.1% of revenue for the 788 companies on average, based on the latest available financial data. Carbon costs could

³² <http://www.eia.doe.gov/oiaf/ieo/highlights.html>, accessed 8 September 2010

³³ €17.09/EUA, Point Carbon. Figures are rounded up

³⁴ UK Department of Energy and Climate Change (2010) Updated short term traded carbon values for UK public policy appraisal



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ACCESS TO CARBON MARKETS

The CDM allows emission-reduction projects in developing countries to earn certified emission reduction (CER) credits, each equivalent to one tonne of CO₂e. China has sold the largest volume of CERs until now. The main buyers have been companies in Europe that use CERs to help meet emissions caps under the EU Emission Trading System (EU ETS).³⁵ However, greater restrictions on CER imports into the EU ETS, and on the eligibility of certain countries and sectors under the CDM, could limit access for firms in more industrialised economies such as the BASIC countries, Mexico and South Korea. Least developed countries could therefore be best placed to access the CER market during the third phase of the EU ETS from 2013 to 2020.

equate to less than 0.01% of revenue for some companies. However, the company with the highest financial risk from emissions could see carbon costs equate to up to 3% of sales. At US\$108 per tCO₂e, future carbon costs could equate to up to 20% of revenue at a company level.

For the 709 companies analysed that were profitable, carbon costs could equate to 0.3% of combined earnings before interest, tax, depreciation and amortisation (EBITDA) on average in 2013. Carbon costs could equate to less than 0.01% of EBITDA for the least exposed companies, and more than 97% of earnings for the company with the highest exposure. The projected rise in emissions and carbon costs could increase profit risk significantly by 2030, when carbon costs could wipe out 100% of EBITDA for 16 companies.

Actual exposure to carbon costs may vary due to factors including reductions in greenhouse gas emissions, sector-specific abatement costs, future earnings, national policy mixes and access to carbon markets. While emissions trading schemes aim to achieve mitigation cost-effectively across the economy, delays in implementing cap-and-trade could increase abatement costs. Companies in some developing countries could partly offset exposure to carbon costs by selling carbon credits for mitigation projects under the UN Kyoto Protocol Clean Development Mechanism (CDM).³⁶ With carbon credits trading at almost US\$18/tonne of CO₂e,³⁷ carbon markets could present opportunities for some companies to reduce their emissions at little or no cost.

For 196 companies that were profitable in the Utilities, Basic Resources, Oil & Gas, Travel & Leisure and Construction & Materials sectors, carbon costs for 4% of projected emissions could total over US\$2.3 billion in 2013. If these costs were internalised, combined EBITDA would fall by less than 1% on average. However, carbon costs could reduce EBITDA by more than 5% for 24 companies in 2013, and for 84 companies in 2030. Carbon-intensive companies in sectors such as Basic Resources could find it particularly difficult to pass on carbon costs without losing market share, given volatile commodity prices in world markets.

If all of the emerging market companies analysed in these sectors had to pay US\$22 for all of their current direct and first-tier indirect supply chain emissions, portfolios could be exposed to US\$7,964 in carbon costs for every US\$ million invested. However, investments in the same sectors with companies reweighted based on carbon efficiency could reduce exposure to carbon costs by 20%, to US\$6,402/US\$ mn. Investors seeking to protect risk-adjusted returns in resource – and carbon-intensive industries could reduce exposure to carbon costs by favouring carbon-efficient companies in emerging markets. Funds that use the S&P/IFCI Carbon Efficient Index as a benchmark can underweight carbon-intensive companies to manage financial risk from carbon costs.

