

**CLIMATE DISCLOSURE: MEASURING FINANCIAL
RISKS AND OPPORTUNITIES**

HEARING
BEFORE THE
SUBCOMMITTEE ON
SECURITIES AND INSURANCE AND INVESTMENT
OF THE
COMMITTEE ON
BANKING, HOUSING, AND URBAN AFFAIRS
UNITED STATES SENATE
ONE HUNDRED TENTH CONGRESS

FIRST SESSION

ON

EXAMINING THE TYPES OF ECONOMIC RISKS AND OPPORTUNITIES
POSED AND THE CONNECTION BETWEEN CLIMATE CHANGE AND THE
HEALTH OF FINANCIAL MARKETS; RISKS AND OPPORTUNITIES DIS-
CUSSED IN CORPORATE FINANCIAL DISCLOSURE STATEMENTS AND
WHETHER REQUIREMENTS ARE ADEQUATE; AND LISTEN TO INVES-
TORS AND OTHER STAKEHOLDERS ON THEIR REQUEST FOR CON-
SISTENT CLIMATE RISK DISCLOSURE IN ORDER TO BETTER MANAGE
FINANCIAL RISKS

WEDNESDAY, OCTOBER 31, 2007

Printed for the use of the Committee on Banking, Housing, and Urban Affairs



Available at: <http://www.access.gpo.gov/congress/senate/senate05sh.html>

U.S. GOVERNMENT PRINTING OFFICE

50-362

WASHINGTON : 2010

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512-1800; DC area (202) 512-1800
Fax: (202) 512-2104 Mail: Stop IDCC, Washington, DC 20402-0001

COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS

CHRISTOPHER J. DODD, Connecticut, *Chairman*

TIM JOHNSON, South Dakota	RICHARD C. SHELBY, Alabama
JACK REED, Rhode Island	ROBERT F. BENNETT, Utah
CHARLES E. SCHUMER, New York	WAYNE ALLARD, Colorado
EVAN BAYH, Indiana	MICHAEL B. ENZI, Wyoming
THOMAS R. CARPER, Delaware	CHUCK HAGEL, Nebraska
ROBERT MENENDEZ, New Jersey	JIM BUNNING, Kentucky
DANIEL K. AKAKA, Hawaii	MIKE CRAPO, Idaho
SHERROD BROWN, Ohio	JOHN E. SUNUNU, New Hampshire
ROBERT P. CASEY, Pennsylvania	ELIZABETH DOLE, North Carolina
JON TESTER, Montana	MEL MARTINEZ, Florida

SHAWN MAHER, *Staff Director*

WILLIAM D. DUHNKE, *Republican Staff Director and Counsel*

JOSEPH R. KOLINSKI, *Chief Clerk and Computer Systems Administrator*

JIM CROWELL, *Editor*

SUBCOMMITTEE ON SECURITIES AND INSURANCE AND INVESTMENT

JACK REED, Rhode Island, *Chairman*

WAYNE ALLARD, Colorado, *Ranking Member*

ROBERT MENENDEZ, New Jersey	MICHAEL B. ENZI, Wyoming
TIM JOHNSON, South Dakota	JOHN E. SUNUNU, New Hampshire
CHARLES E. SCHUMER, New York	ROBERT F. BENNETT, Utah
EVAN BAYH, Indiana	CHUCK HAGEL, Nebraska
ROBERT P. CASEY, Pennsylvania	JIM BUNNING, Kentucky
DANIEL K. AKAKA, Hawaii	MIKE CRAPO, Idaho
JON TESTER, Montana	

DIDEM NISANCI, *Staff Director*

TEWANA WILKERSON, *Republican Staff Director*

C O N T E N T S

WEDNESDAY, OCTOBER 31, 2007

	Page
Opening statement of Chairman Reed	1
Opening statements, comments, or prepared statements of:	
Senator Casey	3
Senator Menendez	
Prepared statement	27
WITNESSES	
Dr. Gary Yohe, Professor of Economics, Wesleyan University	5
Prepared statement	29
Jeffrey Smith, Partner in Charge of Environmental Practice, Cravath, Swaine, and Moore	7
Prepared statement	45
Mindy Lubber, President, Ceres	9
Prepared statement	80
Russell Read, Chief Investment Officer, CalPERS	12
Prepared statement	95
ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD	
“Carbon Disclosure Project—Report 2007—USA S&P500: On behalf of 315 investors with assets of \$41 trillion”	109

CLIMATE DISCLOSURE: MEASURING FINANCIAL RISKS AND OPPORTUNITIES

WEDNESDAY, OCTOBER 31, 2007

U.S. SENATE,
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS,
SUBCOMMITTEE ON SECURITIES, INSURANCE, AND
INVESTMENT,
Washington, DC.

The subcommittee met at 2:32 p.m., in room SD-538, Dirksen Senate Office Building, Hon. Jack Reed, Chairman of the Subcommittee, presiding.

OPENING STATEMENT OF CHAIRMAN JACK REED

Chairman REED. Good afternoon. Let me welcome all of our witnesses, thank you very much, and begin the hearing.

This is a topic that is increasingly more relevant and important to all of us, and it is a topic of great concern. Today we are dealing with the issue of Climate Disclosure: Measuring Financial Risk and Opportunities.

The purpose of today's hearing is to look at the types of economic risks and opportunities posed by climate change and the connection between climate change and the health of financial markets, also to examine how climate risk and opportunities are currently being discussed in corporate financial disclosure statements and to determine whether or not current disclosure requirements are adequate, and also to explore the possibility for improvements and hear from investors and other stakeholders on their requests for consistent climate risk disclosure in order to better manage financial risk.

Global warming presents a real and serious risk to our environment, our communities, and our financial markets. While no one can predict the consequences of climate change with certainty we do know enough to understand that there are risks. These risks include crop damage from more severe droughts, damage to coastal communities from sea level increases, more intense storms, blackouts that may result from heat waves, and many, many other potential risks.

I believe it is in our self-interest to manage the risk and find ways to mitigate global warming while attempting to adapt to the upcoming changes and identify business opportunities to reduce carbon emissions.

There is a growing awareness among analysts, investors, businesses, government officials, and other stakeholders that climate change not only poses risk but can create new opportunities in the financial sector. Major environmental risk and liabilities can sig-

nificantly impact companies' future earnings and, if undisclosed, could impair investors' ability to make sound investment decisions. But at the same time, a corporation or investor can profit from environmental innovation such as the development of new energy-efficient or renewable energy technology.

The cost associated with more extreme weather events, regulations to curb greenhouse gas emissions at the global, regional, state, and local level, growing global demand for low carbon technologies, and the increasing geographic spread of infectious diseases are just a few of the ways that climate change is likely to ripple through the U.S. and global economy. With these risks, as I mentioned before, however, come some opportunities. Companies in many sectors can increase their profitability by implementing energy-efficient strategies and developing emission reducing technologies and products whose value is enhanced by global efforts to reduce greenhouse gas emissions.

In September 2007, the Carbon Disclosure Project released its fifth survey. The CDP represents 315 institutional investors with assets of \$41 trillion, or more than one-third of the total global invested assets. Fifty-six percent of S&P 500 companies answered the survey. Of those responding, 81 percent of the companies reported that they regard climate change as posing a commercial risk, and 69 percent of those firms also considered it an important business opportunity.

While the majority of the S&P 500 companies participated in the survey, the CDP also conducted a review of Form 10K securities filings and found that climate change disclosure was rare.

There is an old adage in business, "what gets measured gets managed." Investors recognize this and they are calling for greater climate disclosure, both voluntary and mandatory.

In September, a broad coalition of investors, State officials with regulatory and fiscal management responsibilities, and environmental groups filed a petition asking the SEC to issue an interpretive release to clarify that publicly traded companies must assess and fully disclose their financial risk and opportunities related to climate change under existing law. The 22 petitioners include leading institutional investors in the United States and Europe, managing more than \$1.5 trillion in assets.

In addition, the number of shareholder resolutions on climate change is increasing from six in 2001 to almost 50 in 2007. These resolutions now account for over 10 percent of all shareholder resolutions that are filed. Public disclosure about global warming has largely focused on the scientific debate and the environment consequences. As the science has become stronger and the need for action more compelling, global warming is getting increasing attention in corporate boardrooms and from investors and the market is responding. However, markets work best when they have accurate information, informational transparency is therefore vitally important if financial markets are to price climate risk and opportunities efficiently.

In addition to today's hearing on climate disclosure I think it is also important for the Subcommittee to consider the emerging financial market in emissions and carbon trade. The global effort to reduce the emissions of greenhouse gases that has led to the cre-

ation of large and rapidly growing carbon markets around the world is something that has to be reckoned with. According to the World Bank, the global carbon market grew from approximately \$10 billion in 2005 to over \$30 billion in 2006. Some credible private estimates put the global market at over \$50 billion in 2007.

While it is difficult to predict with precision, the enactment of a mandatory cap and trade bill in the United States would create the largest carbon market globally. In the EU Emissions Trading Scheme, carbon trading occurs both over-the-counter and on exchanges with significant participation by some of the largest regulated financial institutions. It is expected that a U.S. cap and trade program would develop similarly.

Today's hearing is an opportunity to learn from our witnesses about what economics is telling us about climate change, the connection between climate change and the health of financial markets, and the type of information investors need to make sound decisions in the marketplace. It is also an opportunity to examine voluntary and mandatory mechanisms for climate change and climate risk disclosure by public corporations, whether current disclosure is adequate, and the need for the SEC to offer guidance for climate risk disclosure.

I want to recognize now my colleague, Senator Casey, for his opening comments. Senator Casey.

STATEMENT OF SENATOR ROBERT P. CASEY

Senator CASEY. Mr. Chairman, thank you very much.

I want to thank you for calling us together today. I want to thank our witnesses for bringing their expertise and experience to bear on these questions, and also for the time they took to travel here and to present testimony.

I have just a brief opening statement. First of all, to thank the Chairman for bringing this issue to the fore. This is an issue or these issues we will discuss today are issues that are not often talked about in the same context, often not in the same paragraph if not in the same galaxy. People do not think of climate change and investment strategy in the same place. But we know that that is not the case, that they are closely interrelated.

Like a lot of Americans, one of the most searing images that I remember on the issue of climate change was brought home—a lot of them obviously—a motion picture that did it for many Americans. But I remember the picture on the cover of Time Magazine in 2005. I cannot remember which week, but with the polar bear on the small piece of ice and all around him is water, presumably that melted around that ice piece.

I will never forget one fact in that article, and you did not have to be a scientist or a climatologist or any kind of an expert for this to come home to you, and it certainly did for me, where they said that since about 1970, roughly 35 years, the percent of the Earth's surface which has been the subject of drought had doubled, had doubled. Now you do not need much expertise to know that when that kind of drought occurs and that kind of landmass has drought connected to it, over time that leads to hunger and darkness and death for the human race, for the human race that is affected by that drought. So this is an urgent priority.

At the same time, we all have strong feelings on the question of climate change. Most of us in this room, and in most rooms in the country, would say we have to make good investments. In the context of investments that pertain to financial investments, whether it is pension fund investments or other investments of public dollars—not to mention private investment—you want to do it in a way where you get a good return and you do it prudently and you do it based upon the best evidence available for that investment.

So for all those reasons, when I was—in the 2 years I was a State Treasurer of Pennsylvania, I thought my obligation was not just to do the basic job of being a State Treasurer, but was to think beyond the boundaries of normal investment strategy and to think of other ways to get a good return on investment in connection with an important priority like climate change.

So what we did in Pennsylvania in two short years, and I think it bears repeating, I think, in other parts of government, especially at the Federal level, and other States have done many of these things as well. I do not claim to be the author of all of these. But the first thing we did was we created a Keystone Green Fund, a new investment, which we established to attract and leverage private sector investments in clean technology projects. Many of you have heard of those kinds of efforts in States.

No. 2, we had an active equity management initiative where up to \$50 million in State assets were invested so that we could place those assets with investment managers who had a demonstrated track record of providing superior returns on their investments in clean technologies.

And then the last two things we did are even more applicable for today: environmental equity screens. Our department, at that time, developed new investment screens for its managers and outside consultants, the firms and individuals you retain to invest public dollars in an appropriate way. We wanted to use those screens when evaluating a company's potential exposure to environmental liabilities, all part of good, hardheaded financial investment strategy.

And No. 4, we joined a national organization which many people in this room know about, the Investor Network for Climate Risk. We formally joined that network, which as some people in the room know, is a network of institutional investors and financial institutions that promote better understanding of financial risks and investment opportunities posed by climate change.

So I think that there are great possibilities for the Federal Government to chart a brand-new course in this area. I know some initiatives are underway. I think Senator Reed calling this hearing is one opportunity to explore such strategies, where we can literally equate and work on two sides of—two ends of a problem, I should say. One is the challenge posed by climate change, challenge to our environment, challenge to human life literally. And on the other hand, get good returns on those investments, especially in the area of clean technology.

And oh, by the way, we can create jobs, too. So the old false choices of picking the environment over jobs or picking good environmental or climate policy as opposed to good investment policy,

all those dichotomies I think are shattered in large measure because of what we know now.

And for all those reasons, Mr. Chairman, I am happy to be here and honored that you would bring these experts together.

Chairman REED. Thank you very much, Senator Casey, for your very eloquent words and also your insights as a former treasurer who had the responsibility to invest and do it in a conscientious way. Thank you very much.

Let me now introduce our panel. We are very pleased to be joined this afternoon by experts in the field. Let me first begin by introducing Dr. Gary Yohe. Dr. Yohe is a Professor of Economics at Wesleyan University and the recent Nobel Prize recipient for his work on the International Panel on Climate Change.

I did not see you being interviewed with Al Gore. I guess you were out of town. I understand.

His work has focused attention on both mitigation and adaptation to climate change and tools to try to manage the risk of climate change in an uncertain world.

We are then joined by Mr. Jeff Smith who is the Director of the Environmental Practice Group at Cravath, Swaine, and Moore Law Firm. The group also provides day to day counseling on environmental management and corporate governance issues, environmental issues of interest to the SEC, shareholder relations involving environmental matters, and environmental litigation. Mr. Smith recently completed a 3-year term as Chairman of the American Bar Association's Special Committee on Environmental Disclosures. Thank you very much.

Ms. Mindy Lubber is President of Ceres, a U.S. coalition of investors and environmental organizations working to improve corporate, environmental, social and governance practices and Director of the Investor Network on Climate Risk, an alliance that coordinates U.S. investor responses to the financial risk and opportunities posed by climate change.

And finally, Mr. Russell Read is the Chief Investment Officer for CalPERS, the nation's largest pension fund that manages \$250 billion of retirement funds for 1.5 million California retirees. Mr. Read is responsible for the Strategic PLAN for CalPERS Investment Office, including tactical asset allocation, risk management, business development and new investment programs.

Thank you again for joining us. I have had an opportunity to look at all the statements. They are excellent, they are detailed, they are analytical. I will ask you, though, to contain your verbal comments to about 5 minutes so that we can get through the panel and Senator Casey and I will have an opportunity to ask questions. Thank you very much.

Dr. Yohe, would you please begin?

**STATEMENT OF DR. GARY YOHE, PROFESSOR OF ECONOMICS,
WESLEYAN UNIVERSITY**

Mr. YOHE. Mr. Chairman, Senator Casey, members of the Subcommittee, thank you so much for your invitation to present some testimony based on my work as an economist and also as a senior member of the Intergovernmental Panel on Climate Change.

You asked me to talk a little about how economics can inform national and global responses, a little about what the Stern Review contributed to the landscape, a little about what the IPCC has contributed, and then to connect it all to the health of financial markets. It is difficult to do all of that quickly. I did provide, as you noted, some remarks and some details, so I will try to hit the highlights.

My testimony is anchored on a fundamental conclusion that emerged from both the IPCC Fourth Assessment Report and the Stern Review: economics can play a significant role in understanding how we should respond to the risks of climate change. My take is that this role will be productive in policy deliberations only if the practitioners accept the shortcomings of cost-benefit analysis of the problem and begin to adopt a risk management approach to the problem.

I was pleased to note that both Senators spoke specifically about climate risks and a lot less about costs versus benefits in their opening remarks.

Both the Stern Review and the IPCC Fourth Assessment Report describe a climate that is changing faster than anticipated just 5 years ago. Significant impacts are being calibrated in many metrics, some are economic, but some are now being expressed in terms of human lives at risk, risks to unique and threatened ecosystems, and so on.

Perhaps more critically, many of the temperature thresholds that could trigger critical impacts are thought to be lower than we thought just five years ago. This suggests that the associated risks are closer in our future than earlier anticipated.

It is perhaps with respect to the risks about which you are having conversations and deliberations most important to recognize that achieving no specific concentration target will guarantee you achieving a particular temperature target or temperature threshold in terms of increases in global mean temperature. That is to say, the best you can talk about in terms of policies that you think about on the adaptation side or the mitigation side is reducing or mitigating the risks associated with certain thresholds. Guarantees are just not going to happen.

Some of these risks are identified in the tables that I have sent to you. Translating them into dollars and cents is an extraordinary challenge, and some might say that we have failed to meet that challenge. Economists do know that they should be measuring the social cost of carbon. More than 200 estimates are now available, but they are far from comprehensive in their coverage of potential damages. Depending on how heavily the future is discounted heavily and how equity concerns are incorporated in the calculations, even negative "costs" are possible. The median estimate for a 3 percent discount rate is about \$20 a ton of carbon. That is about \$5 a ton of carbon dioxide.

The Stern Review, though, reports an estimate of \$85 a ton of carbon dioxide.

So what's the deal? Many of us (I have included some of the testimony that I made about Stern last February) feel that Stern was right for the wrong reason. There is an economic reason for immediate action based on identifying a risk that is "dangerous" and rec-

ognizing that climate policy is an imperative. As soon as that happens, temperature thresholds can be identified and associated probabilistically with concentration targets. Since concentrations depend on cumulative emissions, the climate policy problem becomes an exhaustible resource problem for which the least costly approach is well established: set an initial scarcity rent immediately and arrange for it to increase at the rate of interest in a predictable and persistent way. The policy can be implemented by trading permits or setting a carbon tax. I tend to favor a carbon tax, but that is entirely a different story.

It is essential that the Senate and others who worry about climate change for the United States and the globe recognize setting policy in 2007 or 2008 that will solve the problem once and for all is impossible. Current deliberations need to be informed about the long-term risks as you indicated, but you need to work to set near term policy in terms of promoting “carbon friendly” investments that will be undertaken at the appropriate time (so that they will not be particularly expensive) and avoid locking the economy into high carbon decisions.

In short, a significant mitigation is in our future. Ignoring climate policy in economic decisions will be just as unsustainable for business in the United States and around the world as ignoring climate risks.

Thank you very much.

Chairman REED. Thank you very much, Dr. Yohe.

Mr. Smith, please.

STATEMENT OF JEFFREY SMITH, PARTNER IN CHARGE OF ENVIRONMENTAL PRACTICE, CRAVATH, SWAINE, AND MOORE

Mr. SMITH. Chairman Reed, Senator Casey, thank you very much.

In addition to your kind introduction, I should note that I have been practicing environmental law for 27 years, principally at the intersection of environmental law and business issues, and that I have had the opportunity and sometimes the pleasure to review thousands of pieces of environmental disclosure. Notwithstanding that experience, which I hope to make of use to the Committee, I am speaking on my own behalf, not on behalf of the ABA or my firm or my clients.

