Best Practices in Climate Change Risk Analysis for the Electric Power Sector

The Results of the Ceres Electric Power / Investor Dialogue

Prepared by
David Gardiner & Associates, LLC

October 2006

Ceres
A Ceres Report

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About Ceres

This report was commissioned by Ceres, a national coalition of investors, environmental groups, and other public interest organizations working with companies to address sustainability challenges such as climate change. Ceres also directs the Investor Network on Climate Risk, a group of 50 institutional investors from the U.S., Europe, and Canada who collectively manage nearly $4 trillion of assets.

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Sponsored by grants from the Pew Charitable Trusts and the Surdna Foundation. The opinions expressed in this report are those of the authors and do no necessarily reflect the views of the sponsors.

Table of Contents

Introduction

Findings from many of the world's leading scientists are raising awareness and driving action among leaders in government, business, and financial community about climate change. Globally, government leaders have adopted the Kyoto Protocol to reduce the emissions that cause climate change, while here in the United States, state governments have taken the lead in reducing emissions. Business leaders, especially in the electricity sector, are increasingly recognizing that future limits on greenhouse gases are inevitable, and will profoundly change the way in which society uses and produces energy. And investors are becoming increasingly concerned about the physical and regulatory risks that climate change may present to their portfolios. Some have pressed companies for increased disclosure and persuaded companies and investors that the risks and opportunities posed by climate change deserve serious attention.

Ceres launched the Electric Power/Investor Dialogue in 2002 to bring together diverse interests to consider climate change and encourage proactive action to address it in the electric power sector. During the first phase of the Dialogue, participants developed a set of key findings and recommendations. In June 2003, eight electric power companies, nine investment funds, two investment advisory firms, and five major public interest and environmental groups concurred with the recommendations. The group recommended that investors, government policymakers, electric companies, and environmental and consumer groups should:

- Actively Engage in the Climate Change Issue
- Quantify and Analyze Climate Change Financial Risk
- Create a National Climate Change Program
- Transform the Market for Clean Energy Technologies

To follow through on these recommendations, Ceres initiated a second phase of the Dialogue, which has focused particularly on the second of these goals—How to Quantify and Analyze Climate Change Financial Risk. This report presents the findings and recommendations of that work, and reviews the current state of best practices in climate risk analysis. The purpose of the report is to expand understanding and use of these best practices so that electric companies, their investors, and the public can better identify and address climate risk.

Bringing together leaders from industry, the investment community, and the environmental community is the hallmark of our work at Ceres, and the Electric Power/Investor Dialogue epitomizes the power of engaging a group with different perspectives. The participants in this Dialogue—a diverse group of energy, financial, and environmental leaders—contributed their time, their expertise, and hard work to develop this report and key findings and recommendations. This project is successful because of their efforts. On behalf of the entire Ceres family, I extend our sincere thanks and appreciation to all of them.

In addition, David Gardiner, president of the environmental consulting firm of David Gardiner & Associates, facilitated the Dialogue with the able assistance of his colleague, Lisa Jacobson. Along with Ceres' Director of Electric Power Programs, Dan Bakal, they steered the project to successful completion and have authored this report. We thank them for their wonderful efforts.

Sincerely yours,

Mindy Lubber
President
Ceres

Executive Summary, Key Findings, and Recommendations

This report summarizes the results of the second phase of Ceres Electric Power/Investor Dialogue—a collaborative effort of energy, environmental, and financial experts regarding global climate change. The report summarizes best practices in climate risk analysis for the electricity sector, and, with input from the participants in the Dialogue, recommends steps that investors, financial analysts, and companies can take to conduct and improve analysis of climate risk.

A few reasons Electric Companies must view climate change as a risk:

- High exposure to GHG emissions regulations
- Transmission efficiency may be affected by climate change
- Material increases in operating costs; coal to gas switching may be required
- Potential climate-change related damage to facilities; higher maintenance costs
- Premature retirement of physical stock not fully depreciated
- Changing seasonal electricity demand patterns
- Pressure to increase end-user rates
- More emphasis on renewable/ clean power; Renewable Portfolio Standard requirements

— Carbon Disclosure Project

This report is based on the discussion in the Dialogue, which focused on the risks that future climate change regulations pose to the electricity industry. The trend toward regulation of carbon dioxide (CO_2)—the primary contributor to global warming—is clear. The Kyoto Protocol is taking effect internationally, some states are already regulating CO_2 from electric utilities (Massachusetts, New Hampshire, Oregon, Washington), and others are considering it. Regional efforts are also being developed. Seven northeastern states (Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont) have agreed to a Regional Greenhouse Gas Initiative (RGGI) to cap and trade CO_2 emissions from the electric power sector. California, Oregon, and Washington are working on a similar region-wide approach to limit greenhouse gases.

At the federal level, the question is no longer if carbon will be regulated, but *when*, and *how*. In February 2006, Senators Domenici (R-NM) and Bingaman (D-NM) produced a white paper titled *Design Elements of a Mandatory Market-Based Greenhouse Gas Regulatory System*, and have called upon companies, NGO's, and civil society to engage with Congress on this issue.

Pending regulation of carbon dioxide and of air pollutants poses significant financial risks for the electricity sector and its investors. Electricity production is the source of 40% of U.S. and 10% of worldwide CO_2 emissions.[1] In its recent report to stakeholders, American Electric Power (AEP) said "Among the most significant economic drivers for coal-based generators are current and future environmental policies, particularly air quality policies and programs." A company's fuel mix and market conditions (especially between regulated and deregulated service territories) create wide disparity between risks for each company. Previous analysis of climate risk for electric power companies had found that:

- AEP estimates that compliance with the current Clear Air Act requirements would cost AEP $3.5 billion through 2010, and a total of $5 billion through 2020. This would have a Net Present Value of $2.6 billion, and that the proposed McCain-Lieberman climate legislation would cost at an additional NPV value of $0.5 to $0.9 billion
- The Southern Company estimates that a moderate scenario for controlling greenhouse gases would cost it or its customers $780 million annually.
- In Europe, where controls on greenhouse gases from electric power companies are already starting, CO_2 has been trading for approximately €15–29 per metric ton since February 2005.[2]
- The financial impacts of air quality and climate change regulations could be material. This is highly dependent on the company structure and on the outcome of potential legislation.
- Bernstein Research[3] estimates that greenhouse gas regulation is likely within the next 5 years and that companies with high-carbon fuel mixes that have not prepared for future costs of carbon emissions could see losses of 24%—83% of EBITDA, and more prepared companies with less polluting fuel mixes could see gains of 4%—139% of EBITDA.

- Citigroup[4] analysts expect greenhouse gas regulation by 2012, evaluated a range of scenarios, and concluded that the electric power companies could face significant costs or gain depending upon the specifics of the legislation and its implementation.
- Analysts from JPMorgan[4A] anticipate federal greenhouse gas regulation after the next presidential election, that the costs could be material, and that the regulatory uncertainty poses challenges for analysts and corporations.

Electric companies that take positive and proactive measures to address global warming may also capture significant benefits for shareholders, such as reducing shareholder exposure to higher regulatory costs. While some companies are finding that the benefits to making voluntary GHG reductions are limited, others find that it prepares them for likely future regulations. According to a recent study, electric power companies with above average environmental management earned 30% greater total shareholder return over three years than below average companies over three years.[5] Proactive companies will likely seize new clean energy technology markets. Forward-looking environmental management also enhances reputation with consumers and especially with regulators—an important group for this industry.

Electric power companies with above average environmental management earned 30% greater total shareholder return over three years than below average companies over three years.

Key Findings and Recommendations

The report finds that, in the marketplace today, many leading electric power companies, investors and analysts are using three categories of analytic tools to assess climate risk:

- **Emissions Analysis** – Analysts compare electric company emissions of carbon dioxide or air pollutants — in absolute values and rates per megawatt hour. This comparison provides investors and other stakeholders with an initial indication of which companies face the greatest risks from future regulations.
- **Corporate Governance and Management Systems Analysis** – Analysts compare electric companies' systems, structures, policies, and practices to address climate risk. This provides information about the company's ability to navigate the uncertain future of climate change regulation.
- **Financial Analysis** – Analysts compare electric companies by calculating the financial costs of plausible regulatory scenarios. This provides estimates of plausible bottom-line compliance costs and business opportunities.

While each tool has advantages and limitations, they offer companies and investors useful methods to evaluate climate risk. The findings of the Dialogue indicate that investors and electric companies should:

- Make use of all three climate risk analysis tools the industry-wide standard practice.
- Use these tools in combination to achieve the fullest assessment of climate risk.
- Make this information publicly available in a standard format.
- Conduct financial analyses of climate risk by factoring in other air quality regulations and proposals to assess a company's entire approach to emissions reductions.

The three tools covered in this report—emissions analysis, corporate governance and management systems analysis, and financial analysis—provide strong foundations for climate risk analysis. Used in combination, investors and companies will gain valuable insights into a company's climate risk exposure and its management approach to mitigate this risk. The three analytic tools also enable investors to make a more sophisticated comparison across sectors and among peers.

When these analytic tools are applied on their own, limitations arise that do

not provide a full view of a company's climate risk profile. When applied as a group, these tools complement each other and offer a more comprehensive evaluation procedure for investors and companies. For example, an advantage of emissions analysis and financial analysis is that they use objective factors, based on verifiable data. However, they are limited in their ability to capture crucial information on a company's risk management strategy. Financial analysis, corporate governance and management systems analysis and financial analysis form a complementary triad, providing investors and companies with a credible tool to determine climate risk.

