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Carbon Disclosure Project Report 2006

Electric Utilities 265

On behalf of 225 investors with assets of $31 trillion.

Part of the CDP initiative

CARBON DISCLOSURE PROJECT

Report written by

TRUCOST PLC

taking the environment into account

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CDP4 Signatories 2006

This report is based on the submissions from corporations in response to the fourth Carbon Disclosure Project (CDP4) information request sent on 1st February 2006. This report, other CDP reports and all responses from corporations are available without charge from www.cdproject.net. The contents of this report may be used by anyone providing acknowledgement is given. 225 investors were signatories to the CDP4 dated 1st February 2006 including:

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British Coal Staff Superannuation Scheme **UK**

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BT Financial Group **Australia**

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CCLA Investment Management Ltd **UK**

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Cheyne Capital Management **UK**

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Eureko B.V. **Netherlands**

F&C Asset Management **UK**

FAPES-Fundacao de Assistencia e Previdencia Social do BNDES **Brazil**

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Fundação CESP **Brazil**

Fundacao Forluminas de Seguridade Social **Brazil**

Gartmore Investment Management plc **UK**

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Hermes Investment Management **UK**

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HSBC Holdings plc **UK**

Hyundai Marine & Fire Insurance Co, Ltd **South Korea**

I.DE.A.M -Integral Dévelopment Asset Management **France**

Indexchange Investment AG **Germany**

ING Investment Management Europe **Netherlands**

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Interfaith Center on Corporate Responsibility **USA**

Internationale Kapitalanlagegesellschaft mbH **Germany**

Ixis Asset Management **France**

Jupiter Asset Management **UK**

KLP Insurance **Norway**

LBBW - Landesbank Baden-Württemberg **Germany**

Legal & General Group plc **UK**

Light Green Advisors, LLC **USA**

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Ontario Municipal Employees Retirement System (OMERS) **Canada**

Ontario Teachers Pension Plan **Canada**

Oregon State Treasurer **USA**

Pax World Funds **USA**

PETROS - The Fundação Petrobras de Seguridade Social **Brazil**

PGGM **Netherlands**

PhiTrust Finance **France**

Pictet & Cie. (Europe) S.A. **Germany**

Portfolio Partners **Australia**

Prado Epargne **France**

PREVI Caixa de Previdência dos Funcionários do Banco do Brasil **Brazil**

Prudential Plc **UK**

Public Sector Superannuation Scheme and Commonwealth Superannuation Scheme **Australia**

Rabobank **Netherlands**

Railpen Investments **UK**

Rathbone Investment Management / Rathbone Greenbank Investments **UK**

REAL GRANDEZA Fundação de Previdência e Assistência Social **Brazil**

RLAM **UK**

Robeco **Netherlands**

Rockefeller & Co Socially Responsive Group **USA**

SAM Sustainable Asset Management **Switzerland**

Sanlam Investment Management **South Africa**

Sanpaolo Imi Asset Management Sgr **Italy**

Sauren Finanzdienstleistungen **Germany**

Schroders **UK**

Scotiabank **Canada**

Scottish Widows Investment Partnership **UK**

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Service Employees International Union **USA**

Shinkin Asset Management Co., Ltd **Japan**

Siemens Kapitalanlagegesellschaft mbH **Germany**

SNS Asset Management **Netherlands**

Social Awareness Investment, ClearBridge Advisors, a unit of Legg Mason Inc. **USA**

Societe Generale Asset Management **UK** Limited **UK**

Societe Generale Group **France**

Sogeposte **France**

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Standard Life Investments **UK**

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Swedbank **Sweden**

Swiss Reinsurance Company **Switzerland**

TfL Pension Fund **UK**

The Co-operative Bank **UK**

The Collins Foundation **USA**

The Dreyfus Corporation **USA**

The Ethical Funds Company **Canada**

The Royal Bank of Scotland Group **UK**

The Shiga Bank, Ltd (Japan) **Japan**

The Wellcome Trust **UK**

Third Swedish National Pension Fund (AP3) **Sweden**

Threadneedle Asset Management **UK**

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Warburg-Henderson Kapitalanlagegesellschaft mbH **Germany**

WestLB Asset Management (WestAM) **Germany**

Zurich Cantonal Bank **Switzerland**

1 Executive Summary

The Carbon Disclosure Project (CDP) is a global initiative aimed at informing investors of the risks and opportunities presented by climate change, and to inform company management of the views of their shareowners regarding climate change. The institutions signed up to the Project now represent over $31 trillion of assets under management.

1 Executive Summary

The Carbon Disclosure Project (CDP) is a global initiative aimed at informing investors of the risks and opportunities presented by climate change, and to inform company management of the views of their shareowners regarding climate change. The institutions signed up to the Project now represent over $31 trillion of assets under management.

A recent review of the economic impact of climate change by the UK government, the Stern Review[1], estimates that the expenditure required to mitigate climate change can be limited to 1% of global GDP annually if action is taken now. If no action is taken the overall costs and risks associated with climate change could equate to 20% of global GDP annually. Nations are currently debating how to enhance and broaden the Kyoto Protocol in order to address emissions reductions beyond 2012. The Stern Review describes in detail the critical importance for a global solution to climate change and this will require carbon emissions to be priced through tax, trading or regulation. There is a general consensus that in order to stabilise atmospheric concentration of CO_2e to 550 parts per million, a level at which climate risks can be limited to those attributed to a 2^oC temperature increase, significant cuts in emissions will be required.

The Stern Review describes the necessity for the Electric Utility sector to be decarbonised by at least 60% by 2050. The sector faces three main issues:

- It is the most carbon intensive sector and has therefore been one of the first to feel the effects of environmental regulations and the pricing of carbon emissions.
- As a result of the wide range of emissions arising from different fuel types used to generate electricity, there are many different CO_2e reducing strategies available.
- Adaptation to changing regulation is difficult for the Electric Utility sector given the long lifespan of power stations and the significant capital expenditure required. This is exacerbated by the significant variability in the age and efficiency of current installed technology.

The analysis presented in this CDP report highlights that, using a conservative estimate of the cost of reducing carbon dioxide emissions, costs equivalent to 7% of revenue could be at risk for the largest emitting Electric Utility companies if nothing is done to mitigate emissions. As a consequence, investors have a legitimate interest in comparing the emissions of the Electric Utility companies they invest in.

In previous years the CDP has sent a climate change questionnaire to FT500 companies, which requested that companies report their emissions data according to the Greenhouse Gas (GHG) Protocol. This year (CDP4) the CDP expanded the number of companies surveyed to more than 2,100. Given the importance of carbon emissions to the Electric Utility sector this report, compiled by Trucost, analyses the responses of the 265 largest listed Electric Utility companies by market capitalisation. This is the first sector report the CDP has produced. The key findings are as follows:

- **Response rates to survey were low** considering the contribution of the Electric Utility sector to carbon emissions. The Electric Utility sector is the most carbon intensive sector of the MSCI All World Developed Index - the sector is responsible for nearly a quarter of greenhouse gas emissions globally[2]. Only 42% of Electric Utilities responded to the CDP questionnaire.
- **The CDP has had a cumulative effect** on the responsiveness of FT500 Electric Utilities surveyed in previous years. The response rate has increased from 71% to 96%.
- **Responses were highest in Kyoto Annex 1 countries and in the EU 25 and Japan**, where regulations to control carbon emissions are more developed.

Costs equivalent to 7% of revenue could be at risk for the largest emitting Electric Utility companies.

1 http://www.hmtreasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm

2 Trucost analysis

- **Companies that had to comply with the EU Emissions Trading Scheme had the highest response rate at 67%.** Although this level of disclosure is the highest it is somewhat disappointing that the remaining Electirc Utilities did not respond given their legal responsibilities to report their emissions to the regulator in Europe. Some utilities have cited commercial sensitivity as the rationale for this lack of disclosure.
- **Larger companies were more likely to respond** and the largest companies were significantly more likely to measure and quantitatively report their emissions.
- **Quantitative disclosures were low**. Less than 30% provided data on emissions, although this was nearly 70% of those that chose to respond to the CDP. This is disappointingly low given the fact that most Electric Utility companies are required to report their actual emissions to regulators.
- **Not a single Chinese Electric Utility provided quantification of their emissions.** China is the world's largest user of coal for power generation, and is currently responsible for nearly one fifth of the world's emissions[3].
- **Responses lacked comparable statistics**. Several made disclosures regarding investments, but most did not describe the type of investment (capital vs. operating expenditure), whether it was a part of business-as-usual investment or in new technologies specifically designed to reduce emissions. Electric Utilities face difficult decisions regarding investments, especially given the significant sums involved due to the long term nature of the capital expenditure, and further transparency on this is to be welcomed.
- **European companies were less carbon intensive than North American or Asian companies,** which is largely due to the efficiency of European plants historically given their access to fuel resources. This has meant that, in part, European Electric Utilities may be better prepared than their peers from an emissions trading perspective.
- **Few Electric Utilities would create Economic Value Added (EVA) if the cost of their emissions were financially recognised (using the TRUEVA measure).** Only 6 of 25 companies assessed would have a positive TRUEVA.
- **Some U.S. Electric Utilities could face costs equivalent to 7% of revenue** if they had to reduce emissions by 25%, as proposed by new regulations instituted in California recently, on the basis of their emissions today.

The fact that the CDP has 225 institutional investor signatories with more than $31 trillion in assets under management is very encouraging; it shows that investors are taking the issue of climate change increasingly seriously. As a result the CDP is having a very positive cumulative effect on carbon disclosure levels. As disclosure becomes the norm, focus will inevitably shift to the adequacy and usefulness of those disclosures. Investors need more information of better quality if they are to factor carbon issues into mainstream investment management and decision-making.

In Europe, the advent of the EU Emissions Trading Scheme (EU ETS) in January 2005 means that carbon emissions increasingly carry a cost. This has increased incentives for participating companies to reduce them. The EU ETS also requires participating companies to submit verified emissions data to a central register. However, it does not remove the need for separate corporate disclosure of emissions because the register is organised on an installation basis rather than on a beneficial owner basis and is therefore not organised well for investment purposes.

All other things being equal investors will increasingly express a preference for companies that emit less carbon on a per unit of output basis. This, in turn, creates a virtuous circle where companies with lower carbon intensities when compared to peers are rewarded with a lower cost of capital by investors who increasingly recognise GHG emissions as a financial driver.

3 International Energy Agency, based on 2004 emissions.

The Electric Utilities Report highlights that most of the disclosures were difficult to compare even though the CDP questionnaire specified the GHG Protocol as a common standard for reporting. Many companies discussed the risks and opportunities in some depth; but without further quantification and greater standardisation in measurement to improve comparability it will be difficult for investors to fully assess the climate change risks for Electric Utilities.

Companies are coming under increasing investor demand to provide emissions data and many are devoting considerable resources in responding to those demands. It is therefore something of a missed opportunity that, where they make detailed quantitative carbon disclosures, those disclosures are not always adequate for investors to make many meaningful comparisons. Companies that have successful strategies leading to reductions in carbon emissions when compared to output, value added or other economic yardsticks are unable to demonstrate their success unequivocally in relation to competitors in the absence of comparable, standardised measures. This absence of comparable statistics also allows companies that choose not to institute policies and strategies to reduce their dependency on carbon emissions, to avoid investor criticism.

Investors lack the necessary information to make informed decisions with respect to carbon emissions, which are becoming a source of cost to companies in a significant proportion of the world and having an effect on earnings at many points in the global supply chain. Concerned responsible investors are vulnerable to ‘green wash’ when reporting consists of vague qualitative disclosures from equally concerned companies about the issue of climate change. The absence of reliable data makes it difficult for markets to take account of carbon emissions within asset pricing.

Qualitative management discussion is necessary for investors to understand how companies might meet the climate change challenge going forward but it is not a substitute for environmental performance evaluation using standardised and verified data. Unlike other sectors the Electric Utility sector is used to gathering this type of information. As most regulators require disclosures of emissions, and most operators already measure fuel inputs and the efficiencies of their plants, it should not be overly onerous for Electric Utilities to improve their disclosures to investors in the future.

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2 Background

The Carbon Disclosure Project (CDP) provides a coordinating secretariat for institutional investor collaboration regarding climate change. CDP's aim is twofold:

- to inform investors regarding the significant risks and opportunities presented by climate change; and
- to inform company management regarding the serious concerns of their shareowners regarding the impact of these issues on company value.

It is estimated that CDP signatories now manage an astonishing 31.5% of total institutional funds worldwide.

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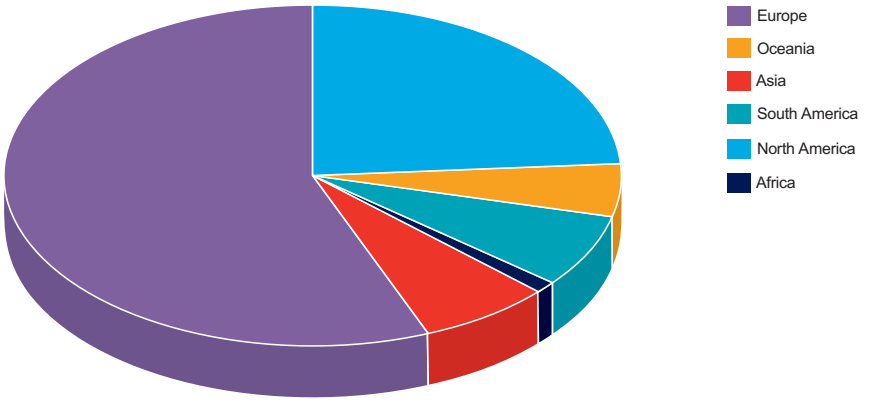
It is estimated that CDP signatories now manage an astonishing 31.5% of total institutional funds worldwide.[4]

Figure 1. CDP4 Signatories by region



Henri de Castries
Chairman of Management Board and Chief Executive

"Climate change and the impact that it will have on key industries such as agriculture, tourism, energy, transport and insurance, is as important as interest rate risk and exchange risk. As a major global investor, we support the CDP and value the information that it provides to help us make informed decisions on the subject."

Having launched in December 2000 at No. 10 Downing Street, London, CDP has four times invited institutional investors to collectively sign a single global request for disclosure of shareowner value relevant information regarding greenhouse gas emissions.[5] In doing so it has created four of the largest ever collaborations of global institutional investment capital – $4.5 trillion, $10.2 trillion, $21 trillion and now $31.5 trillion of assets under management.

The information requests have historically been sent to some of the largest global companies (the FT500) by market capitalisation. In 2006, working with regional partners, CDP has expanded its target company sample size in Asia, Australia and New Zealand, Brazil, Canada, France, Germany, Japan, the UK and the U.S, such that the information request was sent to more than 2,100 companies globally. Overall, 940 responded to the questionnaire, including 112 Electric Utilities.[6] The response rate across the expanded samples was similar to the 47% of CDP1. The total number of responses almost tripled, driven by the dramatic increase in companies being included in the CDP for the first time.

This report focuses specifically on disclosures from the 265 Electric Utilities sample of companies. Findings for other samples are detailed in separate 2006 Carbon Disclosure Project Reports for Asia ex-Japan, Australia, Brazil, Canada, France, the UK FTSE 350, the FT500 (global), Germany, Japan and the S&P500 (U.S.). Please refer to the inside back cover for details of the full reports.

In 2006, CDP was sponsored in France by AXA and Ademe; in Brazil by ABN AMRO and ABRAPP; in the U.S. by Calvert; and by the California Public Employees' Retirement System (CalPERS) and the California State Teachers' Retirement System (CalSTRS) for the Electric Utilities report.

We thank these leading investors and our other regional partners sincerely for their support.

Al Gore
Former US vice President

"Integrating… climate change into investment analysis is simply common sense… The carbon intensity of profits is an approach that needs to be adopted… Climate change is a problem that's not going to be solved by politicians… Politicians have an important role to play; but the underlying reality is going to have its effects on the market, regardless of public opinion and government action."

4 In CDP's rough estimation, the asset base available to institutional funds worldwide is approximately $100 trillion, and signatories to CDP account for about one third of this sum (subject to some double counting).

5 See Appendix - 6.4 for the CDP4 questionnaire.

6 As of the publication date.

Chairman, Mitsubishi Clean Energy Finance Committee

"Because developing countries are exempt from the Kyoto-Protocol target, the efforts such as your programme (CDP) are the only avenue for persuading them to increase their commitment to climate change."

Win Neuger
CEO, AIG GLOBAL INVESTMENT GROUP

"As an investor, we must actively manage the risks and opportunities related to climate change and other environmental trends. The information gathered by the CDP helps us to do this. On the opportunity side, AIGGIG is allocating new private equity to GHG mitigating investments."

The Sustainable City Awards

In February, CDP was named by the Corporation of London as the overall winner of the 2006 Sustainable City Awards. CDP was praised for effecting a tangible impact on global efforts to combat climate change.

The responses from CDP4 and previous years can be downloaded from www.cdproject.net.

In summary the project has created:

- The largest registry of corporate GHG emissions data in the world
- A world-leading and up-to-date information repository for the investment community facilitating superior equity and debt investment decision-making
- Shareowner support for corporations to measure and manage the climate change issue
- Investor community leadership supporting the work of other stakeholders engaging with the climate change issue (e.g. policymakers, consultants, accountants)
- A process applauded by investors such as Henri de Castries of AXA (September 2005) and Sir John Bond of HSBC (May 2004), business leaders such as Jeff Immelt CEO GE (May 2003) and politicians such as Tony Blair (February 2003) and Angela Merkel (August 2006).

No longer can fiduciaries claim to be unaware of what is at stake. Taking climate risks into account is now becoming part of smart financial management. Failure to do so may well be tantamount to an abdication of fiduciary responsibility and indicative of poor management.

Leading investment consultants, Mercer, stated in their report, 'A trustee's perspective: addressing climate change as a fiduciary issue': "The materiality of climate change as outlined in this document clearly shows that climate change risk could have the potential to impact a Fund's investments over the long term. In addition, we suspect climate change risk is neither fully known nor understood and that it is not yet properly managed by the various groups involved in the ongoing management of pension scheme assets. In line with these definitions of fiduciary responsibility, we suggest that it is consistent with fiduciary responsibility to address climate change risk."[7]

Leading global law firm Freshfields Bruckhaus Deringer took this analysis a stage further in their recent report entitled: 'A legal framework for the integration of environmental, social and governance (ESG) issues into institutional investment' by commenting as follows:

"In our view, decision-makers are required to have regard (at some level) to ESG considerations in every decision they make… On that basis, integrating ESG considerations into an investment analysis so as to more reliably predict financial performance is clearly permissible and is arguably required in all jurisdictions."