Investor interest in climate change is at a volume and level of sophistication that is unprecedented in my experience. Superfund and asbestos, which were both substantial issues, run a distant second.

This has had several significant consequences over the past 5 years. There has been a dramatic rise in the number of shareholder resolutions and in the level of support of those resolutions. There has been a development of an unprecedented, sophisticated, robust and often third-party verified voluntary disclosure marketplace, particularly involving companies in the energy sector with high sensitivity to climate change issues. And in these reports, companies often share substantial baseline data and strategic decisions and analyses with investors.

There has also been a coalition of public forces, typically State Attorneys General and—as Senator Casey noted—State Treas-

urers, and private and pension money to drive the shareholder resolution agendas and the disclosure agenda.

Against this recent backdrop, there are long-standing, broad and flexible SEC disclosure regulations that have governed environmental disclosure for over 30 years. They have led, often after guidance from the SEC, to significant and still evolving disclosure across all market sectors from a variety of legal technically challenging environmental topics, ranging from Superfund, to the 1990 Clean Air Act to the cluster rules for pulp and paper in the late 1990's, as well as all types of environmental litigation.

Briefly, the regulatory construct is contained within Reg S-K and Reg S-X and includes Item 101, which requires disclosure of material capital expenditures and the cost of compliance with environmental law, including any laws implicating climate change; Item 103, which requires disclosure of material litigation to which a company or its property could be subject; and Item 303, which requires disclosure of material known trends and uncertainties and gives investors an opportunity to look at the company and its prospects and its challenges through management's eyes.

For financial statement disclosure, the operative principle is embodied in FAS 5, which requires accrual of a contingent loss when it is both probable that it has been incurred and the amount is estimable. This provision, which is subject to substantial accounting art—and I'm not an accountant—strikes a balance between two competing forces. On the one hand, matters should be kept out of financial statements until they are more likely than not real and a value can be fairly placed on them. There is arguably nothing more misleading to the market than ill supported math.

On the other hand, guidance to FAS 5 makes clear that recognition of a liability cannot be delayed until the event is certain or there is only one estimate of a loss. Beyond a point, a company should not be able to hide behind uncertainty. Material surprises also disrupt markets.

Woven throughout these regs and overarching all of securities law under the 1933 Act and the 1934 Act is the concept of materiality. This is a highly significant filter that separates the important from the trivial. This is a flexible standard and case law and litigation emphasize that it is non-numerical. It is nevertheless important to be precise about how to use it in the climate change context.

The standard is that the event or the loss must be material to the company from the perspective of a reasonable investor, not material to society at large or significant to a large number of investors. While no one can seriously dispute the importance of climate change as a societal issue, there are nevertheless many companies for which it is not now and may never be a material issue. It would be a mistake to make everyone say something.

Similarly, even for companies at the heart of greenhouse gas emission issues, certain types of information are not now and may never be material. The cost of carbon credits, for example, may soon be material to a coal burning utility in Ohio but the physical risk to its own plants from the effects of climate change may never be. Even companies that should say something should not be compelled to say everything.

In the past, the SEC has responded to market demands for information with successful guidance and clarification about how to act. For example, after the passage of Superfund between the mid-1980's and early 1990's, prompted in part by guidance from the staff, substantial and increasingly precise amounts of information became available to investors about liability for hazardous waste contamination.

On a shorter time fuse, through the workings of a Staff Legal Bulletin, the SEC was successful in prompting disclosure about public company preparedness to address the millennium bug which, like climate change, had potentially far-reaching market consequences.

The way forward consists of some to-dos, in my view, and some not-to-dos. The to-dos are very simple. The SEC should clarify in a reasoned and considered way the application of time-tested disclosure principles to climate change. The SEC should also keep the business effects of climate change on its regular agenda so that, as with Superfund, changing circumstances can lead to evolving requirements.

The not-to-dos include these: do not abandon or substantially expand or to modify time-tested disclosure principles. They work and they can and should be made to work in this instance. Do not take any action that risks flooding the market with untested data or unprovable assumptions. This will undermine investor confidence, obscure evolving business truths and burden companies with the obligation of gathering and reporting information that would ultimately be of no lasting value. And finally, do not let the voluntary disclosure marketplace supplant mandatory disclosure. The voluntary market is robust, energetic and valuable at the moment, but it is unfiltered and unordered. The SEC should reassert its role as the gatekeeper of material information on climate change for the marketplace.

Thank you, Senator.

Chairman REED. Thank you very much.

Ms. Lubber, please.

STATEMENT OF MINDY LUBBER, PRESIDENT, CERES

Ms. LUBBER. Thank you, and thank you for having me.

It is a pleasure to be here, Mr. Chairman. When I was the Regional Administrator of the EPA, you led on many great things in New England, and I thank you.

Mr. Casey, when I founded the Investor Network on Climate Risk, it was leaders like yourself who really saw the vision of bringing together and marshaling the forces of investors, investors like you, like Mr. Read to my left in taking a leading role on the financial impacts of climate change on what it takes to address that.

We all know that addressing climate change is a multipart very complex situation. Thinking about bringing our carbon footprint down by 80 percent by the year 2050 is complex, is not going to happen tomorrow, but at the same time mandates and requires every ounce of our energy. But we also know it is a step-by-step process. It is building one block after another.

The block that we are talking about today, I would argue, is very doable, can be done in the short term, and will have a marked difference on the overall effort to address climate change and mitigating its impacts and eventually getting to a point where we bring that carbon footprint down by the year 2050.

Today we are talking about the issue of material information of companies assessing their climate risk—and I do believe once they assess the problem, they act on it—better, and disclosing it, disclosing it in a way that investors understand the risks to a company and the opportunities to a company.

The solution to that disclosure, to that important information in the marketplace, is fairly straightforward. The SEC, whose job it is to provide adequate information to the investor community of publicly traded companies is obligated to make sure that material risk and opportunity is disclosed so people can make adequate decisions. For whatever reason, there is a logjam.

What we are talking about today is not solving the entire problem of climate change but taking a very important step that could be led by leaders such as yourself to help break a logjam, to ask the SEC to issue interpretive guidance that their present rules and regulations that are in place, nobody is looking for a new statute necessarily or a new set of regulations that need to be promulgated. As a former regulator, I know full well that that can be complex, 500 pages, years of deliberations.

What we are looking for is a memorandum to remind companies that they ought to be disclosing material risk of climate change.

There is a very simple message I am trying to convey to your Committee today and it is that investors and capital markets have an important role to play in tackling global warming. But marshaling that market power to address this colossal challenge requires investors getting the information they need from companies about the risks and the opportunities they face from climate change.

Right now the information companies are providing on climate change is just not adequate. It is not at the level investors need, in most instances. There are great examples, Johnson Controls, Dow, Dupont, who are doing it. It is not impossible, it can be done, and it is being done. But not in enough instances and not uniformly. We need to make sure that investors have the informed information they need to make good decisions.

Action by the Securities and Exchange Commission to rectify the situation is manageable, it is doable in the short term, and no doubt your leadership can make it happen.

Before getting into a few specifics, let me provide some brief background on why investors managing trillions of dollars in assets are concerned about climate change and what they are doing to encourage better climate risk disclosure from U.S. companies as an important step. Investors recognize that climate change is real, that it poses enormous financial risks and opportunities to each of their portfolios. Prolonged heat waves, the kind of horrors we saw in New Orleans, those kinds of physical changes are billion-dollar implications to our economy. Emerging carbon reducing regulations have hundreds of millions of dollars of impact on many companies that are regulated. And the growing opportunities for climate

friendly technologies and products are just a few of the ways that climate change is already rippling across our economy and across dozens of business sectors from insurance to agriculture, to electric power, tourism, and transportation.

And opportunity related disclosure, the upside of addressing climate change, is especially important because climate change offers significant new business opportunities for investors and companies such as investing in and developing clean technologies and renewable energy.

To evaluate how companies and sectors will be affected by climate change, investors need better information. How will power companies building new coal-fired power plants be affected by regional and Federal carbon limits? And how will insurers and agricultural companies be impacted if severe droughts—as we are seeing now in the Southeast and are experiencing—become more common? And which automakers are best positioned to seize the opportunities that will be created by new, tailpipe emission limits and tougher fuel efficiency standards? These are material issues, material risks that investors need to know.

In an effort to get that information, investors have filed dozens of shareholder resolutions with companies over the recent years requesting more and more information about their risk exposure and their response strategies to climate change. And they have sent disclosure requests to 50 large power companies and 30 large insurance companies and they have joined hundreds of investors worldwide to send voluntary risk disclosure questionnaires.

These efforts have resulted in some U.S. companies improving their disclosure, but they are the exception rather than the rule. Despite a groundswell of demand from investors for more information on the business impacts, corporate climate disclosure continues to be scant, inconsistent, and not always addressing material issues. This needs to change. The Securities and Exchange Commission can and should use its existing authority to make this happen.

In final, 6 weeks ago 18 leading investors, including Russell Read to my left representing CalPERS, filed this petition asking the SEC to require companies to assess and disclose their financial risks from climate change. The petitioners included \$1.5 trillion of investors, investors from across the country, California, Florida, New Jersey, New York, North Carolina, and Rhode Island.

Climate risk disclosure, without question, falls squarely into the category of material risks that companies should be disclosing in their SEC filings. The petition requests, because after being asked for 4 years and the SEC has been nonresponsive, the petition more formally requests that the Commission formally issue interpretive guidance clarifying that material climate related information must be included in corporate disclosures under existing law.

I want to emphasize that the petitioners are not seeking an onerous new disclosure regime. They are just asking that because climate risk varies between sectors and could change because of quickly evolving regulatory regimes and new scientific information, that we issue general guidance from the SEC as suggested in the petition.

The bottom line, efficient markets depend on the availability of information. The SEC can and needs to do more to ensure that this information makes its way into the marketplace to allow for a number of things: investors to make good decisions, companies to understand their risk, and in my judgment they will act on that risk when they look at it, and to further the discourse. I believe this will take an important step in addressing the world problem we are facing of global warning.

Thank you.

Chairman REED. Thank you very much.

Mr. Read, please.

**STATEMENT OF RUSSELL READ, CHIEF INVESTMENT
OFFICER, CALPERS**

Mr. READ. Chairman Reed, members of the Committee, thank you for inviting me here today.

I am pleased to speak today on behalf of America's largest pension system, the California Public Employees Retirement System, also known as CalPERS. We provide pension and health benefits to 1.5 million public employees, retirees, and their families. We have more than \$250 billion invested in the market.

Since investment income typically pays over 75 cents of every pension dollar, we rely on sustainable and compelling long-run returns to make sure that the money will be there down the road for California's public employees. Sustainability is the key word here. We are in a marathon, not a sprint. This is about sustainable portfolio companies, a sustainable healthy economy needed by these companies in order to thrive, and sustainable natural resources.

Across our diverse investment portfolio, CalPERS has committed several billion dollars to those programs, managers, technologies, and companies which can offer both compelling investment returns as well as substantial long-term improvements in the environment. Sustainability is why we are investing specifically in alternative energy and conservation ventures, why we are pushing companies to fully report carbon emissions that may harm the environment, and why we are urging government leaders to create incentives and penalties to protect the environment. Without such efforts, we risk sawing off the branch that we are sitting on.

Increasing evidence indicates that climate change presents material risk to numerous sectors of the economy. These risks may be operational, market, legal, regulatory, or reputational in nature. Some companies are voluntarily including climate risk and sustainability reports or more general corporate responsibility reports. However, many companies are not disclosing their climate risk or strategies for dealing with these risks at all. This makes it impossible to assess companies' long-term financial prospects, at least with respect to key environmental challenges these companies might face.

From our standpoint, voluntary disclosure is not enough. Those who voluntarily disclose often lack the material information needed to properly assess their environmental sensitivities. To make matters worse, there is little consistency in format or in detail, making it nearly impossible to compare the environmental and carbon footprints of different companies.

The information tends to be directed to environmental interest groups or the general public but not to investors. Given the significance of climate risk for major companies in a new carbon constrained world, reporting on carbon risk could and should be standardized. It should not be a virtue. It should become an obligation and it is quickly becoming a necessity for prudent investment decisionmaking.

Yet it is not just risk that we are interested in, but equally we are interested in the opportunities that are created by better disclosure. For example, CalPERS has committed over \$600 million to clean technologies and products that reduce emissions, to manufacturing processes that minimize the use of natural resources, and to systems that do not contaminate air, water or land. We have also earmarked \$500 million for managers who screen companies for compliance with environment guidelines. And we have set an energy reduction goal of 20 percent over the next 5 years for office, retail and industrial and apartment properties totaling tens of billions of dollars in value.

We are also engaging companies in the airline, auto, utilities and oil and gas industries that are under performing compared to industry peers and that lack disclosure. You may ask isn't this SEC petition a case of regulatory overkill?

Let me close with the results of a survey of 265 global power companies that we published with a sister pension fund to show why disclosure is so essential. Only 25 of those 265 companies had complete information about the energy costs, emissions, reduction programs, and targets and emissions trading agreements. So take a guess, how many of those 25 companies created overall economic value after subtracting for the cost of their carbon footprints? The answer is six. Six of the 25 companies added value to the economy.

What about the other 240 companies for which we have little or no information? Investors are working blind with those other companies. This is the kind of information that investors need and are not getting but will be material in our evaluation in the future. Without your help it is unclear whether the SEC will do the right thing here and set the environmental and carbon reporting standards that will prove critical to investors and corporate America alike.

Thank you for your attention to this important issue, and I am happy to answer any questions.

Chairman REED. Thank you very much.

Thank you all for excellent testimony and also for observing scrupulously the convention of 5 minutes, which we do not so we appreciate at least the witnesses cooperating.

Dr. Yohe, you mentioned in your testimony that we should essentially move away from cost-benefit analysis and embrace risk management approach. Can you talk about that in terms of a specific company? For example, how would that differ from what is being done at the moment?

Mr. YOHE. A specific company might try to envision climate risks that it face when it considers its business conditions in a warming environment. It might also want to take the regulatory environment that it faces on carbon, its location, and other factors into account. I think that it would, at this point, be nearly impossible to

for such a company to simulate the range of costs and benefits (in terms of climate change) for any investment that it might be considering.

Firms could, however, look at a range of possible options and cast them in terms of metrics of climate-related risks that maybe are not even calibrated in terms of economic measures. They could thereby achieve a wider understanding of their carbon footprint, and their significance in their profitabilities. This information could then be conveyed to their shareholders, to their customers, and to the other people who have a vested interest in their material risk.

Chairman REED. I think part of this is—the challenge really is trying to get this in a way that is understandable by the investing public. There is some sophisticated investment analysts but there is also some one just reading the proxy statement here and there. Are you suggesting that it is so complicated that it might not be ever reduced to something that could be measured by dollars?

Mr. YOHE. I am suggesting that this could easily be the case. Conceptually, in business boardrooms and in rooms like this where decisions are made about climate change and climate policy, measuring climate risk and/or climate change contribution will be very difficult for a very long time.

If you are then thinking about asking firms to subtract the value their carbon footprints from their bottom lines to determine the degree to which they contribute to social damages calibrated across the planet, then you have a problem.

How do you cope with estimates of the carbon footprint that range from $-\$3$ per tonne of carbon up to $\$100$ a tonne? Your, and their, calculus would depend on a wide range of numbers. And which one do you want to use? Is it the material risk of the customers with which firms are conducting business? Or are would you allow firms to look at firms' (global) social cost of carbon "footprints"?

Depending on what you decide, shareholders will get extraordinarily different answers to their concerns about "material exposure".

Chairman REED. Ms. Lubber, you have a comment, too?

Ms. LUBBER. I think we can make it much more contained, controlled, understandable and disclose material risk. I would argue is not quite that difficult. When we talk about, No. 1, what kind of disclosure are we looking at? What is the information that investors might benefit from? Be it me, if it is $\$4,000$ in the company or Mr. Read who is managing $\$260$ billion the last time I looked but he might correct me being off by a few billion.

That is the first is regulatory risks. For a company that is about to build four coal-fired power plants, they could take a look at the regulatory schemes that are being negotiated in Congress. Material risk does not demand precise provision. But one can tell that given that a coal-fired plant lasts over 40 years, if the laws change and there is a price on carbon, there will be real cost to that electric utility company. They can calculate it, they can disclose it. Investors would want to know whether that next coal-fired power plant is going to cost $\$60$ million or $\$160$ million.

There is risks like increased storms. Insurance companies have 300 risk assessors on staff. They know how to assess risk from

storms. Until last year most of them were only assessing based on the year before, not the 5 years in the future or 10 years. The reality is they can make assessments on what kind of risks they face. And it is the insurers who have had a painfully low disclosure rate.

So when we are looking at assessing physical risks, and one can make predictions based on scenarios, looking at regulatory risk, looking at the very real litigation risk that is growing. There are more and more companies at the wrong end of litigation, whether it is State Attorneys Generals or other litigators, those are real financial risks that I, as an investor, want to know. Is this company I am putting money in about to be sued? Is the cost of the product they are putting out about to go up exponentially because a price is being put on carbon? Those are real material risks. They can be calculated. There are standards out in the marketplace. That is the kind of information we are looking for and is crucial for investors to have when building a portfolio.

Chairman REED. Thank you.

Mr. Read, this is an opening to a huge topic and your response would be appreciated.

Mr. READ. When I look at the issue, I think in terms of the financial tools that are used by financial analysts and specifically financial efficiency ratios that are used all the time. I think what we are talking about here is the introduction of carbon efficiency ratios. This is something which I think could be put out in some very compelling and intuitive ways, things that would be accessible to investors on a broad basis, that would be important to the marketplace, and could be digested I think relatively unambiguously.

So when you think of these sorts of efficiency ratios, you think of, for instance, things that could be a carbon-to-sales ratios. Carbon sales ratio could be an example of it. There is a whole analog to carbon efficiency ratios that are analogous to the standard financial ratios that we look at all the time.

Chairman REED. Thank you.

I wanted to pose a general question to Mr. Smith first but allow individual panelists to comment briefly, and then I am going to recognize Senator Carper who has joined us. But there will be a second round because when Tom is finished I will initiate a few other questions.

I was particularly struck and included in my statement the Carbon Disclosure Project survey, which suggest that if you ask a company privately is there a huge risk out there because of climate change, 81 percent say of course there is. Are there opportunities? Well, that is 69 percent, of course there is.

But then you look at their disclosure and there is nothing like that. Mr. Smith you represent a lot of companies. Is it because they do not have the right guidance to disclose? Is it because there are rational business reasons?

Mr. SMITH. Senator, I think there are a variety of reasons and I think this where I part company a little bit or maybe a lot with the other witnesses. That is, the hard truth, and it is very difficult for us to digest faced with the physics of the crisis at the moment, is that there are some things that are just fundamentally unknowable at the moment. And I think there is a great harm to the marketplace to put disclosure, particularly numerical disclosure, on

something that is fundamentally unknowable and unquantifiable. Whether you want to make up a metric and drop it on top, there are other sorts of ways.

But I think the disconnect between projects such as the Carbon Disclosure Project, which are very valuable on their own terms, and 10Ks is not as great as it would seem. Because I think that responsible leadership in most responsible companies has the same view as the societal view. This is a medium to long-term risk which is going to be costly to correct, that we have to act on it soon because of the factors that Dr. Yohe described, and that there are also opportunities in that process.