Enabling effective analysis of climate risk among electric power companies will require improved corporate disclosure of key climate risk information—emissions, corporate governance actions and management systems, and the impact that plausible regulatory scenarios would have on company performance and their corporate risk management options. Investors and electric power companies should work together to standardize this reporting.

As future climate change regulations appear more likely, climate risk assessment tools are of higher value. Investors and electric companies should make use of climate risk analysis tools the industry-wide standard practice

Climate Risk Analysis: Findings and Recommendations Statement[6]

Based on the findings of the Electric Power/Investor Dialogue, Ceres has developed the following Findings and Recommendation statement.

In the marketplace today, leading electric power companies, investors and analysts are using primarily three categories of analytic tools to assess climate risk: emissions reporting analysis, corporate governance and management system analysis, and financial analysis. While each tool has advantages and limitations, they offer companies and investors useful methods to evaluate climate risk. As future climate change regulations appear more likely, climate risk assessment tools are of higher value. Investors and electric companies should make use of climate risk analysis tools the industry-wide standard practice. Using any one tool in isolation is not adequate to assess climate risk.

Emissions Analysis

Finding: Emissions analysis typically compares companies on the basis of a single, common indicator—their current greenhouse gas emissions and uses emissions as the prime indicator of risk. It is based on the concept that companies with higher emissions have greater climate risk than those with lower emissions. However, emissions reporting analysis does not capture environmental programs, risk management tools or business plans that will mitigate climate risk or create business opportunities, nor market structures or regulatory environments that impact climate risk. Nor does absolute emissions reporting capture risk appropriately, since larger companies (in MWh terms) will almost always have higher absolute emissions than smaller companies, yet may have less risk when benchmarked to MWh. It will also not capture new entrants into the market, who often have lower emissions intensity. Emissions reporting is already standardized in U.S. power markets, although does not always include reporting for cogeneration or many distributed generation facilities. Still, most electric generators in this country must publicly report the majority of their carbon dioxide emissions to government agencies, thus making emissions analysis quantifiable and verifiable. However, tracking companies over time is difficult because of frequent changes in ownership of facilities.[7]

Recommendation: Financial analysts, investors and companies should assess corporate climate risk by considering both absolute emissions and emission rates (emissions/MWh) as well as changes in these measures over time. It would also be useful to obtain projections into the future, under the assumption of the same assets remaining in operation, unless there has been an announced change in assets—new, retirement, repowering, for example.

Corporate Governance and Management System Analysis

Findings: Corporate governance and management system analysis assesses climate risk by comparing corporate governance actions on climate risk. These actions include board and management actions to consider climate risk, emissions reporting and disclosure, and development of corporate climate risk management strategies and business strategies. These strategies may include investments in clean energy technologies, such as renewable energy, integrated gasification combined-cycle (IGCC), combined cycle natural gas generation, demand-side management (DSM), as well as emissions reduction programs and advocacy for climate policies that add certainty. The purpose of this analysis is to assess the corporation's systems, structures, policies, and practices to address climate risk—the Ceres/IRRC Corporate Governance and Climate Risk analysis and the Carbon Disclosure Project are examples of these types of assessment tools. A company with poor corporate governance practices for climate change may face greater climate risk than a company with an effective approach. On the other hand, a company may have an effective corporate governance and management system for addressing climate risk, but still face significant challenges in addressing the issue. Information on corporate governance is not widely available to the public in a standard format. This analytic approach does not examine market structures or regulatory environments that the companies may face, nor does it examine the company's cost of complying with future climate regulations and is best understood as part of the "Financial Risk Analysis" outlined below.

Recommendation: To analyze corporate climate risk, investors and companies should evaluate companies on the basis of corporate governance and management systems. Power companies and investors should work together to make this information available in a standard reporting format.

Climate Change Financial Risk Analysis

Finding: Financial risk assessment tools calculate risk by assessing compliance costs and business opportunities for each company based on plausible regulatory scenarios. Even with market and regulatory uncertainties, best practice in Europe and the United States demonstrates that a reasonable range of regulatory scenarios can be used as inputs for financial modeling, and that companies and investors can reasonably estimate future costs. For example, recent reports issued by American Electric Power, Cinergy, and First Energy assess the impact of several climate change scenarios on corporate financial performance.

Simple financial models, such as those that compare cost for compliance with one or two likely regulatory scenarios, are valuable for investors and external analysts because they enable easy comparisons across companies and broad assessment of climate risk. Power companies value more robust financial tools to understand internal climate risks and business opportunities and allocate capital given a range of policy and allowance pricing scenarios. Companies also want to demonstrate to investors, regulators and customers how their business strategy, market conditions and other relevant factors impact their climate risk and management strategies. For example, some companies suggest that investing in low and zero carbon options can protect companies and consumers against volatility of fossil fuel prices, and therefore, future costs of reducing carbon emissions. Given the dynamic and layered markets in which power companies operate, more complex models are needed to understand the full exposure of a power company and its strategy to mitigate risk. Furthermore, issues such as a company's unique regulatory environment and its ability to recover expenses, are important to consider. For this industry, the Clean Air Act is the primary regulatory driver, and a company's compliance strategy and allocation of resources to mandated and reasonably anticipated limitations on emissions such as SO_2, NOx and Hg may be useful to investors and analysts to understand a company's climate change compliance strategy, capital allocations and scheduling of expenditures.

Some companies suggest that investing in low and zero carbon options can protect companies and consumers against volatility of fossil fuel prices, and therefore, future costs of reducing carbon emissions.

Recommendation: Comparing power company compliance costs in a limited number of plausible scenarios, preferably specific proposed federal and state legislation, are useful tools for investors to help evaluate power companies. Companies should use more robust financial analysis tools to better allocate capital and make strategic business decisions, including how to mitigate the risks of future climate regulations. Ideally, these should factor in other air quality regulations and proposals to assess a company's entire approach to emissions reductions. Companies and regulators should also consider the benefits of low and zero carbon options in hedging against fossil fuel price volatility and increasing costs of reducing carbon emissions. While containing assumptions about future events and other inputs, they provide a context and a place to start for further evaluation. Due to the complexity of the key assumptions, it is essential that companies and analysts make their assumptions completely transparent. They offer quantitative measures of climate risk under a range of potential outcomes and enable comparisons of companies, projects or other potential investments.

Climate Risk Disclosure

Using emissions and corporate governance tools together can provide a relatively simple, preliminary tool for identifying the companies that face the greatest risk.

Finding: As investors have sought more information about climate risks, electric power companies have increased their level of climate change related disclosure. In a recent study of U.S. and international electric power companies, 96% of the power companies in the survey discussed climate change in their 2004 financial filings.[8] More and more power companies are attempting to quantify financial risk in their annual filings; however, the data format varies widely from company to company, thus making it difficult for investors to analyze climate risk.

Recommendation: Electric power companies should publicly disclose key climate risk information—their absolute emissions and emissions rates and their corporate governance actions and management systems. Ideally, these emission disclosures should be made using widely accepted protocols and verified by a certified third party to ensure that information is reported in a consistent manner within and across industry sectors. They should also disclose their corporate risk management options and strategies and the impact that plausible regulatory scenarios would have on company performance. To make it easier to disclose and to analyze, investors and electric power companies should work together to standardize this reporting.

Integrated Climate Risk Analysis

Finding: Used in combination, these analytic tools can provide a sophisticated view of climate risk that helps investors differentiate among power companies, by identifying those that have the greatest potential climate risk and those that have the least. Using emissions and corporate governance tools together can provide a relatively simple, preliminary tool for identifying the companies that face the greatest risk. For example, a company with either high emissions or high emissions rate *and* a weak approach to corporate governance would be considered higher risk. A company with low emissions or low emissions rate (corresponding to a low financial exposure) *and* a strong corporate governance strategy would be considered at lower risk.

Recommendation: Investors and electric companies should use these tools—analysis of emissions, corporate governance and management, and financial risk—in combination to achieve the fullest assessment of climate risk. Once this first stage of analysis is complete, a more thorough and company-specific assessment can be undertaken. Investors should gain a more in depth and real time view of climate risks and business strategies of the companies they are evaluating including knowledge of their assets and their generation mix, and their regulatory and market environments.

Dialogue Participants

Ceres is grateful to the following people for participating in one or more of the meetings the dialogue. Company names are for informational purposes only. Organizations do not necessarily endorse the findings of this report.

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Best Practices in Climate Risk Analysis

Tools to analyze climate risk will continue to evolve as regulations unfold and corporations become more knowledgeable and sophisticated on climate risk issues. As a baseline, electric power companies and investors have identified current best practices in three areas of climate risk assessment—emissions, corporate governance and management systems, and financial analysis. This section of the report describes the current best practices in each area.

Emissions Analysis

Background

"[C]omparative emissions information helps us understand how our environmental performance stacks up against competitors and also helps us integrate environmental targets into comprehensive business strategies. [O]ur industry requires clarity and certainty about future environmental requirements so that we can rationalize investment decisions on behalf of shareowners."

Ronald Drewnowski, Director of Environmental Strategy and Policy, PSEG

Comparing electric power companies' current emissions of carbon dioxide and air pollutants—in absolute values and rates per megawatt hour—gives investors and corporate leaders a single, common indicator of climate risk, and analyzing emissions serves as a useful first step when evaluating climate risk.

