

INDEX SERIES FTSE PUBLICATIONS

FTSE CDP Carbon Strategy Index Series.

Integrating carbon risk into investments.



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FTSE

FTSE Group (FTSE) is a world-leader in the provision of global index and analytical solutions. FTSE calculates indices across a range of asset classes, on both a standard and custom basis, working with investors from all around the world. FTSE indices are used for investment analysis, performance measurement, asset allocation, portfolio hedging and the creation of a wide range of index derivatives, traditional and Exchange Traded Funds (ETFs), and other structured products.

FTSE has a long tradition of listening and responding to the market so that it is at the forefront of developing new approaches to index design, many of which are now accepted as the market standard. Exchanges around the world have chosen FTSE to calculate their domestic indices, and FTSE collaborates with a variety of trade bodies and industry experts to deliver a range of innovative index solutions.

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CDP

The Carbon Disclosure Project (CDP) is an independent not-for-profit organisation providing a transformative global system for companies and cities to measure, disclose, manage, and share climate change and water information.

Over 3,700 companies across the world's largest economies now measure and disclose their greenhouse gas emissions and assessment of climate change risk and opportunity through CDP, in order that they can set reduction targets and make performance improvements. This data is gathered on behalf of 655 institutional investors, holding US\$78 trillion in assets. CDP now holds the largest collection globally of self-reported climate change data.

www.cdproject.net

Ends Carbon

ENDS Carbon is a leading provider of carbon performance benchmarking, ratings and risk analysis. Originating from the Carbon Benchmarking Project at Edinburgh University Business School, ENDS Carbon is now part of the ENDS Report which has been at the forefront of environment and energy business intelligence in the UK for over 30 years. Led by a team of asset management and index construction specialists, ENDS Carbon has partnered with FTSE and CDP to provide its expertise in the creation of the FTSE CDP Carbon Strategy Index Series.

ENDS Carbon will publish a series of reports associated with the index series which will enable constituent companies and investors to benchmark performance.

www.endscarbon.com

Executive summary.

Mitigating and adapting to climate change is one of the biggest challenges for the 21st century and will be a major structural driver of economic change. The FTSE CDP Carbon Strategy Index Series aims to support investors in incorporating climate change risks into their investment strategy.

It features future-oriented criteria to assess the exposure of individual companies to higher future costs associated with greenhouse gas emissions. Some companies will be better placed to exploit the transition to a low carbon economy; other companies will see their value diminished if they fail to adapt. These indices are carbon-risk-tilted versions of FTSE's established benchmark indices. The constituent companies remain the same but the weights of the companies are varied on the basis of their exposure to carbon risk relative to their sector peers. The overall weights of each sector are the same as for their benchmark indices, but some companies in each sector are over-weighted, while others are under-weighted.

FTSE Index Partners

- The Carbon Disclosure Project (CDP) holds the largest database of corporate climate change information in the world. It represents some 655 institutional investors, with combined assets under management in excess of US\$78 trillion. CDP supplies the core data for the indices.
- ENDS Carbon is a carbon benchmarking and performance ratings specialist. It is a sister company of the ENDS Report, the leading technical environmental regulation publication. ENDS Carbon is responsible for company analysis and scoring for the indices.

Key Principles

1.

Carbon risks

There is an expectation that carbon risks will have material impacts on corporate earnings in certain industry sectors over the next decade and beyond.

2.

Future orientated

In assessing how well positioned a company is, the index series places emphasis on future risks, trends and strategy, not simply on current emissions performance.

3.

Transparent models

The indices are transparent about assessment methods and sources of forecasts, and use simple and credible risk models.

4.

Material risk focus

Carbon risks are much more material in some sectors than others. Companies in the most exposed sectors will see their weights in the indices varied to the greatest extent, those in lower risk sectors will have small adjustments.

5.

Tracking error and performance

The index series aims to closely track the performance of established FTSE benchmark indices and includes all of the underlying constituents. The non market-cap weighting of the stocks reflect each constituent's carbon risk as measured against sector peers.

The FTSE CDP Carbon Strategy Index Series includes:



FTSE CDP Carbon Strategy Index

- Carbon Strategy 350
- Carbon Strategy All-Share
- Carbon Strategy Europe
- Carbon Strategy Japan
- Carbon Strategy Australia 300
- Carbon Strategy Australia 200

Corresponding FTSE benchmark

- FTSE 350
- FTSE All Share
- FTSE All-World Developed Europe
- FTSE All-World Developed Japan
- FTSE ASFA Australia 300
- FTSE ASFA Australia 200

Investment hypothesis.

This index series is founded on two hypotheses.