³⁵ http://www.unfccc.int/resource/docs/publications/cdm_annual_report_2009.pdf, accessed 4 October 2010

³⁶ World Bank (May 2010) State and Trends of the Carbon Market 2010

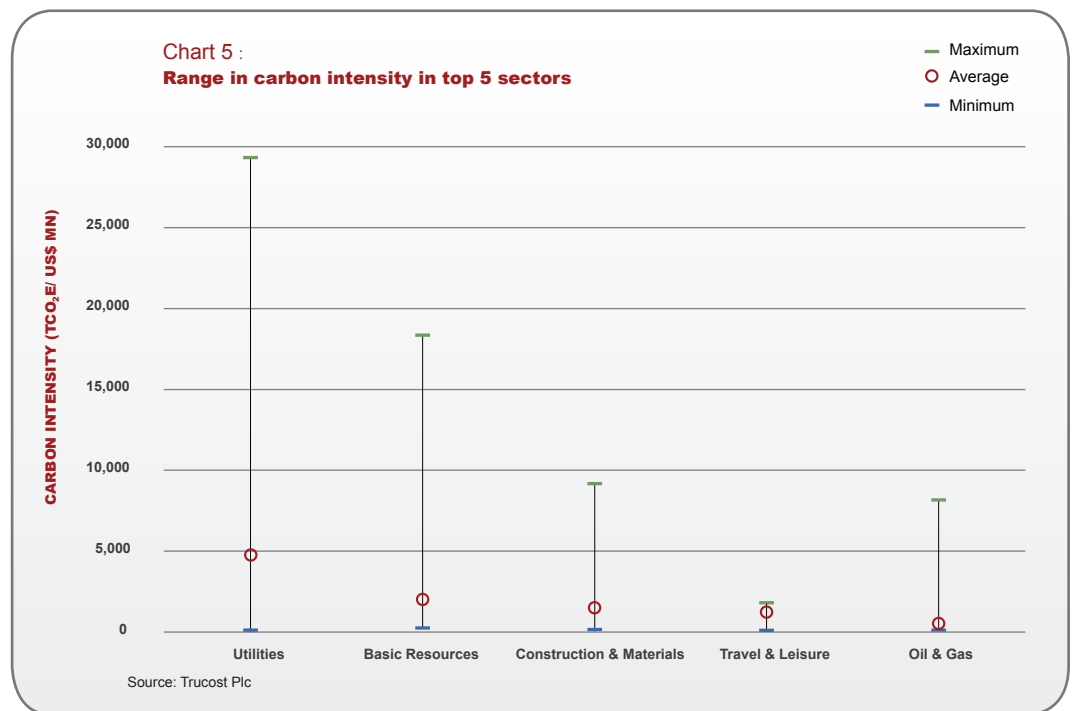
³⁷ Secondary CERs trading at €14.09 as of 7 September 2010, Point Carbon

Carbon Risks & Opportunities in Emerging Markets

“Reweighting securities based on carbon efficiency reduced the Index carbon footprint by 22%.”

REDUCING PORTFOLIO EXPOSURE TO CARBON EMISSIONS

Significant variation in the carbon intensity of companies in certain sectors in the S&P/IFCI LargeMidCap Index presents an opportunity to overweight carbon-efficient companies. Variations in carbon efficiency are greatest in the Utilities, Basic Resources, Construction & Materials, Travel & Leisure and Oil & Gas sectors as shown in Chart 5. Drivers for differences in carbon performance within sectors include varied business activities, production processes, fuel sources and energy efficiency.



The most carbon-intensive companies in the above sectors are shown in Table 3. The weightings of most of these companies were reduced by almost 50% in the S&P/IFCI Carbon Efficient Index.

Table 3: Companies ranked bottom on carbon intensity in five sectors

	Company	Carbon intensity (tCO ₂ e/US\$ mn)	Percentage higher carbon intensity than sector average
Utilities	China Resources Power Holdings Co. Ltd	29,318	>100%
Basic Resources	National Aluminium Co. Ltd	18,348	>100%
Construction & Materials	Ambuja Cements Ltd	9,124	+100%
Travel & Leisure	Genting BHD	1,724	+37%
Oil & Gas	Essar Oil Ltd	8,176	>100%

The sector and market weights of the underlying Index were largely maintained, but portfolio carbon is reduced significantly. The carbon footprint of the resulting S&P/IFCI Carbon Efficient Index is 22% smaller than that of the underlying index (440 vs. 563 tonnes of CO₂e/US\$ mn).