When you take it down the funnel and say what does this mean for me now, then you come up with a very different calculus. You may well be, to take my coal-burning utility in Ohio, you may know or may feel or your advisors here on the Hill may tell you that it is inevitable or virtually inevitable that there will be some sort of Federal legislation on this issue. But it is still a challenge, notwithstanding the immediacy of that event, it is a tremendous challenge to say what the consequences of that will be, what the shape of that legislation is going to be. And then to quantify what the costs of that might be to you.

And to disclose that on a contingent basis, that is to say we believe based on best information here are the range of legislative outcomes, and based on our internal calculations here is the range of costs which each of these outcomes could impose on our company, that would really be more than a full-time job and I think not really ultimately all that helpful to the marketplace.

On the other side of the equation, I think what we would I would urge is the SEC and obviously the marketplace generally needs to be poised really almost by the minute because the speed of these developments from a regulatory standpoint and from a financial standpoint has really been staggering. I think there needs to be a nimbleness so that there is a constant attention and evolution of what is useful but based on what is truly useful and not what can be made up as a number that placates people who are looking for numbers. Fake numbers are bad.

Chairman REED. But would you suggest that there has to be at least an indication in these disclose materials that this is a factor? Even if you cannot quantify it. And that second—and what you presuppose is a very rational thoughtful process of evaluating and making a judgment that is not material, the question exists is that process going on in many boardrooms? Or is simply not a topic that is even—this is so far out of our perspective that we do not even worry about that stuff?

Mr. SMITH. My view, and I think I have a fairly wide-based view but it's not an exclusive view I believe, is that it is going on in a lot of board rooms. It has become rapidly and over the course of the last 2 or 3 years at least a weigh station and a checkpoint for most responsible boards, particularly boards in industries where there is likely to be an immediate effect, the automotive industry, the power industry, the aluminum sector, the steel sector, anybody who is carbon rich, carbon emission rich, and intensive.

And also I think, interestingly, the fact that we are, in effect, trailing European markets on the cost of carbon because there is

an active auction market there, as you know, and there is a unit price. We do not live on an island or in a glass house and so there are many U.S.-based companies that have operations in the European theater who have now the capacity and ability and who do disclose with numerical specificity the cost of carbon to them in their operations. I have cited some examples in my written testimony of that.

It is quite clear when there is a number I think responsible companies are disclosing those numbers. I think the tricky part is timing and not overwhelming the marketplace with data that is really not ultimately of use.

Chairman REED. Let me ask the comments of other panelists before I turn quickly to Senator Carper, but we will have a chance. Ms. Lubber.

Ms. LUBBER. I want to go back to what we are looking for is the disclosure of material risk, not any risk, not minor risks, not risks that cannot be calculated. But if we are seeing 60 or 70 percent disclosure voluntary that is not fully complete, shows that it can be done. When we see disclosure in the mandatory filings, in the 10ks, by DuPont, Johnson, GE, many electric utility companies, they are disclosing material risk. They are looking at scenarios. They are finding ways to come up with realistic numbers. And they are disclosing information. They have shown us that it can be done.

The problem is when you look at two auto companies. Auto companies know there will be some change in CAFE standards, if not tomorrow, in 4 years, but looming. And given that their product lines take 7 or 8 years to get out, the fact of the matter is that if the CAFE standards change, fuel economy and their products have to change a bit, they need to know now. There will be a cost to making those changes.

Those are the kind of things that can be calculated, that shareholders want to know who is best positioned to come out with a line of cars that are more fuel-efficient. Those are the material risks that can be disclosed. We see one auto company doing it in and another writing nothing.

It tells me it can be done, it is being done, and we will all benefit from more consistency in seeing those material risks. Not every risk, not wacky calculations, but scenario planning which companies—that is what they do. Board members are charged with, as fiduciaries, looking at the risk to the company. This falls squarely in what boards should do, what disclosures should show, and what investors need in the marketplace.

Chairman REED. Do you have a comment, very briefly?

Mr. READ. I think there are two focal points to look at. One deals with sequence, one deals with standardization.

Regarding sequence, there will be a requirement—you simply have to have standardized carbon disclosure before you have a carbon trading system. You could not have a credible carbon trading system without standardized disclosure. So there is a sequencing which, to the extent that we get into the serious talks regarding carbon trading regimes, you have to know what you are starting with. You have to know, and the marketplace itself has to have a guide for what the relative values will be. So in terms of sequencing, the information has to come before the trading system.

The second part is standardization. I think I really agree completely with Mr. Smith that different companies in good faith can have some different ways of measuring their carbon footprints. So what is the role that we are talking about here? I think the industry investors, and certainly the Senate and the Congress, can come up with some standardized measures, methodologies for measuring carbon footprint. So I do not think that is really the hurdle.

But I think that is the opportunity here, to have standardization and standardization which can allow for eventually a carbon trading system or any other measurement system that you might choose to put in place.

Chairman REED. Thank you.

Dr. Yohe, please.

Mr. YOHE. Thank you. Just briefly, after listening to this conversation and learning a lot, I would like to go back to first principles about the complexity of the problem and the notion that we are not going to solve the problem immediately. What we need to do is set up an environment wherein we make it clear that carbon is not free and that it will be more expensive next year than it is this.

That suggests to me setting a targeted price for permits or, a tax for carbon and arranging for it to grow over time in a predictable and persistent manner. The key is that business understand what the price is and what it will be.

Over a period of time within which the results further studies of the climate system will be emerging, that price should increase at something like the rate of interest. Reports of liabilities and material concerns could then be offered from a business environment within which uncertainty derived from climate policy would be minimized.

Uncertainty would expand when, from time to time, policy adjustments would required in response to global portraits of how we are doing against long-term objectives.

It is in these adjustments that the risks associated with all of those thresholds about which I spoke earlier come into play. Companies would have to try to anticipate what was going to happen to climate policy and how those adjustments were going to be made. If the adjustment process were sufficiently transparent though, the uncertainties affecting private business decisions could be managed.

I am, here, making a distinction between the social cost of carbon (damages created by climate change aggregated across the globe and discounted to the present) and the private (policy derived) cost of climate policy to business. Is there a macro institution that does something like this—make manageable adjustments to short-term policy informed by long-term objectives? I would suggest maybe the Federal Reserve Board is such an institution. The FED has certain long-term targets for economic growth that inform its long-term objectives for growth in the money supply, but they also make adjustments in the short-term varying economic conditions. People who are affected by the FED's decisions understand their process. They face material risks to changes in monetary policy, but they take this into account all of the time. Accounting for short-term climate policy would thus be a familiar problem cast in a different metric.

Chairman REED. Thank you very much, Dr. Yohe.

Senator Carper, thank you.

Senator CARPER. Thank you, Mr. Chairman. And to our witnesses welcome. I just want to make sure I have the correct pronunciation of all of your names. Dr. Yohe.

Mr. YOHE. Yohe.

Senator CARPER. Yohe. Yohe.

Mr. Smith.

Mr. SMITH. If you miss on me, we have got a lot to talk about.

Senator CARPER. Although, in Delaware Y-o-h-e is always Yohe, but Yohe.

Ms. Lubber.

Ms. LUBBER. You have got it.

Senator CARPER. And in Delaware, we would say George Read. He was one of our great colonial heroes. Is it Read?

Mr. READ. Yes, sir.

Senator CARPER. The Reads have it here.

Maybe just a quick statement and then a couple of questions if I may.

First of all, I thank the Chairman for convening this hearing and for letting an interloper come on, somebody who is not even on the Subcommittee, come in and not just sit here but also even ask questions. I am grateful for that opportunity.

I think I may be the only member of the Banking Committee who serves on the Environment and Public Works Committee where I chair, along with the great help of Senator George Voinovich, a subcommittee that deals with climate change and nuclear safety and security.

For a long time I felt—I think I can speak for Senator Voinovich, we believe that companies need certainty, particularly as they address the future, particularly companies providing electricity, utilities. And they are trying to figure out what the demand is going to be for their product, electricity. They are trying to figure out how to provide it. They are trying to guess what the regulations are going to be with respect to emissions of sulfur dioxide, nitrogen oxide, mercury, CO₂, and the like.

What I have heard from any number of utilities is tell us what the rules are going to be. Just tell us what the rules are going to be. Give us a reasonable amount of time, some flexibility and then get out of the way and we will figure out how to get this done.

But they are interested in certainty and I am sure they are reflecting the views of not just their boards of directors but also the views of a lot of their investors who have a fair amount of money at stake in a number of these companies.

I think climate change regulations are coming. If I were an investor, I would want to have some idea of what that will entail.

I think it is tomorrow, there is a Subcommittee on the Environment and Public Works Committee, we are going to have a markup. You may have already talked about this before I got here. The Subcommittee will be chaired by Senators Lieberman and Warner, and they are going to attempt to move their climate change bill just addressing CO₂. They are going to try to move it out of Committee to the full Environment and Public Works Committee.

I think the bill contains a provision that requires the SEC to promulgate regulations requiring companies to disclose their climate change risks. And I have a copy here of the language, it is actually pretty brief. Mr. Chairman, with your indulgence, I would just like to read it if I may. It is not that long. I will read the first portion of it.

“Section 9002, Corporate Environmental Disclosures of Climate Change Risk.” That is what this section is entitled. I will but just read the first paragraph. It says “Regulations: not later than 2 years after the date of enactment, the Securities and Exchange Commission shall promulgate regulations in accordance with Section 13 of the Securities Exchange Act of 1934, directing each issuer of securities under that act to inform, based on the current expectations and projections and knowledge of the facts of the issuer, securities investors of material risk relating to—” and they mention two things.

The first of the two things they mention is “the financial exposure of the issuer because of the net global warming pollution emissions of the issuer.” And the second is the “potential economic impact of global warming on the interests of the issuer.”

Those are the two things that are mentioned. And then they go on to mention some other stuff, uniform format for disclosure and some other information. That is really the heart of the provision.

My question, really for all of you, would be to ask you to just let Senator Reed and me know what you think of this idea. And I will pass this on to the folks at the Committee, the other Committee.

Anyone just jump in, in no particular order. Ms. Lubber.

Ms. LUBBER. We are big fans of the movement on mandatory disclosure—

Senator CARPER. Would you start that over again?

Ms. LUBBER. I am sorry. I am Mindy Lubber, and we are big fans of mandatory caps on carbon, which the Lieberman-Warner bill has. And we are delighted that this kind of disclosure provision is embedded in it.

I could not agree with you more that the business community and everybody else likes certainty. They want to know what the rules of the game are. We know that there will be carbon regulation coming or a major statute. There are 10 different versions. I think the business community is owed, as well as everybody else, a clear statute that gets passed sooner rather than later, given the gravity and the magnitude of the problem. And they will figure out how to get in line with compliance.

When we were all part of the debate around the Clean Air Act and the Clean Water Act, there were all sorts of this is going to kill the business community, it is too much regulation, it costs too much. And once the certainty was provided, once the statutes were put in place, there has been nothing in history that has seen the kind of change in air emissions and in water emissions and the magnitude and the speed at which the problems got better.

That is the speed we have got to be seeing, given the magnitude of the problem of global warming. And I think moving expeditiously on a statute that puts a cap on carbon and a cost on carbon. Right now carbon pollution is free so we keep getting more of it. Putting a price on it and a limit on it is the certainty that we need to put

in place. And we would love to see that move expeditiously with this kind of disclosure certainty included in it.

Senator CARPER. Thanks very much.

May I hear from others, please? Dr. Yohe.

Mr. YOHE. If I understood what you read correctly, and it is the first time I have heard it, they are asking for disclosure of material risks from climate impacts as opposed to material risks from climate policies.

Senator CARPER. I think that is correct.

Mr. YOHE. I think that we need to go back to what I said earlier. The subtext there is that attribution of observed risk to climate change is a very difficult task that we cannot expect businesses to accomplish. Senator Reed, you asked earlier about a specific company. I still do not have a specific company, but let me focus on a specific location. Consider a company that was located in New Orleans say 3 years ago. Of course, Katrina came and the levees broke. Perhaps our company was destroyed. Maybe it is back in place now, but maybe it is not.

Now think about what they might have reported about material risk from climate change in 2003. It was certain back then that a hurricane would strike New Orleans at some point. Could our business attribute Katrina, or its intensity, to climate change? Probably not. Would they have been required to do so if the Lieberman-Warner bill on climate change had been in place back then? Attribution is so difficult that I am doubtful that requiring them to do so would have been a good thing.

The chance of a severe hurricane was surely a material risk that should have been reported. I hope that representatives from our business would have attended all of the workshops that were held along the Gulf Coast prior to Katrina. Those workshops clearly outlined the risks associated with rising sea levels and severe coastal storms. Our business may have even heard the Army Corps of Engineers describe how vulnerable the levees were. But to hold our business responsible for saying that these risks were born of climate change is, for me, a little bit hard to swallow.

Senator CARPER. Thank you. Mr. Smith.

Mr. SMITH. I have, I guess, two reactions. First of all, from a process standpoint, my immediate reaction to the provision is that it is useful but not necessary. And that is that there are mechanisms that are lesser than a statutory mechanism for achieving the same result, and that have actually worked sometimes with fine tuning and sometimes with macro tuning in other examples to prod the disclosing community along to refine their thinking, to say more. I am thinking principally of Staff Accounting Bulletin 92, which was issued with respect specifically to Superfund litigation and remediation liabilities in 1992.

And then out of the environmental arena, the very useful, short and terse work that the staff did with respect to the millennium bug, the Y2K bug, which was a pervasive problem. One of the requirements there was to compel disclosure, but on a Staff Legal Bulletin basis, on the degree of preparedness of a company to meet the issue. And if they had not done an assessment, that that fact itself was material because you had not looked and therefore the

investment community needed to know that you had not even bothered to look.

That is my process comment.

If the Senator will indulge me for a second for a story from experience from a substantive standpoint, I think that the distinction lies between two companies, one with whom I had experience—privatizing a pulp and paper business in another country that had a mill—a material mill—situated on a peninsula jutting out into a saltwater body and took all of its process water from the aquifer underneath the peninsula. And took huge volumes of it up. And just as their billion-dollar bond issue was about to come to market, started getting salt water readings in its fresh water wells, which would have been fatal to its paper production.

The onset of even those negligible readings of saltwater in a mill of that importance was something that was an immediate and material risk, disclosable, and was disclosed. That is useful disclosure. If you are going to buy a piece of those bonds, you needed to know that certain parts of the mill might not work if saltwater intrusion continued.

On the other side, I would hate to have legislation that compelled disclosure of a catalog of risks that were not particular to the actual workings of a particular business. You might have a water dependent business in the Midwest in the United States that clearly would be adversely affected if global warming dried streams on which it relied for discharge or for cooling water. But if there were no scientific data behind the event, then simply to disclose that we are dependent on heavy usage of water is not necessarily useful for the marketplace, and the degree of quantifications necessary would certainly not assist in the pricing of any investment in that particular company.

Senator CARPER. Good, thank you. And thanks for the example.

Mr. READ, my time has expired, but just briefly, if you would take a shot at this one.

Mr. READ. Very briefly, from my vantage point, sufficient regulatory authority does exist already by the SEC to compel appropriate disclosure. However, although they have that ability now, I think it likely will take prodding by your body to compel the SEC to put those disclosure standards in place.

Senator CARPER. Thanks so much. Thank you all.

Thank you, Mr. Chairman.

Chairman REED. Senator Casey, if you have questions.

Senator CASEY. Mr. Chairman, thank you very much.

I have to apologize. I was running out to the floor and walking at a fast pace, running on the way back. I wanted to, first of all, say that when I was giving my opening, Ms. Lubber, you were at that time and still are have a network that I referred to and I did not acknowledge it and I am sorry about that. I did not realize. I was reading the first part where they say president of—is it Ceres? Is that how you pronounce it?

Ms. LUBBER. Ceres.

Senator CASEY. Ceres. But I did not read the rest of it. It says Director, Investor Network on Climate Risk, which I was talking about. I am sorry about that.

But I guess the general question I have for really everyone on the panel, and I know you have spoken to this either in your statement or when I was gone so some of it might be redundant. But it is good to repeat ourselves on important topics, I think.

Just what you think, if you had an agenda item or an action agenda for the U.S. Senate, other than having a hearing like this, which I think is a critical component of having a strategy, what would you have us do in the next year to advance some of the goals that you have outlined today? And maybe I will go right to left or left to right, it does not matter to me. Mr. Read.

Mr. READ. I think there have been some points brought up today, Dr. Yohe mentioned one of them, which is likely there should be a healthy debate on the comparative merits of a carbon trading system, for instance, versus a carbon tax. This is more than what it might seem, though, at first because there are different—they really are different tools. You can get to different things.

For instance, with a carbon tax you potentially could apply that not only to U.S. companies but to international companies which provide imports to the U.S. You can apply it in different ways, I think. You can have a very—for instance, if there is a larger carbon footprint from companies in China, you could make the appropriate assessments on that potentially with a carbon tax in a way that you could not with a carbon trading system.

There are going to be some very important issues that you can get at just by having that debate on the tax versus the carbon trading system. So I think it is worth having it. Irrespective of where you end up, you are going to be in a better place having that argument in good form.

Of course, the actual impact of—well, when it comes to global warming, carbon is not the only issue. There are many other forms of greenhouse gases. So we think in terms of CO₂, but there are lots of other challenges that we are going to be facing. For instance, there could be material wealth of methane that could be going into the atmosphere over the coming years. Methane is a good 30-fold greater impact than CO₂ on the atmosphere.

The other part, I think, that I would really wrestle with very seriously is that the social goal that we are looking at, for instance, when looking at renewable fuels, is looking at renewable and clean technologies over conventional and dirtier technologies. So what that points to is the need for broad-based support rather than narrow support. So I think now when I look at the nature of what is supported, it is not as much—I take a look at some things, unwittingly by having too narrow a sense of what our renewable or clean fuels, things can happen like for instance using methane as fuel from municipal waste does not receive a subsidy. That can get crowded out compared to corn-based ethanol. That would not be the intent of the Senate right now, to have one clean technology crowd out another.

But I think the imperative for trying to have broad-based incentives for renewables will be also an important consideration for this body.

Senator CASEY. Thank you very much.

Ms. LUBBER. I am going to answer the question in wave the magic wand, you asked that open question and I appreciate it. I think, given that magnitude of the problem—

Senator CASEY. We do not have one, by the way.

Ms. LUBBER. If you could find me a magic wand or if I could find one, I will bring it to you.

But given the magnitude of the problem, which is up there with the greatest economic, environmental, national security, public health threats we face. Given that it is not any time in the future but we are now starting to see the impacts now. Given that we are certain that the problem is getting worse and not better. And given that we know minimally, and I think the IPCC Commission is going to tell us that this may even be an understatement, that we need to reduce are carbon footprint by 80 percent by the year 2050 and that we have got to start that yesterday.

These are big issues. My magic one would say if the Senate, with your leadership from this Committee and others, should move to pass a comprehensive cap and trade or a tax—I look at the cap and trade not because I think it is smarter or more elegant or even preferable, but more realistic. Literally put a price on carbon. This gas that is going into the air is not free. It costs us a lot of money. But when things are free you get a lot more of it. Right now carbon pollution is free.

I would put a price on carbon and a limit to the amount that can go up into the air, a cap and trade system. With very clear limits not only for what we need to get to 2050, but what needs to be happen by 2030 and 2020.

At the same time I would have incentives that will help jump-start an industry that is going to also allow us to meet the energy needs of this country and beyond. If, in fact, we are going to limit the carbon going into the air and limit the coal use and limit some other fuels, we have got to make sure we are jump-starting the industry that will allow us to keep our cost of living and keep moving.