Material Risk Hypothesis

Climate change and carbon emissions related regulation are expected to have a material impact on the corporate earnings of companies in certain key industry sectors over the medium and long-term. There is an increasingly comprehensive range of emission trading schemes, carbon taxes, and efficiency standards, as well as a number of other regulatory and market incentives being introduced around the world in a shift towards a low carbon economy.

These schemes present risks to the profitability of companies, particularly those in carbon intense sectors. These risks are not yet well understood and may not yet be fully reflected in share prices. An index tilted towards companies that are well positioned for these risks should offer attractive investment potential over the long-term. This hypothesis provides a rationale for evaluating climate change risk in a small but growing number of sectors.

Carbon Efficiency Hypothesis

Carbon efficiency is valuable for all companies because it can reduce operating costs, help drive lean business, encourage product innovation and strengthen supplier relationships. In addition, research has shown that achieving high levels of carbon efficiency is not easy, so it is a useful test for good management overall. The Carbon Efficiency Hypothesis, though weaker than the Material Risk Hypothesis, provides a rationale for tilting the indices for all companies, including those with comparatively low emissions intensities.

Supporting investors integrate carbon risk.

It is hoped that the FTSE CDP Carbon Strategy index series will contribute to the ongoing discussions between companies and investors about the appropriate response to climate change in different sectors.

The large numbers of institutional investors that support CDP and the UN Principles for Responsible Investment are monitoring corporate performance on this key issue, and working to integrate climate change risk into asset allocation and investment mandates. One of the aims of the index series is to contribute to this process.

The index partners recognise that there is not yet a consensus about the most appropriate carbon strategies for specific sectors and also acknowledge that the analytical models adopted by this index are open to refinement. The index partners welcome suggestions from companies and investors to enhance the analytical framework¹.

¹ Contact index@endscarbon.com for information on how to contribute suggestions and comment on suggestions made by others.

Assessing carbon risk.

Research Cycle

All companies in the relevant FTSE benchmark indices are included in the corresponding FTSE CDP Carbon Strategy Index Series, with their weights altered. Data is collected on an annual basis, aligned with the CDP questionnaire process. CDP data is the primary data source, however if this is unavailable or incomplete, data from recent company reports and website information may be incorporated into the assessments where relevant.

Assessment Framework

Companies in the index series are assessed using two scoring frameworks – a series of sector-specific ‘Carbon Risk Models’ and a ‘Carbon Scorecard’.

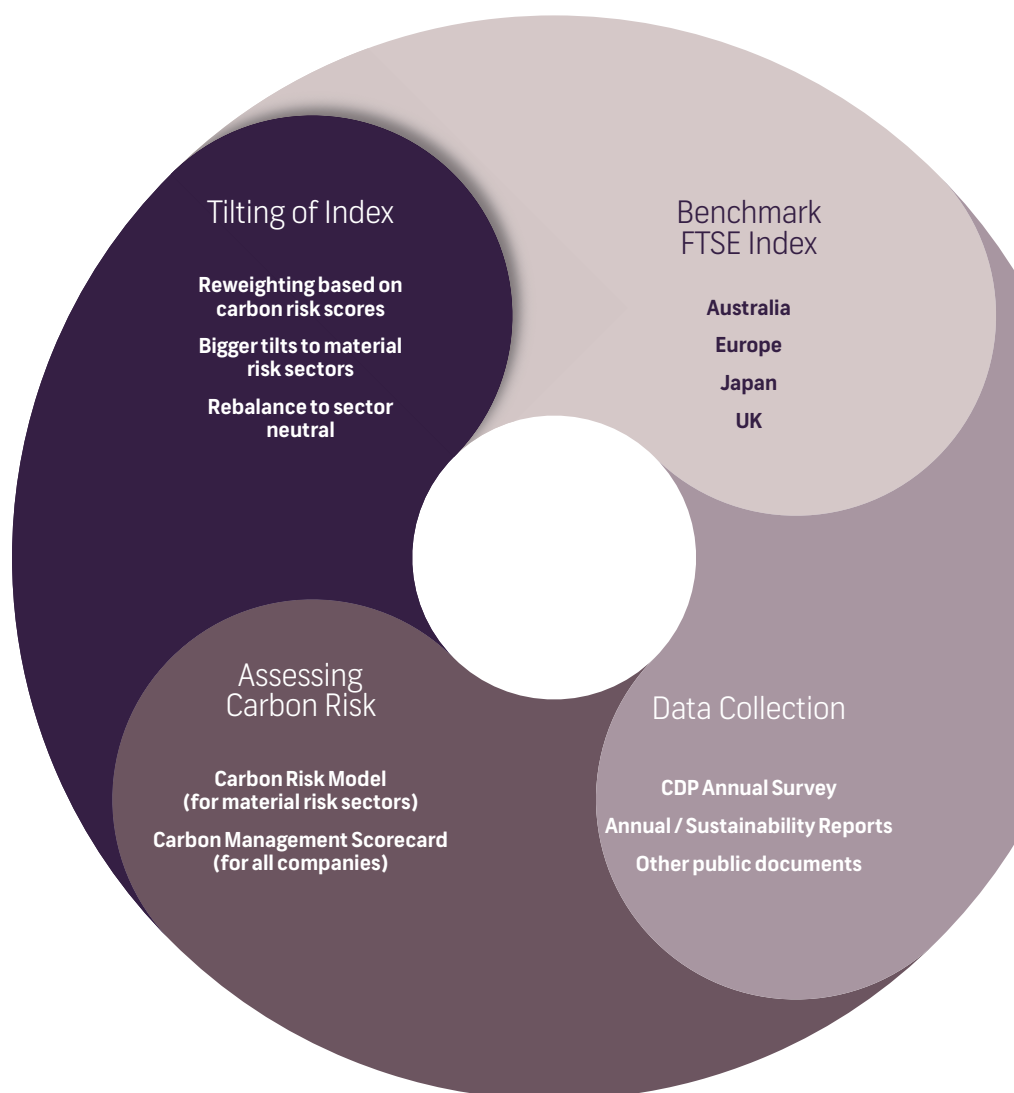
Companies whose business activities have the highest material medium-term financial risks & opportunities associated with GHG emissions² are classified as “material risk sectors” and are assessed using a combination of the Carbon Risk Model and the Carbon Scorecard³.