Electric power generators are currently required to measure and disclose emissions of four primary air pollutants—Nitrogen Oxide (NOx), Sulfur Dioxide (SO2), Mercury (Hg), and Carbon Dioxide (CO_2)—to the Environmental Protection Agency (EPA). By obtaining this data and comparing it across companies, investors and corporate leaders are provided with a simple, standardized, and objective method of calculating climate risk. Similar to financial risk analysis (discussed later in this paper), comparing emissions data helps compare companies based on common indicators and reduces subjectivity.

Power companies with high emissions and/or emissions rates are considered to be more at risk than those with low emissions or low emission rates since companies with higher emissions and/or emissions rates may have greater compliance burdens, as well as increased operational efforts to lower emissions.

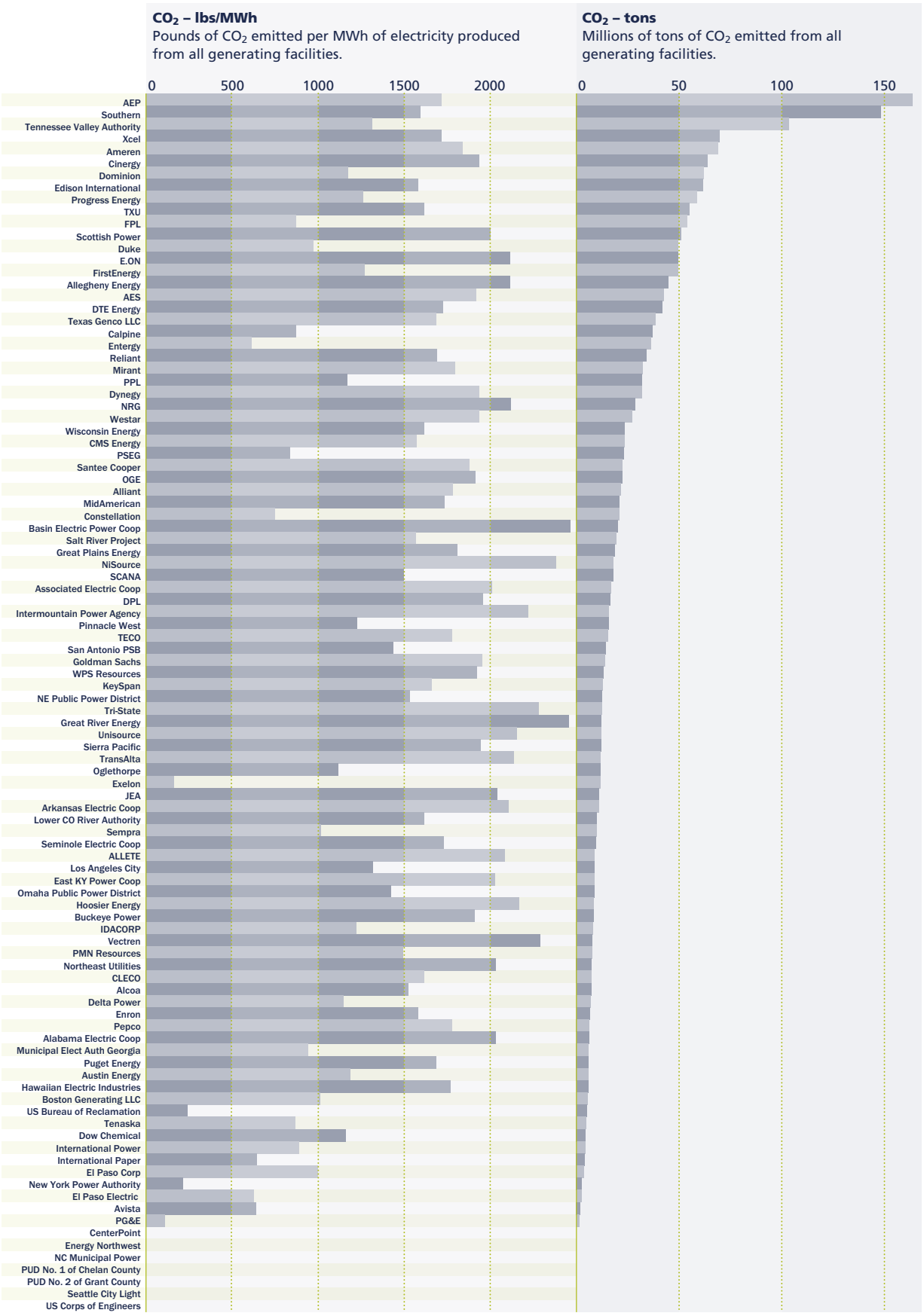
Examining total emissions data alone is not a sufficient measure of climate risk, since larger power generators will in most cases have high absolute emissions. Investors should also evaluate companies on the efficiency of their output. For the power sector, this includes rates that measure emissions per megawatt hour. The key is to use comparable measures that reveal efficiency and low carbon generation.

Best Practices

An example of best practice for analyzing climate risk through emissions analysis is the latest of five reports produced by Ceres, the Natural Resources Defense Council (NRDC), and Public Service Enterprise Group Incorporated (PSEG). The report, released in April 2006, *Benchmarking Air Emissions of the 100 Largest Electric Generation Owners in the U.S.*, compares the 2004 total emissions and emissions rates of the 100 largest electric power companies in the United States.

The *Benchmarking Air Emissions* report allows investors, companies, and the public to:

- gauge each company's risk exposure, particularly to potential CO_2 regulations
- uncover trends in the industry
- examine disparities between the highest and lowest emitters



All source – CO_2 Total Emissions and Emission Rates

Total emissions (millions tons) and emission rates (lbs/MWh) from all generating facilities

The report found that there are wide disparities between companies in both their total emissions and emission rates of carbon dioxide. The graph below shows this disparity with *total* CO_2 emissions on the top and CO_2 emission *rates* on the bottom. These disparities indicate that regulations of greenhouse gases, such as carbon dioxide, are likely to have differing financial impacts on companies as well—a key point for investors.

A comparison of two large electricity companies, Exelon and the Southern Company demonstrates these disparities. Southern is the second largest producer of electricity in the country and relies heavily on coal. Southern produces about 23% more electricity than Exelon, the fourth largest producer of power and primarily a nuclear energy generator. But Southern produces more than twelve times the *total* amount of carbon dioxide as Exelon, and its CO_2 emissions *rate* is over ten times higher than Exelon's.

The report also found that carbon dioxide emissions are highly concentrated among a small number of companies. Seven electricity producers—American Electric Power, the Southern Company, the Tennessee Valley Authority, Xcel, Ameren, Cinergy, and Dominion—contribute 25% of the electric power industry's CO_2 emissions, while 19 producers[9] are responsible for half of the industry's emissions.

Emissions Analysis has the following benefits and limitations.

Benefits:	Limitations:
Allows investors and corporate leaders to: • Utilize a simple method of calculating climate risk. • Compare companies based on common indicators. • Assess both absolute emissions and emission rates, to provide a more dynamic picture and to compare the efficiency of companies. • Examine quantifiable and verifiable data, with less room for subjectivity.	*Emissions analysis:* • May not reflect the full exposure or business opportunities of a given company. • Is static and is often based on historic data that may no longer be relevant. • May be difficult to aggregate on a parent-company basis. For example, the publicly available emissions data provided to the US government are facility-based. • Does not indicate market structure or regulatory climate or other factors that may have a significant bearing on the costs of complying with future climate restrictions.

Emissions Analysis and Emissions Reporting

A key to effective emissions analysis is the accurate and standardized reporting of emissions and electricity generation data. The US power sector is unique because it is the only sector required to report facility-level emissions data to the national government for CO_2 on an annual basis.

In addition to the electric power sector's mandatory reporting requirement, there is a growing menu of climate change-related reporting programs that companies are using to report emissions data. Most of these programs are voluntary and are designed for a broad spectrum of companies and energy users. Electric companies often report their data under multiple programs. There is a key difference be ween mandatory and voluntary reporting program: mandatory programs focus largely on direct emissions from individual facilities, while voluntary program focus on measuring emissions across the entire corporation or entity and "indirect" emissions, produced from purchased power or employee travel.

Knowledge of the range of reporting programs used by companies is important for investors. However, emissions analysis is about more than reporting of emissions data. *It is the practice of evaluating companies based on common data inputs to indicate climate risk.*

To provide a view of the key elements contained in reporting programs, this report outlines three of the leading reporting programs.