The CDP Secretariat extends sincere thanks to the signatory investors, responding corporations and regional partners for their participation in CDP4.

Future plans

CDP is now established as an annual process and the CDP5 information request will be sent on 1 February 2007. CDP will focus on improving the quality and quantity of responses from corporations and expanding the project in relevant countries and sectors.

CDP is able to accept disclosure statements from corporations at any time. Please contact info@cdproject.net for more information. These responses will be made available at the CDP website www.cdproject.net

CDP would be delighted to explore future participation with all interested institutions and we invite organisations to contact us at info@cdproject.net

7 The full report is available from: www.carbontrust.co.uk/Publications/CTC509.pdf

3 Introduction

The Carbon Disclosure Project (CDP) is now in its fourth year. This year the project has grown from a survey of the FT500, the largest companies globally by market capitalisation, to now include more than 2,100 companies across the world. The growth of the project is a clear indication that investor interest in the effects of climate change on business is increasing significantly.

3 Introduction

The Carbon Disclosure Project (CDP) is now in its fourth year. This year the project has grown from a survey of the FT500, the largest companies globally by market capitalisation, to now include more than 2,100 companies across the world. The growth of the project is a clear indication that investor interest in the effects of climate change on business is increasing significantly.

CDP4 now incorporates its first sector report, which analyses the responses of 265 of the largest publicly quoted Electric Utilities globally by market capitalisation. The World Wide Fund for Nature (WWF), in collaboration with CalPERS and CalSTRS, commissioned Trucost to analyse the responses of those Electric Utilities for this report.

The CDP now has the support of financial institutions representing over $31 trillion of assets under management. In the face of this it is extremely difficult for Electric Utilities to argue that investors are unconcerned about the greenhouse gas (GHG) emissions of the companies in which they hold shares. Companies themselves are also taking the climate change issue increasingly seriously as evidenced by an increasing willingness to be transparent about carbon emissions and to discuss policies and actions which are designed to reduce them. In addition, there are regulatory requirements to report on relevant emissions data in many regions, most notably in Europe where the EU Emissions Trading Scheme has completed the first year of operation.

Are companies measuring, managing and reporting their climate change impacts as a consequence? This report examines the key trends in GHG disclosures to the CDP. It shows how the Electric Utility sector compares with other sectors and whether market capitalisation, among other things, affects its propensity to disclose information on GHG emissions and the nature of those disclosures.

The climate change issue, and the near-certainty that carbon emissions will carry a price across the world either through the introduction of carbon trading schemes, carbon taxes or through the imposition of statutory limits on carbon emissions, poses very serious questions for Electric Utilities. This situation is exacerbated by the capital intensity of the sector and the long periods over which capital assets are depreciated; investment decisions made today are likely to have implications for emissions over the next 40 years.

In contrast the Kyoto Protocol sets no limits for emissions post-2012 and in any case significant developed nations, such as the U.S. and Australia, have yet to ratify the agreement. In addition developing countries (non-Annex 1) which are responsible for significant and fast-growing emissions are largely outside the agreement. It is worth examining the reasons why the U.S. and Australia have not ratified the Kyoto Protocol since any follow-on agreement to the first phase of the Kyoto-Protocol agreement will have to address these issues. These fall into five broad categories:

1. **International competitiveness and loss of comparative advantage.** Clearly limiting atmospheric concentrations of carbon dioxide can only be achieved by constraining the growth of carbon emissions. Action by nations will involve a combination of policies which either set limits on carbon emissions or places a price on them through the introduction of carbon taxes or emissions trading schemes. This will tend to increase the prices of goods and services in those nations in some proportion to the carbon intensity of their production. Unilateral action by nations will introduce new price differentials which will affect international competitiveness and trade-flows. Multi-lateral but non-global agreements such as the Kyoto Protocol introduce similar price differentials between participating and non-participating nations.
2. **Emissions reductions may constrain growth.** Measures to control emissions will constrain growth in the countries that introduce them although, as the recently published Stern Review[8], a report by the UK government on the economics of climate change, argues, the failure to combat global

Stern Review

"Climate change is the greatest market failure the world has ever seen."

8 http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm

warming will have effects of greater magnitude on GDP of between 5 and 20 times the costs of early action.

3. **Emissions from developing countries are currently unconstrained.** The Kyoto Protocol does not constrain carbon emissions in developing countries. Instead it seeks to encourage the transfer of carbon efficient technology from developed to developing nations through the Clean Development Mechanism and Joint Implementation Initiative. However, emissions from emerging economies are rapidly increasing and have the capacity to seriously undermine efforts in the developed world to reduce carbon emissions. China is already the world's second largest energy consumer; its emissions are growing at an average of 4.2% per annum and will exceed those of the U.S. by 2015[9]. Developing nations were effectively excluded from the reduction targets contained in the Kyoto Protocol. The developing nations successfully argued that in achieving its growth the developed world was responsible for 70% of the increase in atmospheric concentrations of CO_2 from pre-industrialised levels. The key issue is whether it is morally right to constrain growth in non-Annex 1 nations to protect the climate when growth in Annex 1 nations was achieved with no such constraints.

4. **No global emissions trading scheme exists for carbon.** The European Emissions Trading Scheme was initiated in 2005 as a vehicle for delivering emissions reductions so that the EU could meet its emissions reduction obligations as agreed under the Kyoto Protocol. It is the first mandatory carbon emissions trading scheme in the world. While many would argue that the first year of the EU ETS was not successful in reducing emissions as a result of some member states giving over-generous emissions allocations, it is nevertheless the first attempt at a mandatory framework to reduce emissions by carbon trading. Other countries are proposing similar schemes and recently California passed a law that aims to cut emissions by 25% by 2020 using a trading scheme. As yet, however, none of these schemes have been linked. Without such linkage, which requires a high level of international agreement, there will be potential for significant disparities in the price of carbon across different regions due to the different abatement options they face.

5. **The Federal Administration's doubts regarding the science of climate change.** The Federal Administration in the U.S. has claimed for some time that there were serious doubts over the reality of climate change being caused by human activity. This was one of the major factors in the Administration's decision to pull out of the Kyoto Protocol. This stance has shifted considerably in recent years.

Discussions of the policy to address climate change post Kyoto will affect the Electric Utility sector more than most. The Stern Review described how the Electric Utility sector has to reduce emissions by 60% in order to stabilise atmospheric concentrations of CO_2e at 550 parts per million by 2050, a figure that most scientists concur would limit the effects of climate change to those associated with a $2^{o}C$ rise in temperature.

The Review states, "Climate change is the greatest market failure the world has ever seen, and it interacts with other market imperfections. Three elements of policy are required for an effective global response. The first is the pricing of carbon, implemented through tax, trading or regulation. The second is policy to support innovation and the deployment of low-carbon technologies. And the third is action to remove barriers to energy efficiency, and to inform, educate and persuade individuals about what they can do to respond to climate change."

The question is, how much will this cost? Later in this report we look at the impact of applying the current cost of CO_2 emissions to Electric Utilities using a price for carbon emissions from the only existing formal market for carbon emissions – the EU Emissions Trading Scheme. These figures are by their very nature conservative – an average of €18.2 ($25.6) per tonne over 2005 – and are largely determined by the current allocation method for allowable emissions, abatement technology and the price differential of primary fuels such as coal and gas. The social cost of CO_2 is in fact considerably higher: the Stern Review estimates that the social cost of carbon emissions could be as much as US$85.

9 US Dept. of Energy/Energy Information Administration, June 2006

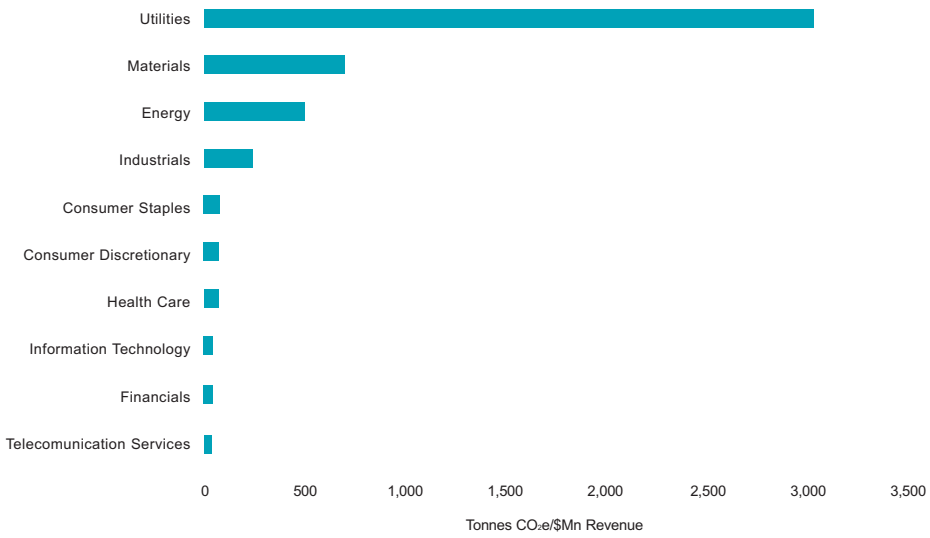
Clearly considerable uncertainty surrounds such figures. Theoretically society should encourage industry to reduce or abate their emissions as long as abatement costs are less than US$85. This will produce net economic benefit. However, marginal abatement costs rise as easy wins are taken up and at some stage abatement costs could move towards social damage costs. As a consequence, the analysis presented in this report may be considered as a conservative estimate in many cases.

It is clear, however, that the Electric Utility companies face increased costs but they also have a wide range of options available to them. This report describes the responses of the Electric Utility sector to the CDP survey.

3.1.1. Why Electric Utilities?

It is clear that the Electric Utility sector is a significant emitter of emissions globally. In order to establish this in the context of an investment universe, the carbon intensity of the Utilities sector was analysed in the MSCI All World Developed Index. Analysis of all the companies within the MSCI All World Developed Index was carried out in order to produce a ranking of the carbon intensity of different sectors (expressed as tonnes of carbon dioxide equivalents emitted per $ million of revenue). This shows how sensitive sectors are to measures designed either to control or place a price on carbon emissions. Given both the scale of emissions from this sector and the sensitivity of the companies within it to measures aimed at reducing them, it is easy to see why many investors are taking a keen interest in carbon risk among Electric Utilities. Other sectors have significantly less direct exposure to emissions regulation as they are far less carbon intensive. In addition, Electric Utilities require significant capital expenditures and long-term forward planning to manage installed capacity. As a consequence, it is more difficult and costly for these companies to adapt in the short and medium terms to policy decisions designed to control carbon emissions.

Figure 2. MSCI World Carbon Intensity



The Electric Utility sector is facing increasing regulatory pressure to reduce its emissions in many countries. As part of its commitment to the Kyoto Protocol the European Union launched the Emissions Trading Scheme in January 2005, which places caps on carbon emissions from key sectors including the Electric Utility sector (see Box 1, below). Similar trading schemes are under development in Canada, Australia and New Zealand, while Japan is closely monitoring the European model. The Environment Ministry in Japan established Japan's Voluntary Emissions Trading Scheme (J-VETS) in April 2006. In the U.S., the North-Eastern States and California are developing emissions trading schemes at a state level. The Governor of California, Arnold Schwarzenegger, has recently signed into law the Global Warming Solutions Act, which requires the state to reduce its emissions of GHGs to 1990 levels by 2020. This landmark legislation means the state will have to

Duke Energy

"Duke Energy ... believes that a mandatory, federal, economy-wide policy response - for example, a carbon tax - is preferable to this patchwork, as it would be less costly to society and more effective in managing greenhouse gas emissions,"

cut its emissions by the equivalent of around 174 million tonnes of carbon dioxide, or 25% of projected business-as-usual emissions for 2020. The Act authorises the California Air Resources Board, part of the Environmental Protection Agency, to implement "market-based compliance mechanisms". These could include "greenhouse gas emissions exchanges, banking, credits and other transactions", provided those approaches achieve the same GHG reductions as direct compliance. The GHG restrictions will take effect at the start of 2012, applying to utilities, refineries and industrial facilities. In addition, some U.S. utilities companies have taken public positions in support of a nationwide, mandatory, market-based policy to control carbon dioxide emissions. In a recent speech, Paul Anderson, Chief Executive Officer of Duke Energy, an Electric Utility and natural-gas pipeline company that ranks 86th in the Fortune 500, called for a federal tax to discourage emissions of carbon dioxide. Saying "there is no free lunch," Anderson warned business leaders that Americans may have to get used to paying more for energy in order to tackle global warming. Anderson complained that concern about climate change has led to a costly "patchwork" of local, state and regional policies. "Duke Energy ... believes that a mandatory, federal, economy-wide policy response - for example, a carbon tax - is preferable to this patchwork, as it would be less costly to society and more effective in managing greenhouse gas emissions," said a company policy statement that accompanied Anderson's speech. "A national approach would also be easier to integrate into a comprehensive global response, which the U.S. and other countries should continue to pursue." Other leaders agree: "We accept that the science on global warming is overwhelming," says John W. Rowe, Chairman and CEO of Exelon Corporation. "There should be mandatory carbon constraints."

Aside from emissions specific regulation, the sector is undergoing major structural changes in many parts of the world. Deregulation and increased competition will make it increasingly possible for customers to switch their suppliers more freely. Rising fossil fuel prices and concern with security of supply, increased demands for energy in all parts of the world, price hikes and public concerns over climate change make Electric Utility companies very sensitive to the issue of climate change and keen to demonstrate green credentials in publicity campaigns. In the UK, leading utility companies have asked for clarity on the policy position of the government citing concerns around capital investment stemming from regulatory uncertainty beyond the second phase of the EU ETS that ends in 2012. They argue that this uncertainty is preventing companies from making necessary long-term investment decisions. A large number of nuclear and coal-fired plants are reaching the end of their lives and will close in the next 10 years. E.ON estimated that its shortfall would be largest in 2009 and 2010 and is currently considering spending at least £1bn on two 800 megawatt coal-fired plants. These plants would be fitted with more efficient 'super-critical' boilers which increase the energy efficiency of coal-fired energy from 36% to 45%. However, coal-fired generation typically produces 40% more CO_2 than gas-fired generation and investment decisions are therefore highly influenced by future carbon price projections in Europe.

A similar situation exists in Germany where, according to research by WWF, two thirds of current generation capacity will have to be replaced by 2030. 57% of lignite plants and 49% of coal plants will be retired in the intervening period. Given the fact that these plants are amongst the most carbon intensive and given the uncertainty surrounding future policy decisions, which will have a large bearing on the market price of carbon allowances, power executives will face extremely difficult decisions over the next decade or so. Currently announced plans for replacement investments will result in more than 70% of that gap to be filled with CO_2 intensive coal based generation, which is detrimental to the CO_2 emissions reduction plans being discussed politically for the future.

The same applies in other geographies - the Electric Utility sector faces critical decisions. A crisis in capacity in the near term means that many companies need to make investments today that will last for up to 40 years. The carbon intensity of these investments will have to be carefully weighed against the evolving political situation in the next few decades.

Also, future near-term emissions are largely determined by existing installed capacity. Companies will have to make decisions about capital allocations: do they invest in reducing emissions from existing plants or commission new, cleaner plants that will replace the existing plants.

It should be noted that CO_2 credit prices had a significant influence on wholesale power prices in the first year of the EU ETS. The EU ETS was structured such that the participants were conferred an asset, in the form of an allowance of a certain proportion of their emissions with a small remainder to be acquired on the market if they emitted above that allowance. Several companies were successful at passing the cost of buying these extra allowances on to their customers. A recent report[10] has estimated that, in the UK alone, Electric Utilities made a profit of around $1.5 billion from the scheme. Many economists would argue that there is much to learn from this, and that perhaps a better method of allocation would be to auction allowances rather than gifting them.

BOX 1. THE EU-EMISSION TRADING SYSTEM (EU ETS)

The European Commission placed the EU ETS at the centre of the European policy response to reaching its Kyoto target of 8% reduction to the base year level of 1990. It is the largest company-level, multi-country, multi-sector emissions trading scheme in the world. It is a legally binding system (governed by the EU ETS Directive) designed to put EU member states on track over the period 2005 to 2007 to facilitate the transition to the Kyoto binding period 2008 to 2012. Phase 1 of the scheme operates from 2005-2007 and Phase 2 from 2008-2012. The EU sets a cap on the total amount of EU-wide CO_2 emissions and the overall target is translated into differentiated emission reductions or limitation targets for each Member State under the burden sharing agreement. Although all EU-25 member states are covered by the EU ETS the most stringent reductions will come from Germany (21%), Denmark (21%) and the UK (12.5%).

Governments in the EU will pursue different national strategies, which will then be reflected in their National Allocation Plans (NAPs). NAPs have to be drawn up for each trading period and have to be accepted by the EU Commission. Member States can meet their targets by allocating restricted emission allowances to the sectors and companies covered by the scheme. The NAPs define the emissions allowances provided to the sectors covered. The basic idea behind the trading scheme is that Member States limit emissions from the energy and industrial sectors through the allocation of allowances, thereby creating scarcity for carbon allowances, which will in turn foster the development of markets and a reduction of overall emissions. The intention of the instrument is to assure that those that cause emissions should be held liable for paying for the resulting costs to society, based on the "Polluter Pays Principle". In theory, this should result in a least cost abatement strategy, spur innovation for less carbon intensive technologies and ultimately lead to a socially optimal emission level. It is important to realise that the ETS, as it is designed currently, is a complex instrument. There are various levers and variables that impact on the eventual allocation of CO_2 allowances for a given plant and multiple optimisation opportunities exist to minimise the risk and value impact on the installation.

Being a market-based approach, at the heart of the ETS is the common trading currency of emission allowances (EUAs), which permits its owner to emit one tonne of CO_2. Installations with excess allowances can sell them or bank them for the future within the same phase in national registries but there is a strict separation between Phase 1 (2005-7) and Phase 2 (2008-12). After each year, installations must surrender a number of allowances equivalent to their verified CO_2 emissions in that year. Companies that are not able to produce enough allowances to cover their emissions will have to pay a fine of €40 per tonne in the first period and as much as €100 per tonne in the second trading period. In order to provide additional market liquidity and flexibility, the EU-Linking-Directive connects the EU-ETS with the CDM and JI mechanisms of the Kyoto Protocol.

10 IPA Consulting, 2006

4 Analysis of CDP4 Electric Utilities responses

The 265 largest publicly quoted Electric Utilities globally by market capitalisation were surveyed by the CDP in partnership with CalPERS and CalSTRS.