Final company ratings are scored on a range from +2.5 to -2.5. A weighted average is applied for companies in material risk sectors, with 75% of the weight placed on Carbon Risk Model scores in most cases. All companies outside of material risk sectors are assessed entirely on the Carbon Scorecard. These scores are used to tilt the weighting of companies in the index against their peers.

Index Construction

The FTSE CDP Carbon Strategy Index Series is tilted to over or underweight individual companies but is also sector-neutral. This means that companies in each sector that are best positioned on carbon risk see their weight in the index increase at the expense of those that are poorly positioned. The resulting weights are then adjusted to ensure that the overall weight of each sector is the same as in the underlying index⁴. This mitigates the impact of sector performance effects on index outcomes.

The extent of reweighting is related closely to the two investment hypotheses that underpin the index series with the tilts for companies in the material risk sectors being ten times more than those for low risk sectors. The Material Risk Hypothesis is a strong hypothesis and justifies a more significant tilting factor (a maximum of $\pm 25\%$ of market capitalisation). The Carbon Efficiency Hypothesis is weaker, and as a result the tilt factor is reduced to a maximum of $\pm 2.5\%$ of market capitalisation⁵.



² These fall into the following Sectors, based on the FTSE Industry Classification Benchmark: Oil & Gas Producers, Chemicals, Forestry & Paper, Industrial Metals & Mining, Mining, Construction & Materials, Automobiles & Parts, Travel & Leisure, Electricity, and Gas, Water & Multiutilities.