Emissions Reporting Initiative	Voluntary/ Mandatory	Status	Resources
NGO Programs			
WRI/WBCSD GHG Protocol	Voluntary	Active	www.ghgprotocol.org
State Registry Programs			
Wisconsin Air Contaminant Inventory Reporting Program	Mandatory	Active	www.dnr.state.wi.us/org/aw/air/emission/
Wisconsin Voluntary Emission Reduction Registry	Voluntary	Active	www.dnr.state.wi.us/org/aw/air/registry/
New Hampshire Registry	Voluntary	Active	www.des.state.nh.us/ard/ClimateChange/ghgr.htm
New Jersey Reporting Requirement	Mandatory	Active	www.state.nj.us/bpu/wwwroot/energy/envi.pdf
California Climate Action Registry	Voluntary	Active	www.climateregistry.org
West Coast Governors Regional GHG Initiative	Voluntary	Under Dev't	www.ef.org/westcoastclimate/
Regional Greenhouse Gas Registry (RGGR)	Not yet determined	Under Dev't	www.rggr.us
Federal Programs			
DOE 1605b Program	Voluntary	Under Dev't	www.pi.energy.gov/enhancingghgregistry/index.html
EPA Climate Leaders Program	Voluntary	Active	www.epa.gov/climateleaders/
EPA Natural Gas Star	Voluntary	Active	www.epa.gov/gasstar/
Climate VISION	Voluntary	Active	www.climatevision.gov/

Table 1: Examples of Emissions Reporting Programs

World Resources Institute/World Business Council for Sustainable Development Greenhouse Gas Protocol

The World Resources Institute/World Business Council for Sustainable Development Greenhouse Gas Protocol (GHG Protocol) is one of the most well known voluntary reporting programs. The groups developed the Protocol to provide guidelines for clear and consistent corporate-level reporting of greenhouse gas emissions. While voluntary, the GHG Protocol is widely recognized as a standard reporting format across many business sectors. Emissions data is compiled on a facility level, and includes a company's direct and indirect[10] emissions. The GHG Protocol has guided prominent government and voluntary initiatives such as the Environmental Protection Agency's Climate Leaders program, the California Climate Action Registry and sector-specific protocols designed for the cement, petroleum and forestry industries. In late August 2004, the Mexican government announced a two-year partnership with WRI and WBCSD to develop a voluntary reporting platform for Mexican companies, following the GHG Protocol.

The current GHG Protocol does not provide a vehicle to account for off-site, project-based reductions or offset purchases. A separate protocol is under development for corporate reporting of these types of activities. Further, because the GHG Protocol allows companies to choose how they define their organizational boundaries, it does not provide a level field for comparison of companies or across sectors. Nevertheless, this basic reporting structure is the foundation for many voluntary inventory and reporting programs.

DOE Voluntary Greenhouse Gas Reporting Program (1605b)

Section 1605b of the Energy Policy Act of 1992 established a registry of GHG emission baselines, reductions, project results and future commitments that has become known as the 1605b database. This system was originally designed to be informational and as a framework to develop improved measurement and tracking procedures.

The database includes six leading greenhouse gases (GHGs) and is administered by the Energy Information Administration. Any person, entity or company can report activities. There are general reporting guidelines and some industry-specific guidelines but the reporting protocols are not standardized and entities can choose their own approach. Largely for this reason, the 1605b data are generally considered to be inconsistent and unreliable either as baseline data or evidence of reductions. To the extent that the system has since been suggested as a basis for emission trading or creditable reductions, the quality issues have become more important.

As part of the Bush Administration's effort to develop a voluntary response to climate change, DOE initiated an effort to enhance the accuracy, reliability and verifiability of the 1605b system. Proposed revisions to the program have been under development for several years, and are currently out for public comment. The Department is expected to finalize the new, more rigorous program in late 2005.

California Climate Action Registry

In 2001, California established a voluntary, entity-wide greenhouse gas emissions registry with the purpose of certifying emissions and emissions reductions from sources inside and outside the state in anticipation of a mandatory greenhouse gas emission reduction program. A non-profit organization, the California Climate Action Registry (CCAR) runs the registry, and is charged with administering the program and facilitating the development of both general and industry-specific reporting rules. The CCAR is expected to eventually certify project-based activities, but its initial focus has been on emissions reporting.

The power sector is a primary target audience of the registry and CCAR has developed industry-specific reporting rules. The rules require entity-wide reporting and independent, third party verification of the data. Due to the data certification requirement and the use of industry-tailored reporting rules, the CCAR is the most rigorous voluntary greenhouse gas registry in the U.S. The registry is also a model for regional registries under development in the Northeast through the Regional Greenhouse Gas Initiative and in the West Coast through the West Coast Regional Greenhouse Gas Initiative.

Corporate Governance and Management Systems Analysis

Background

Examining a company's emissions data provides a sound starting point for assessing climate risk; however, even companies with relatively low emissions and emission rates could face significant climate risk if they are not prepared to manage future emission reduction requirements. Companies that have sound corporate governance and strong environmental management systems in place are viewed to be better prepared for impending climate change and GHG emission regulation than those that do not.

Several companies within the electric power sector are already attempting to manage climate risks by establishing systems at all levels of the corporation to efficiently handle future emission reporting and reduction requirements as well as to help guide future investment strategies toward low carbon technologies. Companies that are postponing climate change planning until the regulatory environment becomes clearer are viewed to be at a disadvantage to those that are preparing now.

Examples of actions currently underway to prepare for a world in which greenhouse gas emissions are constrained include:

- **Considering climate policy at a high level** – The Boards of many companies have considered climate change and established corporate climate policies. Calpine and NiSource, for example, have each considered the issue at the corporate level and have created such policies.
- **New climate risk disclosure** – In response to shareholder pressure, several companies have begun to undertake new levels of disclosure of their climate risks through annual or special reports. AEP, Cinergy, DTE Energy, FirstEnergy, Progress Energy, Southern Company, and TXU have all issued or have agreed to issue special reports in this respect. Cinergy also devoted its 2005 annual report to a discussion of the climate change issue.
- **Investing in clean energy technologies and emission reductions or offsets** – Florida Power and Light Energy (FPLE) is the largest developer of wind power in the United States, producing more than 40% of all wind generation. American Electric Power and Cinergy are each committed to investing in Integrated Gasification Combined Cycle (IGCC) technology to prepare for carbon sequestration. Calpine has developed the nation's largest fleet of highly efficient, modern combined cycled natural gas. Some companies have participated in programs to sequester carbon through planting trees, while others are engaged in research and develop of new technologies.
- **Participating in voluntary reduction programs** – Power companies are participating in voluntary emission reduction programs run by both government and private entities. For example:
  - AEP participates in the Chicago Climate Exchange (CCX), a voluntary emissions trading program that involves a commitment to reduce GHG emissions by four percent below baseline (the average of emissions from 1998-2001) by 2006. The National Association of Security Dealers (NASD) audits the baselines and annual emissions of the more than 100 members of the CCX, and monitors CCX trading activity against fraud and manipulation.
  - The Florida Power and Light Group is a participant in the World Wildlife Fund's Power Switch, in which companies commit to support binding limits on national or power sector carbon dioxide emissions and to sell 20 percent of electricity from new renewable sources by 2020; increase energy efficiency by 15 percent by 2020; or phase out the least efficient half of energy generation (or production) from coal.
  - Many other companies are participating in The Environmental Protection Agency's Climate Leaders program, including AEP, Calpine, Cinergy, Entergy, Exelon, NiSource, FPL, PSEG, and WE Energies, while many in the industry participated in EPA's voluntary program to reduce emissions of sulfur hexafluoride (SF6), a potent greenhouse gas. PG&E, Southern California Edison, Sempra, Pacificorp, and Calpine are all members of the California Climate Action Registry.

Investors and corporate leaders must have a standardized method to compare a company's preparedness.

Current best practices in corporate governance and management systems analysis have the following benefits and limitations.

Benefits:	Limitations:
Allows investors and corporate leaders to: • Gauge senior management's view of climate risk to determine whether it is taken seriously. • Assess disclosure of absolute and normalized emissions. • Understand the programs in place to manage risk, i.e., pre-compliance strategies such as offset purchases, portfolio diversification, etc.	*Analysis of corporate governance and management systems:* • May not show how corporate actions are linked to overall business strategy or investments in new technology. • May not reflect the regulatory or market conditions of a company. • May not provide insights into corporate culture or corporate accountability. • May not provide guidance on prioritization of actions.

Best Practices

As more companies begin to plan for climate risk, innovative policies and procedures will emerge. Although best practices in corporate governance and management policies on climate risk are rapidly evolving, investors and business leaders can use two publicly available existing tools to analyze a company's corporate governance and management systems on climate risk relative to their competitors.

- First, Ceres and the Investor Responsibility Research Center (IRRC) have developed a ***fourteen point climate change governance check list*** that examines a company's preparedness in five categories: board oversight, management execution, public disclosure, emissions accounting, and emissions management and strategic opportunities.
- Second, electric power companies can participate in the Carbon Disclosure Project, by responding to an ***extensive climate risk assessment questionnaire*** which examines six categories: strategic awareness, management accountability and responsibility, emissions management and reporting, emissions trading, emission reduction programs in place, and establishment of targets.

An overview of each, as well as their strengths and weaknesses, are described below.

In addition, there are an increasing number of proprietary tools, such as Innovest Strategic Value Advisors' EcoValue 21 rating system, that compare power companies on the basis of their management of environmental issues. This report does not analyze the proprietary tools.

Ceres/IRRC 14-Point Governance Check List

In March 2006, Ceres and the Investor Responsibility Research Center (IRRC) produced a report titled *Corporate Governance and Climate Change: Making the Connection*, which ranked the governance and disclosure practices of 100 companies in the 10 most carbon-intensive sectors, including 19 electric power companies.

Companies were evaluated according to a Climate Change Governance Checklist. The checklist consisted of 14 governance steps that companies can take to proactively address climate change and ranks companies on a 100-point scale. Each of the five governance categories carries a different number of maximum points to reflect the number of actions available and their relative importance to the overall score.