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MANAGING CARBON RISK WHILE MAINTAINING FINANCIAL PERFORMANCE

Rebalancing holdings based on carbon efficiency enables investors to reduce carbon risk while maintaining sector allocations, diversification and benchmark financial performance. The S&P/IFCI Carbon Efficient Index closely tracks the investment performance of the parent Index.

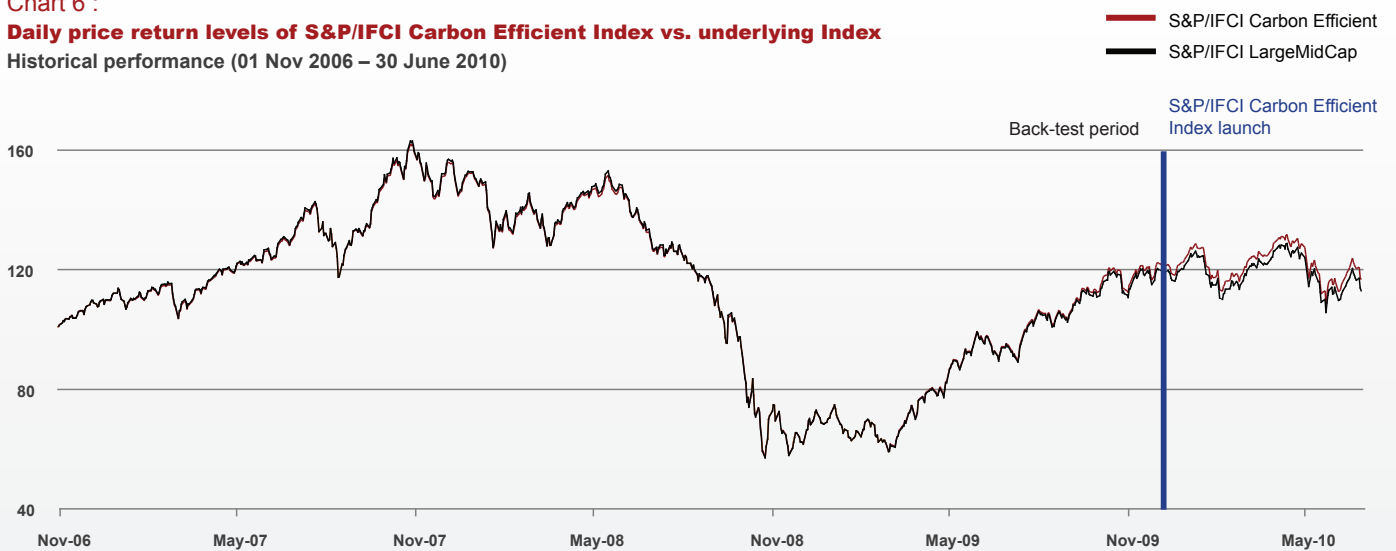
Prior to the index launch on 11 December 2009, S&P conducted a back-test over more than three years beginning on 1 November 2006 (see Chart 6). Using daily returns, the S&P/IFCI Carbon Efficient Index has an annualised tracking error of 1.41% versus the S&P/IFCI LargeMidCap Index from the beginning of the back-test period through to 30 June 2010.

On a price return basis, the S&P/IFCI Carbon Efficient Index has declined 3.74% from the index launch on 11 December 2009 to 30 June 2010, but has outperformed the S&P/IFCI LargeMidCap Index by 135 bps. Likewise, during the back-test period, the S&P/IFCI Carbon Efficient Index returned a cumulative 19.17%, beating the 17.18% return of the S&P/IFCI LargeMidCap Index.