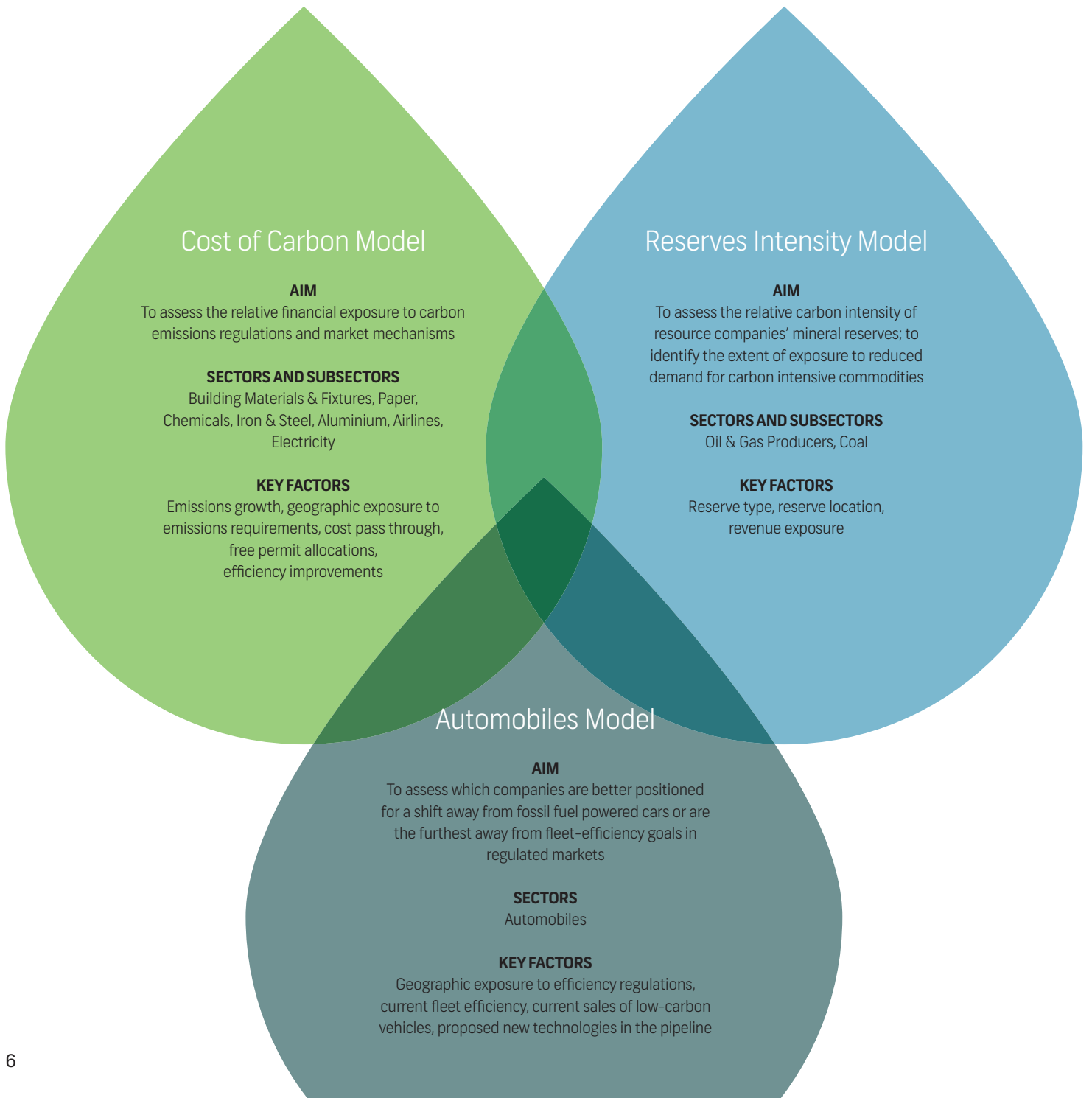
³ A company’s ICB classification is a guide as to whether to apply a carbon risk model in the assessment. Business activities are also assessed. For example, some companies in the ICB Multiutilities sector have electricity generation businesses which are scored on a material risk basis; and, conversely, some mining companies have been scored on a low risk basis (e.g. gold mining companies).

⁴ The sector reweighting is done at each quarterly review of the indices. In most cases, reweighting occurs at the ICB sector level with two exceptions. Airlines are reweighted at the ICB subsector level and two Energy sectors (Oil Equipment, Services & Distribution and Alternative Energy) are combined before reweighting.

⁵ Tilt factors are applied prior to sector re-balancing.

Carbon risk models.

There are currently 3 Carbon Risk Models:



Establishing Sector-Specific Frameworks

The nature and extent of risk in the material risk sectors will vary. For example, for some sectors the primary risk is the cost of carbon imposed by regulations such as the EU Emissions Trading Scheme (EU ETS) and the Australian carbon tax and future emissions trading scheme. In others, the risk arises from changing patterns of demand for products such as high-emission vehicles. In order to estimate the exposure of individual companies, the index series uses models incorporating the key risk factors facing sectors exposed to material carbon risks.

It is possible that a company may have exposure to a number of the risk models. Such companies are assessed on a revenue-based weighted average from the outcome of the individual models.

Carbon risk assumptions used by the index series

The understanding of carbon risks is still unfolding, so analysis must be based on informed assumptions. The main assumptions used by the index series are recorded below. They draw on authoritative sources and will evolve over time⁶.

The risk evaluation for the indices operates with reference to a ten year time horizon. It ignores both short-term market fluctuations and long-term factors that are likely to impact after this horizon. Companies will be reassessed on an annual basis, and short-term fluctuations such as daily changes in oil prices, will not be taken into account. The index series will give little emphasis to factors beyond the ten year time horizon because of uncertainty about long-term regulation, the pace of climate change technology, and because of time discounting. A ten year time frame is short enough to allow a degree of certainty about the material risks that are expected to emerge in the coming years, and long enough for an index approach to be effective.