Climate Change Governance Checklist: 100 Point System		
	BOARD OVERSIGHT	*Points*
1	Board committee has explicit oversight responsibility for environmental affairs.	
2	Board conducts periodic review of climate change and monitors progress in implementing strategies.	**Up to 12**
	MANAGEMENT EXECUTION	
3	Chairman/CEO clearly articulates company's views on climate change and GHG control measures.	
4	Executive officers are in key positions to monitor climate change and coordinate response strategies.	**Up to 18**
5	Executive officers' compensation is linked to attainment of environmental goals and GHG targets.	
	PUBLIC DISCLOSURE	
6	Securities filings identify material risks, opportunities posed by climate change.	
7	Sustainability report offers comprehensive, transparent presentation of company response measures.	**Up to 14**
	EMISSIONS ACCOUNTING	
8	Company calculates and registers GHG emissions savings and offsets from projects.	
9	Company conducts annual inventory of GHG emissions from operations and publicly reports results.	**Up to 24**
10	Company has set an emissions baseline by which to gauge future GHG emissions trends.	
11	Company has third party verification process for GHG emissions data.	
	EMISSIONS MANAGEMENT AND STRATEGIC OPPORTUNITIES	
12	Company sets absolute GHG emission reduction targets for facilities and products.	
13	Company participates in GHG trading programs to gain experience and maximize credits.	**Up to 32**
14	Company pursues business strategies to reduce GHG emissions, minimize exposure to regulatory and physical risks, and maximize opportunities from changing market forces and emerging controls.	

Chart 1 – Corporate Governance Checklist

Source: Ceres and IRRC

The checklist examines a company's performance under five main categories—board oversight, management execution, public disclosure, emissions accounting, and emissions management and strategic opportunities. It does not prioritize actions under the categories, but ranking is possible based on the number of affirmative "checks" a company receives.

Strengths

The checklist is a good starting point and provides a standardized method for investors to compare companies' corporate governance and management systems as it relates to climate risk preparation. By comparing companies' policies and procedures, investors and corporate leaders can assess where each company stacks up against its competitors, and corporations have an opportunity to show a competitive advantage.

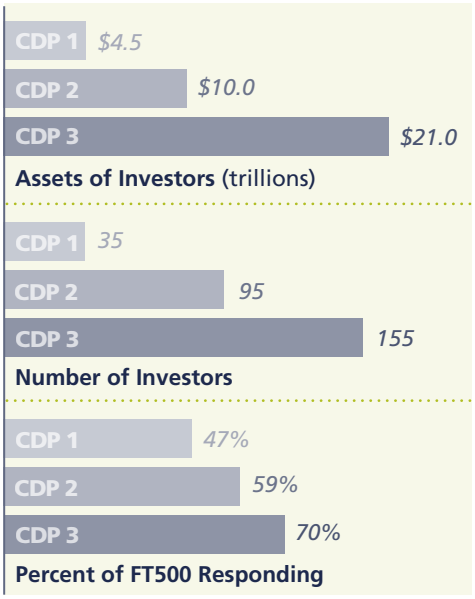
Weaknesses

The largest downfall is that the checklist does not necessarily indicate a company's climate risk exposure as emissions and financial analyses do; rather, the checklist is designed to examine how well a company is developing the management structure to manage their risk exposure. As an example, in a 2006 report by Bernstein & Co.[11] that measures the financial exposure to climate change risks and opportunities, Constellation Energy appears to have low risk because of their high nuclear content. However, according to the *Corporate Governance and Climate Change* report, Constellation received the lowest score of all the power companies examined, indicating that the company does not have as sophisticated governance and disclosure to prepare for the risks or, more importantly for Constellation, the opportunities climate change may bring.

The checklist is also not exhaustive, and may not measure all climate risk policies. The checklist does not rate each item on the list, instead giving each equal weight. Additionally, the sections on emissions data collection and reporting do not specify which mechanism is preferable for corporations to use, which could result in each company measuring and reporting emissions in different ways, making cross-company comparisons difficult.

Carbon Disclosure Project

The Carbon Disclosure Project was launched in 2000 as a mechanism for coordination among institutional investors seeking climate risk preparedness in their portfolios. The project consists of a questionnaire mailed to the FT500 largest companies requesting information on the company's climate risk governance and strategy, measurement and management.



Graph 1: Carbon Disclosure Project Growth

Similar to the five categories examined in the Ceres/IRRC checklist, the CDP assesses a company's performance in six areas:

1. Strategic Awareness: the extent to which a firm considers climate risks and opportunities to be relevant to its business
2. Management Accountability/Responsibility: whether and how a company has allocated responsibility for the management of climate-related issues
3. Emissions Management and Reporting: the progress a company has made in quantifying and disclosing/reporting its emissions profile, including the use of third-party verification
4. Emissions Trading: the extent to which a firm has considered emissions trading in its risk management response
5. Programs in Place: quality and nature of any emissions reduction programs, including energy efficiency, that a firm has implemented
6. Establishment of Targets: have formal GHG emissions/ reduction targets been set with a timeline?

There have been three rounds of the CDP and each year has seen growth in investor interest and corporate response (see graph at right). In 2004, CDP3 was endorsed in by 155 institutional investors, representing $21 trillion under management. In September, 2005 CDP announced that over 350 companies—about 70% of the FT500—responded to the CDP3.

The Carbon Disclosure Project's Questionnaire focuses on many of the same corporate practices as the Checklist—governance and strategy, measurement and management—but is not as specific.

Strengths

As opposed to the Ceres/IRRC checklist, which is administered in a time-consuming interview process, the CDP is administered en masse to hundreds of organizations at once, simplifying the process of making inter- and intra-industry comparisons. The CDP analyzes the findings of the questionnaire and produces regular reports, examining each industry. This significantly eases investors' time investment, as is demonstrated in Table 1.

	Considers Climate Change to Present Risks and/or Opportunities	Responsibility Allocated for Management of Climate Change Related Issues	Has taken steps to implement relevant emission-reducing technologies	Strategy to Prepare for Emissions Trading Regimes		Quantified GHG Reporting		Estimates product, supply chain and/or other indirect emissions	Emission Reduction Programs in Place		Formal GHG Reduction Targets Set with Timeline	Measures emissions intensity against production, sales and/or other output measures	Reports total revenue represented by fossil fuel and electric power costs
				Monitoring Developements	Evidence of Early Engagement	Emissions Data Disclosed	Use of Third-Party Reporting Protocol / Verification		Energy Efficiency Programs	GHG Reduction Programs			
American Electric Power	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔
Dominion Resources	IN	IN	IN	IN	IN	IN	IN	IN	IN	IN	IN	IN	IN
Duke Energy	✔	✔	✔	✔		✔	✔		✔			✔	
Entergy	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	
Exelon	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		
FirstEnergy	✔	✔	✔	✔		✔	✔	✔	✔	✔		✔	✔
FPL Group	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔
PG&E Corporation	✔	✔	✔	✔		✔	✔		✔			✔	✔
Southern Company	✔	✔	✔	✔		✔	✔		✔	✔	✔	✔	✔
TXU Corporation	✔	✔	✔	✔		✔	✔	✔	✔	✔			

IN = Provided information / CSR Report / website link

Table 1: Comparison of North American Electric Companies' Corporate Governance and Management Systems

Source: CDP3 (Note: Chart data is taken from the CDP3 report, completed in 2005. It may not reflect all policies of the companies shown.)

Weaknesses

Due to their qualitative and descriptive natures, neither the checklist nor the CDP offer clear and transparent mechanisms to assess the depth of commitment to a particular action or enable easy comparisons. The CDP Questionnaire relies on a corporate response to a questionnaire, and though the CDP has a 71% response rate, investors may not get the data they seek from any particular company and the data is reported by the company and not verified by the CDP or any other third-party.

Financial Analysis

Background

In addition to analyzing an electric power company's emissions and corporate governance and management systems, investors and corporate leaders can begin to quantify the bottom-line financial risk posed by climate change under various regulatory scenarios.

There are two key best practices that investors and business leaders should examine when performing a financial analysis of climate risk:

- **Comparing Emissions Pricing.** Some analysts have examined climate risk in the electricity sector by determining a likely price for reducing carbon dioxide. This approach has been particularly common at the state levels, as regulators and companies attempt to capture a future cost to carbon in their power planning and procurement decisions.

"You would be crazy not to consider CO2 costs. These are 40-year to 50-year assets."

David Eves, Xcel Energy

The report reviews four examples of best practices in carbon pricing as established by the Wisconsin Public Utilities Commission, the California Public Utilities Commission, Pacificorp, and Xcel Energy. In addition to examining financial risk to CO_2 emission reductions, investors and managers can examine the cost of future reductions in other key air pollutants. Because of the financial importance to the electricity sector of other emissions regulated under the Clean Air Act, some analysts have developed prices for air pollutants that are regulated under the Clean Air Act as well. For example, the Public Service Enterprise Group Incorporated (PSEG) developed a pricing model for NOx, SO2, Mercury, and CO_2.

- **Comparing Regulatory and Pricing Scenarios.** Other analysts have developed more sophisticated tools that compare the impacts on power companies of several plausible regulatory or carbon pricing scenarios. This report examines financial models developed in Europe to examine the impacts of the EU emission trading program on the power sector, a 2006 research report by Sanford C. Bernstein & Company, the World Wildlife Fund Power Switch analysis, which looks solely at carbon dioxide, and the approach of researchers Robert Repetto and James Henderson, which compares reductions of four air pollutants under three various regulatory scenarios.