4 Analysis of CDP4 Utilities responses

4.1 Overview

The 265 largest publicly quoted Electric Utilities globally by market capitalisation were surveyed by the CDP in partnership with CalPERS and CalSTRS. Trucost was commissioned by WWF to analyse the responses. Of the 265 Electric Utilities surveyed 42% responded and a further 8% provided some information. Only 14% of companies had been included in previous Carbon Disclosure Project surveys, as a result the majority of the companies that responded this year were doing so for the first time. Over 16% of companies declined permission for responses to be publicly disclosed which is perhaps indicative of the commercial sensitivity of emissions data to this sector.

Inevitably, the overall quality of answers and the data supplied varied, with significant geographic bias. The highest proportion of responses came from Europe, representing 22% of companies surveyed, where 55% of companies responded. Although the response rates in Europe are high in a global context, the fact that the EU ETS requires participating companies to disclose actual emissions to the relevant regulatory authority, who are then required to publish it, means that companies cannot claim commercial confidence or data collection difficulties as reasons not to disclose; emissions data is already in the public domain. The response rates from companies domiciled in European countries that are bound by the EU ETS was 67%. Given the investment relevance of the trading scheme it is surprising that only two thirds of regulated companies were able to provide data to the CDP.

North America, which had the most number of companies surveyed (over a third), came second with 50% of companies responding to the survey. Response rates in other geographies varied. For example, 28% of Asian companies responded. This response rate is largely due to Japan, where all surveyed companies responded. Not a single Chinese Electric Utility, however, responded to the survey even though 32 were sent questionnaires. This lack of disclosure from utilities in a country that was responsible for 15% of global emissions in 2001 and where emissions are projected to reach 27% of global emissions by 2050 is of particular concern.

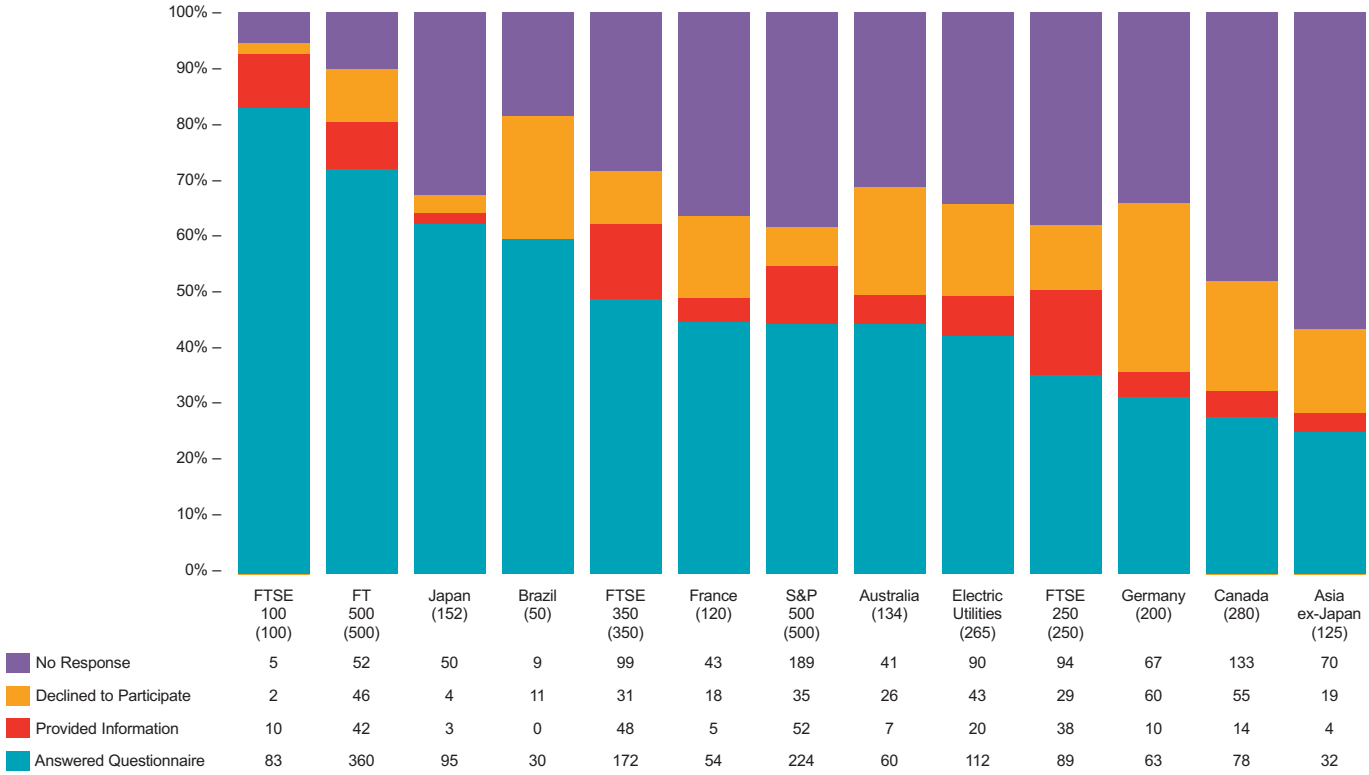
4.2 Responses to the CDP4 Electric Utilities questionnaire

4.2.1 Key Trends from CDP Geographic and Sector Expansions

The first three iterations of the CDP information request were sent to the FT500 companies but in 2006 the CDP4 process was expanded to more than 2,100 companies. This was made possible through 10 geographic expansions and one sector expansion in partnership with organisations around the world. In this section we give details of these partnerships, the headline results of other samples and just a few of the highlights they reveal. A report on each of the other samples is available for free download at www.cdproject.net/cdp4reports.asp

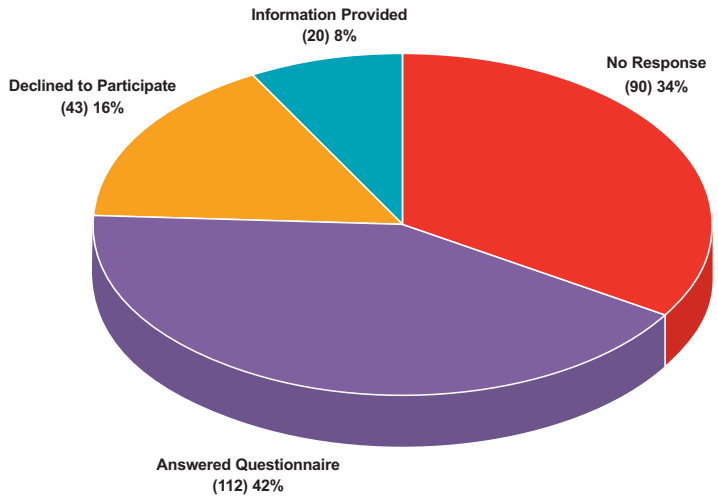
The responses to the CDP4 were analysed and classified into four types: Answered Questionnaire (AQ), Provided Information (IN), Declined to Participate (DP) and No Response (NR).

Figure 3. Global Overview: CDP4 Responses by Sample



Just over 42% of Electric Utilities responded to the CDP4 survey. Of all the samples, this response rate was 9th out of the 13 samples surveyed for CDP4. This response rate was low in comparison with the UK FTSE 100, where over 80% of companies answered the questionnaire. However, this has been the first time that most Electric Utility companies have been asked to respond to the CDP questionnaire, and this should be taken into account when considering the response rates.

Figure 4. CDP4 - Electricity Utility 265



4.2.2 Electric Utilities Response Rate

265 of the world's largest publicly quoted Electric Utility companies were surveyed for their climate change disclosures by CDP4. The companies surveyed came from 46 different countries including countries from North and South America, Europe, Asia and Oceania.

Overall, 42% of Electric Utility companies responded to the CDP4 questionnaire. The majority of companies, therefore, did not respond to the survey, and a significant proportion (16%) actively declined to participate. The reasons for this low response rate may include the following:

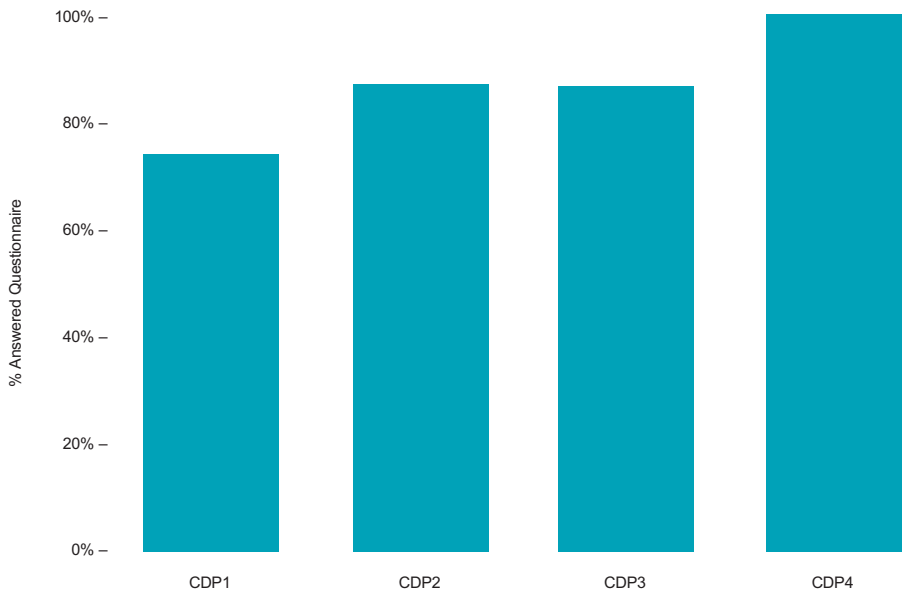
- For most companies (86%) this will have been the first time they have been asked to respond to the CDP, and as such will be unfamiliar with the Project as a whole.
- While the awareness of environmental issues has been rising, some companies will be in the first stages of considering their environmental impact, and the level of responses may be indicative of this.
- Although regulatory incentives to quantify and reduce environmental impacts are increasing, they vary considerably across geographical regions.
- In Europe and the U.S. a significant number of investors are actively engaging with both companies and their regulators to improve environmental reporting generally and carbon emissions data specifically. They have established organisations such as the Investor Network for Climate Risk (INCR) and the Institutional Investor Group for Climate Change (IIGCC) that aim to facilitate a more proactive approach to engaging with company management. In other geographies investor pressure is not so coordinated and the issue of climate change may not yet be perceived as an important investment driver.
- A number of companies included in the survey, in particular Chinese companies, have significant government ownership, with a limited free float. As a result, these companies may be less influenced by pressure from institutional investors to disclose their position regarding climate change.

Response rates from Electric Utility companies were low in comparison with other samples, with a significant number declining to participate. Most companies, however, were new to the CDP.

4.2.3 Historical Overview

Whilst the total number of responses from Electric Utilities to CDP4 was relatively low responses have been steadily increasing over time for those that have been previously surveyed by the CDP.

Figure 5. % of Answered Questionnaire over time for those Electric Utilities surveyed since CDP1

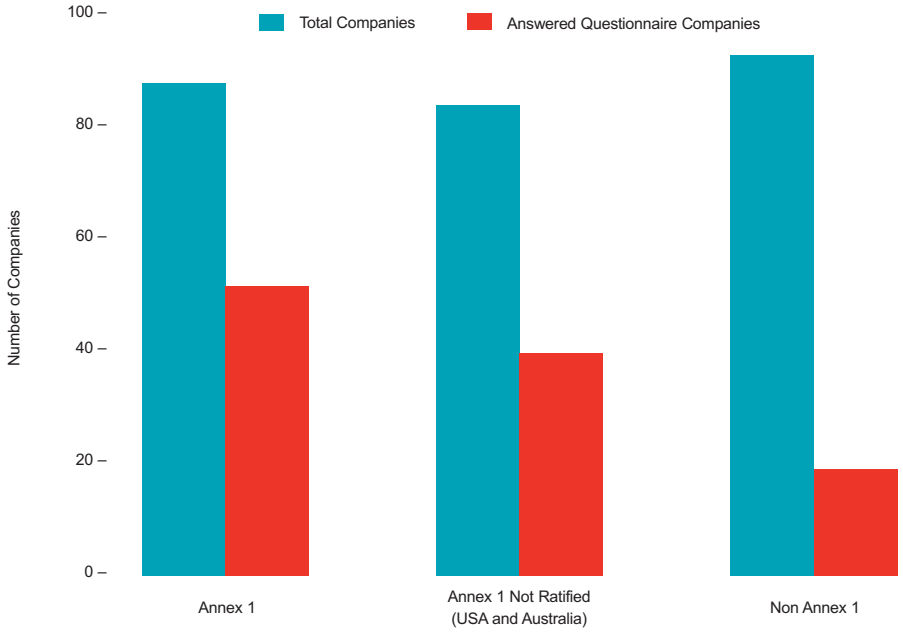


For the majority of companies this year was the first time that they had been surveyed: only 14% of companies had been included in previous CDP surveys. Of those companies that have been included in previous surveys, 96% of them responded this year, up from 71% of the Electric Utilities surveyed in the first year.

Most of this growth in the response rate over the last four years has been due to an increasing number of Asian utilities returning the questionnaire. This trend is an indication that Electric Utilities are increasingly willing to report on significant environmental issues such as climate change. Most importantly it demonstrates that the CDP becomes a more positive force towards disclosure over time; there is a cumulative effect. However, over 16% of Electric Utility companies declined to respond to the survey. It is easy to imagine that those companies which failed to respond might cite the commercial sensitivity of carbon emissions data as a reason. However if the data is commercially sensitive then it only underlines the legitimacy of institutional investor demands to gain access to it.

Almost all Electric Utilities that were surveyed in previous years answered the questionnaire for CDP4.

Figure 6. Effect of Kyoto Protocol



4.2.4 Regional Variation

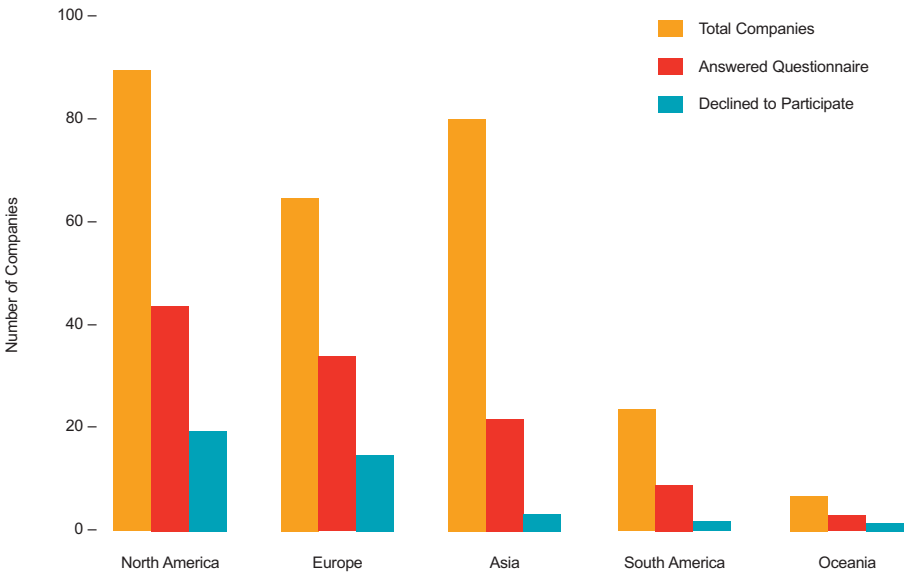
The 265 Electric Utilities represented 46 different countries including countries from North and South America, Europe, Asia and Oceania.

Response rates to CDP4 among Electric Utilities differentiate markedly between regions and the Kyoto Protocol may be playing a part in this. Over half of the companies (59%) in countries which are members under Annex 1 of the Kyoto Protocol responded to the questionnaire, while only 22% of companies surveyed from Non-Annex 1 countries responded.

Non-ratified Annex 1 countries, namely the U.S. and Australia, responded relatively well with 48% of the companies surveyed responding.

Whilst the largest number of companies surveyed came from North America, the highest proportion of responses came from Europe (52%). Investigating European responses more closely, companies based in EU25 countries, that is, companies which are most likely to have an obligation to comply with the EU ETS, have an even higher response rate: 67% of Electric Utility companies surveyed in the EU25 responded.

Figure 7. Electric Utilities 265 - Continental Overview



E.ON: The largest company in the sample

"E.ON has been dealing with climate protection for many years and we believe that climate change requirements must become part of everyday business. E.ON has therefore implemented many processes related to climate change (e.g. emissions trading procedures) within its operational activities."

This relatively high response rate can be attributed to the effect of the EU ETS on the sector and the scheme's requirement for participating companies to submit emissions data annually to a public register. Given that all companies governed by the EU ETS have an obligation to measure and report the emissions of their installations to their regulators this response rate could have been even higher. While companies in France, Italy, UK and Germany responded well, only one out of eight Swiss companies replied. Switzerland is not part of the EU ETS or the European Union and therefore Swiss companies are not obliged to monitor and record emissions. Switzerland was also one of only two countries (the other being the Philippines) from which the number of companies that declined to participate was greater than those that answered the questionnaire.

North America had the most number of companies surveyed (over a third), and nearly half (49%) of companies surveyed responded to the questionnaire. There is a growing awareness of the climate change issue in the U.S. and increasing pressure on U.S. companies to develop alternative sources of energy as a result of security concerns and high oil prices. Nearly a quarter of North American Electric Utilities, however, declined to participate.

Response rates in other geographies varied as well. Asian companies accounted for nearly a third of the sample of the Electric Utilities surveyed, with 28% of Asian companies responding. This response rate is largely attributable to Japan, where all surveyed companies responded. The 100% response rate of Japanese companies is likely to be due to the fact that Japan has taken an active role in implementing the Kyoto protocol and has a relatively sophisticated regulatory regime.

Most companies in the Asian region are based in China (32), yet not a single Chinese Electric Utility responded to the survey. This lack of disclosure from utilities in a country that is responsible for a large and growing proportion of global carbon emissions is of particular concern. China's CO_2 emissions are predicted to exceed those of the U.S. by 2015.[11] This lack of disclosure may be explained, in part, by the fact that Chinese Electric Utilities are most likely to have significant government ownership and therefore may be less influenced by pressure from institutional investors to disclose their respective positions regarding climate change. Also, only 7% of CDP signatories are Asian, which may also be a governing factor in the response rate of Asian utilities.

Proportionally Latin American companies responded well with 38% of companies responding. They represented 9% of the total companies surveyed.

Considerable variation in response rates between countries, with most responses coming from North America and Europe. All Japanese companies responded in contrast with Chinese companies, none of which disclosed information. The regulatory stance of particular governments, and in particular the European Emissions Trading Scheme, may be having an effect on disclosure.