Chart 6 :

Daily price return levels of S&P/IFCI Carbon Efficient Index vs. underlying Index
Historical performance (01 Nov 2006 – 30 June 2010)

REBASED RETURNS (1 NOVEMBER 2006 = 100)



Source: S&P

BENCHMARKING PORTFOLIOS AGAINST CARBON-EFFICIENT INDICES

Large institutional investors such as pension and sovereign wealth funds can invest in emerging markets while managing exposure to carbon costs. As governments in emerging markets come under pressure to price or regulate GHGs emissions, carbon costs are likely to affect the profit margins of carbon-intensive companies, causing their valuations to fall. However, investors can access carbon-efficient companies with lower risk from future rising carbon costs relative to their sector peers. The S&P/IFCI Carbon Efficient Index provides an opportunity to replicate the historical risk return profile of the S&P/IFCI LargeMidCap for emerging markets, with less carbon linked to holdings. The Index provides a market benchmark to stimulate greater investment flows to carbon-efficient companies. Long-term investors could allocate assets according to Index weightings to position their investments for the transition to a low-carbon economy. Funds that shift investment flows towards carbon-efficient companies will be well placed under carbon constraints.

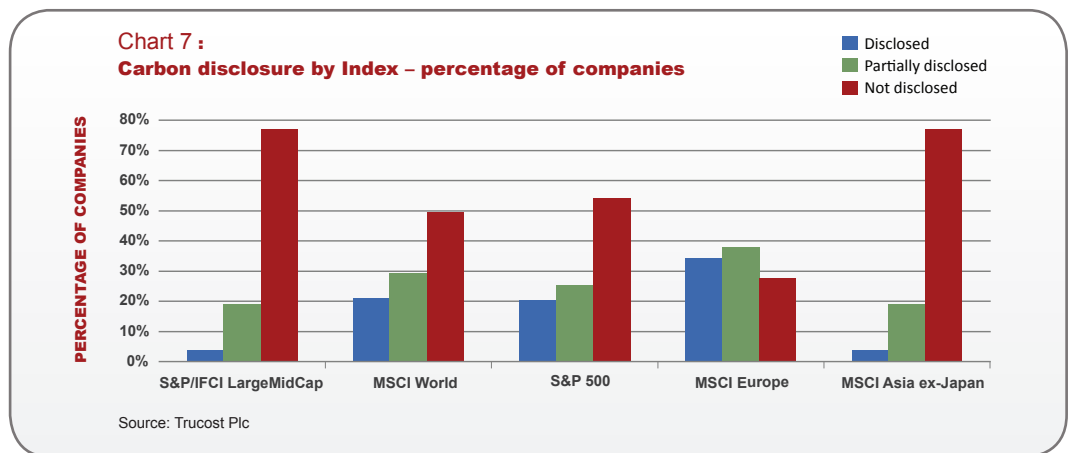
Carbon Risks & Opportunities in Emerging Markets

ANALYSIS INCLUDES DISCLOSED EMISSIONS DATA

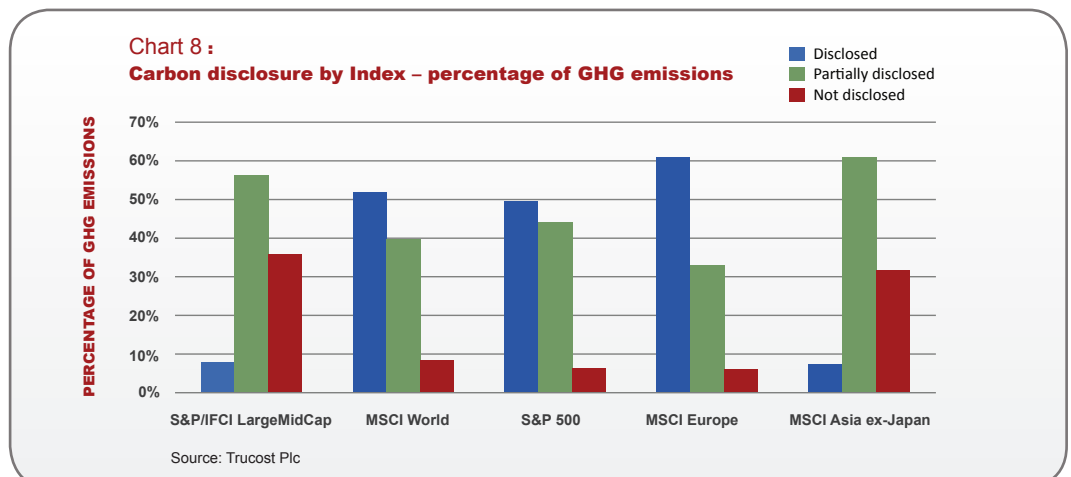
Trucost maintains the world's largest and most comprehensive database of standardised corporate GHG emissions data. The database includes company-specific environmental data. This includes greenhouse gas emissions data provided through direct communications with the company itself, or disclosed publicly. Where a company only discloses data for part of its overall activities, Trucost may standardise or normalise quantities in order to calculate the environmental impacts of the business's entire operations in line with environmental reporting standards such as the Greenhouse Gas Protocol. Where companies do not disclose adequate data, corporate impacts are calculated using Trucost's advanced environmental profiling model (see Appendix 1 on page 19).