To investors, both complex and simple financial models have value. However, given the uncertainties inherent in financial modeling and their limitations in incorporating other market dynamics such as future trends in merchant generation, deregulation and fuel prices, simple approaches may be most useful to investors—especially at the initial stages of assessment. Many investors want simplicity and comparability. They seek credible models that compare the same factors. They care about corporate and facility emissions and the potential financial liabilities of different regulatory scenarios.

Power companies use more robust financial tools to understand internal climate risks, to assess business opportunities and to allocate capital under a range of policy and allowance pricing scenarios. Companies also want to demonstrate to investors, regulators and customers how their business strategy, market conditions and other relevant factors impact their climate risk and management strategies.

Given the dynamic and layered markets in which power companies operate, more complex models are needed to understand the full exposure of a power company and its strategy to mitigate risk. For example, issues like a company's unique regulatory environment and its ability to recover expenses are important to consider.

Benefits:	Limitations:
Financial risk assessment tools: • Offer a quantitative measure of climate risk under a range of potential outcomes. • Enable comparisons of companies, projects or other potential investments. • Allow for a reasonable range of permit prices and regulatory scenarios to be used as inputs for financial modeling, even with market and regulatory uncertainties. • Gauge senior management's view of climate risk to determine whether it is taken seriously. • Assess disclosure of absolute and normalized emissions. • Understand the programs in place to manage risk.	*Financial risk assessment tools:* • Are static and are often based on historical data that may no longer be accurate. • Require analysts to gain a deep and real time understanding of the assets and generation mix of the companies they are evaluating—both today and into the future. This is especially challenging for the power sector, given the frequent changes in asset ownership. • Do not incorporate strategic business changes, corporate risk or environmental management initiatives.

Analyzing Emissions Pricing

A number of decision makers are beginning to calculate a price of carbon to determine potential future carbon risk. This approach is relatively simple, and attempts to estimate at an overall cost of compliance for each ton of carbon dioxide or other emissions from a power plant or company.

- The Wisconsin Public Service Commission uses a climate change sensitivity run—at $15/ton of carbon dioxide—when evaluating new generation projects in the state. While it is not a factor in decision-making, the use of a quantitative tool helps the Commission differentiate among potential projects.
- The California Public Utility Commission now requires investor owned utilities to incorporate a "greenhouse gas adder" of $8 per ton of carbon dioxide when evaluating competitive bids to supply energy. According to the Commission "This adder is designed to capture the financial risk to IOUs [investor owned utilities] ratepayers of emitting GHGs, recognizing the likelihood that these emissions will be limited by regulation in the future. The adder will improve the cost-effectiveness of energy efficiency and renewable generation resources."
- The Colorado Public Utility Commission and Xcel Energy, an electric power company headquartered in Minnesota, recently agreed to include in least cost planning for project evaluation a cost of $9 per ton of CO_2 for a new power plant in Pueblo, Colorado.
- The electric power company, PacifiCorp, incorporates a possible cost of $8 per ton of CO_2 in its consideration of bids to provide energy.
- The New Jersey-based electric company, PSEG has estimated allowance prices for NOx, SO_2, Mercury, and CO_2 over 20 years to guide investment decisions in light of climate change and other regulatory risk. The pricing plan uses point estimates and ranges, and incorporates allowance prices in modeling new and existing plants. PSEG uses the pricing for internal modeling only, and seeks input from outside experts.

Analyzing Regulatory and Pricing Scenarios

Several organizations have begun to analyze the potential financial risks of climate policies on the electricity sector using more complex financial models. This report reviews three basic approaches that have been used in the United States and in Europe. Each approach makes critical assumptions about the level and timetable of proposed reductions, the methods by which the government will allocate the permits for the power companies, and the degree to which costs can be passed on to consumers. Each of these assumptions can significantly affect the outcome of the analysis, and, thus, need to be carefully examined.

Bernstein Research Call

In February 2006, Bernstein & Company released the results of a study to quantify the potential exposure of individual utilities to potential federal caps on CO_2, based on the February white paper by Senators Domenici (R-NM) and Bingaman (D-NM) titled *Design Elements of a Mandatory Market-Based Greenhouse Gas Regulatory System*.

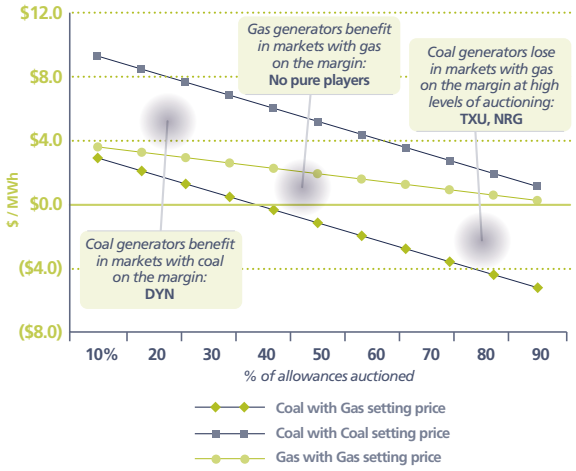
To estimate the effect which CO_2 emissions limits may have on power prices and generators' gross margins in unregulated markets, Bernstein adopted the following methodology.

1. Using EPA data on power plants' CO_2 emissions (see page 10 of this report), calculated the average CO_2 emissions per MWh produced by coal and gas-fired generators in the various unregulated power markets of the U.S.

2. Multiplied these average CO_2 emissions rates by a range of assumed prices for CO_2 emissions allowances to estimate the increased cost to utilities of generating a MWh of electricity at their coal and gas-fired plants.
3. Estimated the number of hours per year during which power prices in these markets reflect the operating costs of coal-fired and gas-fired generators, respectively.
4. Assumed that power prices in unregulated power markets will rise to reflect the incremental cost to the marginal or price-setting generators of purchasing CO_2 emissions allowances.
5. Calculated the impact which the price and cost increases resulting from the imposition of CO_2 emissions limits will have on the gross margins of nuclear, coal-fired and gas-fired generators in the various unregulated power markets.

The findings of the report show that the utilities that will benefit most from national CO_2 emissions limits will be those with the largest unregulated sales of nuclear generation, with particular benefits accruing to those nuclear generators whose fleets are situated in regions where coal-fired generators are the marginal or price-setting suppliers. These companies could see gains of 4%–139% of EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization).

Most adversely affected in this study were unregulated coal-fired generators supplying markets where gas is the predominant price setting fuel. These companies could see losses of 24%–83% of EBITDA.



Effect of Auctioning on Margins at $10 per ton for Carbon Credits

Source: Citigroup Investment Research

Citigroup Equity Research

In September 2006, Citigroup issued analysis entitled, "Carbon Limits are Coming", which concluded that greenhouse gas regulation is likely to be implemented by 2012 and will have positive and negative impacts on corporate profits in the electric sector. The report modeled low, medium and high cost scenarios, and made varying assumptions regarding allocation of allowances and "safety valve" prices. Key findings included:

- Nuclear power generators see significant increases in revenue even under low cost scenarios.
- Gas-fired generators will likely see some financial benefits, although to a lesser degree than nuclear operators.
- Coal-fired generators in gas-driven markets would face the greatest exposure, although there would be a great deal of variation depending on the company, the specific scenario, and the percentage of allowances auctioned.
- In regulated markets, greenhouse gas regulation will likely increase electricity rates in the short run, but should decrease over time as carbon reduction technologies become more commercially available.

JPMorgan North America Corporate Research

In September 2006, JPMorgan released a report entitled, "Warming to rules on Climate: Carbon Emissions Limits are Coming, but Key Details are Still Uncertain." The report discussed the potential impacts of state and regional and federal climate regulations, but did not provide company-specific analysis due to considerable uncertainties in policy design and implementation. Highlights included:

- Eventual federal regulation is likely to reflect state regulations and help mitigate the risks associated with a patchwork of requirements.
- Coal-fired generators are likely to face the most risk, especially in de-regulated markets.
- Renewable energy and nuclear power are likely to benefit under any regulatory scenario. However, wind and solar have limited ability to provide baseload power needs due to problems with dispatchable capacity and cost.
- Conservation and energy efficiency could be the most effective means to reduce CO_2 emissions, and electronic metering alone has reduced demand by 10% in many programs

European financial models

Financial analysis tools are somewhat more advanced in Europe, in part because climate policy and carbon trading markets are more advanced there than in the U.S. In particular, as a step towards meeting its obligations under the Kyoto Protocol, the European Union launched a greenhouse gas emissions trading program in early 2005 that called for greenhouse gas emission reductions at electric power facilities.

Initially, the European emissions trading program is limited to reducing carbon dioxide emissions and each country under the program is permitted to decide which sources will be covered and how emissions allowances will be allocated. This information is detailed in each country's National Allocation Plan (NAP). All but just a few NAPs have been approved by the European Commission, and the European power sector has a leading role to play in meeting the overall program cap.

In anticipation of the start of the EU emission trading program, several investor groups and consulting firms that serve the European market developed financial models to assess climate risks for European power companies. The models aimed to assess the financial impacts the program would have on individual companies and groups of companies in the power sector. Some models revealed projected winners and losers, while others evaluated the sector as a whole.