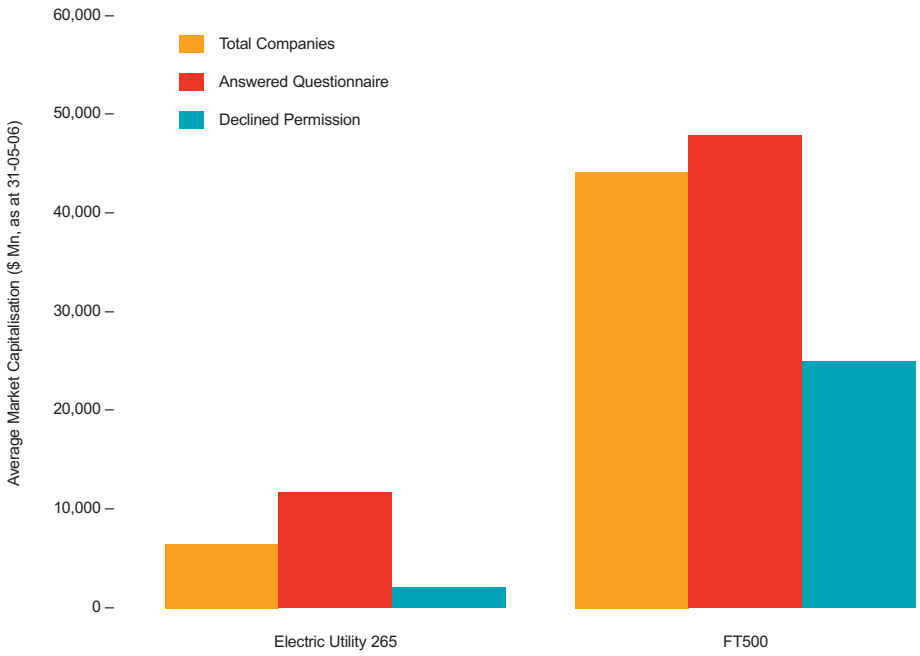
11 US Energy Information Administration/Department of Energy, International Energy Outlook 2006

4.2.5 Size Matters

Although regional differences could be attributed to regulatory differences, the size of companies also has an impact on how the questionnaires were answered and the type of the information that was supplied. Trucost identified that out of all the Electric Utilities surveyed those that provided a response to CDP4 were significantly larger than average, indicating that larger companies are more likely to describe their strategy regarding climate change and are probably more likely to have the resources to do so. However larger companies also face greater complexity collating data from numerous operations often in various geographies.

A similar trend was observed in the CDP4 survey of FT500 companies, where those that responded to the questionnaire were also larger than average. Companies that declined to participate were significantly smaller than average in both the Electric Utilities and the FT500 samples. This may be a result of lack of available internal resources or a consequence of less stakeholder pressure.

Figure 8. Response Rates by Market Capitalisation



4.3 Quantitative data responses

The responses were analysed to determine the level of quantification of carbon emissions by Electric Utility companies that responded to the CDP.

Disclosure of carbon dioxide emissions to the CDP should be compliant with the international GHG Protocol[12], developed and refined by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). The GHG Protocol identifies operational boundaries to distinguish between direct emissions (Scope 1) and indirect impacts (Scope 2 and 3) that arise from electricity and outsourced activities (see Box 2, below).

BOX 2. GHG PROTOCOL

The Greenhouse Gas Protocol Initiative (GHG Protocol) aims at harmonizing GHG accounting and reporting standards internationally by encouraging consistent approaches to GHG accounting. The development of these standards and corresponding tools has become increasingly relevant since the ratification of the Kyoto Protocol and the development of national, and other relevant GHG emissions trading schemes, both within and outside of the Kyoto framework.

It defines three "scopes" for reporting purposes with companies at least reporting, separately, on Scope 1 and 2.

Scope 1: Direct GHG emissions

Companies report GHG emissions from sources they own or control.

Scope 2: Electricity indirect GHG emissions

Companies report the emissions from the generation of purchased electricity that is consumed in its owned or controlled equipment or operations.

Scope 3: Other indirect GHG emissions

Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions. They occur from sources not owned or controlled by the company.

For more information, see www.ghgprotocol.org

Differing regulations and carbon emissions reporting standards between regions has led to inconsistent disclosures of quantitative carbon emission data. This combines with differing boundary interpretations, standardisation techniques and reporting requirements at a corporate level to make it very difficult to draw satisfactory comparisons and conclusions from quantitative emissions data where it was disclosed to the CDP4.

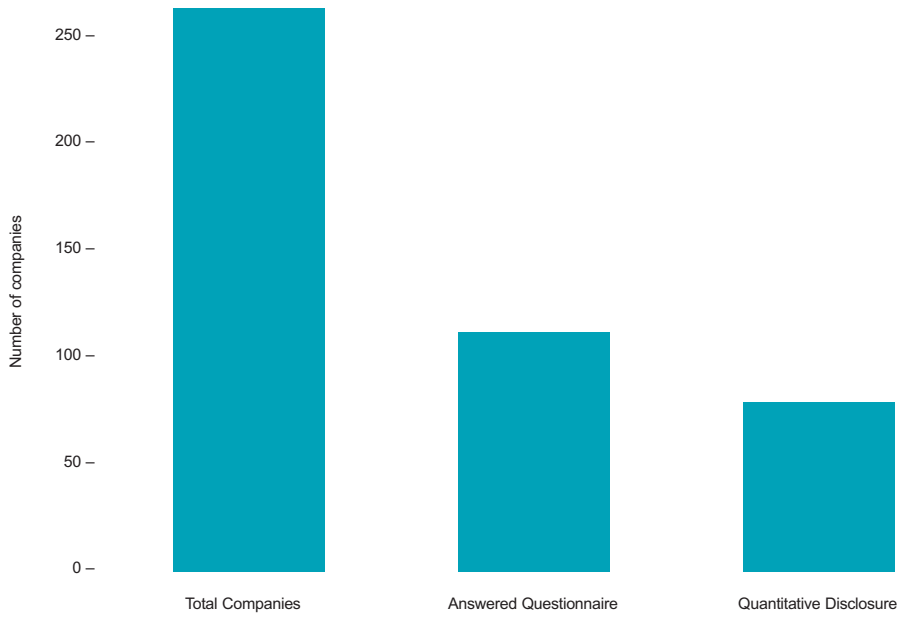
Out of the 112 companies which responded nearly 70% (78) supplied quantitative data. The majority of these disclosures came from companies from Kyoto Annex 1 countries, where 47% of companies surveyed provided quantitative data. Non-ratified Annex 1 countries (U.S. and Australia) responded relatively well, with over 35% of the companies surveyed providing data. Only 8% of non-Annex 1 companies provided any quantification of their emissions.

It should be noted, however, that the data has been extracted directly from the responses submitted to the CDP. In some cases the data provided may not necessarily be comparable. Companies may have different methods of measuring or calculating their emissions that can be a source of wide variation.

This analysis highlights the extent to which companies provided data. Companies also supplemented this data with qualitative comments, which is analysed in Section 4.4 in this report.

12 http://www.ghgprotocol.org

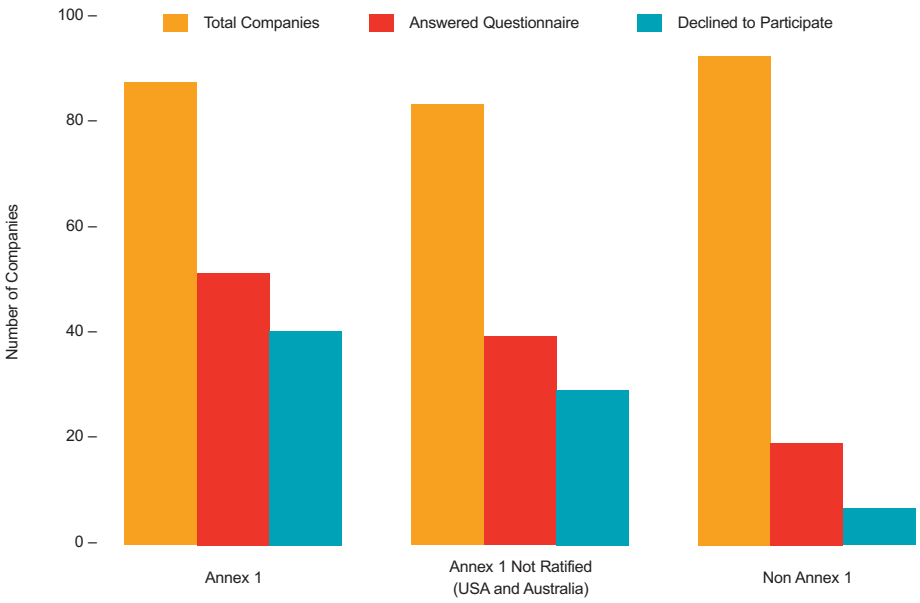
Figure 9. Electric Utility 265: Quantitative Disclosure



4.3.1 Regional Variation

Quantification also varied by region. Companies in the EU were most likely to provide emissions data; with 40% of EU companies surveyed providing it. This represents 60% of the companies that responded to the questionnaire, which is surprisingly low given the requirement for the vast majority of EU Electric Utility companies to measure and report emissions data to the EU ETS at an installation level. Over a third of North American companies also provided emissions data. More than three-quarters (77%) of Canadian companies that were surveyed reported quantitative data, whilst only 35% of U.S. utilities did so. In the remaining regions less than 20% of responding companies provided quantitative data, although 59% of Asian Electric Utilities that answered the questionnaire did provide emissions data. The majority of Asian companies that quantified their emissions were Japanese, with all Japanese companies providing emissions data, which reflects the success of voluntary schemes and regulatory requirements that promote corporate disclosure of environmental impacts in Japan.

Figure 10. Quantitative Disclosure, Kyoto Overview



Kansai Electric Power Co., Inc.
DISCLOSURE OF EMISSIONS. AREA: JAPAN

"In addition to CO_2 emissions associated with fuel combustion for generation, Kansai emits SF_6 gas used in the insulation of electrical equipment such as gas circuit breakers. Emissions of other gases are considered to be zero under the normal operation.

Annual emissions as of 2004

CO_2 : 51.6 $MtCO_2$
SF_6 : 2.1 tSF_6 (50,190 tCO_2e)

Since Kansai is a vertically integrated electric power company, reporting Scope1 and Scope2 separately is not suitable from the view point of double counting. CO_2 emissions consist of the following sources.

1 Emissions associated with own generation (Scope1)

2 Emissions associated with electricity purchased from outside suppliers and sold to end users (Scope3)

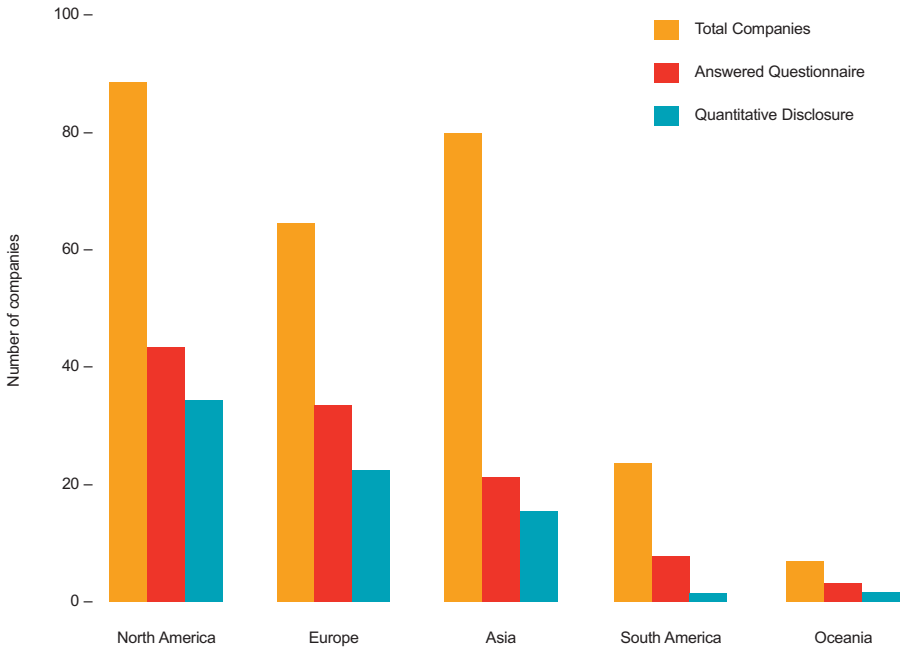
3 Emissions from interchanged power with other electric power companies and sold to end users (Scope3)

CO_2 emissions associated with vehicles of the company was 11,997 tCO_2 (Scope3). For reference, self consumption and distribution and transmission losses, which relates to Scope2 (indirect emissions), was 13,105 million kWh from which approx. 41$MtCO_2$ is estimated."

RWE AG: EU ETS Reporting

"RWE is subject to the EU ETS. The present NAP II proposals would cause an additional financial burden for RWE, but we regard it as a sustainable compromise. Legislation as from 2012 is still unclear. Having regard to the lively discussion on security of supply and competitiveness, we expect high efficiency coal-based power stations to continue to play a decisive role in the energy mix in Europe."

Figure 11. Electric Utility 265 - Regional Overview



4.3.2 Larger companies more likely to quantify

In general Electric Utilities that quantified their emissions were, on average, over twice the average size of those companies sampled. They were also over 20% larger on average than companies that answered the questionnaire. This trend may be an indicator of a greater ability among large multinational Electric Utilities to measure emissions across their operations. A similar market capitalisation bias exists in other less carbon-intensive sectors responding to the CDP4 survey of the FT500. In multinational conglomerates it is understandable that companies with greater resources globally would be able to dedicate more effort to measuring emissions. For Electric Utilities, however, most of their emissions are direct Scope 1 emissions; they can quantify the fuel input and understand the efficiency of their combustion processes, and have immobile long-lasting assets. All these factors mean that, in contrast with other business types, it should be easier for Electric Utilities to measure their emissions as these calculations are directly related to their core business. It is economically feasible and relevant for all Electric Utilities, regardless of their size, to measure their emissions.

This trend of larger companies reporting their emissions was most pronounced for European, Asian and North American companies, and in particular for companies within the EU. Interestingly, Asian Electric Utilities were smaller on average than North American companies for the entire sample but the Asian companies that answered the questionnaire and quantified their data were larger on average than North American companies; the market capitalisation bias amongst responding companies is more pronounced in Asia.

4.3.3 Carbon Efficiency

Trucost analysed the responses of those companies that did quantify their emissions. In order to calculate carbon intensity and compare companies, emissions were normalised to revenue, correct as of 31st May 2006.

Interestingly, companies in North America and Asia had significantly higher carbon intensity than those in Europe and those governed by the EU ETS. In Europe there has historically been a stronger emphasis on energy efficiency largely due to a lack of direct access to resources. European utilities have made significant investments to improve efficiency given the relatively high price they have to pay for fuel.

An alternative explanation is that electricity is more competitively priced in North America and Asia. However, comparing this measure of carbon intensity (tonnes CO_2e/$Mn Sales) with other measures of efficiency, such as CO_2e /kWh, produces similar geographic differences.

It should be noted, however, that companies can use many different methods to calculate emissions, which could produce differing results. Also, although every company should have reported according to the GHG protocol, companies can use different methods to define organisational and operational boundaries, which can significantly alter the carbon intensity.

Figure 12. Electric Utility 265 - Average Market Capitalisation

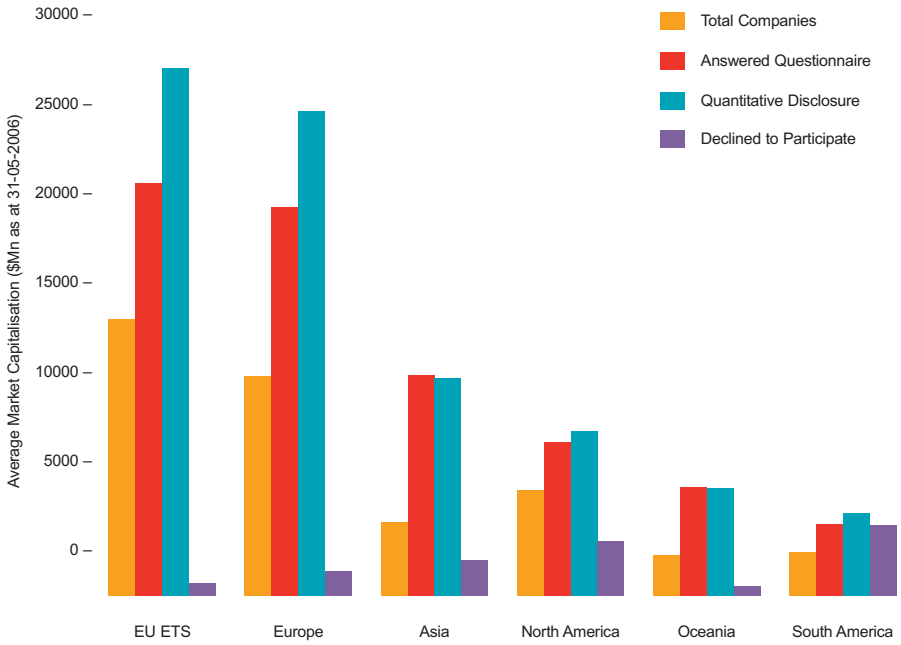
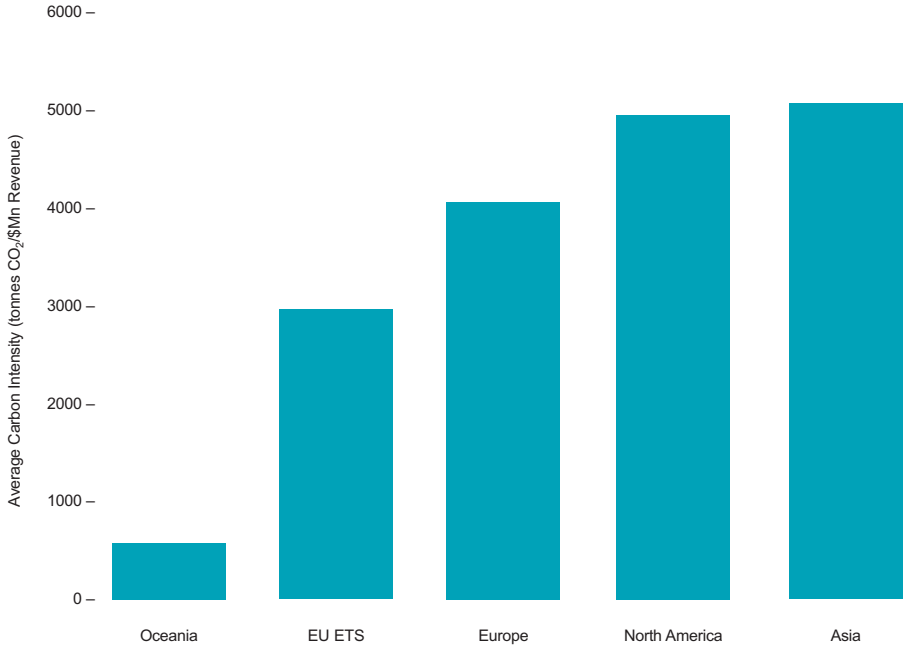
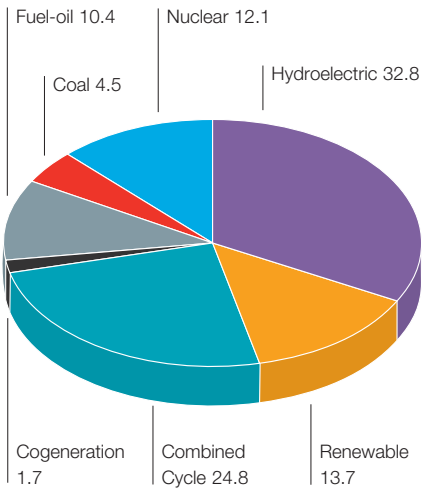


Figure 13. Average Carbon Intensity of Quantitative Disclosure Companies

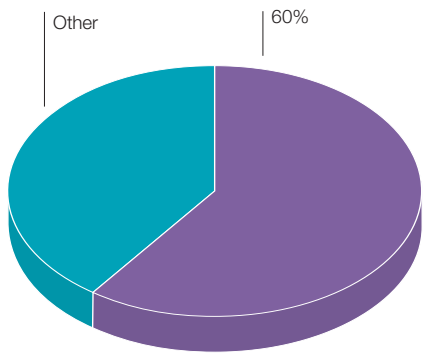


Just over half of the Electric Utilities that responded to CDP4 provided emissions data. Rates of quantification between regions varied considerably. Kyoto Annex 1 countries were most likely to report emissions data, with the majority of this reporting from companies in North America and Europe. All other regions had lower reporting level with the notable exception of Japan where all 11 companies responded and provided data. There appears to be a strong correlation between the regulatory regime and the level of quantification.