And I certainly think there is movement to do that but that is what I believe will get on top of the problem.

I want to add just one point, and that is the issue being debated at this hearing, I would argue, is more narrow, is more doable, is nevertheless quite an important stepping stone and does not even require statutory change. The SEC has the authority to require the disclosure of material risks. Many companies are doing that. Those companies say when they do it, when they just assess their risk even before they disclose. They end up managing it better. We know that is information that ought to be the marketplace. We are seeing it done. It is not overly burdensome. We know the standards by which we want to measure it.

I think that is something that could happen now that will make a difference in moving us forward and that, with the leadership of this Committee and a discussion perhaps with the SEC, we can move on this without statutory changes and without even regulatory changes. And it will go a long way in helping move companies to act to reduce their carbon footprint.

Mr. SMITH. Senator, I have never been very good at magic wand questions. I do not even know what my favorite ice cream is. So

I am going to limit the question to the scope of what I came to talk about, which was disclosure.

I think clearly the most significant thing, from my perspective, is to grant the marketplace the clarity of information which the Senator was talking about having heard about with respect to utilities and their desire for clarity of regulation.

I think this hearing is extremely timely. The Superfund examples that I talked about earlier in my testimony and have written about in my written testimony were done, unfortunately, years after the fact. The fact that this hearing is being held today, before any comprehensive Federal legislation, I think really is a tremendous window of opportunity for teeing up and aligning what the Federal regulatory solution is going to be with what it dictates to the marketplace about what to say about that regulation is going to be.

I would encourage this Committee and the Senate as a whole to maintain that synchrony to the greatest extent possible, so that the markets that are going to drive the solutions once there is certainty can also drive out information with clarity and under clear guidelines on a going forward basis.

If we had to do it and waste 5 years and go backwards the way we did with Superfund, I think that would be a lost opportunity and a terrible mistake.

Thank you.

Senator CASEY. Doctor. I know we have a vote that, I think, just started.

Mr. YOHE. I will try to be quick. IPCC is not policy proscriptive, so we certainly do not say that an 80 percent reduction by 2050 is required. My own personal view is we have to get to an 80 percent reduction sometime in this century. Picking 2050 is a good place to start the discussion, but it might be too early or too late.

I also agree that you should think seriously about taxing carbon as it enters the economy. I think that you need to hear why cap and trade was a good idea for regulating sulfur dioxide emissions and why the economics that made it right for sulfur dioxide do not necessarily apply to carbon emissions.

Fundamentally, though, I think members of the Senate should remember that there is another component to the United Nations Framework Convention on Climate Change that this country has signed. We have, through the Convention, agreed to help the least vulnerable people on the planet adapt to and cope with the impacts of climate change. The new negotiations for the second commitment period of the Kyoto Protocol include international discussions about how to create and manage adaptation funds. We need to participate fully in those discussions I think, as well (and I guess Speaker Pelosi has suggested this and has thereby caused a bit of an uproar), that representatives of the legislative branch of this Government should go to Bali (and subsequent meetings of the Conference of the Parties of the Framework Convention) as observers to see the negotiations first hand.

Mitigation and adaptation will both be on the table, and you all need to get a full understanding of exactly the way the world looks at us, exactly the way the world looks at the problem, and exactly

the way the world looks at the requirement to do both—i.e., to mitigate and to adapt.

The fact is that we are committed to another half degree to one degree Centigrade warming over the next century even if greenhouse gas emissions ended tomorrow. Adaptation is an imperative. Working on how best to adapt is not giving up on the problem. Adaptation is an essential part of a policy portfolio that is absolutely required.

Senator CASEY. Thank you and I thank the Chairman for the extra time.

Chairman REED. Thank you, Senator Casey. And thank you for your wonderful testimony. This has been informative and insightful and, I think, hopefully prophetic. Mr. Smith's comments about the timeliness of the hearing, I concur entirely.

Let me make just brief administrative announcements. Some of my colleagues might have additional written statements. They will all be made part of the record.

If there are additional questions for the witnesses or if there is additional testimony, that will be accepted no later than November 7th. We would ask the witnesses if you do receive written questions, please respond within 10 days.

But thank you very much for your participation today and for your great work throughout the year.

The hearing is adjourned.

[Whereupon, at 3:53 p.m., the hearing was adjourned.]

[Prepared statements and additional material supplied for the record follow:]

PREPARED STATEMENT OF SENATOR MENENDEZ

I want to thank Chairman Reed and Ranking Member Allard for putting together this important hearing.

If there is anything I hope we can take away from today's discussion, it is that climate change does not exist in a bubble. The fact that we are having a hearing on this issue in the Banking Committee speaks to its very nature. Asking the questions of what we can do to affect global climate change is not limited to those who advocate for the environment or to improve our energy usage. It is not limited to one region of the world, or to certain cities. It is not limited to just one sector. The responsibility falls on all of us. And we must all be asking the questions of what we can do to affect our climate—especially those of us who think we have little or no role.

Today we have a chance to ask those questions, to look at what those in the financial sector are doing, to ask those who perhaps do not think about emissions on a daily basis to do more.

It is imperative that our nation make a transition to a cleaner, safer, greener, and wealthier country. We must take action to stabilize greenhouse gas emissions and ward off the potentially catastrophic effects of global warming. This will not happen by itself, however.

I am pleased that Senators Lieberman, Warner, and Boxer have shown such leadership in the issue of climate change by introducing and moving a bill forward. This bill would take a number of important steps, including requiring the reporting of climate risks. However, I do think we should look closely at how the bill deals with corporate reporting of climate risks and greenhouse gas emissions, and believe there could be room for improvement.

First I think it is important to distinguish between two very different kinds of reporting.

On the one hand, we want investors to know whether companies are faced with financial risks because of the potential effects of climate change. These risks range from increased insurance claims to physical risks such as stronger storms or flooding. In general these risks are difficult to quantify or even predict, but are nonetheless terribly important for those making investment decisions.

The second kind of risks that should be reported are the risks associated with the necessary changes we will all have to make in order to reduce global emissions. These risks are also difficult to predict and also difficult to put into dollar terms, but I would submit that these risks can be quantified.

What future regulations will entail or what costs they might impose cannot be foretold, but if companies simply reported their emissions to investors then investors would be empowered to make their own calculations on potential exposure or the likelihood of different sets of policies being enacted. Without such data investors will be limited to what companies choose to disclose and left to trust the company's own assessments of financial risk.

Unfortunately I do not read the Lieberman Warner bill to require such disclosures. Instead it gives the SEC broad discretion to formulate risk reporting associated with climate change.

My staff is currently working on some language that I feel must be part of any corporate reporting on climate change:

First, the EPA is the organization with the expertise and experience in administering greenhouse gas emissions reporting programs. The SEC must work alongside the EPA to design such a program here.

Second, emissions reporting should be done at the corporate level and not just at the facility level. And this reporting needs to include indirect emissions such as electricity use and not just direct emissions. Climate leaders such as Citigroup, Target, and Marriott do not have large industrial facilities or power plants that would be covered by the Lieberman Warner bill. Yet all three companies are voluntarily reporting their emissions to the EPA. They realize that they can significantly help reduce our nation's carbon footprint and they want to be held accountable for taking this responsibility seriously. In turn, investors such as those represented by CERES here today want to know what organizations are sensibly planning for the future and who is stuck in the mindset of last century.

Third, emissions must also be reported by country. Different nations operate under different regulatory regimes and therefore multinational corporations are exposed to different risks.

I'm afraid I cannot stay for the whole hearing today, but I would like to hear from the witnesses on this issue, and I will be submitting questions for the record.

Again, I want to thank Chairman Reed and Ranking Member Allard for their work in putting this hearing together. I look forward to working with them, this

Committee and the EPW committee in putting together climate change legislation that will help us transform our economy and protect investors at the same time.

PREPARED STATEMENT OF GARY W. YOHE

**Woodhouse/Sysco Professor of Economics
Wesleyan University
Middletown, CT 06459**

gyohe@wesleyan.edu

Wednesday October 31, 2007

Penultimate Draft (October 30, 2007) subject to minor editing

Mr. Chairman, Senator Allard, and Members of the Subcommittee on Securities, Insurance and Investment of the Senate Committee on Banking, Housing and Urban Affairs. Thank you for your invitation to present testimony on a range of topics related to my work as an economist and as a senior member of the Intergovernmental Panel on Climate Change (IPCC). You have, specifically, asked that I discuss (1) how economics can inform national and global responses to the risks and opportunities of climate change, (2) how those risks might be connected with the health of financial markets, (3) how the *Stern Review on the Economics of Climate Change* and my work for the IPCC can inform your deliberations.

My testimony will be anchored on a fundamental conclusion that has emerged to broad consensus from both the Fourth Assessment Report of the IPCC (2007) and the *Stern Review* - economics can play a significant role in understanding how we should respond to the risks of climate change. My take on it all is, though, that this role will lead to productive deliberations only if practitioners accept the shortcomings of a cost-benefit approach to the problem of what to do about climate change *and* recognize the strengths of a risk management approach to the same set of issues. Only then can the analyses climate change and the resulting policy discussions accommodate fully the multiple metrics with which climate risks and opportunities must be calibrated

I recognize, of course, that the Subcommittee on Securities, Insurance and Investment is primarily concerned about vulnerabilities and opportunities that can be enumerated in dollars and cents. I hope that you will see, however, that risks calibrated in other metrics (like millions of people at risk of hunger or water stress or coastal flooding) also matter to financial markets. I think that it is obvious that exposure to climate policy matters to investors and that setting standardized rules for carbon accounting will be a critical concern as we move forward. Surely risks expressed in terms of the frequency and intensity of extreme weather events matter to a subcommittee with the word insurance in its name. In short, I hope to connect some important dots so that even climate skeptics will take the issues before you seriously.

Before I proceed, it is imperative that you recognize that the IPCC, because it cannot be policy prescriptive, makes no policy recommendations. It does, though,

describe thoroughly the increasing evidence that climate is changing faster than we thought just five years ago in support of a conclusion that risks and opportunities are coming at us faster than previously thought. Increased resolution in our understandings of impacts and vulnerabilities that are apparent throughout the Fourth Assessment Report show that vulnerability to climate change is perhaps even more widely diverse than previously thought, that differences in the capacities to adapt and to mitigate vary even more widely across nations and communities within nations (even within the most developed nations), and that unabated climate change will likely impede progress toward achieving Millennium Development Goals by mid-century.

The *Stern Review* was, in contrast, designed explicitly to be policy prescriptive and to make an economic case for immediate action to reduce the emission of greenhouse gases. It anchored its analysis on the same literature as the IPCC, but it did not stop there. It ultimately calls for immediate action designed to limit concentrations of greenhouse gases to no more than 550 parts per million in carbon dioxide equivalents, and it supports this call with a dazzling array of statistics which have, themselves, become a source of debate. I have repeatedly asked, however, that the discussions of *Stern* not focus on those statistics at the expense of missing the major message – climate policy is required, and the least expensive way to proceed toward any policy target is to begin now.

1. **The major messages of the *Stern Review's* assessment of the current science are sound. Indeed, they are completely consistent with the conclusions presented by the three Working Groups of the IPCC in their contributions to the Fourth Assessment Report. They are consistent, in other words, with the conclusions about the underlying science that were unanimously accepted by representatives of the signatory nations of the United Nations Framework Convention on Climate Change who attended the IPCC plenary meetings in Paris, Brussels, and Bangkok. They include:**
 - a. **Climate is changing faster than was anticipated only 5 years ago (in the Third Assessment Report of the IPCC).**
 - b. **Significant climate impacts have been calibrated in terms of multiple metrics (some are economic, but many are not), and thresholds of associated climate risk have been identified in terms of changes in global mean temperature.**
 - c. **Many of the temperature thresholds for critical impacts are now thought to be lower than anticipated only 5 years ago. It follows that we are approaching them more quickly than we thought, and so we will reach them sooner than we thought.**
 - d. **Achieving any concentration threshold cannot guarantee achieving a specific temperature threshold; but achieving a concentration target can reduce the likelihood of crossing those thresholds at any point in time.**

- e. **Achieving any concentration threshold may, however, only delay the inevitable unless the rate of change in temperature is diminished by persistent policy intervention over the entire century and perhaps beyond.**

Figure 2 in the Executive Summary of the *Stern Review* offers a concise portrait of the essential results of the most recent science. I attach a version here as Figure 1. Notice that temperature thresholds are identified for truly dangerous impacts in many dimensions in the lower portion of the figure. The imprecise links between temperature targets and concentration targets are meanwhile illustrated in the upper portion of Figure 1. They summarize current understanding to show, for example, that holding concentrations

- below 750 ppm means a greater than 95% chance of exceeding 2 degrees (Centigrade) of warming above current levels and a 70% chance of exceeding 3 degrees of additional warming,
- below 650 ppm means a 95% chance of exceeding 2 degrees and a 60% chance of exceeding 3 degrees,
- below 550 ppm means around a 70%-80% chance of exceeding 2 degrees and a 50% chance of exceeding 3 degrees,
- below 450 ppm means a 50% chance of exceeding 2 degrees and a 25% chance of exceeding 3 degrees, and
- below 400 ppm means roughly a 30% chance of exceeding 2 degrees and still a 5% chance of exceeding 3 degrees.

Putting the two parts of the figure together allows the reader to judge the sensitivity of our experiencing any specific risk to various policy objectives. It is, indeed, a spectacularly powerful portrait of the policy predicament.

2. **The contribution of Working Group II to the Fourth Assessment Report of the IPCC puts people on the planet and offers more detailed descriptions of climate risks across diverse regions and sectors. Risks are calibrated in multiple metrics, and vulnerability depends on exposure and sensitivity, both of which vary from place to place in ways that are determined by development pathways.**

The Fourth Assessment Report confirms the assertion from the Third Assessment Report that developing nations will be most vulnerable to climate change because of high exposure to potential impacts and low capacity to adapt. Some of the details behind this conclusion can be found most easily from Tables 20.8 and 20.9 in the contribution of Working Group II; they are replicated here as Tables 1 and 2, including the notes that locate discussions of the various risks in the background chapters. Notice, for example, that literature published since the Third Assessment Report was released in 2001 shows that

- an additional 1°C of warming would increase the number of people facing water scarcity by up to 1.2 billion additional people in Asia and 250 million in Africa and would cause up to a 5% decline in wheat and maize productivity in India;
- for another degree of warming, China would experience a 12% decline in rice productivity, that up to 2 million additional people in Asia would confront significant risk of coastal flooding, and that water scarcity would affect another 1.6 billion more people in Asia and Africa; and
- for more warming, the pace of increased exposure will accelerate.

The Summary for Policymakers approved in Paris synthesizes these and a wide assortment of other results in a series of fundamental conclusions:

- vulnerability to climate risk will be amplified in areas that already confront multiple stresses (for example, from land degradation, globalization, exposure to disease, etc.);
- adaptation is unavoidable because the planet would be committed to more warming even if emissions of greenhouse gases were halted today;
- a portfolio of adaptation and emissions controls will be required if the world's people are to cope with climate risk because, of course, emissions will not end tomorrow; and
- even these combined actions may be overwhelmed by the turn of the century.

Everyone has his or her own view of what is most important among these far-reaching conclusions. You can find your own collection of risks and opportunities for various amounts of warming on Tables 1 and 2. For me, the fundamental bottom line that plenary delegates decided to take home to their governments is that *climate change will impede progress toward meeting Millennium Development Goals (MDGs) across the world.*

This stark and succinct assessment of the future, along with the recognition that adaptation and mitigation will be necessary, is certainly troubling; but the silver lining behind the growing storm cloud is an enormous opportunity. The Fourth Assessment Report emphasizes that strengthening many of the factors that support the capacities of communities to adapt to climate risk is entirely consistent making progress toward achieving the MDGs over the next half century. Indeed, investments in eradicating extreme poverty and hunger, providing primary education, promoting gender equality, combating HIV/AIDS and other diseases, ensuring environmental sustainability, and working to develop global partnerships for development could all be essential components of an efficient part of an effective climate policy.

To my eyes, therefore, the new Fourth Assessment Report thereby offers a roadmap by which climate change can find its way onto the planning and implementation agendas of finance ministers all around the world – and into the deliberations of committees like this one. Instead of being yet another problem that

complicates your lives, the coincidence of goals noted by the Report shows why coping with climate risk can be yet another good reason for them to what they have been trying to do all along – to promote sustainable development.

This pathway to the highest levels of government is also illuminated, for any country that wants to pick up the idea, when the Report calls for *adopting a risk management perspective in assessing impacts, adaptation, and sustainable development*. The language of risk management is a language with which finance ministers and financially focused committees are quite familiar. The IPCC now sees that risk-based portraits of impacts net of the effects of alternative adaptations can, when inserted into alternative development pathways at specific locations, offer decision-makers simultaneous insight into a multiplicity of climate risks. *A policy portfolio designed to reduce climate risk should take advantage of two different policy tools: reducing exposure through mitigation and reducing sensitivity through adaptation.*

3. **Translating this range of climate risks into economic terms continues to be a challenge. Many of them defy calibration in terms of dollars and cents. Many of them have not been thoroughly analyzed. Summary statistics are fraught with uncertainty, and are critically dependent on value judgments imposed by decision-makers, themselves.**

Economists have been trying for some time to assign currency values to the impacts of climate change identified in Figure 1 and Tables 1 and 2 by tracking their potential trajectories along long-term scenarios of how the future might unfold. Not surprisingly, economists do not agree on what that future might hold. They do, however, agree on what measure to use: “the social cost of carbon” defined as the damage caused over time by releasing an additional unit of ton of carbon in the atmosphere discounted back to the year of its emission. That is to say, the social cost of carbon represents the “marginal cost” of emissions; alternatively, it represents the “marginal benefit” of unit of carbon emissions reduction.

More than 200 estimates of the social cost of carbon are now available. The median estimate for studies using a 3% utility discount rate (4% to 5% on the dollar) with no equity weighting is about \$20 per tonne of carbon (slightly more than \$5 per tonne of carbon dioxide or about \$3 per barrel of oil). For estimates that discount the future much more heavily and apply equity weighting to the distribution of economic impacts, however, the median is about \$100 per tonne of carbon (\$27 per tonne of carbon dioxide), and 10% of the estimates exceed \$200 per tonne of carbon. The Fourth Assessment Report, based on a smaller sample, puts the average estimate around \$43 per tonne of carbon (about \$12 per tonne of carbon dioxide), but notes that 12% of the estimates are actually negative. The *Stern Review* (with its very low discount rate, equity weighting, and reflections of potential catastrophic loss) reports an estimate in excess of \$300 per tonne of carbon (around \$85 per tonne of carbon dioxide).

I have been told that presenting such a range in a political environment would allow people who do not think that climate is a problem to focus on the lower part of range and people who think that climate is a large problem to focus on the upper part of the range. Productive conversations between the two sides, I have also been told, would seldom be a product of such readings. For this, and a few other reasons, I now preach caution to all. To appropriately understand the content of the range of estimates, we must work to understand what is going on behind the scenes. Why is the range so large? What combinations of underlying factors produce low or even negative estimates of social cost, and what other combinations support estimates on the high end of the scale? Answers to these questions can be enormously revealing.

The choice of discount rate and the incorporation of equity weights are extremely important, and both lie within the purview of decision-makers. High discount rates sustain low estimates because future damages become insignificant (and even negative costs derived from near term opportunities that are not overcome by long-term risks). Conversely, low discount rates produce high estimates because future damages are important. Meanwhile, strong equity weighting across the globe support high estimates because poor developing countries are most vulnerable. Conversely, weak or no equity weighting can produce low estimates because poor developing countries do not factor heavily in the overall calculation.