Assumptions regarding significant carbon-related developments over a ten year time frame include:

i. Carbon emissions will have a cost in Kyoto Protocol Annex 1 countries⁷:

This cost will differ between Annex 1 regions. In some regions, especially the EU and Australia, it will be represented by explicit permit prices. In others the cost of carbon will be implicit, and imposed by other kinds of regulatory instrument. The index assumes the following explicit costs of carbon in our models for the EU ETS: €15 per metric ton of carbon dioxide equivalent (CO₂e) in 2008 rising to €36 per metric ton of CO₂e in 2020⁸. For Australian ETS, carbon is priced at A\$23 per metric ton of CO₂e in 2012, rising to A\$37 per metric ton of CO₂e in 2020⁹.

ii. The level of costs for particular companies will depend on the detail of regulatory design:

For example, the decision to allocate free emissions permits to airlines in the EU ETS based on their current emissions levels has the effect of creating higher costs for rapidly growing airlines compared to their slow-growth competitors.

iii. The cost of carbon will raise the operational costs of some companies:

This will result in higher prices for customers (and therefore lower demand), or lower profit margins for companies, or both. This will vary depending on the ability of companies to pass costs on to customers.

iv. Non-price based regulations:

Fuel efficiency standards and renewables obligations will become widespread and create material risks for some companies. This will affect the electric utilities sector, the alternative energy sector and the automobiles sector.

⁶ Comments are invited on these assumptions. Please send to index@endscarbon.com.

⁷ The UN Kyoto climate change treaty defined a list of 40 industrialised carbon intensive developed nations as Annex 1 countries. They include Australia, Canada, France, Germany, Japan, Russian Federation, United Kingdom, United States of America and other EU states.

⁸ Point Carbon Forecasts (2011)

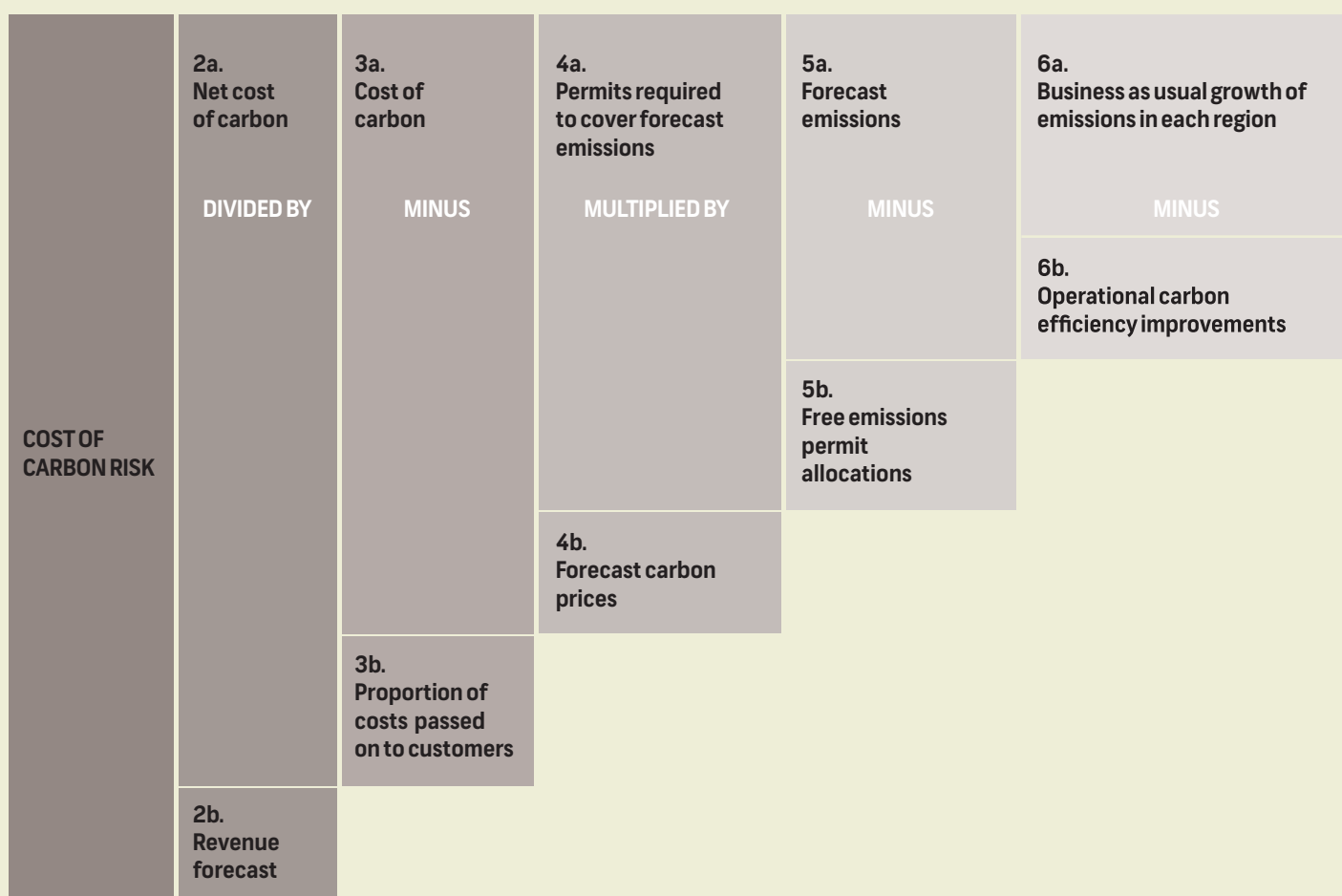
⁹ Sources include the Australian Government (2011)