Iberdrola: Generation mix and efficiency



Gross production with no CO_2 in Spain



Takes into account production and emissions from IBERDOLA's power plants and those corresponding to the Company's percentage interest in cogeneration, combined cycle and nuclear power plants.

The difference in emissions intensity between companies in different regions is largely driven by two factors: the type of installed generation capacity and emissions regulations. Emissions are determined by the type of fuel used and the technology employed to consume the fuel. The table to the right summarises the different types of fuel typically used to generate electricity and their relative emissions, expressed in grams per kilowatt hour.

In general coal-fuelled plants are more carbon intensive than gas. The emissions of coal fuelled plants vary depending on the type of coal – lignite produces more emissions per unit than bituminous coal. Gas combinated technology reduces the CO_2 emissions/kWh when compared with standard gas thermal technology. Available clean coal technologies can make a significant contribution to containing the growth of CO_2 emissions. For example, advanced steam cycle or integrated gasification combined-cycle technology could raise the average efficiency of coal-fired power plants from 35% today to more than 50% by 2050[15]. There is, however, a physical limit to efficiency gains in coal combustion and it is likely that it will continue to be the most CO_2 intensive fuel.

Fuel Type[13]	gCO_2/kWh
Coal	950
Petroleum	893
Gas	599
Other Fuels[14]	625

In the U.S., 81%[16] of CO_2 emissions from electric power generation are a result of coal combustion. The generation mix of a selected sample of countries is presented below.

Country[17]	Renewable	Gas	Coal	Oil	Nuclear
France	12.0%		9.5%		78.0%
Germany	10.0%	11.0%	48.0%	5%	26.0%
Italy	25.0%		75.0%		
Spain	24.0%		76.0%		
Switzerland	55.3% *(hydro)*		4.7%	40.0%	
UK	7.0%	40.0%	33.0%	1.0%	19.0%
U.S.	9.0%		71.0%	20.0%	
Canada	58% *(hydro)*	6%	19%	3%	12%
Japan	11.0%	26.0%	25.0%	10.0%	29.0%
China	7.7% *(hydro)*	2.9%	73.2%	14.2%	2.0%
Brazil	84% *(hydro)*		7.4%		8.6%

13 Source: US Department of Energy/Environmental Protection Agency. Based on data from 1999. Note that there can be variation in the estimation of emissions that arise from a particular fuel type. For instance, other sources have a lower figure for emissions arising from gas-fuelled generators. This variation is due to differences in the efficiency of the process and the age of the generator. Data from one source only has been used in order to be consistent.

14 Other Fuels include municipal solid waste, tires, and other fuels that emit CO2 when burned to generate electricity

15 International Energy Agency

16 US Energy Information Administration

17 Ernst & Young, "The European Generation Mix", 2006; Association of Electricity Producers; Institute of Energy, Japan; Energy Brazil; Canadian Electricity Association.

The table below illustrates the variation in carbon intensity between a selected sample of countries and regions from United Nations data.

World Region[18]	gCO_2/kWh
World	540
Africa	663
Latin America	169
Asia excluding China	683
China	1007
Former USSR	1653
Middle East	616
OECD total	420
OECD North America	476
OECD Pacific	371
OECD Europe	362
Non-OECD Europe	912
Non-OECD total	792
European Union	349

Clearly, the European Union is less carbon intensive than North America and Asia, which correlates with the findings from the CDP sample or through trading schemes such as the EU ETS.

The table below analyses the effect that the Kyoto Protocol has had on the emissions efficiency of companies in the CDP sample compared with global statistics from the UN.

	265 Electric Utilities	*All Electric Utilities*
Kyoto Protocol	**Efficiency gCO_2/kWh**	**Efficiency gCO_2/kWh**
Annex-1	406	433
Non-Annex 1	544	720
Annex 1-NR	748	666

International Power: Regulatory uncertainty presents risk

"In the EU ETS uncertainty remains over CO_2 allocation levels in Phase II of the scheme, and this will not be resolved until the end of 2006. Beyond 2012, no decisions have yet been made on a successor to Kyoto or the EU ETS.

CO_2 prices in the EU ETS have been extremely volatile in the last two months following the uncoordinated release of 2005 emissions data and ensuing uncertainty as to how Member States will respond to what appears to be an over allocation of allowances. This volatility provides both trading risks and opportunities."

18 Data derived from "A manual for the preparers of eco-efficiency indicators", United Nations Conference on Trade and Development (UNCTAD), 2001.

Stern Review 2006

"Climate change is an externality with a difference. [It is] global, long-term, uncertain, potentially large and irreversible."

4.3.4 Economic Value Added and Environmental Externalities

The consulting firm Stern Stewart has popularised a measure of value added (EVA® or "economic value added") that incorporates the firm's cost of capital. This measure subtracts from the company's net operating profits after taxes an estimate of the cost of its capital stock, recognising that equity capital as well as debt and long-term leases has an economic cost. This measure uses the concept of the "weighted average cost of capital", dependent on the firm's asset structure and riskiness. EVA measures the company's financial surplus after accounting for the costs of the capital it has used in its operations. It is a widely accepted measure of a company's true economic value.

Industries produce two types of output; product and non-product. Many companies generate and discharge enormous amounts of waste, much of which pollutes the natural environment and imposes the cost of this damage on households and other enterprises. Economists call these damages "externalities" because their costs typically fall not on the firms that discharge the wastes but on those that suffer the damages. Consequently, accounting systems do not ascribe these costs to their sources or even quantify them systematically. "Climate change is an externality with a difference. [It is] global, long-term, uncertain, potentially large and irreversible."[19] External costs can become internalised by the introduction of legislation. In Europe, the introduction in 2005 of the EU Emissions Trading Scheme placed a price on emissions of carbon dioxide. The cost of emissions permits, which averaged approximately $22 per tonne of CO_2 in the first year, was responsible for up to 30%[20] of the recent steep increase in electricity prices in Europe.

External cost is a useful measure from several points of view. It can serve a company's management as a benchmark for tracking performance relative to peers or its own past performance. It can also serve as an external benchmark for investors concerned about the environmental performance of companies as well as their finances. Not least, it can serve as a measure of a company's environmental exposure and financial risk originating in its environmental performance. Over time, the trend is clearly that firms are increasingly being forced to internalise these environmental costs, either through stricter environmental regulations or through liability for damages caused to others.

Dr Robert Repetto[21] and Trucost have combined EVA with environmental external costs to produce a measure of true value added, "TRUEVA", that subtracts from the firm's operating surplus not only its costs of capital but also the environmental damages it imposes elsewhere in the economy. True value added recognises that a company produces not only useful products for which customers are willing to pay but also wastes and emissions which impose damages and which victims would pay to avoid. This measure, TRUEVA, is the first means of estimating the net economic contribution of industry on a company-by-company basis incorporating its environmental impact.

In order for Trucost to analyse the TRUEVA of the Electric Utilities in this study two types of data were required, firstly the companies needed to have disclosed quantitative information to CDP4 and secondly EVA data had to be available. Trucost, with the cooperation of EVA Dimensions, produced the TRUEVA measure for 25 of the 77 companies that reported emissions data to the CDP, focusing on U.S. and European utilities.[22] The external cost of CO_2 emissions is a matter of some debate, and as such valuations can vary considerably. There is, however, a proxy for the future cost of carbon for many companies – Europe has an emissions trading scheme that has placed a price on carbon emissions. The average price over the first year of the EU ETS was $22 per tonne of CO_2 emitted and this was used to produce the measure of TRUEVA for the selected sample of companies. The CO_2 emissions were disclosed to the CDP by the companies themselves.

19 Stern Review, 2006,http://www.british-embassy.de/pdf/stern_review_presentation.pdf

20 Implications of the EU Emissions Trading Scheme for the UK Power Generation Sector, IPA Energy Consulting, 2005

21 Professor of Economics and Sustainable Development, Yale School of Forestry and Environmental Sciences, Yale University.

22 EVA data was provided by Stern Stewart for US and European Electric Utilities.

The analysis indicates that, at this level of external cost per tonne of CO_2 emitted, only 6 of the 25 companies would have a positive TRUEVA. Remarkably, by this measure few Electric Utility companies were adding value to the economy. The damages they imposed exceeded the surpluses they generated, often by a large margin. American Electric Power, Electricite de France and the Southern Company, imposed net costs of $3.6, $3.3 and $2.7 billion respectively in 2004/5. American Electric Power and Southern Company are two very large, coal-based power generators. These companies must be regarded as quite exposed to future restrictions on greenhouse gas emissions. Electricite de France, whilst it has a relatively low level of emissions relative to sales (1650 tCO_2 /$Mn Sales) has a very low EVA of -$1,043 Mn, therefore resulting in a low TRUEVA measure.

This analysis used only Scope 1 emissions, which are emissions for which companies are directly responsible, because very few companies reported Scope 2 emissions, which are emissions from supplied electricity. This means that companies such as PG&E, which purchase and resell electricity from other generators, are flattered by this analysis.

Rank	Company Name	TRUEVA ($Mn)
1	AMERICAN ELECTRIC POWER	-3,556
2	ELECTRICITE DE FRANCE	-3,300
3	SOUTHERN CO	-2,667
4	SUEZ	-2,519
5	XCEL ENERGY INC	-1,697
6	RELIANT ENERGY INC	-1,516
7	PROGRESS ENERGY INC	-1,494
8	FPL GROUP INC	-1,190
9	EDP ENERGIAS DE PORTUGAL SA	-874
10	FIRSTENERGY CORP	-863
11	ENTERGY CORP	-720
12	PINNACLE WEST CAPITAL CORP	-668
13	TECO ENERGY INC	-467
14	PPL CORP	-460
15	SCOTTISH POWER PLC	-305
16	DPL INC	-283
17	PNM RESOURCES INC	-235
18	CONSOLIDATED EDISON INC	-134
19	IBERDROLA SA	-130
20	ACEA SPA	26
21	HERA SPA	32
22	FORTUM OYJ	122
23	EXELON CORP	225
24	ENEL SPA	228
25	PG&E CORP	404

American Electric Power:
EMISSIONS REDUCTION COMMITMENT

"Chicago Climate Exchange – As a founding member of the CCX, AEP committed to reduce or offset its greenhouse gas emissions a cumulative 10 percent over the 2003 to 2006 period below a baseline average of 1998 to 2001 emissions levels (167 million metric tons). Over the 2007 to 2010 period, AEP agreed to extend its CCX greenhouse gas reduction commitment. This extension commitment amounted to an additional cumulative 19.75 percent reduction. Through these commitments, AEP expects to reduce or offset a total of approximately 46 million metric tons of greenhouse gas emissions. AEP is already ahead of its reduction targets, having reduced 21 million metric tons during 2003 and 2004. AEP's initiatives to meet these goals include both on-system actions, such as plant efficiency improvements, and off-system projects, such as reforestation projects and the purchase of emission reduction credits."

PG&E: Non-carbon emitting generation

"When coupled with the company's generation from small hydroelectric facilities (less than 30 MW) and the renewable generation the company purchased to satisfy customers' needs (and the state's renewable portfolio standard requirements), approximately 56 percent of the electricity used to serve customers in 2005 came from non-emitting resources…It is important to recognise the contribution that these non-emitting resources make toward reducing the overall carbon intensity of the electric generating sector. Technologies used to support these power generation facilities continue to improve and become more cost-effective, and PG&E believes that such technologies provide for future opportunities."

4.3.5 U.S. Electric Utilities – A case study

As outlined in the introduction, the State of California now has binding targets for CO_2 emissions, with the aim of achieving a 25% reduction in emissions by 2020. The mechanisms employed to achieve these emissions reductions are likely to include the development of so-called 'Cap and Trade' schemes similar to the EU ETS. The GHG restrictions will take effect at the start of 2012, applying to utilities, refineries and industrial facilities.

The following case study analyses the impact of this type of legislation on U.S. Electric Utilities. Trucost modelled the effect of emissions reductions of 25%, compared to the emissions disclosed to the CDP this year. In the EU ETS, companies that cannot achieve emissions reductions have to purchase emission allowances from companies that can. Economic theory suggests that the price of emission allowances should equal the marginal abatement cost of carbon emissions. An attractive feature of 'Cap and Trade' schemes, such as the EU ETS, is that the market participants with the lowest marginal abatement costs are most incentivised to reduce emissions. In this way reductions in emissions are achieved at the lowest cost to the economy as a whole. It is generally accepted that the least expensive way of reducing CO_2 emissions is to increase gas-fired generation at the expense of coal-fired generation. For power generators with coal and gas capacity, the decision to do this depends on the relationship between coal and gas prices and the price of emission allowances – the carbon price. A higher coal price relative to the prevailing gas price will increase the incentive to switch fuels and decrease the marginal abatement cost. When marginal abatement costs are lower than the market price of carbon, power generators with the available capacity will make the switch and sell the surplus emission allowances to those that do not. With some exceptions, owing to fears that allocations of emissions allowances were over-generous, relative coal and gas prices have been a good indicator of the market price of allowances in the EU ETS.

The scenario modelled below illustrates the effect on companies that would have to purchase credits assuming that all players will have to achieve a 25% reduction in CO_2 emissions or purchase emissions allowances at the average price of emissions allowances in the first year of the EU ETS.[23]

The results demonstrate a considerable variation in the exposure of U.S. Electric Utilities to this type of legislation, given the assumptions. For the 23 companies analysed, the average exposure would be 2.62% of sales revenue per annum. Eleven companies would be more exposed than average. The most exposed companies include American Electric Power, DPL and Southern. Two of these companies also exhibited the lowest TRUEVA scores. It should be noted, however, that companies such as PG&E, who have very low levels of emissions relative to turnover, achieve this by purchasing and reselling electricity supplied by other generators. Clearly, the price they pay for this electricity will increase in the above scenario reflecting the carbon cost. One way of adjusting for this is to analyse Scope 2 emissions according to GHG Protocol which are emissions 'embedded' in supplied electricity. However, only five companies disclosed Scope 2 emissions to the CDP. PG&E disclosed scope 2 emissions amounting to 18 million tonnes which would increase the cost of a 25% reduction in carbon emissions to 0.89% of turnover from 0.03% when only direct Scope 1 emissions are considered.

The findings show that companies from North America and Asia were more carbon intensive than those from other regions, although different methods of reporting and calculation may have been applied by those companies reporting emissions data. However, the carbon intensities calculated from the CDP4 responses correlated strongly with the carbon intensities for different countries which were obtained from a different source. Only 6 of the 25 Electric Utilities sampled had a positive true economic value added (TRUEVA), and many U.S. Electric Utilities face significant costs if emissions trading occurs in the US.

23 Source: Point Carbon

Company	Emissions disclosed (tonnes)	Turnover ($Mn)	Carbon Intensity (tCO_2/$Mn)	Cost of carbon priced at $22.57 (EU ETS Average for 2005) in $Mn	Cost of 25% reduction at $22.57 ($Mn)	% of Turnover
U.S. Companies	845,641,147	8,448	4,643	830	207	2.62%

Company	Emissions disclosed (tonnes)	Turnover ($Mn)	Carbon Intensity (tCO_2/$Mn)	Cost of carbon priced at $22.57 (EU ETS Average for 2005) in $Mn	Cost of 25% reduction at $22.57 ($Mn)	% of Turnover
American Electric Power	146,464,960	12,111	12,094	3,306	826.43	6.82%
DPL Inc.	15,000,000	1,285	11,674	339	84.64	6.59%
Southern Company	137,000,000	13,554	10,108	3,092	773.02	5.70%
Pinnacle West Capital Corp	24,856,860	2,988	8,319	561	140.25	4.69%
Xcel Energy Inc.	63,993,950	9,625	6,648	1,444	361.09	3.75%
Progress Energy Inc	58,059,820	10,108	5,744	1,310	327.60	3.24%
Wisconsin Energy Corporation	21,000,000	3,816	5,504	474	118.49	3.11%
Reliant Energy Inc.	49,000,000	9,712	5,045	1,106	276.48	2.85%
TXU	50,000,000	10,437	4,791	1,129	282.13	2.70%
Teco Energy Inc	14,250,000	3,010	4,734	322	80.41	2.67%
PPL Corporation	29,029,910	6,219	4,668	655	163.80	2.63%
FPL Group	47,349,255	11,846	3,997	1,069	267.17	2.26%
FirstEnergy	45,359,808	11,989	3,783	1,024	255.94	2.13%
PNM Resources, Inc.	6,947,618	2,077	3,345	157	39.20	1.89%
Entergy Corp	32,295,775	10,106	3,196	729	182.23	1.80%
Nisource Inc	22,777,035	7,899	2,883	514	128.52	1.63%
Puget Energy Inc	5,771,509	2,573	2,243	130	32.57	1.27%
WPS Resources Corporation	13,904,081	6,963	1,997	314	78.45	1.13%
Public Service Enterprise Group	24,805,542	12,430	1,996	560	139.97	1.13%
AVISTA CORP	2,540,117	1,360	1,868	57	14.33	1.05%
Constellation Energy Group, Inc.	22,089,040	17,132	1,289	499	124.64	0.73%
Exelon	12,609,867	15,357	821	285	71.15	0.46%
PG & E	536,000	11,703	46	12	3.02	0.03%

EDF: Recognition of regulatory risks

"Today, there are too many uncertainties at this stage to produce financial elements which could only be based on hypotheses and forecasts marred by uncertainties. However, in strategic terms, the emergence of the carbon constraint such as described within the emission permit system, negotiable until 2012 in the European Union, has led the Group to consider its positioning to take the appropriate way for its future decisions."