It turns out, however, that several scientific parameters that decision-makers cannot choose are even more important in explaining the range. Indeed, climate sensitivity (i.e., the increase in global mean temperature that would result from a doubling of greenhouse gas concentrations from pre-industrial levels) is the largest source of variation. It is possible to derive high estimates for the social cost of carbon even if you assume low discount rates and almost no equity weighting; all that is required is the recognition that “Mother Nature” may have put the climate sensitivity lies at the high end of the latest range of estimates. Andronova and Schlesinger (2001), for example, find that the historical record could easily be explained with climate sensitivities as high as 8 or 9 degrees Centigrade (even though the TAR reported an upper bound of 5.5 degrees).

There is, in short, no way around a fundamental truth - this and other sources of profound uncertainty in our understanding of the climate system and how it will evolve over time are intrinsic parts of the arena within which climate policy will be discussed. It is pointless to wait for the uncertainty to be resolved.

4. **The *Stern Review's* estimates of economic damages have been controversial in part because they are difficult to understand and in part because they are highly dependent on underlying assumptions about discounting, aversion to risk, aversion to inequality, and the valuation of non-economic metrics of impact and significant risk (abrupt change and extreme events, for example).**

The controversies surrounding the damage estimates have spawned a spate of detailed discussions of the technicalities involved in applying economic analysis to a complex problem like climate change. Many economists have concluded that the *Review* is right for the wrong reason in its call for immediate climate policy. Details of my own views can be found in my testimony before the Senate Committee on Energy and Natural Resources last February (attached here as an appendix).

5. What is the right reason? It follows from the Fourth Assessment Report and the underlying documentation of the *Stern Review* that some sort of policy intervention, based on the economics of hedging against climate risks and the economic cost of policy adjustment that may have to be applied to abruptly, will be required to avoid “dangerous anthropogenic interference with the climate system”.

It is important to note that it is impossible to write climate policy in 2007 that will be valid for the entire century. Coping with thresholds and uncertainty over the long term will require adopting an adaptive risk management approach where series of medium-term policy decisions will be informed by the evolution of long-term objectives. Designing such a program will be difficult, because it will need to give clear signals of intention over the medium-term even as it maintains flexibility so that it can respond to

- changes in scientific understanding,
- changes in social valuations of impacts, and
- changes in our expectations of how the policies are working.

In every case, however, this flexibility must somehow be immune to political and/or economic manipulation, and so designing such a mechanism will require a considerable amount of political leadership.¹

As soon as you recognize that some sort of policy will be required (and that recognition follows directly from Figure 1 and/or Tables 1 and 2), simple economics says that taking the least cost approach means starting now. This conclusion is true in large measure because atmospheric concentrations of greenhouse gases depend on cumulative emissions over time, so achieving a targeted concentration target (and thus a corresponding range of possible temperature increases and associated climate risks) is fundamentally an exhaustible resource problem. The long-standing Hotelling result that I teach my students in their first course on environmental and resource economics therefore applies (at least to a first approximation): to maximize the discounted value of welfare derived from an exhaustible resource (that is, to minimize

¹ It strikes me, as an aside, that the Federal Reserve System of the United States (the FED) is an example of an institution designed to accomplish all of these tasks. While surely in a different context, the FED confronts the same sorts of short-term versus long-term tensions with the same sorts of price or quantity policy tools and protected from political manipulation by carefully designed insulation.

the discounted costs of limiting cumulative emissions over the long-term), simply calculate the appropriate initial “scarcity rent” (in this case, an initial price for carbon for 2007) and let it increase over time at the rate of interest.²

Adjustments over time in the policy target (borne of uncertainty about the climate system specifically and the future more generally) confound the issue, to be sure, but I have shown in Yohe, et al. (2004) that some hedging based on the Hotelling minimum cost result minimizes expected costs even if there is a chance that we will discover sometime in the future that the climate problem fixes itself and climate policy initiated now was unnecessary. Why? Not because it generated some energy independence for the United States, even though that would be a good idea. Rather, because the expected costs of adjusting to more pessimistic climate news sometime in the future if we delay taking action are higher than the expected costs of doing too much too soon (even with discounting at the market rate of interest).

To be more specific, the Hotelling result means that it is enough to specify an initial price of carbon (or perhaps setting targeted permit price for a cap and trade system). This price should be designed to get the attention of American business and to show political leadership in the face of a serious problem. It need not, however, be set so high that it would cause undo economic harm in the short-run. Allowing the carbon price to increase at the rate of interest year after year (following Hotelling) and acknowledging that adjustments for new knowledge about performance and risk will have to be accommodated over time will give the policy traction.

I personally favor a tax because permit markets can be volatile, and because responding to this volatility by building in a “safety value” on the price of permits sets up a loophole in the policy that could easily be manipulated. Indeed, it undermines the power of the policy. A tax, increasing at the rate of interest, would produce a persistent and predictable increase in the cost of using carbon that would inspire cost-reducing innovation and fuel switching in the transportation, building, and energy supply sectors of our economy.³

The revenue of a carbon tax (or the auction of tradable permits, for that matter) could be used to subsidize research and development of alternative energy. At the moment, we have the technology for modest reduction of greenhouse gases at little cost. Deeper cuts in the future would be expensive unless there is substantial technological progress. Developing large-scale, safe, clean and cheap energy is essential for solving the climate problem, and would also help the American economy become less dependent on imported fuels; and to help it prepare for the depletion of conventional oil and gas. American companies have the potential to lead what the Europeans call the next industrial revolution.

² Note that the emission reduction trajectory in the Stern Review violates this basic principle.

³ The tax should increase, in real terms, at the real rate of interest. If expressed in nominal terms downstream, then it should increase at the nominal rate of interest.

Be assured that providing incentives for American business to prepare for a carbon scarce future will put them in a good position when it comes time to compete in world markets, especially if their competitors in China and India do not follow suit. This is why 10 major corporations are on record in support of a U.S. (federal) climate policy that has some teeth and is predictable. There is money to be made, but only if uncertainty about climate policy is reduced.

6. Setting the initial tax can be an exercise in determining the appropriate short-term incentives for carbon-saving investments and energy conservation rather than an exercise in “solving the climate problem”.

Since no policy created in 2007 will “solve the climate problem”, it is possible and even desirable for the Senate to step out from under that burden to confront a more manageable problem (while still making progress towards an ultimate solution to the climate problem). You are not trying to “Solve the climate problem.” You are trying to “Acknowledge and confront the climate problem in 2007 with the best information available.” More specifically, your problem is “What do we do now?”

The answer is to design something for the near-term that will discourage long-term investments in energy, transportation, and construction that would lock in high carbon intensities for decades to come. Moving decisions in that direction would be consistent with long-term programs designed to “solve” the climate problem (however our understanding of it evolves) and with the minimization of long-term economic costs of the policies.

The ramifications of concluding that adaptation alone will not be able to accommodate unabated climate change should also be understood. For some developing countries, and particularly for the least developed countries whose emissions are small, the need for mitigation may not be an immediate problem. For other countries like China, India, and Brazil where substantial industrial development has already taken place, current and anticipated future emissions of greenhouse gas emissions are more significant. These countries have historically been reluctant to commit to emissions standards, and that was an understandable position in a world where the largest contributor to atmospheric contributions sits on the sidelines. In a future where significant mitigation policies will be in place, however, ignoring future of vigorous climate policy will lead to development plans that are unsustainable – indeed, as unsustainable as development plans designed without taking climate risks into account.

**Appendix – Testimony on the *Stern Review*
February 13, 2007
Senate Committee on Committee on Energy and Natural Resources**

The damage estimates are difficult to understand because they are expressed in terms of a “certainty equivalent and equity equivalent annuity” metric that converts expected discounted welfare values computed across thousands of possible futures into a single number.

The analysis underlying the computation of this metric is sound, if not brilliant; see Mirrlees and Stern (1972) for the details of its development. Its application to the climate problem is path-breaking, but it is vulnerable to the sort of misinterpretation that will make people roll their eyes and wonder if any of us know what we are talking about. The authors of the *Review* are careful to say that “total cost over the next two centuries...*are equivalent* to an average reduction in global per capita consumption of at least 5%, now and forever” (my emphasis). When the results are reported in the popular press, however, the conditional phrase about equivalence is usually deleted, and that is a problem. Readers can react by saying - “It’s now, and I don’t see my 5.3% reduction in consumption. Where is it? It’s still now! Still not here!”

Notwithstanding this presentation problem, it is important to note that the damage estimates include not only the economic ramifications of climate impacts as they play out over time, but also a “risk premium” tied to the current level of uncertainty about the future as displayed in the simulation model. It is here that aversion to risk and aversion to inequality have an effect on the estimates. Weitzman (2007) argues that the *Stern* estimates undervalue these contributions because the tails of the distributions of our understanding of the climate impacts are so “thick”; in other words, the representations of uncertainty upon which the underlying simulations are conducted do not adequately consider the likelihood of extreme consequences.

The damage estimates have been criticized because they are based on a very low discount rate – a rate that virtually guarantees high values.

Dasgupta (2006), Maddison (2006), Nordhaus (2006), Tol (2006), Tol and Yohe (2006), Tol and Yohe (2007), Varian (2006), Yohe (2006) and Yohe and Tol (2007) all make this point. Some argue that imposing such a low discount rate on investments to mitigate climate change in a world where other investments are required to earn higher returns is a prescription for the inefficient allocation of resources over time. Others argue that public investments can earn lower than market returns if they complement private investment; see for example, Ogura and Yohe (1977). Still others, including the *Stern Review* itself, make an ethical case for minimizing the rate at which impacts that will be felt by future generations are discounted in current policy deliberations.

Regardless of how one comes down on this debate, and the choice of a discount rate is in the purview of policy-makers, it is important to recognize the sensitivity of the damage estimates to that choice. Tol and Yohe (2007) report, on the basis of a simple model calibrated to the *Stern Review* baseline scenario where damages create the equivalent of a 5.3% reduction in per capita consumption, that lowering the rate further would have very little effect on the estimate while increasing the discount rate to 3% would reduce damages to the equivalent of a 1.6% decline in equivalent per capita consumption.

It should finally be noted that Weitzman (2007) expresses concern that the economic profession at large has not yet solved the problem of exactly how to discount the distant future when intergenerational transfers of wealth must be considered. His point is simple: there is a lot of fundamental work still to be done in this regard.

The damage estimates have also been criticized because they seem to have been calibrated to the high end of current understanding of impacts, because they sometimes miss the opportunity for adaptation especially in a future where incomes will be higher, and because they add estimates of catastrophic damages to a baseline that already included estimates of the willingness to pay to avoid such calamity.

Tol (2006), Tol and Yohe (2006) and Yohe and Tol (2007) have made these points, but it is important to note that the range of uncertainty reflected in the underlying simulations is not tied entirely to these upper-end estimates. Tol and Yohe (2007) confront the “So what?” question that we begged in their earlier comments by exploring the implications of simply assuming that the developing world’s capacity to adapt will grow toward the current level of the world developed countries as their economies grow. The result is a reduction in discounted damages of more than 50%. Why so large? Because the small discount rate rewards increases in future adaptive capacity as heavily as it punishes future impacts.

Mitigation costs are estimated in terms of percentage losses in GDP, and so it is difficult to compare the costs of policy with its benefits (calibrated in terms of losses in equivalent per capita consumption).

Mendelsohn (2006) has remarked that the mitigation cost estimates are too low. Others have noted that they seem to run only through 2050. Tol and Yohe (2006) wonder why the conventional 550 ppm concentration target from earlier work persists as a policy target when damage estimates are so much higher than before. Perhaps most importantly, however, the *Review* never presents the net effect of mitigation in terms of the equivalent per capita consumption metric employed to track damages. Tol and Yohe (2007) have attempted to do so for a simple model calibrated, again, to support a 5.3% loss absent any intervention. They find that achieving a 550 ppm concentration target would reduce damages to

2.2%, that a achieving a 650 ppm target would reduce damages to 3.0%, and that achieving a 400 ppm target would reduce damages to 0.8%.

References

- Dasgupta, P. (2006), *Comments on the Stern Review's Economics of Climate Change*, Department of Economics, Cambridge University
<http://www.econ.cam.ac.uk/faculty/dasgupta/STERN.pdf>
- Intergovernmental Panel on Climate Change (IPCC) (2007), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report*, in Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J., and Hanson, C.E. (eds), Cambridge University Press, Cambridge, UK.
- Maddison, D.J. (2006), *Further Comments on the Stern Review*, Department of Economics, Birmingham University
<http://www.economics.bham.ac.uk/maddison/Stern%20Comments.pdf>
- Mendelsohn, R.O. (2006), "A Critique of the Stern Report", *Regulation* (Winter 2006-2007), 42-46.
- Nordhaus, W.D. (2006), A Review of the Stern Review of the Economics of Climate Change", *Journal of Economic Literature* 45: 686-702.
- Stern, N., S. Peters, V. Bakhshi, A. Bowen, C. Cameron, S. Catovsky, D. Crane, S. Cruickshank, S. Dietz, N. Edmonson, S.-L. Garbett, L. Hamid, G. Hoffman, D. Ingram, B. Jones, N. Patmore, H. Radcliffe, R. Sathiyarajah, M. Stock, C. Taylor, T. Vernon, H. Wanjie, and D. Zenghelis (2006), *Stern Review: The Economics of Climate Change*, HM Treasury, London.
- Stern, N., S. Peters, V. Bakhshi, A. Bowen, C. Cameron, S. Catovsky, D. Crane, S. Cruickshank, S. Dietz, N. Edmonson, S.-L. Garbett, L. Hamid, G. Hoffman, D. Ingram, B. Jones, N. Patmore, H. Radcliffe, R. Sathiyarajah, M. Stock, C. Taylor, T. Vernon, H. Wanjie, and D. Zenghelis (2006), *Postscript*, HM Treasury, London.
- Tol, R.S.J. (2006), "The Stern Review of the Economics of Climate Change: A Comment", *Energy & Environment*, 17, (6), 977-981.
- Tol, R.S.J. and G.W. Yohe (2006), "A Review of the Stern Review", *World Economy* 7: 233-250, 2006.
- Varian, H.R. (2006), "Recalculating the Costs of Global Climate Change", *New York Times*, December 14, <http://www.nytimes.com/2006/12/14/business/14scene.html>.
- Weitzman, M. (2007), "A Review of the Stern Review of the Economics of Climate Change", *Journal of Economic Literature* 45: 703-724.
- Yohe, G.W. (2006), "Some thoughts on the damage estimates presented in the Stern Review - An editorial", *Integrated Assessment Journal* 6: 65-72.
- Yohe, G.W., Schlesinger, M.E., and Andronova, N. (2004), "To Hedge or Not Against an Uncertain Climate Future", *Science* 306: 416-417.
- Yohe, G.W. and R.S.J. Tol (2007), "The Stern Review: Implications for Climate Change", *Environment*, forthcoming in March of 2007.

Figure 1: Stabilization levels and probability ranges for temperature increases. Source: Figure 2 from Stern, et al. (2006).

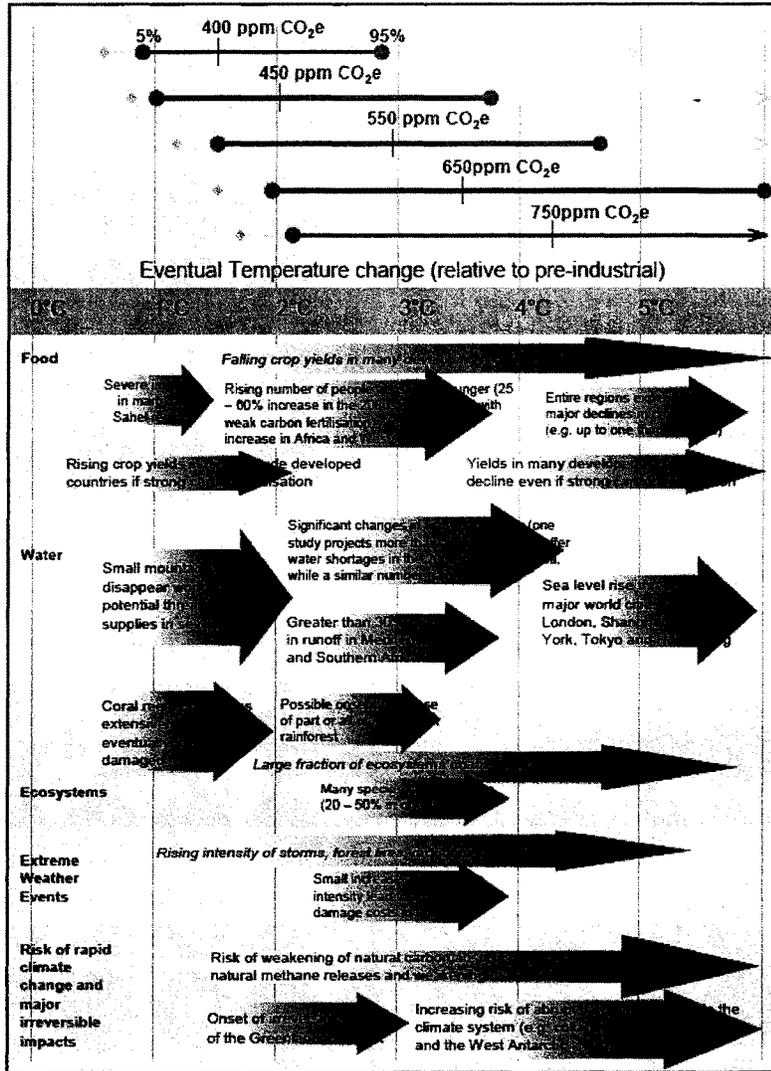


Table 1: Sectoral Risks from Climate Change; Source: IPCC (2007)

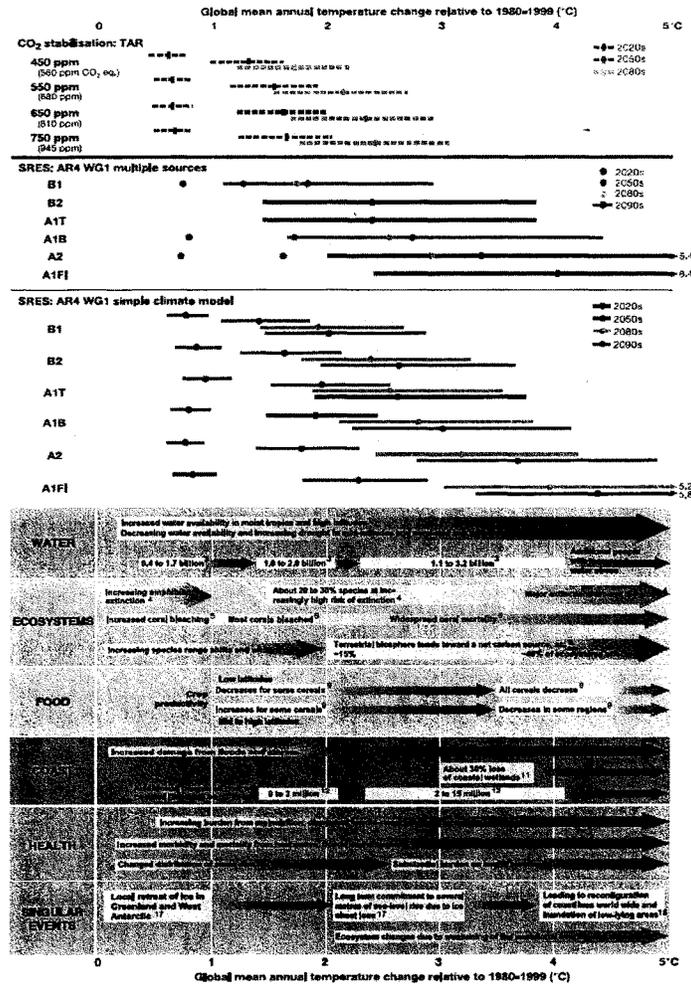


Table 20.8. Examples of global impacts projected for changes in climate (and sea level and atmospheric CO₂ where relevant) associated with different amounts of increase in global average surface temperature in the 21st century. This is a selection of some estimates currently available. All entries are from published studies in the chapters of the Assessment. (Continues below Table 20.9)

Table 2: Regional Risks from Climate Change; Source: IPCC (2007)

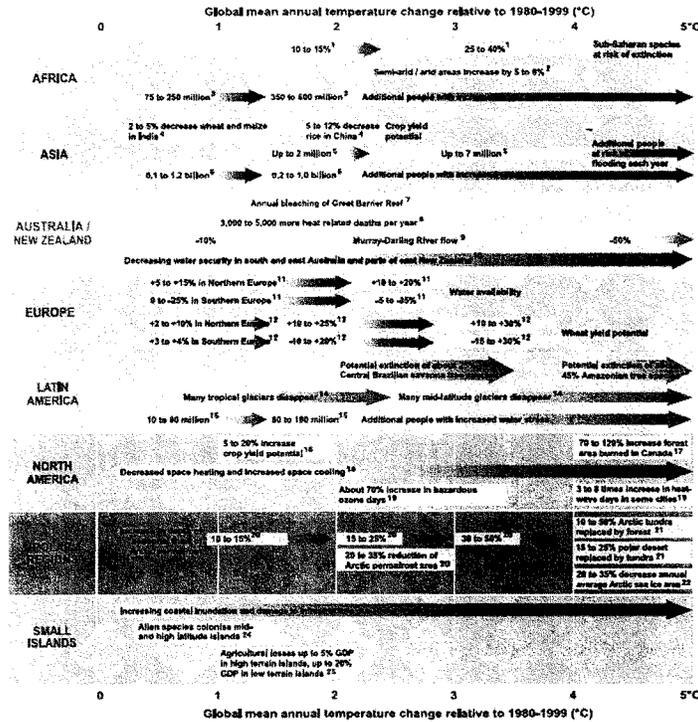


Table 20.9. Examples of regional impacts. See caption for Table 20.8.