Cost of carbon model.

The Cost of Carbon Model assesses the relative cost each company in a sector will bear as a result of carbon regulations. These typically require estimates to be made of future carbon emissions trends and carbon permit allocations.

The Cost of Carbon Model gives an indication of the relative proportion of the earnings that will be consumed by permit acquisition. Various factors affect the cost of carbon for each company including emissions growth, free permit allocations and carbon prices. These are significant because they vary between regions, sectors and individual companies. As a result the model for each region and sector is slightly different, but Figure 2 provides a general indication of the method used.

Figure 1. General Cost of Carbon Model



1. Cost of Carbon is normalised by Forecast Revenue to correct for company size variations.

2a. Net Cost of Carbon is Gross cost of Carbon less proportion of cost expected to be passed through to customers.

2b. Revenue forecasts are based on linear projection of historical revenue and consensus analyst forecasts for 2011 and 2012.

3a. Gross Cost of Carbon is Carbon Price multiplied by Permits forecast to be required to cover future emissions.

3b. Pass through adjustment differs depending on the market structure, commodity prices and company profile. Our estimates are based on informed assumptions.

4a. Permits required are based on Forecast Emissions less Free Permits.

4b. Carbon Price is forecast using authoritative forecasts till 2020. Regulated regions are those with established carbon pricing regimes, currently the EU and Australia. Regulatory schemes are under contemplation in South Korea, Japan, parts of China, parts of the USA and elsewhere; the cost of carbon model is designed to be able to incorporate new systems, with appropriate modification, if and when they become fully operational.

5a. Forecast Emissions are emissions from previous reporting year multiplied by forecast emissions growth and adjusted by estimated operational efficiency improvements.

5b. Regulatory compensation includes free allocations under established regulations until 2020.

6a. Business as usual growth of emissions in each region is GHG Protocol Scope 1 emissions reported for the latest year (2010) multiplied by the forecast growth rate. Scope 1 emissions are allocated to regions, based mainly on CDP 2011 responses. Alternatively, assumptions are made based on regional revenue, production or capacity breakdown.

Reserves model.

For some sectors the impact of carbon regulation is not going to directly reduce profit margins, but may considerably affect companies indirectly. Sectors specialising in hydrocarbon intensive commodities like coal may experience changing patterns of demand for their products rather than being directly regulated. A high carbon price will reduce demand for coal and increase demand for sources of low carbon energy.

Oil producers may experience indirect effects in other ways, due to rising costs related to high carbon intensive operations such as tar sands or heavy oil exploration and production. The costs are likely to grow due to the increasing scarcity of easy-to-access oil reserves.

Oil exploration & production companies

Companies in the oil and gas sector typically have oil reserves¹⁰ representing different intensity levels depending on reserve geographical location (heavy oil in Angola vs light oil in Middle East) and type (tar sand vs conventional oil). To take account of these factors, the model uses a calculation of the weighted average carbon intensity of oil reserves and what impact local regulation will have on the exploration costs of that particular field. Reserves are allocated pro-rata on an equity-ownership basis. Companies producing biofuels may experience growth in demand for low carbon fuel alternatives and a 'reserves-equivalent' figure has been estimated¹¹.

Coal mining companies

The most material carbon risk for many companies in the mining sector is reduced demand for coal production in regions with carbon regulations. To assess this risk, a model is used that evaluates the overall proportion of company revenues arising from coal, and the proportion of their coal reserves in regions that are most likely to see falling demand as a result of carbon regulation.