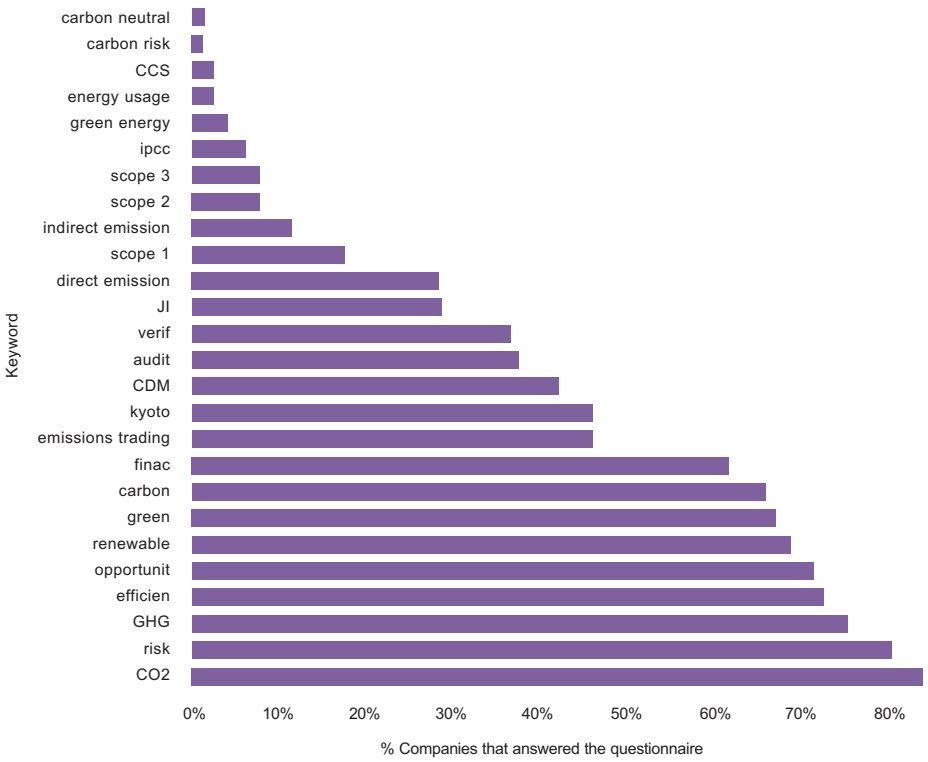
4.4 Qualitative analysis of responses

Trucost also examined the qualitative information provided to the Electric Utilities report by searching for keywords and examining these disclosures. Qualitative information is extremely useful when interpreting the attitude and strategy of companies with respect to future risks. However, qualitative information without supporting data does not allow for reliable comparisons to be made. The majority of companies in this sample, however, did not provide any data, thereby making a complete analysis of their performance and the risks and opportunities facing their businesses impossible.

This report categorises the types of qualitative disclosures companies are making to the CDP, primarily by analysing whether a defined keyword has been used and examining the context in which it is applied. Keywords were truncated in certain instances in order to capture variations of a particular word.

The most popular keywords were CO_2, risk and efficiency, with nearly all companies responding mentioning these words. Over two thirds of companies mentioned renewables. Less than half mentioned either the CDM or JI mechanisms for reducing emissions. An increasingly common concept, particularly in the UK, 'carbon neutral' is only mentioned 2% of the time.

Figure 13. % of Answered Questionniare companies using keywords



The term "GHG" was used in a variety of contexts. Most commonly it was used in relation to "regulation" to explain the legislative framework in which the company operates.

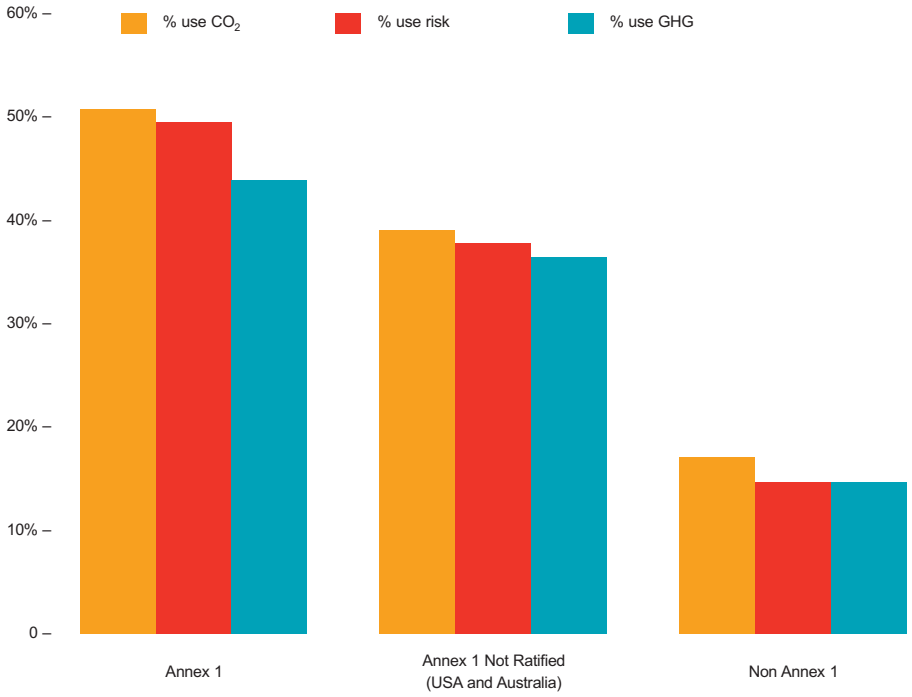
The word risk was used in combination with the following:

"regulation"
- uncertainty about future GHG directives;
- increasing cost of compliance;
- increasing cost of environmental protection;
- new taxes or caps;

"weather"
- modification in natural sources of energy (wind, water, biomass);
- modification of peaks of demand;
- extreme events (hurricanes, ice storms, droughts, flooding) that may damage facilities and hamper energy production.

"EU ETS"
- the price of carbon as a potential risk due to its volatility

Figure 14. Kyoto status against % companies using top three keywords



Companies in Annex 1 countries were more likely to report on the top three keywords, CO_2, risk and GHG.

International Power: EU ETS

"For existing regulation, IPR factors the cost of emissions credits into both investment decisions and operational analysis of IPR's existing assets. All investment decisions are made on the basis that future costs of environmental compliance will increase.

In Europe and the EU ETS, uncertainty remains over Phase II CO_2 allocations, the degree of harmonisation across Europe and whether member states who hold a surplus of credits in 2005 will take measures to tighten allocations in Phase II. However, for our merchant assets in the UK we expect the cost of carbon to be largely reflected in the price of power...These factors consequently make future investment decisions increasingly difficult as allocation levels, CO_2 costs and future legislation will have a significant impact upon long-term acquisition or greenfield projects."

4.4.1 Investment strategies

The responses were also examined for evidence that companies are anticipating costs associated with changes in carbon regulations or carbon markets and whether they are investing to take advantage of the opportunities that are presented in a carbon-constrained future. Extracts were taken directly from disclosures made to the CDP, where permission has been granted by the companies to do so.

Company	Investment	Description (excerpts from company disclosures to CDP4)	Turnover ($Mn)	Timeframe
American Electric Power	$1 billion	'In conjunction with the Department of Energy, AEP is leading a consortium to build "FutureGen," a $1billion research project that will build the world's first nearly emission-free plant to produce electricity and hydrogen from coal using IGCC technology while capturing and storing CO_2 in geologic formations.'	12,111	Not Specified
Australian Gas Light	$1.4 billion	'AGL's successful $1.4 billion acquisition of Southern Hydro (736MW), which has lifted the renewable (including hydro) proportion of our power generation portfolio to 41%.'	3,088	Ongoing
Central Eletrica Brasileira	$340,000	'ELETROSUL develops programs of energy efficiency and it intends to share the same ones with City Halls that are willing to form partnerships. They were already appraised biomass projects. For example:- Dejections Swine and sanitary embankments, with it burns off the methane and also as fuel for generation of energy. The company is beginning studies to reduce your emissions. The investment committed until now is about US$ 340.000,00.'	8,886	Ongoing
Chubu Electric Power	$35.2 million	'We have been making efforts to reduce CO_2 emission since about 1993 and set a target "to reduce CO_2 emissions per 1 kWh (CO_2 emission base unit) in FY2010 by 20% compared with FY1990". The amount of the investment of main project is as follows: World Bank Prototype Carbon Fund (PCF) $10 million, Japan Greenhouse Gas Reduction Fund (JGRF) $10 million, A.T. Biopower rice husk power project in Thailand $5.2 million, Global Asia Clean Energy Service Fund $10 million.'	19,902	Ongoing
EDP	€4.5 billion	'The EDP Group is currently implementing a strategy for mitigating climate change that involves the diversification of its generation portfolio and a commitment to renewable energy sources. One of EDP's goals is to reduce the carbon intensity of Iberian generation by 41 percent by 2012, compared to 2002, to 360 grams CO_2/kWh produced. By 2012, EDP plans to commission another 5,700 MW capacity, 49 percent of which will be from renewable sources and the other 51 percent in combined cycle gas power stations, which have cleaner technology than those that burn fossil fuels. EDP hopes by then to have around 2,400MW of installed wind capacity, 1,400MW of which in Portugal. This plan involves an investment of between EUR 4.5 - 5 billion and represents a 35 percent increase in generation capacity in the Iberian Peninsula. Achievement of some of these goals depends on factors beyond EDP's control.'	11,438	Near-term

Company	Investment	Description (excerpts from company disclosures to CDP4)	Turnover ($Mn)	Timeframe
ENEL	€1.7 billion	'Increasing the renewable energy capacity in which Enel is already a world leader with almost 20,000 MW installed capacity in Italy, Spain, Slovakia and America and experience in a wide range of technologies such as hydroelectric, geothermal, wind, solar and biomass. Enel has planned investments for 1.7 billion Euro in the next years. Unfortunately, investments are threatened by difficult authorization procedures and general opposition (wind in Italy) and by conflicts with other environmental policies (implementation of water framework directive may substantially reduce the amount of power generated from hydro plants).'	55,376	Near-term
Entergy	$14.8 million	'Entergy invested $14.8 million in Environmental Initiatives Funds to complete 61 internal emission reduction projects that will achieve 6.2 million tons of CO_2e reductions by 2010. The CO_2 emission reductions from internal projects resulted from investments in power plant efficiency improvements such as turbine upgrades and computerized control systems'.	10,106	Ongoing
E.ON	€6,2 billion	'Renewable energies play an increasingly important role within our energy mix. E.ON already has power plant capacities exceeding 6,500 MW in this area which accounted for some 10.8 percent of our power generation in 2005. Throughout the Group, E.ON will be channeling more than €5 billion into the expansion of renewable energies over the next 10 years. €1.2 billion has already been earmarked for specific projects up to 2008.'	61,292	€5 billion over the next 10 years, and €1.2 billion on projects up to 2008
First Energy	$50 million	'FirstEnergy's current operations are limited to the United States of America primarily in the states of Michigan, New Jersey, Ohio and Pennsylvania. FirstEnergy participates in numerous voluntary initiatives to limit GHG emissions in the U.S. Over the next five years, FirstEnergy expects to spend approximately $50 million on products, programs and activities that will help reduce greenhouse- gas (GHG) emissions or intensity and contribute to the development of technologies and solutions that help address climate change. This effort is in anticipation of future U.S. regulation.'	11,989	Over the next 5 years
Hera Spa	€200 million	'Hera has low emissions and does have a 3 year investment plan focused on the building of "environmental friendly plants". About 200 ml € investments are planned to further expand WTE capacity to further improve "clean electricity production" and reducing environmental impact of waste management through landfills. 4 WTE plants are already under construction.'	2,046	Over the next 3 years
Hokkaido	¥50 million	'In addition, we annually announce our investments in and expenses for measures to halt global warming in our environmental accounting reports. In FY2004, our total investments and expenses dedicated to preventing global warming were 50 million and 5.08 billion yen, respectively.	5,166	Near-term

Company	Investment	Description (excerpts from company disclosures to CDP4)	Turnover ($Mn)	Timeframe
Kansai	¥830 million	'Since fiscal 1999, Kansai has conducted environmental accounting and made the results public. Investment regarding measures against global environmental issues amounts to 730 millions yen in fiscal 2003 and 830 millions yen in fiscal 2004.'	22,268	In 2004
PG&E	$1 billion	'Energy efficiency. In 2005, the California Public Utilities Commission (CPUC) authorized Pacific Gas and Electric Company to invest $1 billion between 2006 and 2008 in energy-efficiency programs and initiatives that will help customers save money, avoid the release of greenhouse gases to the atmosphere, and promote the development and deployment of new energy-efficient technologies and processes. For example, in 2005 alone, PG&E reported life cycle savings of about 7 million MWh and approximately 3.6 million tons of avoided CO_2 from its energy efficiency programs.'	14,528	Between 2006-2008
RWE	€650 million	'Renewable energies. We are planning to invest up to € 650 million over the next five years to expand our use of renewable energies. We will increasingly build wind farms, particularly at coastal sites.'	47,893	Over the next 5 years
Scottish and Southern Energy	£510 million	'SSE is a major investor in the UK's energy infrastructure. During 2005/06 it invested over £500 million in projects designed to contribute towards the UK's key objectives of reliable and low carbon energy supplies. Our Objectives and Targets are aligned to set a reduction in our emissions on a yearly basis. Performance is recorded in our annual Corporate Responsibility Report. SSE is also investing around £10m in a project, with Talisman Energy UK, to deploy two 5MW demonstrator wind turbines in deep water in the Moray Firth. Subject to suitable weather conditions being available, the turbines will be deployed in the water during the summer of 2006 with electricity being generated from 2007. This will be a world first.'	14,035	2005-2006
TXU	$2 billion	'TXU has also committed to investing up to $2 billion U.S. in the development and commercialization of the next horizon of cleaner power plant technology, including integrated gasification combined cycle (IGCC) technology. TXU also is funding research pertaining to the reduction or removal of power plant emissions, including carbon dioxide.'	10,437	Ongoing
Union Fenosa	$134 million	'UNION FENOSA is leading CDM project development in Spain. The total investment in the 3 mentioned already registered project, as well as in La Joya Hydroelectric station, at the validation stage, which will start operation in 2nd quarter 2006 amounts to 125 MUSD. UNION FENOSA expects credits from CDM & JI projects to be at least a 7% of its emissions in 1990, which means 760,000 t CO2 per year along 2008-2012 period. UNION FENOSA is participating in Spanish Carbon Fund, with an amount of 7.19 M€, which is estimated to contribute to UNION FENOSA´s balance with 280,000 CER per year along 2008-2012 period.'	7,209	2006-2012

Only 21 of the 112 companies that responded to the questionnaire quantified the investments they are planning to make or have made. Given that investment decisions now will largely determine how well companies are positioned to adapt to increasing carbon costs it was disappointing that less than 20% of companies provided any figures.

In many cases it was impossible to compare information regarding carbon investment strategies. For example, it was often difficult to ascertain the following:

- What timeframe is the investment to be made over?
- Was it a business-as-usual investment (e.g. replacement of existing machinery) or was it an investment in low-carbon technology above that of the average in the marketplace?
- Was it a capital or operating expenditure?

Several companies did provide detailed descriptions regarding their investments, however, and this is to be welcomed.

5 Summary/Conclusions

The Electric Utility sector is the most carbon-intensive sector and it has significant exposure to future emissions regulation. It is increasingly important, therefore, for these companies to measure, manage, report, and reduce their greenhouse gas emissions.

5 Summary/Conclusions

The Electric Utility sector is the most carbon-intensive sector and it has significant exposure to future emissions regulation. It is increasingly important, therefore, for these companies to measure, manage, report, and reduce their greenhouse gas emissions. Further regulation for the industry in many regions seems inevitable, although the exact scope of many of these regulations is currently unclear. Business leaders are lobbying governments[23] to establish more certainty regarding future climate change regulations. Regulatory uncertainty in itself has a cost and regulations to control carbon emissions have the potential to have serious impacts on Electric Utilities' business models. Rapid regulatory shifts can have a substantial financial impact on industries that cannot adapt over short timeframes. This is especially relevant for the Electric Utility sector given the significant capital expenditures required for new installations and the long lifetimes of each installation. Electric Utilities have a pivotal role to play in the effort to reduce global GHG emissions and progress in the developed economies can easily be undermined by unsustainable growth in the developing world. This trade-off lies at the heart of post-Kyoto discussions.

The Electric Utilities Report highlights the fact that companies in more regulated regions are more likely to respond to the questionnaire. Most of the disclosures, however, were difficult to compare even though the CDP questionnaire specified the GHG Protocol as a common standard for reporting. Many companies discussed the risks and opportunities in some depth, but without further quantification and greater standardisation in measurement to improve comparability it will be hard to fully assess the climate change risks for global Electric Utilities.

Companies are coming under increasing investor demands for them to provide emissions data. Many companies in Europe and North America are devoting considerable resources to responding to those demands. In many cases, however, where they make detailed quantitative carbon disclosures those disclosures are often not adequate for investors to make meaningful comparisons. Companies that have successful strategies leading to reductions in carbon emissions when compared to output, value added or other economic yardsticks, are unable to demonstrate their success unequivocally in relation to their competitors in the absence of comparable, standardised measures. Concerned responsible investors will find it difficult to compare the environmental performance of companies when their reporting lacks emissions data. The absence of reliable data allows companies that choose not to institute policies and strategies to reduce their dependency on carbon emissions, to avoid investor criticism; it makes it difficult for markets to take account of carbon emissions within asset pricing.