DISCLOSURE ANALYSIS

Company disclosures on GHG emissions from operations can help identify and manage direct exposure to carbon costs. Companies that measure their emissions are better placed to reduce them. Almost two-thirds of GHGs analysed in this study are based on disclosed or partially disclosed data. Trucost compiled corporate GHG emissions data from sources including annual reports & accounts, environmental and sustainability reports and company websites. Data is also collected and standardised from other publicly available environmental reporting sources such as the Carbon Disclosure Project (CDP). The S&P/IFCI Carbon Efficient Index is supported by engagement with companies through the CDP and co-sponsored by the IFC to encourage measurement and disclosure of GHG emissions. Where companies do not disclose adequate data, Trucost uses environmental profiles calculated by its model (see "Analysis includes disclosed emissions data"). Chart 7 shows the proportion of companies that disclosed Scope 1 emissions data in each Index.



Four per cent of companies in both the S&P/IFCI LargeMidCap and MSCI Asia ex-Japan Indices disclosed Scope 1 GHG emissions in line with the Greenhouse Gas Protocol. Their disclosures accounted for a larger share of GHG emissions analysed (>7%), as shown in Chart 8 below. This reflects the fact that companies in carbon-intensive sectors are more likely to disclose emissions. Companies in the S&P/IFCI LargeMidCap Index that disclosed at least some information emitted the majority (56%) of emissions analysed. Partial disclosures include information that Trucost could use to derive GHG emissions. For instance, quantities of fuel use or electricity consumption were converted using emissions factors.





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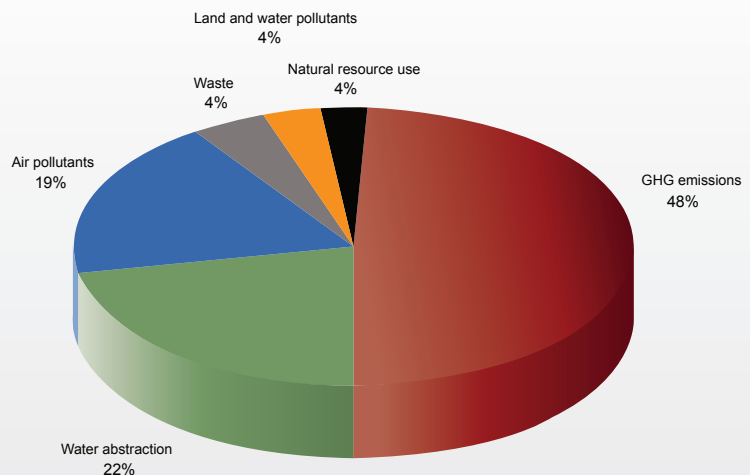
“Greenhouse gas emissions account for almost half of environmental costs associated with the Index.”

OTHER ENVIRONMENTAL IMPACTS

Greenhouse gas emissions are the most significant environmental impact of the companies analysed in the S&P/IFCI LargeMidCap Index. Trucost applied external prices to each environmental resource used and pollutant released by the listed companies. The cost of environmental damages from business activities are not fully paid by companies using environmental resources, such as timber and water, or emitting pollutants such as carbon dioxide. The “external” cost of using an environmental resource, such as timber, or emitting a pollutant, such as carbon dioxide, is the cost of environmental degradation and harm to human health. These costs are largely external to financial decision-making and represent a failure of markets to accurately account for business environmental impacts. However, companies are increasingly expected to pay the costs of reducing pollution and waste or compensate society for the damage they cause as governments apply the “polluter pays” principle through measures such as environmental liability regulations, emissions trading and taxes.