Figure 2. Reserves model for oil

AVERAGE CARBON INTENSITY OF OIL RESERVES	2a. Carbon emissions from exploration and production of oil in kgCO₂e	3a. Oil reserves by location/type in boe. Biofuel capacity expressed as a 'reserve-equivalent' MULTIPLIED BY
		3b. Reserve intensity factor in kgCO₂e/boe
	2b. Total oil reserves expressed in boe	3c. Total proven and probable oil reserves on an equity-ownership basis PLUS
		3d. Estimated reserves-equivalent for biofuels

Intensity factors sourced from:

- National Energy Technology Laboratory, "An Evaluation of the Extraction, Transport and Refining of Imported Crude Oils and the Impact on Life Cycle Greenhouse Gas Emissions", 2009. http://www.netl.doe.gov/energy-analyses/pubs/PetrRefGHGEmiss_lm-portSourceSpecific1.pdf. A report produced for the US Department of Energy.
- Renewable Fuels Agency, RFA Monthly Report 20: 15 April 2009 – 14 December 2009.
- National Energy Technology Laboratory, "An Evaluation of the Extraction, Transport and Refining of Imported Crude Oils and the Impact on Life Cycle Greenhouse Gas Emissions", 2009. http://www.netl.doe.gov/energy-analyses/pubs/PetrRefGHGEmiss_lm-portSourceSpecific1.pdf. A report produced for the US Department of Energy.

Figure 3. Reserves model for coal

EXPOSURE TO REDUCTION IN DEMAND FOR COAL	2a. Coal revenues as % of total revenue MULTIPLIED BY	SUM OF	3a. Market weighting factor of 1.0	MULTIPLIED BY	4a. % of total coal reserves in definitively regulated markets (EU ETS Phase III covering all European countries; Australia)
			3b. Market weighting factor of 0.5		4b. % of total coal reserves in potentially regulated markets (USA, Canada, Japan)
	2b. Proportion of coal reserves in regulated areas		3c. Market weighting factor of 0.001	MULTIPLIED BY	4c. % of total coal reserves in non-regulated markets (rest of world)

2a. Exposure to carbon intensive product (coal). This indicator is expressed as % of turnover generated from coal.

2b. Carbon Exposure driven by Indirect Regulatory Environment. The indicator is expressed as the % of coal reserves located in different territories. Due to the fact that metallurgical/thermal coal breakdown is currently unavailable, all coal reserves are treated equally as thermal.

4a-c. Data available from annual reports and company websites.

¹⁰ The intensity of oil reserves and the emissions regulation present in the geographical location of those reserves are the primary factors considered for these activities.

¹¹ According to World Energy Outlook 2010, the use of biofuels is likely to grow more than four-fold between 2008-2035. As renewable resources, biofuels do not have reserves, but a reserves-equivalent has been created by multiplying current production by estimated number of years. Biofuels act to reduce the carbon intensity of a company's total reserves.

Automobile model.

Global automobile manufacturers are facing increasing pressure from both governments and consumers to produce more fuel efficient vehicles. Not only do all the world's largest automobile markets regulate new vehicle fuel efficiency, but future mandates are becoming progressively more stringent.

The FTSE CDP Carbon Strategy Index Series uses a carbon risk factor to estimate the risks for companies in the automobile industry. This factor ranges from 0 (least risk) to 1 (most at risk) and is based on two indicators. The first indicator assesses each firm's ability to close the gap between regulated fleet-efficiency in the major regulated markets and current efficiency. This is expected to impose significant risks as recent regulation has mandated automakers to ramp-up efficiency or face substantial financial penalties; or in the case of China, the refusal to sell non-compliant models all together. While individually many manufacturers are on pace to comply, collectively there still exists a gap ranging from 6-9% in the major markets analyzed in the model.

The second indicator assesses strategic positioning in new markets for low-carbon vehicles. The model evaluates the strategic position of each company based on the firm's current efficiency, current sales of low-carbon vehicles and proposed new technologies in the pipeline.

Figure 4. Automobile model

FLEET CARBON RISK	Regulated fleet-efficiency gap	% of Unit Sales in Regulated Market	MULTIPLIED BY	Market weighting factor*	MULTIPLIED BY	% gap between market regulation and current performance
	MULTIPLIED BY					
	Strategic positioning for low-carbon technology	AVERAGE OF	Current efficiency average from EU, US & China			
			Current alternative fuel units sold as percentage of total			
New technology pipeline (qualitative scoring approach)						

Notes to model:

- Global automobile markets have been divided into four categories based on fleet-efficiency regulation: Europe, China, USA, and Rest of World. The Market Weighting factors applied in the model are based on the strength of the fleet-efficiency regulations in those markets and are set as: Europe (2), China (1.5), USA (1), and Rest of World (0.75).

All companies are also assessed using a Carbon Scorecard. For companies in material risk sectors the Carbon Scorecard comprises a smaller portion, usually 25% of the overall carbon risk score. For companies outside of material risk sectors the overall carbon risk score is based entirely on the Carbon Scorecard.