Table 20.8. (cont.) Edges of boxes and placing of text indicate the range of temperature change to which the impacts relate. Arrows between boxes indicate increasing levels of impacts between estimations. Other arrows indicate trends in impacts. All entries for water stress and flooding represent the additional impacts of climate change relative to the conditions projected across the range of SRES scenarios A1F1, A2, B1 and B2. Adaptation to climate change is not included in these estimations. For extinctions, 'major' means -40 to -70% of assessed species.

The table also shows global temperature changes for selected time periods, relative to 1960-1999, projected for SPES and stabilisation scenarios. To express the temperature change relative to 1850-1899, add 0.5°C. More detail is provided in Chapter 2 [Box 2.9]. Estimates are for the 2020s, 2050s and 2080s, the time periods used by the IPCC Data Distribution Centre and therefore in many impact studies) and for the 2090s. SPES-based projections are shown using two different approaches. Middle panel: projections from the WGI AR4 SPM based on multiple sources. Best estimates are based on AOGCMs (coloured dots). Uncertainty ranges, available only for the 2090s, are based on models, observational constraints and expert judgement. Lower panel: best estimates and uncertainty ranges based on a simple climate model (SCM), also from WGI AR4 (Chapter 10). Upper panel: best estimates and uncertainty ranges for four CO₂-stabilisation scenarios using an SCM. Results are from the TAR because comparable projections for the 21st century are not available in the AR4. However, estimates of equilibrium warming are reported in the WGI AR4 for CO₂-equivalent stabilisation. Note that equilibrium temperatures would not be reached until decades or centuries after greenhouse gas stabilisation.

Table 20.8. Sources: 1, 3.4.1; 2, 3.4.1; 3, 4.3; 3, 3.5.1; 4, 4.4.1; 5, 4.4.9; 4.4.11; 6.2.5; 6.4.1; 6, 4.4.9; 4.4.11; 6.4.1; 7, 4.2.2; 4.4.1; 4.4.4 to 4.4.6; 4.4.10; 6, 4.4.1; 4.4.11; 9, 5.4.2; 10, 6.3.2; 6.4.1; 6.4.2; 11, 6.4.1; 12, 6.4.2; 13, 6.4; 8.7; 14, 8.2; 8.4; 8.7; 15, 8.2; 8.4; 8.7; 16, 8.6.1; 17, 19.3.1; 18, 19.3.1; 19, 19.3.5; 19, 19.3.5
 Table 20.9. Sources: 1, 9.4.5; 2, 9.4.4; 3, 9.4.1; 4, 10.4.1; 5, 6.4.2; 6, 10.4.2; 7, 11.6; 8, 11.4.12; 9, 11.4.1; 11.4.12; 10, 11.4.1; 11.4.12; 11, 12.4.1; 12, 12.4.7; 13, 13.4.1; 14, 13.2.4; 15, 13.4.3; 16, 14.4.4; 17, 5.4.5; 14.4.4; 18, 14.4.6; 19, 14.4.5; 20, 15.3.4; 21, 15.4.2; 22, 15.3.3; 23, 16.4.7; 24, 16.4.4; 25, 16.4.3

* Best estimate and likely range of equilibrium warming for even levels of CO₂-equivalent stabilisation from WGI AR4 are: 350 ppm, 1.0°C [0.6-1.4]; 450 ppm, 2.1°C [1.4-3.1]; 550 ppm, 2.9°C [1.9-4.4]; 650 ppm, 3.6°C [2.4-5.3]; 750 ppm, 4.3°C [2.8-6.4]; 1,000 ppm, 5.5°C [3.7-8.3] and 1,200 ppm, 6.3°C [4.2-9.4].

45

TESTIMONY OF JEFFREY A. SMITH

BEFORE THE

SUBCOMMITTEE ON SECURITIES, INSURANCE AND INVESTMENT

OF THE

COMMITTEE ON BANKING, HOUSING AND URBAN AFFAIRS

U.S. SENATE

REGARDING

CLIMATE DISCLOSURE:
MEASURING FINANCIAL RISKS AND OPPORTUNITIES

OCTOBER 31, 2007
WASHINGTON, DC

Good afternoon Chairman Reed, Ranking Member Allard, and members of the Committee. My name is Jeff Smith, and I am the partner-in-charge of the environmental law practice at Cravath, Swaine & Moore LLP. I am also the past Chairman of the Committee on Environmental Disclosure of the American Bar Association's Section on Environment, Energy and Resources. Although much of the experience I have gleaned, and that I hope will be of use to this Committee, comes from those affiliations, I am speaking this afternoon as an individual lawyer who has approximately 27 years of experience with environmental issues in business transactions, and not on behalf of my firm or any of its clients, or on behalf of the ABA. I am honored by the invitation to appear today to present my views on climate change disclosure, and I commend the Subcommittee for holding a timely hearing on this important subject.

I. Introduction

The potential environmental, social and political impacts of global climate change are, in many respects, unprecedented. It is already clear that adaptation to climate change will have major implications for the world-wide economy. In addition, the consequences of any sudden, severe events or dramatic shifts in world ecosystems could create economic upheaval, particularly in markets in which risk is concentrated.

Macroeconomic surveys using sophisticated modeling techniques, such as the recent University of Maryland study on the Hidden Costs of Climate Change¹ and the Stern Review², have forecast significant economic costs resulting from climate change in the United States and worldwide. Government-sponsored surveys on climate change science by such organizations as the U.S. Climate Change Science Program now predict with certainty that there will be long-term physical changes to the environment with potentially far-reaching consequences. The recent InterAcademy Council report³, which develops a framework for a transition to sustainable energy, is an example of the rapidly developing thought on how human economic behavior might adapt.

On the regulatory front, the Kyoto Protocol to the United Nations Framework Convention on Climate Change, established in 1997 and entered into force in 2005, sets binding greenhouse gas (GHG) emission limits for the 175 developed countries that signed it. The European Union Trading Scheme (EU/ETS) has established the world's largest GHG emission trading system, with over 11,000 participating industrial entities.⁴

¹ See Matthias Ruth et al., *The US Economic Impacts of Climate Change and the Costs of Inaction*, A Review and Assessment by the Center for Integrative Environmental Research (CIER) at the University of Maryland (October 2007).

² Nicholas Stern, *Stern Review on the Economics of Climate Change* (Cambridge University Press, 2006).

³ InterAcademy Council, *Lighting the Way: Toward a Sustainable Energy Future* (October 2007), available at <http://www.interacademycouncil.net/?id=12039>.

⁴ Donald M. Goldberg and Angela Delfino, *The Impact of the Kyoto Protocol on U.S. Business*, in GLOBAL CLIMATE CHANGE AND U.S. LAW 104 (Michael B. Gerrard ed., 2007).

In the U.S., regional GHG regulatory initiatives involving multiple states⁵ have emerged in the absence of federal legislation controlling GHG emissions.⁶ Even without federal legislation, much of the U.S. economy seems likely to be affected by a GHG emission regulatory regime. Profound and long-lasting consequences for the economy seem almost certain, although careful and timely planning can spread the costs over affected sectors and over time.

II. Disclosure Background and Recent Developments

In many respects, the response of investors and the marketplace to these developments and to the prospects of further profound changes in the regulatory and economic landscapes has been both predictable and understandable: Give us information so that we can assess and price the risks and opportunities.

As a result, in the past five years alone, there have been over 50 white papers on climate change-related topics published by major investment banks, addressing issues such as the implications of climate change for investors and new business opportunities arising from the physical effects of rising temperatures.⁷ More than a dozen studies

⁵ Eleanor Stein, *Regional Initiatives to Reduce Greenhouse Gas Emissions*, in GLOBAL CLIMATE CHANGE AND U.S. LAW 315-316 (Michael B. Gerrard ed., 2007).

⁶ These initiatives include the Regional Greenhouse Gas Initiative, the New England Governors/Eastern Canadian Premiers' Climate Action Plan, Powering the Plains, the Western Governors' Association Clean and Diversified Energy Initiative, the West Coast Governors Global Warming Initiative (West Coast Governors Global Warming Initiative does not include Canada/U.S. compacts), and the Southwest Climate Change Initiative.

⁷ See, e.g., John Llewellyn, Lehman Brothers, *The Business of Climate Change: Challenges and Opportunities* (February 2007); Edward M. Kerschner & Michael

commissioned by various non-governmental organizations (NGOs) over this same period have examined the limitations of business reporting under existing rules. Other NGO reports have compared disclosure of climate risk in SEC filings under both the Securities Act of 1933 (the '33 Act)⁸ and the Securities Exchange Act of 1934 (the '34 Act)⁹, including recent industry-specific analyses for the insurance and petrochemical industries, as well as energy-related businesses likely to be most immediately affected by climate change.

Voluntary climate change disclosure also has increased dramatically in volume, depth, detail and sophistication over the past five years. Organizations such as the Global Reporting Initiative and Carbon Disclosure Project have issued guidelines for corporations seeking to disclose climate change-related information voluntarily.¹⁰ A coalition of investors, including Ceres, has issued a Global Framework for Climate Risk Disclosure.¹¹ It is not an exaggeration to say that the climate change disclosure market

Geraghty, Citigroup, *Climate Consequences: Investment Implications of a Changing Climate* (January 19, 2007); Mark Fulton, Deutsche Bank, *Investing in Climate Change: An Asset Management Perspective* (October 2007).

⁸ 15 U.S.C. § 77a et seq.

⁹ 15 U.S.C. § 78a et seq.

¹⁰ See, e.g., Global Reporting Initiative, *Sustainability Reporting Guidelines*, 2006 (describing G3 reporting guidelines), available at <http://www.globalreporting.org/ReportingFramework/G3Guidelines/>; Carbon Disclosure Project, *CDP5 Letter and Questionnaire*, February 1, 2007, available at <http://www.cdproject.net/questionnaire.asp>.

¹¹ See *Global Framework for Climate Risk Disclosure, A statement of investor expectations for comprehensive corporate disclosure*, October 2006, available at <http://www.ceres.org/pub/docs/Framework.pdf>.

has largely been privatized, and that most of the best and most thorough reporting on climate change to date has been done outside the mandates of '33 Act and '34 Act disclosure, and through frameworks that the SEC did not participate in creating.

Many aspects of these developments are positive, and have resulted in a significant transfer of information to the marketplace. It would be a mistake, however, to believe that this voluntary activity, no matter how sophisticated and well-intentioned, could become a permanent substitute for mandatory reporting. Because there is no agreed-upon format or objective for these reports, notwithstanding the effort with which they are compiled and verified, they do not create ready basis for comparison among and between themselves, or an accessible measurement against a recognized benchmark vetted through well-recognized channels under well-established principles.

To date, there has been no formal, specific clarification from the SEC as to how traditional disclosure standards should be applied to climate change. This has created two issues: (1) a wide variation in the depth, quality and format of formal SEC reporting on climate change; and (2) an unprecedented divergence between the scope and quality of mandatory reports on the one hand and voluntary reports on the other.

Some investor groups have framed the marketplace's demand for climate change information as a dilemma pitting big investors against little investors, implying that information is being hidden from those without the resources or acumen to find it. I disagree. Most big investors, such as mutual funds and public pension funds, are an

agglomeration of little investors, and their trustees are operating at the highest levels of market sophistication and under well-established fiduciary restraints. The real issues are two-fold: (1) the integrity and scope of climate change information in the marketplace as a whole; and (2) how, whether and when that flow of information is going to be standardized, modulated and/or regulated in a manner that allows an assessment of each market participant for which the issue is material and meaningful comparisons among all competing market participants.

III. Environmental Disclosure

There are well-established and useful regulations in place under long-standing SEC protocols for reports to investors required by the '33 Act and the '34 Act. Over the past 30 years, it has been demonstrated that these requirements are broad and adaptable enough to have mandated significant disclosure in response to a wide array of environmental challenges and regulatory developments, ranging from the passage of Superfund in 1980, to the extensive revisions of the Clean Air Act in 1990, to the EPA's complex multi-media regulation of specific industries, such as the co-called "cluster rules" for the pulp and paper sector in the late 1990s.

We have arrived at a time, however, in which the application of these requirements to climate change is uncertain in light of the unprecedented scope and speed of change, and the market's appetite for information. SEC attention to climate change disclosure would accomplish three significant objectives:

- (1) To reassert the SEC's preeminence in the information marketplace and reestablish its gatekeeper role for climate disclosure.

- (2) To allow the information marketplace to develop a normative body of disclosure in controlled circumstances.
- (3) To establish a set of disclosure expectations that will meet what will doubtlessly continue to be both rapid and profound changes in market needs.

There are pitfalls to be avoided on both sides. On the one hand, the comparative paucity of some aspects of '33 Act and '34 Act disclosure to date is increasingly disquieting to the marketplace, which is hearing from multiple sources that major changes are inevitable. On the other hand, there are many elements of climate change that remain unknown and fundamentally unknowable. Prematurely releasing information labeled as data and compelling disclosure that is little more than informed speculation merely to fill a perceived void in the marketplace or to placate an investor group will be counterproductive to the market in general, to individual companies, and ultimately to investors.

Against the backdrop of this dynamic activity, the remaining sections set forth an overview of existing environmental disclosure requirements; several applications of these requirements to the risks and opportunities posed by climate change; and two examples of how the SEC has addressed similar marketplace stresses in the past.

IV. The Mandate of Regulation S-K¹²

The specific framework of current disclosure requirements can be summarized briefly.

¹² 17 C.F.R Part 229 (2005).

Item 101—Costs of Compliance

Under Item 101 of Regulation S-K, a company must disclose any material effects that costs of environmental compliance may have on its earnings, capital expenditures and competitive position.¹³ Item 101(c)(xii) requires the disclosure of contingent effects, as well as those which are known or certain, including material expenditures for environmental control facilities for the remainder of the current reporting year and the succeeding year, as well as for any further periods as the registrant deems material.¹⁴ It is noteworthy that this requirement compels the issuer to make whatever disclosure about the future is necessary to make the disclosure about current plans not misleading. For industries such as coal-burning utilities, cement or aluminum smelters, which might have material capital obligations under some, but not all, pending climate change regulatory scenarios, Item 101 requires ongoing attention both to technical and legislative developments and the disclosure of material contingent capital plans. Common sense and self interest also dictate that a public company not surprise the marketplace with news of a material capital expenditure that had, in fact, been developed as a contingency plan for several years. Note that the filter of materiality appears throughout these requirements. This is an equally well-established, albeit flexible, benchmark, which will be discussed briefly in the following section. It screens out the trivial and focuses investor attention on

¹³ See Securities Act Release No. 5569, Exchange Act Release No. 11236, 40 Fed. Reg. 7013 (Feb. 18, 1975); see also SEC Staff Accounting Bulletin Release No. 92, 58 Fed. Reg. 32,843, 32,843 (June 14, 1993).

¹⁴ See 17 C.F.R. §229.101 (2005).

important issues. It also focuses management's attention on matters that will really make a difference.

The SEC has made it clear that "to the extent any foreign environmental provisions may have a material impact upon the company's financial condition or business, such matters should be disclosed."¹⁵ Thus, a multinational company with facilities in both the U.S. and Europe is currently required to determine whether disclosure is required under Item 101 concerning capital expenditures undertaken as an alternative to purchasing credits in the EU/ETS. If regional rather than national regulatory regimes remain the dominant source of GHG emission reduction mandates in the U.S., a reporting company will likely reach differing conclusions concerning the economics of such capital expenditure on a region-by-region basis within the U. S.

Item 103—Disclosure of Legal Proceedings

Under Item 103, a company must disclose material pending legal proceedings to which it is a party or to which its property is subject, including proceedings "known to be contemplated" by governmental authorities.¹⁶ An administrative or judicial proceeding arising under environmental law must be disclosed if (A) it is material to a company's business or financial condition; (B) it includes a claim for damages or costs in excess of 10 percent of current consolidated assets; or (C) a governmental authority is a party to the proceeding, or is known to be contemplating such proceedings, unless any sanctions are

¹⁵ 1973 WL 11973 (S.E.C. No-Action Letter) (interpreting precursor to Item 101(c)(xii)).

¹⁶ 17 C.F.R. § 229.103

reasonably expected to be less than \$100,000¹⁷. While this amount is clearly not material for many reporting companies, this threshold reflects the SEC's long-held view that environmental performance is significant enough to investors to merit close scrutiny.¹⁸

Although Item 103 does not specifically require a company to predict the effects of litigation, it has become increasingly common to disclose whether management believes that the results of environmental litigation will be material. In addition, aggregation of sanctions is required for purposes of Instructions 5 (A) and (B) in proceedings "which present in large degree the same issues".¹⁹

The climate change litigation docket is increasingly active, and the vast majority of cases are of relatively recent vintage. Most of the significant pending cases can be grouped into one of four categories. The first category is represented by Massachusetts v. EPA,²⁰ and consists of governmental (or other) plaintiffs suing to compel EPA (or other regulatory agencies) to act. In the second group of cases, typified by a matter in the U. S. District of Court for the Eastern District of California, Central Valley Chrysler-Jeep v. Witherspoon,²¹ plaintiffs are challenging regulations that have been adapted or

¹⁷ 17 C.F.R. § 229.103 (Instruction No. 5)

¹⁸ See Cynthia A. Williams, *The Securities and Exchange Commission and Corporate Social Transparency*, 112 Harv. L.Rev. 1246 (1999).