ABN-Ambro, Credit Suisse/First Boston, JPMorgan and UBS, among others, responded to this new program by developing sophisticated and distinct financial models to assess climate risk for the power sector. These studies reached widely different conclusions and overall outcomes, including:

- ABN-Ambro found that the trading program will have little impact on company valuations;[12]
- Standard & Poor's concluded that compliance costs would be significant for power companies, especially those with coal and oil facilities;[13] and
- UBS estimated that European utilities may see windfalls to the tune of $33.1 billion.[14]

The EU financial analysis provides valuable lessons for modelers on climate risk because key assumptions underpinning the models determined these varied outcomes. However, often the assumptions underpinning the models are

proprietary, making evaluating the tools a challenge. In particular, assumptions about the projected price of an emissions permit (the "allowance price"), the method of allocating allowances,[15] the forecasted price of electricity, the pace of technology innovation, and the degree to which power companies switched to cleaner fuels strongly impacted the results of the models.

Looking simply at potential carbon prices, the assumptions varied dramatically.

Carbon Price Assumptions per Ton CO_2

- ABN-Ambro: less than €10/$13
- CSFB: €9.2/$12
- Dresden Kleinwort Wasserstein Research: €15/$19 by 2005, €25/$32 by 2008
- JP Morgan: €6–28/$8–41 by 2010
- Standard & Poor's: €5–20/$6–26
- UBS: €17–31/$22–40[16]

The actual EU allowance prices have fluctuated around €15–29/ton CO_2 since February 2005, primarily due to higher than expected energy prices.

Other key factors, like allowance allocation decisions, impact the models' findings on the compliance costs for companies and the sector as a whole. For example, UBS focused its analysis largely on projected national allocation decisions. By consulting with its own analysts, it created four allocations scenarios: *disaster, black sky, central, and blue sky*.[17] Under the central scenario, the model found a positive impact on equity valuations. Under the disaster scenario, equity value would fall at eight out of ten firms evaluated. However, under all four models, several power companies were not significantly impacted.

WWF Power Switch Study

The World Wildlife Fund's Power Switch study, for example, analyzed more complex scenarios and models that incorporate shifts in fuel prices and a range of regulatory scenarios. It considered 14 companies globally (3 US-based power companies) and analyzed how they would fare under three policy scenarios, with distinct carbon prices. The Power Switch model incorporated regional market differences and changes in each company's generation mix (at different permit prices). It also tried to model the allocation methods for permits and natural gas price volatility and their impact on a company's exposure.

Price per Ton	Rate of Reduction
$4–5 per ton	5% below 2002 levels by 2005
$10–15 per ton	10% reduction below 2002 by 2007/8
$20–25	20% reductions below 2002 by 2012

WWF Power Switch Scenarios

Among the key findings of the report are:

- Policies to reduce greenhouse gas emissions could increase electric power companies' costs by as much as 10 percent of 2002 earnings.
- The cost burden for each company is primarily affected by the allocation method for the greenhouse gas permits and the ability of the power company to pass on costs to consumers.
- Limits on greenhouse gases have a fundamental impact on the prices of the fuels used to generate electricity.
- Even modest price changes as a result of the greenhouse gas limits could increase demand for cleaner fuels such as natural gas.

Best Practices in Electric Power Climate Change Disclosure

Overview

To enable analysts to consider climate risk, they must have access to the key pieces of information that underpin the analysis—emissions, corporate governance and management systems, and some financial information. However, much of this information is not readily available to the financial community through standard corporate financial 10-K filings that require disclosure of "material" risks. Power companies are beginning to consider how to address environmental financial risks such as climate change as they implement new accounting rules under the Sarbanes-Oxley Act of 2002, and this is likely to be an evolving area.

To assist in assessing climate change risk through examination of emissions, analysis of corporate governance and management systems, and quantification of financial risk, investors have begun to push electric power companies to improve disclosure practices.

Although current disclosure practices are far from standardized, there are presently two primary mechanisms for reporting climate change risk: through SEC filings, or through other reports, including those that are explicitly focused on climate risk.

Disclosure Investors have been Seeking

Some investors have been asking electric companies and others to disclose information that is very consistent with the areas that the Dialogue participants identified as critical to conducting climate risk analysis. Some investors have asked companies to disclose their emissions; their corporate governance and management systems, including actions the firm is taking now to address climate, and their strategic analysis of the climate change issue and plan for addressing it. These types of questions are increasing and have been emphasized by recent activities of the Investor Network on Climate Risk.

Recently, an unique global partnership of 14 leading institutional investors and other organizations representing trillions in assets released the Global Framework for Climate Risk Disclosure to provide specific guidance to companies regarding the information they provide to investors on the financial risks posed by climate change. Investors created the climate disclosure framework in response to growing concerns about the risks and opportunities from climate change, whether from new regulations, physical impacts or growing global demand for climate-friendly products. Leading pension funds in the United Kingdom, Australia, California and Connecticut were among the investors.

Rationale for Disclosure

Investors have based their arguments for increased disclosure on a number of legal requirements, including:

- Rule S-K, Item 303 in the SEC Act of 1933 requires U.S. publicly traded companies to disclose *"where a trend, demand, commitment, event or uncertainty is both presently known to management or reasonably likely to have material effects"* on the financial condition of the company.
- Standards[20] set by the International Accounting Standards Board (IASB) require accounting for climate change. Companies that operate in countries that have adopted standards, such as the Kyoto Protocol, to report emission credits from an emission trading system as intangible assets and to report the potential costs of emission reductions as a contingent liability.

- U.S. Supreme Court (1976) states that disclosure is material if disclosure of the emitted fact would have significantly altered the "total mix" of information available or impacted an investor's vote.
- Sarbanes-Oxley Act states that companies must fairly present all material impacts, not just follow the letter of the law.
- Increased investor interest in disclosure of absolute emissions and emission rates; corporate governance and management systems in place to manage climate risk; and specific financial and operational analysis of plausible regulatory scenarios.

Global Framework for Climate Risk Disclosure. A group of leading institutional investors from around the world released the Global Framework for Climate Risk Disclosure—a new statement on disclosure that investors expect from companies—in October 2006. During the last ten years, an increasing number of investors have advocated for and achieved improved corporate disclosure of climate risk. They have also encouraged investment company consideration of climate risk in investment decision-making, and witnessed new government policies to set global warming emission standards that create certainty and level the playing field among all companies. The framework consists of four elements of disclosure: 1) Total historical, current, and projected greenhouse gas emissions 2) Strategic analysis of climate risk and emissions management 3) Assessment of physical risks of climate change 4) Analysis of risk related to the regulation of greenhouse gas emissions.

Best Practices in Corporate Disclosure

Companies currently disclose climate risk information in a variety of formats and in a range of sources. These sources include from financial filings, investor presentations, corporate websites, environmental and sustainability reports, and responses to investor inquiries or inquiries like the Carbon Disclosure Project. Companies also disclose climate risk data, especially emissions information, on a voluntary basis to reporting program such as the US 1605b reporting program, the WRI/WBCSD GHG Protocol and the California Climate Action Registry. Some electric power companies have recently issued or plan to issue specific reports on climate risk.

A benefit of the range of disclosure options is that companies are encouraged to be innovative in the type of information they disclose. In this evolving regulatory climate, companies have flexibility to improve their disclosure of climate risk as their internal knowledge expands. Over time, the challenge is to develop a standardized method of reporting climate risk information to make it easier for investors and analysts to absorb.

Disclosure on Financial Forms

Friends of the Earth (FoE), a non-profit environmental organization, has conducted four surveys of disclosure of climate risk in SEC filings and annual reports. The most recent report, released in September 2005, examined 112 publicly traded US-based companies, including 25 electric utilities, using 2004 SEC 10-K and 20-F filings as well as annual reports.

According to the FoE survey, 96% of the power companies in the survey discussed climate change in their 2004 filings—the highest rate of all sectors surveyed (average was 47%, up from 39% in 2003).

All but one company that disclosed climate risk made some attempt to address its impact on profitability or performance, and about half of the companies disclosed that climate policies could lead to adverse impacts on their business or significant costs. Two companies thought climate change may have a positive impact on the company's bottom line, and two had mixed conclusions.

The FoE survey noted several trends in climate risk reporting:

- Most common practices:
  - discussion of the Kyoto Protocol
  - discussion of climate change legislation and regulations
  - increasing qualitative disclosure of financial impact of policies on the sector and company and corporate responses to climate change
- Emerging practices:
  - disclosure of carbon dioxide emissions
  - dedicating discrete sections to climate change issues on filing
  - highlighting risk management strategies
  - listing climate change as a key risk
    - assessment of climate risk varies
    - quantitative data is rare but emerging

Special Climate Risk Disclosure Reports

Over the past few years, many shareholders have urged electric power companies to increase disclosure of climate risks, and several companies have responded favorably to these shareholder requests. In 2004 and 2005, six companies agreed to prepare reports and Progress Energy has agreed to do so this year. AEP, TXU, Cinergy, Southern Company, FirstEnergy, and DTE Energy have issued reports to shareholders that outline the implications to the companies and their shareholders of climate change and possible climate change regulations. These reports demonstrate a new and advanced form of disclosure that goes beyond information contained on filings with the SEC, and which may lay the foundation for new forms of disclosure in the electricity sector.