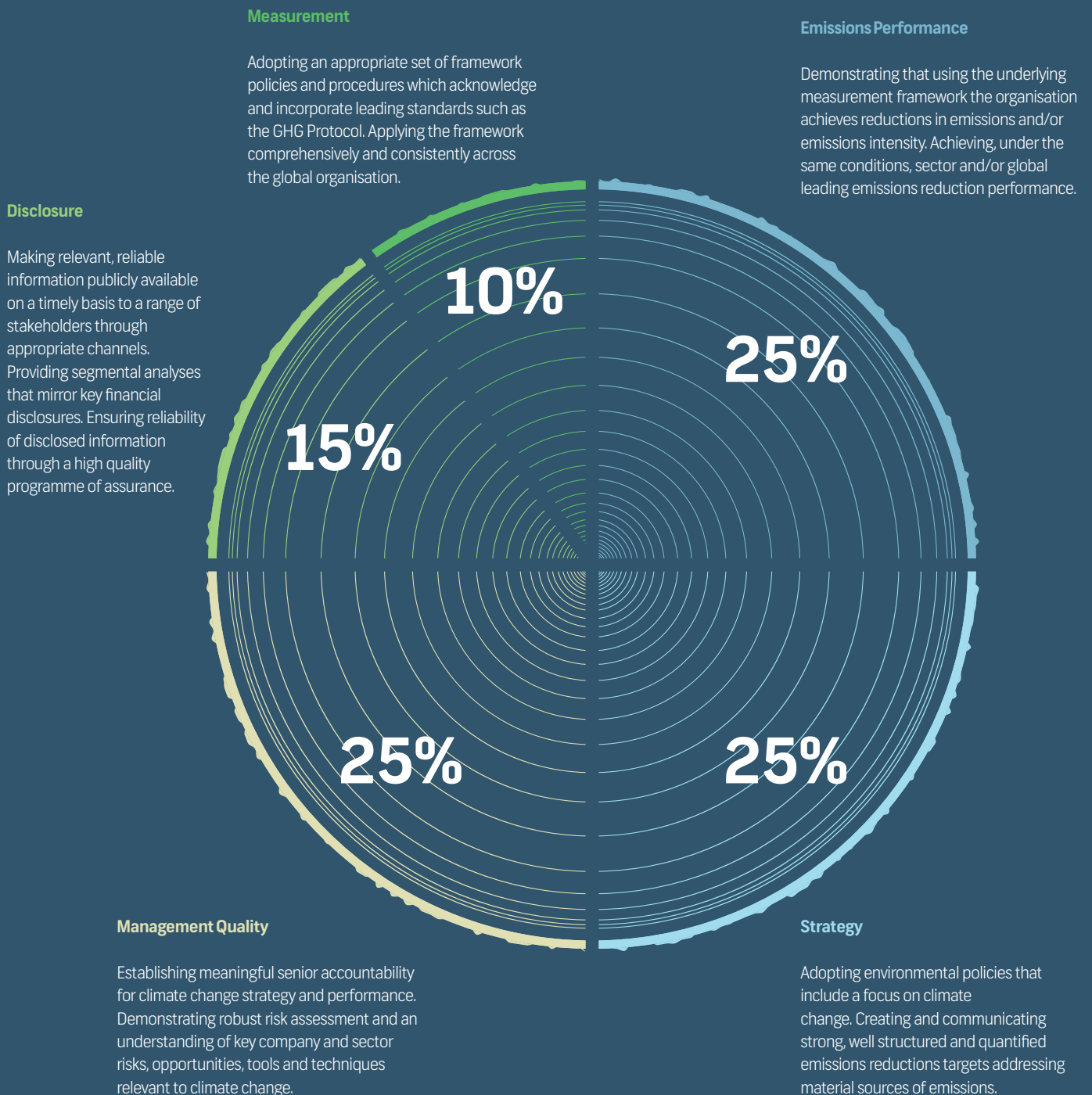
The Carbon Scorecard is designed to reflect best practice carbon management approaches used by companies as well as those represented by established standards such as the UK Carbon Trust Standard, the GHG Protocol, the FTSE4Good Climate Change Criteria, the Caring for Climate Principles and emerging standards such as the Carbon Disclosure Leadership and Performance indexes.

Excellence in assessing management quality is based on principles that are common to business improvement frameworks in general and carbon management best practice frameworks in particular. Effective companies make commitments, set goals, gather data to assess performance and make management decisions, and then monitor results for improvements. They are also transparent and accountable about their impacts to stakeholders.

The Carbon Scorecard assessment comprises five themes: Strategy, Management Quality, Emissions Performance, Disclosure, and Emissions Measurement.

Carbon scorecard.

Summary of Carbon Scorecard Assessment approach



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