¹⁹ 17 C.F.R. § 229.103 (Instruction No. 5)

²⁰ *Massachusetts v. EPA*, 549 U.S. 1438 (2007)

²¹ *Central Valley Chrysler-Jeep Inc. v. Witherspoon*, No. CVF-04-6663 (E.D. Cal 2005); In Witherspoon, an association of car dealerships, acting in concert with the automobile industry, are challenging the so-called Pavley Amendment, which requires the California Air Resources Board to regulate GHG emissions from motor vehicles, on

authorized.²² The second group of cases also involves governmental plaintiffs seeking relief other than action by a regulator. The defendants in these cases are private entities, typically industry representatives of major GHG emitting businesses, such as power generators or automobile manufactures. Typical of this group of cases is Connecticut v. American Electric Power Company (AEP),²³ which was dismissed by the District Court of the Southern District of New York in September 2006 and is currently on appeal to Second Circuit Court of Appeals. The theory of liability is public nuisance, and plaintiffs are seeking a commitment by defendants to reduce their GHG emissions by a certain percentage over a stated period of time. In a similar vein, but seeking different relief, is California v. General Motors²⁴ in which, like the plaintiffs in Connecticut v. AEP, the Attorney General of California (on behalf of the people of California), attempted to use a theory of public nuisance against one of several sources of GHG emissions. Unlike the Connecticut v. AEP case, the California Attorney General sought monetary compensation for the costs of the harms already caused and yet to be caused by global warming allegedly attributable to the defendant's products – tailpipe GHG emissions.²⁵

In the third category of cases, private plaintiffs, usually advocacy groups, are suing either private defendants or governmental agencies to compel them to take climate

the grounds that any such regulation is preempted by the comprehensive federal legislative and regulatory scheme enacted under the Clean Air Act.

²² 2006 WL 2734359 (E.D. Cal. 2006).

²³ 406 F. Supp. 2d 265 (S.D. N.Y. 2005).

²⁴ No. C 06-5755 (N.D. Cal. 2006).

²⁵ The case was dismissed by the District Court on September 15, 2007.

change into account when they are considering environmental permitting decisions. For example, in Northwest Environmental Defense Center v. Owens Corning,²⁶ an environmental advocacy group was granted standing by the District Court in Oregon in part on the basis of harms its members allegedly would suffer from global warming as the result of defendant's failure to obtain a so-called prevention of significant deterioration (PSD) permit under the CAA for alterations to its plant. Finally, there is a fourth group of cases, spurred in part by Hurricane Katrina, which pit private plaintiffs against a widening circle of private defendants and, by implication, their insurance carriers. In Comer v. Murphy Oil,²⁷ for example, private citizens who suffered damage to their homes sued a group of oil companies for their contribution to global warming and thus, by extension, the intensity of Hurricane Katrina. These cases look like traditional mass toxic tort suits, but their outcomes will turn on issues of proof inextricably linked to the science of climate change.²⁸ To date, none of these matters has sought relief that involve payments that have traditionally been classified as "sanctions" under SEC guidance.²⁹

Each of these types of proceedings has obvious implications for other significant GHG emitters should they, or similar causes of action, prove successful. These cases

²⁶ 434 F. Supp 957 (D. Or. 2006).

²⁷ Comer v. Murphy Oil, 2006 WL 1066645 (S.D. Miss. 2006).

²⁸ Comer was dismissed in September 2007 for failure to state a claim on which relief could be granted.

²⁹ The SEC has explicitly stated that cleanup costs under CERCLA are not "sanctions" for the purposes of Instruction 5(C) to Item 103. Thomas A. Cole, SEC No-Action Letter (Jan. 17, 1989), [1989 Transfer Binder] Fed. Sec. L. Rep. (CCH) para. 78,962, at 78,815.

also may have indirect effects on non-defendant companies, both in terms of costs and disclosure obligations, as the threat of legal or regulatory consequences becomes real or more foreseeable. It is widely recognized that precedent established by other parties may be controlling on an issuer. The scope of Item 103 is comparatively clear. As a result, disclosure of climate change litigation, both by the parties involved and by those potentially affected by the outcomes, has been the most robust and detailed of all SEC-mandated climate disclosure to date.³⁰

³⁰ See, e.g., American Electric Power Co., Inc. Annual Report, Form 10-K, for the Fiscal Year ended December 31, 2006 (“In July 2004 attorneys general of eight states and others sued [various] utilities alleging that carbon dioxide emissions from power generating facilities constitute a public nuisance under federal common law. The suits were dismissed by the trial court, and plaintiffs have appealed the dismissal. While we believe the claims are without merit, the costs associated with reducing carbon dioxide emissions could harm our business and our results of operations and financial position.”); and Southern Company Annual Report, Form 10-K, for the Fiscal Year ended December 31, 2006 (“In July 2004, attorneys general from eight states, each outside of [our] service territory, and the corporation counsel for New York City filed a complaint in the U.S. District Court for the Southern District of New York. A nearly identical complaint was filed by three environmental groups in the same court. The complaints allege that the companies’ emissions of carbon dioxide, a greenhouse gas, contribute to global warming, which the plaintiffs assert is a public nuisance. Under common law public and private nuisance theories, the plaintiffs seek a judicial order (1) holding each defendant jointly and severally liable for creating, contributing to, and/or maintaining global warming and (2) requiring each of the defendants to cap its emissions of carbon dioxide and then reduce those emissions by a specified percentage each year for at least a decade. Plaintiffs have not, however, requested that damages be awarded in connection with their claims. [We] believe these claims are without merit and note that the complaint cites no statutory or regulatory basis for the claims. In September 2005, the U.S. District Court for the Southern District of New York granted ...the defendants’ motion to dismiss these cases. The plaintiffs filed an appeal to the U.S. Court of Appeals for the Second Circuit on October 19, 2005. The ultimate outcome of these matters cannot be determined at this time.”)

Item 303—Management Discussion and Analysis (MD&A)

To supplement the mandates of Items 101 and 103, the SEC casts a broader, more subjective net, through its requirements for MD&A disclosure under Item 303.³¹ The SEC views MD&A disclosure as an opportunity to give investors “a look at the company through the eyes of management.”³² In practice, this exercise generally requires the company to disclose “currently known trends, events, and uncertainties that are reasonably expected to have material effects.”³³

Item 303 has been interpreted to require two distinct inquiries. First, management must determine whether an uncertainty is reasonably likely to occur.³⁴ Unless management can conclude that the event is not reasonably likely to occur, management must assume that it will occur.³⁵ Second, the trend or event must be disclosed, unless management can determine that its occurrence is not reasonably likely to have a material effect on the company.³⁶ Disclosure is optional when management is merely anticipating

³¹ 17 C.F.R. § 229.303 (2005).

³² Richard Y. Roberts, *Update on Environmental Disclosure*, Address at the Colorado Bar Ass’n (Sept. 28, 1991).

³³ Concept Release on Management’s Discussion and Analysis of Financial Condition and Operations, Exch. Act Release No. 6211, 52 Fed. Reg. 13,715, 13,717 (Apr. 26, 1987).

³⁴ Sec. Act Release No. 6835, 54 Fed. Reg. 22, 427, 22,430 (May 4, 1989).

³⁵ *Id.*

³⁶ See Management Discussion and Analysis of Financial Condition and Results of Operations: Certain Investment Company Disclosures, Securities Act Release No. 6835, 54 Fed. Reg. 22,427, at 22,430 (May 24, 1989).

“a future trend or event, or anticipating a less predictable impact of a known trend, event or uncertainty.”³⁷

To attempt to capture this balance, Item 303 requires the disclosure of “known uncertainties,”³⁸ that is, knowable possibilities that are less than trends but that could result in material consequences. The SEC has also required disclosure of trends that are “currently known” and “reasonably expected to have material effects.”³⁹ The predictability of the event at issue has as much significance for disclosure purposes as the size of its potential consequences.

The instructions to Item 303 state that the information provided in the MD&A “need only include that which is available to the registrant without undue effort or expense and which does not clearly appear in the registrant’s financial statements.”⁴⁰ The SEC requires registrants to state “the amount, or describe the nature or extent of the potential liabilities” in their disclosure⁴¹ and that, even when an exact calculation of

³⁷ *See Id.* The SEC has expressly rejected as “inapposite to Item 303 disclosure” the probability/magnitude balancing test for disclosure of contingent events set forth by the Supreme Court in Basic v. Levinson. *See* Sec. Act Release No. 6835, 54 Fed. Reg. 22,427, at 22,430 n.27. In other words, it is not proper or necessary to disclose the remote possibility of a catastrophic event.

³⁸ 17 C.F.R. § 229.303(a)(1) (2005).

³⁹ Sec. Act Release No. 6711, Fed. Sec. L. Rep. (CCH) ¶ 84,118, at 88,624 (Apr. 20, 1987).

⁴⁰ 17 C.F.R. § 229.303 (2005) (Instruction 2); *see also* Sec. Act Release No. 6835, 54 Fed. Reg. 22,427, at 22,430 (stating that MD&A requires quantification of potential liability “to the extent reasonably practicable”).

⁴¹ *In re Occidental Petroleum*, 57 S.E.C. Docket 330, 571 (July 2, 1980) (discussing precursor to Item 303).

potential liability is not possible, the effects of such liability should be “quantified to the extent reasonably practicable.”⁴²

For disclosure purposes, climate change is now ripening from being an “uncertainty” or a “trend” to being an “event.” Five years ago, a fair reading of Item 303 might have justified silence on climate change on the part of most public companies, for several reasons. The scientific view, while rapidly coalescing, was far from certain and was being publicly dismissed as speculative.⁴³ The Kyoto Protocol had not been ratified. There was no established GHG emission trading marketplace. As a consequence, the effects on production, demand for products, risks to physical assets, requirements for capital expenditure, and other traditional business metrics were unquantifiable, irrespective of the level of effort on the part of management. In fact, any disclosure involving the “math” of climate change arguably would have been misleading, in that it would have created an illusion of precision.

Today, while there are still significant uncertainties regarding future federal regulation in the U.S., a reasonably broad-based consensus for federal action, involving either a cap-and-trade program or a carbon tax, is forming. Several GHG emission trading marketplaces have been established. There are numerous developing regional and local regulatory mandates for GHG emission reductions. Several individual states

⁴² Sec. Act Release No. 6835, 54 Fed. Reg. 22,427, 22,430 (May 24, 1989).

⁴³ See James Glanz, *The Nation: Blue Sky; Sure, It's Rocket Science, but Who Needs Scientists?*, N.Y. TIMES, June 7, 2001, at D1 (quoting various administration sources as “dismissive” of climate change science).

already have proposed implementing regulations for regional GHG emission compacts.⁴⁴ The Supreme Court has determined that the EPA has the authority to regulate tailpipe carbon dioxide emissions as a pollutant under the Clean Air Act. California is seeking a federal waiver which would allow it to regulate tailpipe GHG emissions. Thirteen other states have adopted California's regulations.

Silence on climate change by any publicly-traded company for which stringent regulation or unfavorable economic trade-offs could translate into material economic or strategic consequences is no longer supportable under Item 303. At the same time, however, many reporting companies are still far enough removed from any of the immediate consequences of climate change justifiably to remain silent, because the forces that will shape any definable, material economic effects of GHG emissions on their customers are too still abstract or uncertain, and their application to the issuer's business is unclear. Compelling such companies to disclose would serve no useful purpose in the market and could undermine the integrity of mandated data and material market developments.

⁴⁴ For example, on October 24, 2007, New York Governor Eliot Spitzer announced regulations to cut GHG emissions from power plants and establish a first dollar emission credit auction as part of the RGGI. See Editorial, Listen to the States, N.Y. TIMES (October 27, 2007).

For a summary of the way these elements of Reg S-K might work ideally in the climate change arena, a snapshot comparison with the four basic requirements of the Global Framework for Climate Risk Disclosure⁴⁵ is instructive.

1. Emissions disclosure. Except for a few GHG intensive industries, a company's actual "carbon footprint" would be immaterial under Reg S-K. Large volumes of emissions data are highly unlikely to be useful to investors or markets.
2. Assessment of Physical Risks of Climate Change. Again, except for a company extraordinarily ill-positioned - for example, with a material gas pipeline subject to proven and ongoing subsidence of the Arctic permafrost - this disclosure would either be immaterial or premature, or both.
3. Strategic Analysis of Climate Risk. For an increasing number of companies, the material trends and uncertainties examined in this analysis should be part of MD&A disclosure under Item 303 of Reg S-K. In addition, as described in Section VII below, it also may be material to discuss the degree of preparedness of companies in a sector that may become highly regulated.
4. Analysis of Regulatory Risks. This is currently mainstream disclosure required under Item 101 and 103.

⁴⁵ See *Global Framework for Climate Risk Disclosure, A statement of investor expectations for comprehensive corporate disclosure*, October 2006, available at <http://www.ceres.org/pub/docs/Framework.pdf>.

It is worthy of note that the crucial concept of materiality appears throughout Regulation S-K and is, of course, the cornerstone of Section 10b-5 of the '33 Act, which prohibits material misstatements or omissions of material information by public companies.⁴⁶ The Supreme Court has held that a matter is material if a reasonable investor would view it as significantly altering the "total mix" of information made available to an investor.⁴⁷ SEC Staff Accounting Bulletin No. 99 states that "a matter is 'material' if there is a substantial likelihood that a reasonable person would consider it important." There is no bright line test of materiality. The SEC has warned against numerical formulas or rule-of-thumb percentages.⁴⁸ Both qualitative and quantitative factors must be used.

V. Accounting Standards

Regulation S-K provides the parameters of what is to be included in financial statements, but does not dictate how specific items are to be accounted for and disclosed.⁴⁹ The standards governing such financial matters are established by the accounting profession. The Financial Account Standards Board's (FASB) principles governing the disclosure of contingent risk, FAS No. 5, "Accounting for

⁴⁶ 17 C.F.R 240.10b-5

⁴⁷ *TSC Industries Inc. v. Northway, Inc.* 426 U.S. 438, 448 (1976).

⁴⁸ Securities of Exchange Commission, Materiality, SEC Staff Accounting Bulletin Release No. 99 (August 12, 1999).

⁴⁹ Mark A. Stach, *Disclosing Environmental Liabilities Under Securities Law 7-2* (1997).

Contingencies,⁵⁰ is the most frequently invoked, even though it addresses risks far broader than environmental ones, because most environmental issues pass through a stage in which the financial outcome is contingent on a number of technical and legal factors. FAS 5 mandates that a loss contingency be accrued by a charge to income, and that the nature of the contingency be described in a footnote to the financial statement, if it is probable that a loss has been incurred and the amount of the loss can be reasonably estimated.⁵¹ If a loss contingency is only reasonably possible, or if the loss is probable but the amount cannot be reasonably estimated, then the company is not required to accrue for it, but its nature must be disclosed in a footnote.⁵²

In the past, the SEC has used a variety of techniques and guidance to clarify specific expectations under the broad construct of existing financial disclosure principles. For example, Staff Accounting Bulletin No. 92 (SAB 92), clarified certain accounting and disclosure issues for contingent environmental liabilities.⁵³ Broadly speaking, SAB 92 was intended to “elicit more meaningful information concerning environmental

⁵⁰ Financial Accounting Standards Board, *Statement of Financial Accounting Standards No. 5, Accounting for Loss Contingencies* (March 1975).

⁵¹ *Id.* at § 8.

⁵² *Id.* at § 10. See also Jonathan S. Klavens, *Environmental Disclosure Under SEC and Accounting Requirements: Basic Requirements, Pitfalls, and Practical Tips*, available at <http://www.abanet.org/environ/committees/counsel/newsletter/aug00/kla.html> (August 2000).

⁵³ SEC Release Staff Accounting Bulletin Release No. 92, 58 Fed. Reg. 32,843, 32,843 (June 14, 1993); Richard Y. Roberts, SEC Commissioner, *SAB 92 and the SEC's Environmental Liability Disclosure Regulatory Approach*, address delivered at the University of Maryland School of Law, at 3 (April 8, 1994).

matters in filings” than had been made available to the marketplace.⁵⁴ The measurement of a liability must be based on “currently available facts, existing technology and presently enacted laws and regulations and should take into consideration the likely effects of inflation and other societal and economic factors.”⁵⁵ Although “significant uncertainties” may exist, SAB 92 made it clear that “management may not delay recognition of a contingent liability until only a single amount can be reasonably estimated.”⁵⁶ When that amount falls within a range of reasonable likely outcomes, the registrant should recognize the minimum amount of the range.⁵⁷

At a practical level, however, many complexities arise in determining whether an event is probable and the liability is estimable. For example, under the EU/ETS, there is no question of probability of emission regulation, and the price of a ton of GHG emissions has been established by the market. As a result, we are starting to see financial disclosure which quantifies GHG emission risk in these markets.⁵⁸ In the U.S., however,

⁵⁴ Richard Y. Roberts, SEC Commissioner, *SAB 92 and the SEC’s Environmental Liability Disclosure Regulatory Approach*, address delivered at the University of Maryland School of Law, at 5 (April 8, 1994).

⁵⁵ SEC Staff Accounting Bulletin Release No. 92, 58 Fed. Reg. 32,843, 32,843 (June 14, 1993), at 32844.

⁵⁶ *Id.* at 32844.

⁵⁷ *Id.* at 32845.

⁵⁸ See Sappi LTD Annual Report, Form 20-F, for the Fiscal Year Ended December 31, 2005, at 38:

The countries within which we operate in Europe are all signatories of the Kyoto Protocol and we have developed a GHG strategy in line with this protocol. Our European mills have been set CO2 emission limits of the allocation period 2005 to 2007. Based upon in depth analysis of our mill production by a Sappi Fine Paper

neither the regulatory regime nor the cost of emission or compliance has been established, so there is currently no financial statement disclosure driven by climate change. Although that absence is increasingly unsettling to the markets, it is unavoidable in the short term.

Furthermore, whether a contingent loss, such as a need to install pollution control equipment at substantial cost in response to pending regulatory requirements, is probable and estimable, will vary by industry, company, plant and jurisdiction. How the SEC's requirements are to be applied in each case is a question to which the answers will continue to change rapidly, particularly in industrial sectors with significant GHG emission profiles. The inherent limitations of determining probability and estimability, however, coupled with the complexity of the questions surrounding climate change, have already resulted in a wide variety of disclosure decisions. In most instances, this variety is justified, and should (and will) continue.

VI. The Marketplace is Demanding Information

Against the backdrop of these long-standing disclosure principles, the marketplace is looking for information and data to help it solve a four dimensional equation in which there are multiple variables. This uncertainty has created a level of

Europe task force it is unlikely that Sappi will exceed their CO2 emission limits. Consequently in July 2005 Sappi Fine Paper Europe sold 90,000 surplus CO2 credits to the value of \$2.5 million (euro 2.0 million) on the European Climate Exchange.

investor involvement, interest and insistence which is unprecedented in my experience.