To varying degrees, the reports addressed the key issues that investors and analysts have identified as important—emissions, corporate governance and management systems, and financial analysis. In addition, each company offered strategic analysis of the company's current position and the implications of climate change for it. Key highlights from the report were:

- **American Electric Power** did a thorough job analyzing, quantifying, and discussing the implications for the company of future regulatory scenarios. It correctly identified current policy and technology uncertainty as the "central challenge" facing the company, but did not clearly state support for ending that uncertainty. The board prepared the report with management and also consulted with a range of industry experts including public interest organizations.
- **Cinergy** presented a thorough discussion of the implications of future regulatory scenarios for the company, and provided some assessment of the financial implications. Cinergy expressed concern about the regulatory uncertainty, and even called for Congress to end the uncertainty. Cinergy also described its greenhouse gas reduction commitment and strategy for achieving actual reductions. The company worked closely with shareholders to develop and release the report, which was also reviewed by its Board of Directors.
- **TXU** comprehensively explained the risks associated with voluntary actions in the absence of a national climate policy, but did not include an examination or quantification of future regulatory scenarios—a primary request of shareholders. TXU also provided a detailed discussion of the company's management systems and qualifications to address existing environmental requirements. It did not consult with many outside experts or with shareholders in preparing or releasing the report.

"There have been a number of bills introduced in the last session of Congress and the current session of Congress that would…impose limitations on carbon dioxide emissions… There is significant uncertainty as to whether any of the proposed legislative initiatives will pass in their current form or whether any compromise can be reached that would facilitate passage of legislation. Accordingly, SCE is not able to evaluate the potential impact of these proposals at this time…

"If EME does become subject to [international] limitations on emissions of carbon dioxide from its fossil fuel- fired electric generating plants, these requirements could have a significant economic impact on their operations."

Edison International Annual Report

Company	Climate Change Disclosure
FirstEnergy	• Described climate policies • Potential regulations would require significant capital
Ameren	• Reduce GHG's by 3–5% from 2002–2012 • Climate change regulations would have material impact on financial conditions
Entergy	• Stablilize GHG's at 2000 levels through 2005 • Emissions data • Lobbying as risk management strategy
AEP	• Reduce GHG's by 18 million short tons from 2003–2006 • Risk management ◆ Energy efficiency ◆ Emissions trading ◆ Divestitures of carbon-intensive assets
PSEG	• Reduce GHG's by 18% below 2000 levels by 2008 • $1.5 million in liabilities if it does not meet its voluntary target (15% below 1990 levels by 2005)
Scottish Power	• Climate change regulation would not adversely impact operations • Subsidiary PacifiCorp incorporated climate change into strategic planning
PG&E	• Can pass cost of climate change regulation on to customers
Consolidated Edison	• General discussion of climate change and potential risks • Cost of compliance could be "substantial"
Exelon	• General discussion of proposed federal emissions regulations, stating that financial implications are unknown • Description of voluntary measures undertaken (EPA's Climate Leaders)

Examples of Climate Risk Disclosure in Annual Reports and SEC Filings in 2003 and 2004

- **Southern Company** reviewed a range of current regulatory requirements and proposed national legislation, provided analysis for each scenario, and discussed the various actions the company will take to reduce or offset its emissions. Investors were disappointed that Southern opposed mandatory limits on greenhouse gas emissions to end regulatory uncertainty and did not commit to seeking cleaner energy sources to meet future demand.
- **FirstEnergy** described the company's approach to managing climate risk and other environmental issues. The report acknowledged the likelihood of GHG regulation and indicated that the company's actions have taken that into consideration. The report provided a comprehensive set of emissions data and some basic financial analysis of regulatory scenarios. The company worked closely with shareholders to develop and release the report, which was also reviewed by its Board of Directors.
- **DTE Energy** issued a report providing a detailed assessment of the company's emissions and approach to managing environmental issues. The report was reviewed by its board of directors and notes that the company has achieved a 6% reduction in its CO_2 emissions relative to 1990 levels. The company acknowledges the possibility of GHG regulation but supports a voluntary approach. The report provides little scenario analysis, but does describe its DTE Energy Ventures subsidiary, which invests in distributed generation and clean energy technologies. To date, it has invested approximately $100 million in companies and venture funds.

Emissions Analysis. The companies generally did not systematically report absolute emissions and emissions rate data for sulfur oxides (SOx), nitrogen oxides (NOx), mercury, and carbon dioxide (CO_2). Cinergy did the best job of disclosing its emissions data, because it revealed absolute emissions for three out of four - SOx, NOx, and CO_2—for multiple years. TXU provided information on SOx and CO_2 emissions. AEP only revealed current CO_2 emissions; however, AEP provided projections of all of the emissions under study. Southern found that even under the most aggressive carbon reduction scenario, its CO_2 emissions will rise from 145 million tons a year to between 160 million and 170 million tons a year by 2020;

Corporate Governance and Management Strategies. In all cases, the Boards of the companies reviewed these reports, indicating a high level of corporate governance engagement. All of the companies addressed what activities they were undertaking related to CO_2 emissions reductions, but provided few details on their long-term strategy. Under the voluntary commitments that AEP and Cinergy have made, each company has a large portfolio of current strategies to reduce emissions, including efficiency improvements, sequestration projects, investments in renewable fuels, and support of the Integrated Gasification Combined Cycle (IGCC) technology with coal. TXU's report does not present any actual CO_2 reduction strategies that the company plans to take in the future. Their report assesses only representative strategies that a company might take now and argues strongly against taking voluntary action to address climate change, except in limited circumstances, until the rules of a mandatory program are known. TXU is purchasing greater amounts than mandated of renewable energy. Future choices, each company suggests, depend upon CO_2 allowance price. Southern projects it will continue to rely on coal for 65 percent or more of its power generation through 2020, of which only three to four percent would come from IGCC technology, and that new nuclear power units in 2015 and 2016 would reduce the company's CO_2 emissions by about seven percent.

Financial Analysis. American Electric Power did the most comprehensive job of analyzing future scenarios, quantifying their implications, and providing a discussion of them. Cinergy outlined possible scenarios and discussed their implications, but did not quantify them. The TXU report summarized legislative and regulatory proposals but failed to quantify the implications of future policy scenarios or discuss what they meant for the company. Southern assumes that any costs for reducing CO_2 emissions will be borne by customers, not by shareholders, and projects that the various carbon reduction scenarios would increase customer costs by two to 14 percent by 2020.

Endnotes

1. Ceres, Natural Resources Defense Council, and PSEG; *Benchmarking Air Emissions of the 100 Largest Electric Power Producers in the United States*—2002; April 2004.

2. Point Carbon, www.pointcarbon.com

3. Sanford C. Bernstein & Company, *Bernstein Research Call*, February 17, 2006.

4. Citigroup Equity Research, Citigroup Global Markets, *Carbon Limits are Coming*, September 11, 2006

4A. JPMorgan, North America Corporate Research, *Warming to Rules on Climate Change*, September 27, 2006

5. Innovest Strategic Value Advisors; *The Electric Utility Industry: Uncovering Hidden Value Potential for Strategic Investors*; New York June, 2002

6. This section represents Ceres' recommendations based on the findings of Phase II of the Electric Power/ Investor Dialogue. Participating organizations do not necessarily endorse any or all of these Findings and Recommendations.

7. See Benchmarking Air Emissions of the 100 Largest Electric Generation Owners in the U.S., 2004, http://www.ceres.org/pub/publication.php?pid=86

8. Friends of the Earth, *Fourth Survey of Climate Change Disclosure in SEC Filings of Automobile, Insurance, Oil & Gas, Petrochemical, and Utilities Companies*, July 2004. Page 22.

9. American Electric Power, the Southern Company, the Tennessee Valley Authority, Xcel, Ameren, Cinergy, Dominion, Edison International, Progress Energy, TXU, FPL Group, Scottish Power, Duke Energy, E.ON, FirstEnergy, Allegheny Energy, AES, DTE Energy, and Texas Genco.

10. The GHG Protocol separates indirect emissions into two categories: 1) purchased power consumed on site, scope 2; and 2) other indirect emissions such as employee travel and emissions from leased assets, scope 3.

11. Sanford C. Bernstein & Company, *Bernstein Research Call*. February 17, 2006.

12. ABN-AMRO, *Climate Change and Investment Analysis*. November 3, 2003.

13. Standard & Poor's, *Emissions Trading: Carbon Will Become a Taxing Issue for European Utilities*, August 21, 2003.

14. UBS Investment Research, *European Emissions Trading Scheme*. September, 2003.

15. When a government creates an emissions trading program, a key decision is how to allocate initially the permits that companies must hold to comply. A government may choose to require companies to purchase them through an auction, or it may allocate or give them directly to the companies using any number of factors. As part of the acid rain program created as part of the Clean Air Act of 1990, for example, Congress granted permits to electric power companies largely on the basis of the firm's historical emissions, a form of direct allocation know as "grandfathering".

16. One Euro equals 1.286 U.S. dollars, the exchange rate on May 2, 2005.

17. UBS analysts developed these scenarios, and have provided little detail about each of the scenarios.

18. This legislation is highly unlikely to be enacted in the form in which it was analyzed, but it does provide an upper bound of likely compliance costs with greenhouse gas and air pollutant controls for the power sector.

19. Robert Repetto and James Henderson; Environmental Exposures, Transparency, and Strategic Management in the U.S. Electric Utility Industry; unpublished paper, Stratus Consulting (2002)

20. These standards are in place many developed countries, such as Europe and Australia. The U.S. Financial Accounting Standards Board has pledged to work with IASB to converge U.S. and international standards.

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