The GHG Protocol defines a clear and internationally agreed means by which companies can measure, manage and report on their carbon emissions. Companies reporting according to the GHG Protocol will be able to demonstrate that they have used the appropriate process to assess risks, define boundaries, measure emissions and report on them in a way that is meaningful, consistent and comparable.

Investors often lack the necessary information to make informed decisions with respect to carbon emissions, despite the latter becoming a source of cost to companies in a significant proportion of the world. Given the global nature of many companies, and the global nature of the climate change problem, emissions disclosures need to display greater conformity. Companies emit carbon in order to create economic benefit for society, imposing an economic, albeit predominantly external, cost on that same society. The reporting of quantified emissions data is essential if these societal costs are to be compared to measures of economic benefit such as output or value-added.

The CDP provides a platform for Electric Utilities to report on the risks and opportunities facing the industry. It also provides an opportunity for companies to make meaningful disclosures to the investment community. This is the first sector-specific CDP report and the results indicate that the disclosures of companies surveyed in the past by the CDP have dramatically improved over time, which is encouraging. It is clear, however, that the disclosures of Electric Utility companies to the CDP will need to improve in the coming years if they are to become useful to institutional investors. Disclosure of emissions data should not be difficult: companies in this sector already have the means to measure their emissions and most are required to report these to local regulators.

23 For example, "Business leaders lobby Blair to set tougher targets on greenhouse gases", Financial Times, June 7th 2006.

6 Appendix

6 Appendix

6.1 List of companies

Company Name	Country	Kyoto Protocol	CDP4 Response
Aare Tessin AG fur Elektrizitat	Switzerland	Annex 1	No Response (NR)
Aboitiz Equity Ventures	Philippines	Non Annex 1	No Response (NR)
ACEA	Italy	Annex 1	Answered Questionnaire (AQ)
Acegas-Aps SpA	Italy	Annex 1	Declined To Participate (DP)
Actelios SpA	Italy	Annex 1	Answered Questionnaire (AQ)
AEM SpA	Italy	Annex 1	Answered Questionnaire (AQ)
AES Corporation	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
AK Enerji Electrik Uretim	Turkey	Annex 1	Information Provided (IN)
Aksu Enerji Ve Ticaret AS	Turkey	Annex 1	No Response (NR)
Alkane Energy plc	UK	Annex 1	Answered Questionnaire (AQ)
Allegheny Energy Corp.	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Allete Inc.	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Alliant Energy Corporation	USA	Annex 1 Not Ratified	Information Provided (IN)
Almendral SA	Chile	Non Annex 1	Declined To Participate (DP)
Ameren Corporation	USA	Annex 1 Not Ratified	Information Provided (IN)
American Electric Power	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
AQUILA INC DEL NEW	USA	Annex 1 Not Ratified	Information Provided (IN)
Arcadia Metal Industry C. Rokas SA	Greece	Annex 1	Declined To Participate (DP)
AS Arendals Fossekompani	Norway	Annex 1	No Response (NR)
Asia Power Corporation	Singapore	Non Annex 1	No Response (NR)
Atco Ltd	Canada	Annex 1	Information Provided (IN)
Atmos Energy Corp	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Australian Gas Light Co	Australia	Annex 1 Not Ratified	Answered Questionnaire (AQ)
AVISTA CORP	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Azienda Energetica Metropolitana Torino SpA	Italy	Annex 1	Declined To Participate (DP)
Azienda Mediterranea Gas Acqua Spa	Italy	Annex 1	Answered Questionnaire (AQ)
Banpu Public Co Ltd	Thailand	Non Annex 1	Answered Questionnaire (AQ)
Bashkirenergo AO	Russia	Annex 1	Declined To Participate (DP)
Beijing Jingneng Thermal Power Co. Ltd	China	Non Annex 1	No Response (NR)
BKW FMB Energie AG	Switzerland	Annex 1	No Response (NR)
Black Hills Corp	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Boralex Inc	Canada	Annex 1	Answered Questionnaire (AQ)
British Energy Group PLC	UK	Annex 1	Answered Questionnaire (AQ)
Budapesti Elektromos Muvek Rt	Hungary	Annex 1	Answered Questionnaire (AQ)
Calpine	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Canadian Hydro Developers, Inc.	Canada	Annex 1	Answered Questionnaire (AQ)
Cap Rock Energy Corp	Austria	Annex 1	Declined To Participate (DP)
Capex SA	Argentina	Non Annex 1	No Response (NR)
Caribbean Utilities Company	Cayman Islands	Non Annex 1	No Response (NR)

Company Name	Country	Kyoto Protocol	CDP4 Response
CEGEDEL Cie Grand Ducale d'Electricite du Luxembourg	Luxembourg	Annex 1	Declined To Participate (DP)
CEMIG CIA ENERG MG	Brazil	Non Annex 1	Declined To Participate (DP)
Centrais Elet Matogrossenses SA - CEMAT	Brazil	Non Annex 1	Answered Questionnaire (AQ)
Centrais Elétricas Brasileiras S/A ELETROBRAS	Brazil	Non Annex 1	Answered Questionnaire (AQ)
Centrais Eletricas de Santa Catarina SA CELESC	Brazil	Non Annex 1	Information Provided (IN)
Central Costanera SA	Argentina	Non Annex 1	No Response (NR)
Central Vermont Public Service Corp	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Centralschweizerische Kraftwerke AG	Switzerland	Annex 1	Declined To Participate (DP)
Centrica	UK	Annex 1	Answered Questionnaire (AQ)
CESC Ltd	India	Non Annex 1	Answered Questionnaire (AQ)
CEZ	Czech Republic	Annex 1	Answered Questionnaire (AQ)
CH Energy Group Inc	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Cheung Kong	Hong Kong	Non Annex 1	Answered Questionnaire (AQ)
China Power International Development Limited	Hong Kong	Non Annex 1	No Response (NR)
China Resources Power Holdings Company Ltd	Hong Kong	Non Annex 1	No Response (NR)
China Yangtze Power Co Ltd	China	Non Annex 1	No Response (NR)
Chongqing Jiulong Electric Power Co Ltd	China	Non Annex 1	No Response (NR)
Chubu Electric Power	Japan	Annex 1	Answered Questionnaire (AQ)
Chugoku Electric Power Co Inc, The	Japan	Annex 1	Answered Questionnaire (AQ)
Cia Energetica de Sao Paulo	Brazil	Non Annex 1	Answered Questionnaire (AQ)
Cia General de Electricidad SA	Chile	Non Annex 1	No Response (NR)
Cinergy Corp	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
CIR - Compagnie Industriali Riunite SPA	Italy	Annex 1	Answered Questionnaire (AQ)
Citic Pacific Ltd	Hong Kong	Non Annex 1	No Response (NR)
Cleco Corp	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
CLP Holdings	Hong Kong	Non Annex 1	Answered Questionnaire (AQ)
CMS Energy Corporation	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Colbun SA	Chile	Non Annex 1	No Response (NR)
Compagnie Vaudoise d'electricite	Switzerland	Annex 1	Declined To Participate (DP)
Consolidated Edison Inc	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Constellation Energy Group, Inc.	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Contact Energy Ltd	New Zealand	Annex 1	No Response (NR)
Copel Parana Energy	Brazil	Non Annex 1	Answered Questionnaire (AQ)
Covanta Energy Corp	USA	Annex 1 Not Ratified	No Response (NR)
CPFL Energia SA	Brazil	Non Annex 1	Answered Questionnaire (AQ)
CTCI Corp (Holdings)	Taiwan	Non Annex 1	No Response (NR)
Datang International Power Generation Company Ltd	China	Non Annex 1	No Response (NR)
Delmagyarorszagi Aramszolgaltato Rt	Hungary	Annex 1	Answered Questionnaire (AQ)
Dominion Resources	USA	Annex 1 Not Ratified	Information Provided (IN)
DPL Inc.	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
DTE Energy Co	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Duquesne Light Holdings Inc.	USA	Annex 1 Not Ratified	Information Provided (IN)
Dynegy Inc	USA	Annex 1 Not Ratified	Information Provided (IN)
E.ON	Germany	Annex 1	Answered Questionnaire (AQ)
Edegel S.A.A.	Peru	Non Annex 1	No Response (NR)
Edison International	USA	Annex 1 Not Ratified	Information Provided (IN)

Company Name	Country	Kyoto Protocol	CDP4 Response
Edison SpA	Italy	Annex 1	Information Provided (IN)
EDP - Energias de Portugal S.A.	Portugal	Annex 1	Answered Questionnaire (AQ)
El Paso Electric Company	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Electrabel - see Suez	Belgium	Annex 1	Answered Questionnaire (AQ)
Electric Power Development Co.	Japan	Annex 1	Answered Questionnaire (AQ)
Electricite de France	France	Annex 1	Answered Questionnaire (AQ)
Electricity Generating Public Co Ltd	Thailand	Non Annex 1	No Response (NR)
Elektrim SA	Poland	Annex 1	No Response (NR)
Elektrizitats Gesellschaft Laufenburg AG	Switzerland	Annex 1	Declined To Participate (DP)
Elektroprivreda Bosne i Hercegovine	Bosnia-Hertzegovinia	Non Annex 1	No Response (NR)
Eletropaulo Metropolitana Electricid	Brazil	Non Annex 1	Answered Questionnaire (AQ)
Emera Inc	Canada	Annex 1	Answered Questionnaire (AQ)
Empire District Electric Co	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Empresa de Distribucion Electrica de Lima Norte SA EDELNOR	Peru	Non Annex 1	No Response (NR)
Empresa Electrica de Iquique SA	Chile	Non Annex 1	No Response (NR)
Empresas EMEL SA (see PPL)	Chile	Non Annex 1	Answered Questionnaire (AQ)
Endesa	Spain	Annex 1	Answered Questionnaire (AQ)
ENEL	Italy	Annex 1	Answered Questionnaire (AQ)
Enerchina Holdings Ltd	Bermuda	Non Annex 1	No Response (NR)
Energie Baden-Württemberg	Germany	Annex 1	Answered Questionnaire (AQ)
Energie Ouest Suisse (Energie Electrique du Simplon SA)	Switzerland	Annex 1	Answered Questionnaire (AQ)
Energiedienst Holding AG	Germany	Annex 1	Declined To Participate (DP)
Energy Developments Ltd	Australia	Annex 1 Not Ratified	Declined To Participate (DP)
Energy East Corp.	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Enersis SA	Chile	Non Annex 1	No Response (NR)
Enertad	Italy	Annex 1	No Response (NR)
Entergy Corp	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Environmental Power Corp.	USA	Annex 1 Not Ratified	No Response (NR)
EPCOR - Edmonton Electric Lighting and Power Company	Canada	Annex 1	Answered Questionnaire (AQ)
Espirito Santo Centr.Eletr. S.A.-ESCELSA (IVEN SA)	Brazil	Non Annex 1	Answered Questionnaire (AQ)
Eszak-Magyarorszagi Aramszolgaltato Rt (EMASZ)	Hungary	Annex 1	Answered Questionnaire (AQ)
EVN AG	Austria	Annex 1	Answered Questionnaire (AQ)
Exelon	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
First Philippine Holdings Corp	Philippines	Non Annex 1	Declined To Participate (DP)
FirstEnergy	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Florida Public Utilities Company	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Fortis Inc	Canada	Annex 1	No Response (NR)
Fortum	Finland	Annex 1	Answered Questionnaire (AQ)
FPL Group	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Fujian Mindong Electric Power Company Ltd.	China	Non Annex 1	No Response (NR)
Gail LD	India	Non Annex 1	Declined To Participate (DP)
Gas Natural SDG	Spain	Annex 1	Answered Questionnaire (AQ)
GD Power Development Company Ltd	China	Non Annex 1	No Response (NR)
Great Plains Energy, Inc.	USA	Annex 1 Not Ratified	Information Provided (IN)
Green Mountain Power Corp	USA	Annex 1 Not Ratified	Information Provided (IN)

Company Name	Country	Kyoto Protocol	CDP4 Response
Guangdong Electric Power Development Company Ltd	China	Non Annex 1	No Response (NR)
Guangxi Guiguan Electric Power, Ltd.	China	Non Annex 1	No Response (NR)
Guangzhou Development Holding Company	China	Non Annex 1	No Response (NR)
Guangzhou Hengyun Enterprises Holdings Ltd	China	Non Annex 1	No Response (NR)
Gujarat Industries Power Company Limited	India	Non Annex 1	No Response (NR)
Guodian Changyuan Electric Power Company Ltd	China	Non Annex 1	No Response (NR)
Hafslund ASA	Norway	Annex 1	Declined To Participate (DP)
Harbin Shirble Electric Heat Co Ltd	China	Non Annex 1	No Response (NR)
Harpen AG	Germany	Annex 1	Answered Questionnaire (AQ)
Hawaiian Electric Industries	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Henan Yuneng Holdings Co., Ltd.	China	Non Annex 1	No Response (NR)
Hera SPA	Italy	Annex 1	Answered Questionnaire (AQ)
Hokkaido Electric Power Co Inc	Japan	Annex 1	Answered Questionnaire (AQ)
Hokuriku Electric Power Co Inc	Japan	Annex 1	Answered Questionnaire (AQ)
Hong Kong Electric Holdings Ltd	Hong Kong	Non Annex 1	Answered Questionnaire (AQ)
Huadian Energy Company Ltd	China	Non Annex 1	No Response (NR)
Huaneng Power International Inc	China	Non Annex 1	No Response (NR)
Hub Power Company Ltd.	Pakistan	Non Annex 1	Answered Questionnaire (AQ)
Hunan Huayin Elect Power	China	Non Annex 1	No Response (NR)
Iberdrola	Spain	Annex 1	Answered Questionnaire (AQ)
Idacorp Inc	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Inner Mongolia Mengdian Huaneng Thermal	China	Non Annex 1	No Response (NR)
International Power PLC	UK	Annex 1	Answered Questionnaire (AQ)
Irkutskenergo	Russia	Annex 1	Answered Questionnaire (AQ)
ITC holdings	USA	Annex 1 Not Ratified	No Response (NR)
Jersey Electricity Co Ltd, The	UK	Annex 1	Answered Questionnaire (AQ)
Jiangxi Ganneng Co., Ltd.	China	Non Annex 1	No Response (NR)
Jordan Electric Power	Jordan	Non Annex 1	No Response (NR)
Kansai Electric Power	Japan	Annex 1	Answered Questionnaire (AQ)
Karachi Electric Supply Corporation Limited	Pakistan	Non Annex 1	No Response (NR)
Keyspan Corporation	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Kohinoor Energy Limited	Pakistan	Non Annex 1	No Response (NR)
Korea Electric Power	South Korea	Non Annex 1	Answered Questionnaire (AQ)
Kyivenergo JSE	Ukraine	Annex 1	No Response (NR)
Kyushu Electric Power Co Inc	Japan	Annex 1	Answered Questionnaire (AQ)
Luz del Sur SA	Peru	Non Annex 1	No Response (NR)
Maine + Maritimes Corp	USA	Annex 1 Not Ratified	No Response (NR)
Mainova AG	Germany	Annex 1	No Response (NR)
Malakoff Bhd	Malaysia	Non Annex 1	Declined To Participate (DP)
Manila Electric Co	Philippines	Non Annex 1	Declined To Participate (DP)
MDU Resources Group Inc	USA	Annex 1 Not Ratified	Declined To Participate (DP)
MGE Energy Inc.	USA	Annex 1 Not Ratified	Information Provided (IN)
Mid American Energy Holdings	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Minera Valparaiso S.A.	Chile	Non Annex 1	No Response (NR)
Mirant Corporation	USA	Annex 1 Not Ratified	Information Provided (IN)
Motor Columbus AG	Switzerland	Annex 1	Declined To Participate (DP)

Company Name	Country	Kyoto Protocol	CDP4 Response
Nesa AS	Denmark	Annex 1	Declined To Participate (DP)
Nisource Inc	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Northeast Utilities Inc	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Northwestern Corp	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Novera Energy Ltd	Australia	Annex 1 Not Ratified	Answered Questionnaire (AQ)
NRG Energy Inc	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Nstar	USA	Annex 1 Not Ratified	No Response (NR)
Oesterreichische Elektrizitatswirtschafts Verbundgesellschaft AG	Austria	Annex 1	Answered Questionnaire (AQ)
OGE Energy Corp	USA	Annex 1 Not Ratified	No Response (NR)
OJSC Novosibirskenergo	Russia	Annex 1	No Response (NR)
Okinawa Electric Power Co Inc	Japan	Annex 1	Answered Questionnaire (AQ)
Oneok Inc. New	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Origin Energy Ltd	Australia	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Ormat Technologies Inc	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Otter Tail Corporation	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Pacific Hydro Ltd	Australia	Annex 1 Not Ratified	Declined To Participate (DP)
Pepco Holdings, Inc.	USA	Annex 1 Not Ratified	Information Provided (IN)
PG & E	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Pinnacle West Capital Corp	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
PNM Resources, Inc.	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
PPL Corporation	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Progress Energy Inc	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Public Power Corp SA	Greece	Annex 1	No Response (NR)
Public Service Enterprise Group	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Puget Energy Inc	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Qatar Electricity & Water Company	Qatar	Non Annex 1	Answered Questionnaire (AQ)
Raetia Energie AG	Switzerland	Annex 1	Declined To Participate (DP)
Ratchaburi Electricity Generating Holdings Public Company Ltd	Thailand	Non Annex 1	Answered Questionnaire (AQ)
Reliance Energy Ltd	India	Non Annex 1	No Response (NR)
Reliant Energy Inc.	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
RWE	Germany	Annex 1	Answered Questionnaire (AQ)
Sahacogen (Chonburi) Pcl	Thailand	Non Annex 1	No Response (NR)
Sarawak Enterprise Corporation Bhd	Malaysia	Non Annex 1	No Response (NR)
Saudi Electricity	Saudi Arabia	Non Annex 1	Answered Questionnaire (AQ)
Scana Corp	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Scottish & Southern Energy	UK	Annex 1	Answered Questionnaire (AQ)
Scottish Power	UK	Annex 1	Answered Questionnaire (AQ)
SDIC Huajing Power Holdings Co., Ltd.	China	Non Annex 1	No Response (NR)
Semapa Sociedade de Investimento e Gestao SGPS SA	Portugal	Annex 1	Declined To Participate (DP)
Sempra Energy	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Shanghai Electric Power Company Ltd	China	Non Annex 1	No Response (NR)
Shantou Electric Power Development Co., Ltd.	China	Non Annex 1	No Response (NR)
Shanxi Top Energy Co., Ltd.	China	Non Annex 1	No Response (NR)
Shanxi Zhangze Electric Power Co. Ltd.	China	Non Annex 1	No Response (NR)
Shenergy Company Limited	China	Non Annex 1	No Response (NR)