Pricing resource use and pollution in financial terms provides a weighting factor to measure the relative importance of different environmental impacts and their potential materiality. Total environmental external costs associated with companies in the S&P/IFCI LargeMidCap Index equate to 5% of their combined revenue. Greenhouse gas emissions account for 48% of environmental costs relative to revenue, as shown in Chart 9.

Chart 9 :
Breakdown of environmental footprint by impact



Source: Trucost Plc

The next most significant environmental impacts of companies in the Index are water abstraction and air pollutants, such as sulphur dioxide, nitrogen oxide and particulate emissions. Waste and pollutants such as heavy metals released to land and water account for 8% of external costs. Information on the sources of the top two impacts – greenhouse gas emissions and water abstraction – at a sector and company level can be used to target action to address related risks.

Carbon Risks & Opportunities in Emerging Markets

MEASURING GHG EMISSIONS

Nine GHGs are included in the analysis, including the six covered by the UN Kyoto Protocol: Carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF₆). Each GHG has a different capacity to cause global warming. Trucost's conversion of GHGs to CO₂e is based on the Global Warming Potential (GWP) index published by the Intergovernmental Panel on Climate Change, which assesses the effect of the emissions of different gases over a 100-year time period relative to the emission of an equal mass of CO₂. To compare the carbon performance of companies of all sizes and sectors, GHG emissions from operations, electricity use and other direct (first-tier) suppliers are normalised by revenue to identify carbon intensity.

APPENDICES

APPENDIX 1: TRUCOST METHODOLOGY

Trucost has developed a comprehensive approach to calculating quantitative environmental impacts across organisations, supply chains and investment portfolios. Trucost has analysed the environmental performance of more than 4,500 companies worldwide.

Where reported, Scope 1 emissions data are included in Trucost's database. Some companies analysed also disclose Scope 2 emissions data which were included in the analysis. Where companies only disclose resource use such as fuel consumption, this information is used to derive environmental data where possible.

Analyses of the carbon performance of companies and portfolios includes direct GHG emissions from operations and those emitted by direct (first-tier) suppliers. First-tier indirect emissions arise from the company's direct suppliers, such as electricity and logistics providers. Analyses of other environmental impacts include all upstream supply chain impacts, not just those from direct (first-tier) suppliers. Adopting this method prevents companies effectively outsourcing environmental external costs. For first-tier supplier impacts and where companies do not disclose adequate data, GHG emissions are calculated using Trucost's environmental profiling model. The model describes resources used through economic interactions between each sector based on the latest census data from the US Bureau of Economic Analysis to analyse interactions between economic productivity and the environment, adapted to generate global input-output modelling.

Quantitative data on industrial facilities' natural resource productivity is combined with information on indicators such as pollutant releases from national emissions registries including the US Toxic Release Inventory and Japanese PRTR. The indicators cover the use of resources such as natural gas liquids, as well as waste production and pollutants such as mercury and GHG emissions. The economic model calculates the quantities of over 740 environmental indicators, per unit of output. The system is consistent with the United Nations Millennium Ecosystem Assessment. Overseen by an international academic advisory panel, the model applies prices to each of the environmental resources and pollutants to analyse, in financial terms, the economic and environmental performance of each sector.

Environmental profiling of companies is based on production data to calculate the likely GHG emissions from business activities in 464 sectors. Using information on a company's revenues in different industries, the model can calculate an organisation's likely direct and first-tier supply chain emissions, based on industry averages. Information on interactions between industries is used to map each sector's supply chain environmental impacts. Calculations incorporate disclosed quantitative data on industrial facilities' actual resource use and pollutant releases where available. Analysed companies are invited to provide additional information and to verify environmental profiles created by Trucost. Analysts quality check any further disclosures made. Trucost's comprehensive coverage ensures that all companies in an index or portfolio are assessed, regardless of environmental disclosure levels.

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