Company Name	Country	Kyoto Protocol	CDP4 Response
Shenzhen Energy Investment Co., Ltd.	China	Non Annex 1	No Response (NR)
Shenzhen Nanshan Power Station Co Ltd	China	Non Annex 1	No Response (NR)
Sherritt International Corp	Canada	Annex 1	Answered Questionnaire (AQ)
Shijiazhuang Dongfang Thermoelectric Company Limited	China	Non Annex 1	No Response (NR)
Shikoku Electric Power Co Inc	Japan	Annex 1	Answered Questionnaire (AQ)
Sichuan Minjiang Hydropower Co Ltd	China	Non Annex 1	No Response (NR)
Sierra Pacific Resources	USA	Annex 1 Not Ratified	Declined To Participate (DP)
Southern Company	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Suez	France	Annex 1	Answered Questionnaire (AQ)
Taiwan Cogeneration Corporation	Taiwan	Non Annex 1	No Response (NR)
Tata Power Co	India	Non Annex 1	No Response (NR)
Tatenergo	Russia	Annex 1	No Response (NR)
Teco Energy Inc	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Tenaga Nasional Bhd	Malaysia	Non Annex 1	Answered Questionnaire (AQ)
Tepco (Tokyo Electric Power Company)	Japan	Annex 1	Answered Questionnaire (AQ)
Terna	Italy	Annex 1	Information Provided (IN)
Tianjin Binhai Energy Development Company Limited	China	Non Annex 1	No Response (NR)
Tohoku Electric Power Co Inc	Japan	Annex 1	Answered Questionnaire (AQ)
Torrent Power AEC Ltd	India	Non Annex 1	No Response (NR)
Tractebel Energia SA - see Suez	Brazil	Non Annex 1	Answered Questionnaire (AQ)
TransAlta Corp	Canada	Annex 1	Answered Questionnaire (AQ)
TransCanada	Canada	Annex 1	Answered Questionnaire (AQ)
Transmissao Paulista	Brazil	Non Annex 1	No Response (NR)
TrustPower Ltd	New Zealand	Annex 1	Information Provided (IN)
TXU	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
UGI Corporation	USA	Annex 1 Not Ratified	No Response (NR)
UIL Holdings Corporation	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Unified Energy System	Russia	Annex 1	No Response (NR)
Union Fenosa SA	Spain	Annex 1	Answered Questionnaire (AQ)
Unisource Energy Corp	USA	Annex 1 Not Ratified	Information Provided (IN)
United Power Company	Oman	Non Annex 1	No Response (NR)
Unitil Corp	USA	Annex 1 Not Ratified	Declined To Participate (DP)
US Energy Systems	USA	Annex 1 Not Ratified	No Response (NR)
Vectren Corp	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Viridian Group PLC	UK	Annex 1	Information Provided (IN)
Westar Energy, Inc.	USA	Annex 1 Not Ratified	No Response (NR)
Wing Shan International Limited	Hong Kong	Non Annex 1	No Response (NR)
Wisconsin Energy Corporation	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
WPS Resources Corporation	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Xcel Energy Inc.	USA	Annex 1 Not Ratified	Answered Questionnaire (AQ)
Xinjiang Tianfu Thermoelectric Co Ltd	China	Non Annex 1	No Response (NR)
YTL Corporation Bhd	Malaysia	Non Annex 1	No Response (NR)
Zhejiang Southeast Electric Power Co Ltd	China	Non Annex 1	No Response (NR)
Zhenghou Coal Industry & Electric Power Company Ltd	China	Non Annex 1	No Response (NR)

6.2 About WWF

The WWF is one of the largest conservation organisations in the world with a full-time climate change programme in over 30 countries. The climate change work focuses on the most carbon intensive industry, the power sector, and aims to clarify risks and threats from the business-as-usual reliance on fossil fuels and to develop innovative and sustainable longterm solutions. Corporations from various sectors do partner with WWF in achieving those aims.

The financial services industry is increasingly affected by climate change and WWF has worked with several institutions to mitigate their exposure. WWF has been supporting the Carbon Disclosure Project over many years now in the UK and was involved with financial services companies in developing their climate change strategies.

In Germany WWF supported the national expansion of the CDP and the first ever German report, and has comitted its support to this work until 2009 together with the BVI (Association of Investment & Asset Management Companies in Germany).

Other multinational financial services companies like HSBC and Allianz Group are engaged in ongoing cooperation or joined projects on climate change, e.g. the Allianz-Group and WWF developed a publication in 2005, “Climate Change and the Financial Sector: an Agenda for Action” and most recently with a U.S. focus “Climate change and Insurance: An Agenda for Action for the United States”.

Germany: www.wwf.de
International: www.panda.org

6.3 About Trucost

Trucost Plc is an environmental research organisation, which helps companies and investors understand the environmental impacts of business activities in financial terms. Trucost offers expert advice and research to major corporations, both public and private, institutional investors and to Government departments and associated agencies. Trucost researched and wrote the environmental reporting guidelines for UK business with the UK government, released in January 2006.

Over the past six years Trucost has built a database of the environmental impacts and disclosures of over 3,200 companies. Trucost has developed considerable experience and expertise in the area of environmental performance, analysis and reporting, working with leading multinational companies in a range of business sectors including Avis, Bloomsbury, Christian Salvesen, Prudential, LogicaCMG, Legal & General and Land Securities Plc.

Institutional investors use Trucost’s research to support due diligence and active engagement activities by incorporating environmental performance measurement into their investment decisions. Clients include Hermes, Henderson Global Investors, Fortis and Merrill Lynch Investment Managers. Institutional investors also use the information to assess the environmental footprint of their portfolios, to highlight poor performers and to better understand where environmental risk lies in their portfolios.

www.trucost.com

6.4 About CalPERS and CalSTRS

CalPERS: CalPERS is the nation’s largest public pension fund with assets totaling more than $225 billion. The System provides retirement and health benefits to approximately 1.5 million State and local public employees and their families.

www.calpers.ca.gov.

CalSTRS: With a $156 billion investment portfolio, the California State Teachers’ Retirement System is the second-largest public pension fund in the United States. It provides retirement, disability and survivor benefits to California’s 776,000 public school educators from kindergarten through community college.

www.CalSTRS.com.

6.5 CDP4 Questionnaire

The following was sent to each company in the sample:

This is the fourth CDP information request (CDP4). Please state the dates of reporting periods, and if reporting emissions for the first time, please provide data for the last four measurement periods, where available. For previous respondents, please highlight developments and trends since CDP3. The following pages provide guidance on answering the questionnaire and further information about CDP4.

1. General: How does climate change represent commercial risks and/or opportunities for your company?
2. Regulation: What are the financial and strategic impacts on your company of existing regulation of GHG emissions, and what do you estimate to be the impact of proposed future regulation?
3. Physical risks: How are your operations affected by extreme weather events, changes in weather patterns, rising temperatures, sea level rise and other related phenomena both now and in the future? What actions are you taking to adapt to these risks, and what are the associated financial implications?
4. Innovation: What technologies, products, processes or services has your company developed, or is developing, in response to climate change?
5. Responsibility: Who at board level has specific responsibility for climate change related issues and who manages your company's climate change strategies? How do you communicate the risks and opportunities from GHG emissions and climate change in your annual report and other communications channels?
6. *Emissions*: What is the quantity in tonnes CO_2e of annual emissions of the six main GHG's produced by your owned and controlled facilities in the following areas, listing data by country?

- Globally.
- Annex B countries of the Kyoto Protocol.
- EU Emissions Trading Scheme.

To assist in comparing responses please state which methodology you are using for calculating emissions and the boundaries selected for emissions reporting. Please standardise your response data to be consistent with the accounting approach employed by the GHG Protocol (www.ghgprotocol.org). Please list GHG Protocol scope 1, 2 and 3 emissions equivalent showing full details of the sources. How has this data been audited and/or externally verified?

7. Products and services: What are your estimated emissions in tonnes CO_2e associated with the following areas and please explain the calculation methodology employed.

- Use and disposal of your products and services?
- Your supply chain?

8. Emissions reduction: What is your firm's current emissions reduction strategy? How much investment have you committed to its implementation, what are the costs/profits, what are your emissions reduction targets and time-frames to achieve them? Explain to what extent current and future emissions reductions involve a change of use in existing assets (i.e. fuel switching at existing facilities) or a need for new investment? What percentage of your revenue is derived from renewable generation in a government sponsored price support mechanism?
9. Emissions trading: What is your firm's strategy for, and expected cost/profit from, trading in the EU Emissions Trading Scheme, CDM/JI projects and other trading systems, where relevant?
10. Energy costs: What are the total costs of your energy consumption, e.g. fossil fuels and electric power? Please quantify the potential impact on profitability from changes in energy prices and consumption.

6.6 Responses from other samples

Asia (Ex Japan)

Partner: Association for Sustainable and Responsible Investment in Asia (ASrIA)

Although climate change is an issue that Asian corporate leaders recognize, most are struggling to reconcile carbon risks with strategic business models in an environment where investors are generally not addressing the issue and government mandates are rare. National government approaches to climate change vary across the region and in general appear to lack teeth. With the exception of Singapore, none have imposed reduction targets. At the multilateral level, in early 2006 Ministers from Australia, China, India, Japan, Republic of Korea and the United States officially launched the Asia-Pacific Partnership on Clean Development and Climate (AP6) and agreed a charter and work plan that outlines a model of private-public taskforces to develop immediate and medium-term actions on climate change by mid 2006. This will be a closely watched event with tangible progress dependent upon a willingness to move beyond aspirational targets.

Of the responding companies 45% were first-time respondents having been included in the CDP for the first time. For those companies included in CDP previously, we are seeing a general improvement in quality of responses and increasing recognition of carbon management as a material business issue. Companies leading in this respect tend to be multinationals with recognized global brand names. Two thirds of responding companies disclosed that they were undertaking or planning to undertake initiatives to reduce carbon emissions, however initiatives varied significantly in substance. Far fewer—23% of respondents—were able to commit to reduction targets.

Australia and New Zealand

Partner: Investor Group on Climate Change (IGCC) Australia and New Zealand

The Australian and New Zealand governments have an evolving regulatory response to climate change. Australia has not ratified the Kyoto Protocol and takes a predominately voluntary approach to emissions reduction at the Federal level. Programs such as the Greenhouse Challenge and the new Energy Efficiency Opportunity Bill provide frameworks for companies to measure, reduce and report energy use and greenhouse emissions. At the State level in Australia, there are some forms of emissions trading and a multi-jurisdictional taskforce has been established to develop a national emissions trading scheme by 2010. While New Zealand has ratified the Kyoto Protocol they are yet to decide their policy response, abandoning their proposed carbon tax at the last election.

Of the companies that completed the CDP4 questionnaire, 93 percent indicated that climate change related issues were of relevance to their business, and 64 percent identified specific risks and/or opportunities. While 80 percent of respondents recognized the importance of establishing management accountabilities in relation to climate change-related issues, only 33 percent demonstrated that they had clear accountabilities within their organization for both the strategic (board-level) and operational management of climate change-related issues.

Brazil

Partner: ABN AMRO and ABRAPP, project managed by Fabrica Ethica

The Brazilian Government has been playing a pro-active and key role in the UNFCCC negotiations. The Clean Development Mechanism (CDM), for example, arose from an original Brazilian proposal and the country is one of the leaders of the G77 and China Group. Brazil has no GHG emissions reductions targets in the first commitment period of the Kyoto Protocol and this gives a special meaning to Brazilian companies´ wide participation into CDP4. The country sees enormous competitive advantages in a future low-carbon economy (renewable energies; bio-fuels; others), and believes it can significantly contribute to mitigating climate change.

The most important challenge for Brazilian companies is to internalize climate change policies into their sustainability strategies and better understand the impact of carbon on competitiveness and long-term financial performance. Few Brazilian companies have corporate GHG inventories currently and their CDP4 responses seldom include GHG emissions definite data, representing just the first step of a learn-by-doing exercise.

Canada

Partner: Conference Board of Canada

Changes to regulatory frameworks, emissions-trading markets and increased investor interest in environmental performance are combining to change the climate change landscape in Canada. In the spring of 2005, the Government of Canada announced a new climate change plan, 'Project Green.' A key element of the plan was a 'Large Final Emitter' system that would regulate the GHG emissions of nine energy intensive industries. Against the backdrop of domestic GHG emissions that have continued to increase and are now 35% above 1990 levels, the spring of 2006 saw the newly elected federal Conservative government announce its intention to replace Project Green with a 'Made in Canada' climate change plan. Canada's status within the Kyoto Protocol framework is currently uncertain, and alternative options such as the Asia-Pacific Clean Technology Partnership and the G8+5 initiative are under consideration.

81 per cent of the Canadian companies that responded to the CDP information request indicated that climate change poses business risks or opportunities. In Canada disclosure goes hand-in-hand with equity market capitalization. Nearly two-thirds of the Top 50 companies responded, and close to half of the Top 100 responded.

France

Partner: Axa and ADEME

France is strongly committed to implementing measures against climate change. Its Kyoto target is relatively low (a stabilization of emissions between 1990 and 2008-2012) because of the importance of nuclear power plants in its electrical production system. In 2004, French emissions were 0.4% below the 1990 baseline. The French government also decided to set a high level target for 2050: the reduction of greenhouse gases (GHG) emissions by 75% ("Factor 4").

The 2005 Climate Action Plan and Law on Energy set new targets and means for energy efficiency and the development of renewable energy. While the large industry is covered by the EU Emission Trading Scheme, France launched an Energy Efficiency Scheme ("white certificates") in 2005, set new technical regulations for the building sector and increased its fiscal measures for households and SME's. New financial mechanisms including domestic GHG emission reduction projects are being developed.

FT500 Global Companies

CDP Secretariat

National public policy approaches to climate change vary significantly across regions. In general, Europe has developed

the most sophisticated climate change strategy, which is highlighted by the EU ETS. Largely as a result of the growth in the EU ETS over the past year, the amount of carbon traded globally increased 44-fold between 2004 and 2005. Many countries facing mandatory emission reduction obligations under the Kyoto Protocol are struggling to meet their targets: the largest "gaps" appear to be in Canada, Italy and Spain. Continued state-level developments in the United States suggest that the country, despite having pulled out of the Kyoto Protocol, is moving toward GHG regulation. Among the more notable developments, the State of California announced an agreement with Britain in August 2006 to develop a market-based framework to reduce GHG's.

CDP4 generated the highest ever response rate from the FT500 sample, 72% (n 358) of FT500 companies responded to CDP4. This compares to 71% in CDP3, 59% in CDP2 and 47% in CDP1. Companies in CDP4 reported 3,343,618,288 tonnes of GHG emissions, more than 10% of global GHG emissions, up from 2,994,834,887 tonnes in CDP3. Over 80% of these emissions are being released by just four industrial sectors: Electric Utilities – International; Electric Power – North America; Integrated Oil & Gas; and Metals & Mining and Steel. The total GHG emissions reported to the CDP increased over 70% from 2001 to 2005.

Germany

Partner: BVI

Germany has taken significant steps to address the issue of climate change. By 2003, Germany had reduced its greenhouse gas emissions by 18.5% (compared with 1990) approaching it's goal of a 21% reduction during the period 2008-2012. The country has enacted renewable energy legislation and participates in the EU Emissions Trading Scheme. The government recently published a scientific study on the expected climatic impacts in Germany. Furthermore, the German government has committed to reduce greenhouse gas emissions by 40% (compared with 1990) by 2020, provided that EU Member States agree to a 30% reduction of European emissions over the same period.

Almost two-thirds of responding companies reported some form of emissions data. However, the data often was not aligned with accepted reporting methodologies. Two-thirds of respondents are already employing low carbon technologies. Some leading companies have undertaken a range of reduction initiatives, with the cost versus benefit ratios demonstrating that reducing emissions often correlates with saving money.

Japan

Partner: (ASrIA) and the CDP Secretariat Japan

In Japan companies with significant emissions from operations or transport have been legally bound to report their GHG emissions since April 1, 2006. The Japanese Ministry of the Environment set up a voluntary emissions trading scheme in 2006 and the Japanese government began purchasing Kyoto mechanism credits through NEDO, New Energy and Industrial Technology Development Organization, this year.

Outside of Europe, Japan has the highest response rate to the CDP4 questionnaire demonstrating a reasonable understanding of the importance of climate change for Japanese business. Many responses report the development and take up of energy saving technologies in both processes and products along with significant purchases of GHG emissions rights.

UK

Partner: Department for Environment, Food and Rural Affairs (Defra), UK Climate Impacts Programme (UKCIP) and Trucost Plc

The UK's continued commitment to tackling climate change and achieving its emissions reduction target of a 20% reduction on 1990 levels by 2010 was further addressed by Government through the launch of 'Climate Change: The UK Programme' (CCUKP) in March 2006. The launch of the CCUKP was preceded by two important international climate policy developments; the UK hosted G8 summit in July 2005 and the 11th Conference of the Parties and first Meeting of the Parties of the UNFCC in Montreal in November. A significant focus of the latter event was the effectiveness of market based trading schemes to cut carbon by global industry. Recent decisions by EU governments to offer lax allocations to industry for the next phase of the EU Emissions Trading Scheme continue to cause debate over whether such schemes will achieve meaningful reductions.

The FTSE100 is the highest responding of all CDP samples, whilst the FTSE250 lag their larger competitors. 10% of the FTSE100 reported that they considered the impacts of climate changes to pose a high risk for their business operations. Despite increasing realisation of climate risks, the majority of FTSE350 companies are not treating this as a priority in their risk management strategies and most fail to quantify their emissions.

U.S.

Partner: Calvert Group and the Investor Network on Climate Risk (INCR)

2006 may have been a tipping point in U.S. public and corporate perception of climate change. Many prominent leaders in the U.S. business community now recognize that climate change will result in physical, regulatory, competitive and reputational risks for their firms along with substantial market opportunities. The vice chairman of Merrill Lynch recently declared, "We are conducting an enormous chemical experiment with potentially huge consequences for our environment, for our economies, and for human life". Goldman Sachs agrees: "We believe climate change is one of the most significant environmental challenges of the 21st century and is linked to other important issues such as economic growth and development, poverty alleviation, access to clean water, and adequate energy supplies." In addition to new commitments such as General Electric's Ecomagination (which expects $20 billion in sales of clean energy products by 2010), companies are calling for U.S. government action on climate change to provide regulatory certainty for companies whose global competitiveness may be at risk because of a lack of clarity and leadership from the federal government.

Trends in U.S. corporate climate change disclosure have improved and this is demonstrated by CDP both through companies receiving the questionnaire for the first time and those that have been in CDP previously. This year sees the highest ever response rate from U.S. companies to CDP.

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