The passage of Superfund is the second place event, but it is a distant second.

Among the questions for which the marketplace is seeking analysis and answers are the following:

What will be the outcome of federal legislative initiatives and the regulations that the Supreme Court ruled that EPA has the authority to issue, and what will the relationship of these outcomes be to local, state and regional legislative efforts?

The current regulatory landscape is balkanized, yet very active, running the gamut from compulsory programs, to strictly voluntary information disclosure, to financial incentives, to information sharing, to cap-and-trade initiatives.⁵⁹ This has multiplied the usual uncertainties that arise in a time of major regulatory shifts.

To what extent will the courts act to compel federal regulation, ratify state initiatives or to create new and independent avenues of liability?

As discussed above, the climate change litigation docket is rapidly expanding. It is clear that it has already had a forcing effect on legislation and regulation. While lawsuits based on public nuisance theories have thus far been dismissed as posing nonjusticiable political questions, that outcome may vary across states and federal districts, and additional theories of liability may emerge. Cases seeking monetary

⁵⁹ For example, California, Hawaii and New Jersey have set mandatory, economy-wide caps on greenhouse gas emissions, while ten other states have formed the Regional Greenhouse Gas Initiative (RGGI), a mandatory cap-and-trade program to reduce carbon dioxide emissions from power plants; *see* Petition for Interpretive Guidance on Climate Risk Disclosure, SEC File No. 4-547 (September 18, 2007) [hereinafter Ceres Petition].

damages present difficult questions of causation and other potential pitfalls for plaintiffs, yet may expose entire industries or broad sectors of the economy to liability.⁶⁰

Which sectors are going to bear greatest cost and risk of climate change, directly and indirectly? How will these risks be spread over time? To what extent will costs be recoverable from customers or rate payers?

These are, of course, the Holy Grail issues for investors. The uncertainty of the national regulatory picture and the still undermined role of the developing economies in GHG emission reduction, means that there are no readily available answers. Because there already have been some discernible shifts in consumer markets, however, such as the popularity of the Toyota Prius or the willingness of some utility customers to pay a green premium for wind power, investors continue to scour the landscape for clues, and are seeking whatever information management is willing or compelled share.

Where are the opportunities embedded in climate change? For example, who will be the technology winners in the alternative energy markets or in emerging technologies to enhance energy efficiency?

As climate change affects the regulatory and physical environment, new business opportunities will arise. State and regional regulation already has jump-started markets for alternative energy and carbon emissions credits. Investors are always interested in

⁶⁰ Shareholder litigation against officers and directors who fail to respond to climate change also may be on the horizon. Expectations flowing from the board's duty of care—including its obligations to inquire, to be informed and to employ adequate internal monitoring mechanisms—may create new consequences for boards and modify the standards by which their conduct is judged. See Jeffrey A. Smith and Matthew Morreale, *Boardroom Climate Change*, New York Law Journal, vol. 238., no. 10, July 16, 2007.

determining which companies are best situated to capitalize on climate change opportunities.

What are the likely business consequences for non-industrial, sectors such as the insurance and financial industries, and how can companies that are well-situated to address these challenges be differentiated from those that are not?

The insurance sector, because of its longer-term financial horizons and its exposure to the consequences of climate change through property and casualty coverage lines, life insurance and direct ownership of physical assets, was among the first sectors to call attention to climate change as a business phenomenon.⁶¹ The market wants information to allow it to separate the well-positioned from the vulnerable.

How will these risks and opportunities play out up and down the supply chain?

Climate change will doubtlessly have consequences throughout the commercial supply chain in the U.S. and abroad. General Electric, for example, has already made a widely-publicized move into “green power” through its “ecomagination” initiative.⁶² With GE as a major mover in the wind turbine industry, the makers of components might be tempted to disclose this opportunity to investors in their SEC filings. Given some of

⁶¹ See The Center For Health and The Global Environment, Harvard Medical School, Sponsored by Swiss Re and the United Nations Development Programme, *Climate Change Futures: Health, Ecological and Economic Dimensions*, November 2005, at 92-107 (discussing the financial implications of climate change, including potential limits of insurability).

⁶² *GE Goes Green: But Climate Change Action Cannot Be Left to Companies Alone*, FINANCIAL TIMES, May 11, 2005, at 18.

the recent failures in siting wind farms⁶³ and the ongoing uncertainty about the tax status of such projects, returns are certainly not guaranteed, and capital investment may be premature. Detailed disclosure might obscure the fact that the overall wind power market is still miniscule and unlikely to be material to any company for years to come.⁶⁴

How will these developments play out on the global stage and in international negotiations with the developing world, particularly the Chinese and Indian economies?

International developments will certainly have significant implications for U.S. reporting companies. The United States and the G-8 group of major industrialized nations recently agreed in principle to reduce greenhouse gas emissions by fifty percent by the year 2050.⁶⁵ The string of international summits—such as the Heiligendamm Summit, June 7-8, 2007, including the world’s largest developing countries (Brazil, China, India, Mexico, and South Africa)—may portend federal regulation of high GHG-

⁶³ See *Alliance to Protect Nantucket Sound, Inc. v. United States Dept’t of the Army*, 288 F. Supp. 2d 64 (D. Mass. 2003); *Ten Taxpayers Citizen Group, et al, v. Cape Wind Associates, LLC*, Civil Action No. 02-CV-12046-JLT (2003); Mark Harrington, *LIPA chief kills wind farm project*, NEWSDAY, August 23, 2007, available at <http://www.newsday.com/business/ny-bzwind0824,0,7647935.story>; Peter Applebome, *On an Upstate Wind Turbine Project, Opinions as Varied as the Weather*, N.Y. TIMES, October 28, 2007, available at http://www.nytimes.com/2007/10/28/nyregion/28towns.html?_r=1&oref=slogin.

⁶⁴ See, e.g., Hexcel Corporation Annual Report, Form 10-K, for the Fiscal Year Ended Dec. 31, 2005, at 39. (“Revenues from materials used to build the blades of wind turbine applications again showed strong growth, up over 50 percent in constant currency compared to 2004. The growth was driven by the increased number of global wind turbine installations and market share gains made in 2004.”).

⁶⁵ See Michael A. Fletcher, *G-8 Leaders Back ‘Substantial’ Cuts In Gas Emissions*, WASHINGTON POST, June 8, 2007, at A12.

emitting sectors.⁶⁶ Investors are eager to see how domestic companies will respond and how their overseas assets and production will be affected.

VII. Market Responses

Public money and private interests have recently combined at a level unprecedented in my experience to support the numerous disclosure and reporting initiatives outlined in the Introduction to this testimony. It is a fair barometer of this confluence of public and private interest that the Ceres Petition was signed by ten state attorneys general or treasurers.⁶⁷ In addition numerous marketplace initiatives have begun to spring up. The Ceres Petition accurately notes that numerous prominent investment firms and consultants now offer advisory services, investment research, funds and indices that analyze business responsiveness and positioning in relation to climate change.⁶⁸

In the information marketplace, shareholder resolutions on climate change and emissions policies have increased rapidly, from 6 in 2001⁶⁹ to almost 50 in 2007. They

⁶⁶ See Joint Statement by the German G8 Presidency and the Heads of State and/or Government of Brazil, China, India, Mexico and South Africa on the Occasion of the G8 Summit in Heiligendamm, Germany, 8 June 2007, available at http://www.g-8.de/nsc_true/Content/EN/Artikel/_g8-summit/anlagen/o5-erklaerung-en.templateId=raw.property=publicationFile.pdf/o5-erklaerung-en.

⁶⁷ See Ceres Petition at 57.

⁶⁸ *Id.* at 35.

⁶⁹ Douglas G. Cogan, Ceres, *Corporate Governance and Climate Change: Making the Connection*, at 16 (Mar. 2006), available at http://www.ceres.org/pub/docs/Ceres_corp_gov_and_climate_change_0306.pdf.

account for over ten percent of all shareholder resolutions filed.⁷⁰ These resolutions are reaching levels of success unimaginable just a few years ago, averaging slightly below 20% shareholder approval.⁷¹ Approximately one-third of these resolutions have resulted in negotiated withdrawals.⁷²

VIII. Next Steps and Possible Solutions

When faced with challenging circumstances, lawyers like to look for precedents. Although this is arguably a situation without true precedent, there are two corollaries, one from the environmental arena and one from outside, that are instructive in what next steps by the SEC might help public companies and the marketplace develop consistent and more informative climate change disclosure.

When Superfund was enacted in 1980, it introduced substantial doubt about legal and regulatory outcomes of hazardous waste cleanup. In particular, Superfund's new liability scheme, which provides for liability that is strict (without regard to fault), joint and several (through which contributors to contamination are liable both individually and as a group for the entire cost of a cleanup), and retroactive (in which liability is not dependent on the legality of the original disposal activity), created significant concerns in

⁷⁰ Carolyn Mathiasen, *2007 Proxy Season Preview: Environmental Issues*, RISK & GOVERNANCE WEEKLY, available at http://www.issproxy.com/governance_weekly/2007/004.html.

⁷¹ *2007 Postseason Report: A Closer Look at Accountability and Engagement*, RiskMetrics Group (October 2007).

⁷² See Investor Network on Climate Risk, *2007 Proxy Season - Resolution Tracker* (May 31, 2007), <http://216.235.201.251/NETCOMMUNITY/Document.Doc?id=2>.

the marketplace about the scope of the costs to responsible parties. Superfund also displaced some of the traditional notions of individual and corporate liability, by providing that an individual corporate officer or a parent corporation could be responsible for the costs of cleanup if they had exercised control over a corporation's handling and disposal of hazardous waste.

As a result, for reasons grounded in physical and fiscal reality — How many waste sites am I involved in? What will be required to clean them up? How much will it cost? — and in the uncertainty of legal doctrine, corporate ability to analyze exposure correctly and succinctly, and then to quantify it and disclose it to the marketplace, was murky at best.⁷³ Before any extensive experience with cleanup could be amassed by the companies that were responsible, Superfund also posed many of the same challenges involving estimation of contingencies under FAS 5, as have been discussed above.

Over time, and under some pressure from investors, the SEC provided a series of clarifications; concerning the scope of Item 103 disclosure of “sanctions” in the

⁷³ See, e.g., Ford Motor Company Annual Report, Form 10-K, for the Fiscal Year Ended December 31, 1983. (“Superfund also requires disclosure of certain other releases into the environment and creates potential liability for clean-up costs and for injury to the environment resulting from a release. [We have] received notices under Superfund or applicable state law that, along with others, [we] may be a potentially responsible party under such legislation for the cost of cleaning up a number of hazardous waste disposal sites in California, Illinois, Indiana, Michigan, Minnesota, New Jersey and Ohio. [We] may have been a generator of hazardous wastes at a number of other sites. [We are] unable to determine the costs which [we] may incur under such legislation; however, such costs could be substantial.”)

Superfund context;⁷⁴ to clarify how materiality was to be defined;⁷⁵ and finally, in a more comprehensive staff guidance document, to address detailed concerns such as management's responsibility to conduct independent diligence on the likely outcome and cost of remediation at a disposal site⁷⁶; the role of insurance as a potential off-set to existing liabilities⁷⁷; and the appropriate financial statement treatment of contingencies that were susceptible to some, but not a definitive, estimation.⁷⁸ This guidance was followed by a widely publicized speaking tour by then-Commissioner Roberts⁷⁹ in which the SEC's expectations were further clarified. The market heard that the SEC was watching these issues closely. The market also heard that the SEC and EPA were sharing

⁷⁴ Management's Discussion and Analysis of Financial Condition and Results of Operations; Certain Investment Company Disclosures, Securities Act Release No. 6835; Exchange Act Release No. 26831, 54 Fed. Reg. 22427 (May 18, 1989).

⁷⁵ SEC Staff Accounting Bulletin No. 99, 17 C.F.R. Part 211 (1999).

⁷⁶ SEC Staff Accounting Bulletin No. 92, 58 Fed. Reg. 32843, 32844 (1993).

⁷⁷ *Id.* at 32844.

⁷⁸ *Id.* at 32845.

⁷⁹ *See, e.g.*, Remarks of Richard Y. Roberts, SEC Commissioner, *SAB 92 and the SEC's Environmental Liability Disclosure Regulatory Approach*, address delivered to the 1994 Quinn, Ward & Kershaw Environmental Law Symposium, The University of Maryland School of Law, Baltimore, MD (April 8, 1994); Remarks of Richard Y. Roberts, SEC Commissioner, *Environmental Liability Disclosure, Litigation Reform, and Accounting Matters of Interest*, address delivered at the National Association of Manufacturers 1993 Government Relations Committee, Fall Meeting, Chatham, MA (September 20, 1993); Remarks of Richard Y. Roberts, SEC Commissioner, *Environmental Liability Accounting Developments*, address delivered at the American Bar Association, Fourth Annual Joint Conference On Environmental Aspects of Corporate & Real Estate Transactions, New Orleans, LA (June 10, 1993).

data on Superfund cleanup.⁸⁰ While the response of most public companies in their disclosure was neither perfect nor immediate, meaningful disclosure of the depth and breadth of Superfund and hazardous waste remediation liability developed over a comparatively short period of time.⁸¹

Outside the environmental arena, the SEC's response to a crisis that was potentially world-wide in scope and uncertain in effect is instructive. In the late 1990s, there was great concern over the potentially devastating effects of the so-called Millennium, or Y2K, bug. The Y2K problem led to speculation that the year 2000 would be represented by 00 and interpreted by software as the year 1900. The feared result was that critical industries would be affected by computer systems that produced either

⁸⁰ See Remarks of Richard Y. Roberts, Commissioner, U.S. SEC on Environmental Liability Accounting Developments before the American Bar Association, Fourth Annual Joint Conference On Environmental Aspects of Corporate & Real Estate Transactions, New Orleans, LA, June 10, 1993.

⁸¹ See, e.g. LTV Steel Company, Inc. Annual Report, Form 10-K, for Fiscal Year ended December 31, 1986, at 33, ("A hazardous waste disposal site located in Grand Prairie, Texas has been designated by the U.S. EPA Superfund Act as a Superfund site requiring cleanup. Aerospace and the Company have been named by the U.S. EPA as potentially responsible parties. In 1977, the steel group shipped 4,700 gallons of a hazardous waste to the site for disposal. The U.S. EPA has estimated that the Company's share of the total volume of wastes at the site is .107%. Aerospace is alleged to have an estimated 9.147% share of the total volume of such wastes. In June 1984, the U.S. EPA issued a Final Record of Decision for the site which set forth a \$4.6 million cleanup program. The potentially responsible parties had jointly endorsed a cleanup program costing approximately \$1.7 million. The U.S. EPA rejected the \$1.7 million settlement offer and has notified the potentially responsible parties that it will unilaterally undertake the cleanup of the site and will bill the parties when total cleanup costs are known. The U.S. EPA's current estimate of the cost of the cleanup program is approximately \$8 million. Aerospace and the Company issued a reply to the U.S. EPA, taking the position that because of the Chapter 11 filings, amounts allegedly owed by them are prepetition in nature and therefore cannot be paid.").

delayed or erroneous results and that markets would be undercut by their reliance on computer programs.⁸²

Faced with a situation in which there were substantial market concerns about the potential for a calamitous risk and market uncertainty about how such a risk might actually be manifested in any particular company's operations, the SEC chose to reissue a Staff Legal Bulletin⁸³ to mandate disclosure. It is noteworthy what the SEC chose to require. First, the staff stated that any company that had not assessed the Y2K problem in its operations should disclose that fact, because it was a material "known uncertainty" under Item 303. While reasonable minds can differ about whether businesses' reliance on computers was more widespread (and critical) than the current threats of climate change to business, the interesting thing is that the SEC recognized that investors would benefit from a statement about the degree (or absence) of preparedness to meet the challenges, irrespective of the substance of the results.

Second, the Staff required companies to disclose in "specific and meaningful" language, the results of their inquiries about Y2K effects up and down their supply

⁸² See Tom Foremski, *Millennium 'bomb' is already ticking: The need to ensure that vital systems do not fail in 2000 is holding up other IT work*, Fin. Times (December 2, 1998). ("Some economists, notably Ed Yardeni, chief economist of Deutsche Bank Securities in New York, have warned that Y2K problems have a 70 per cent chance of triggering a global recession. [Capers] Jones [chief scientist of Artemis Management Systems of the US] says that with his best case scenario of 85 per cent of fixes completed in the US and the UK, "it puts us on the cusp of a possible recession". He had advised the European Union to delay the launch of the euro, arguing that IT departments do not have the resources to tackle two of the most challenging IT projects ever encountered. "The euro affects about 10 million software applications, but Y2K affects some 36 million software applications worldwide," estimates Mr Jones.").

⁸³ Staff Legal Bulletin (SLB) No. 5 (Revised January 12, 1998).

chains, recognizing that a critical weak link there could be as disruptive as a failure on the part of the issuer's own systems. Similarly, a company with no significant direct GHG emission exposure, but in a high energy use business, might find its cost structure altered dramatically by the consequences of GHG emission regulation on the public utility providing its power. Finally, disclosure was required if the issue was material "without regard to related countervailing circumstances", such as plans to cure the problem.

Disclosing companies largely responded to the timeliness and clarity of this guidance. While (mercifully) the underlying problem never truly manifested itself in the marketplace, the degree of awareness and the levels of preparedness by public companies were assisted by the disclosure process.

IX. Conclusion

In summary, it is important for the SEC to move with deliberate speed to reassert its gatekeeper role for the market and to clarify its expectations, but to do so within the rubric of well-settled principles. Over-reaction or radical change will create confusion and could unleash a flood of defensive filings of immaterial and premature information, which ultimately will be damaging to investors and the marketplace. It is also important for the SEC to recognize that it must give climate change ongoing attention, because the lessons of Superfund disclosure strongly suggest that, no matter how well intentioned, public companies will not get it completely right the first time, and that changing circumstances will dictate changing responses.

I would be pleased to be of ongoing assistance to the Subcommittee as it continues to consider this issue.

STATEMENT BY MINDY S. LUBBER
PRESIDENT, CERES, & DIRECTOR, INVESTOR NETWORK ON CLIMATE RISK

BEFORE

THE SUBCOMMITTEE ON SECURITIES, INSURANCE, AND INVESTMENT
OF THE UNITED STATES SENATE COMMITTEE ON BANKING, HOUSING, AND
URBAN AFFAIRS

REGARDING

CLIMATE DISCLOSURE: MEASURING FINANCIAL RISKS AND OPPORTUNITIES

October 31, 2007

Chairman Reed, Ranking Member Allard, and Members of the Subcommittee, I am Mindy Lubber, President of Ceres and Director of the Investor Network on Climate Risk (INCR), and it is a privilege to testify before you today regarding this critical issue.

Ceres is a national coalition of 100 institutional investors, environmental groups and other public interest organizations working with leading U.S. companies to address sustainability challenges such as climate change. INCR is a group of 60 institutional investors representing \$4 trillion in assets focused on the business risks and opportunities posed by climate change.

This testimony is focused on three key points:

- Climate risk disclosure is essential for investors, because climate risk is clearly a material risk that companies should be disclosing in Securities and Exchange Commission (SEC) filings.
- Current climate risk disclosure by U.S. companies is still inadequate and not at the levels investors need to make informed investment decisions.
- Companies that provide full disclosure of climate risks and opportunities see significant benefits.

In addition, the testimony covers:

- Why climate risk is an important financial issue for investors and companies;

- How investors are pushing for better climate risk disclosure from companies, including voluntary disclosure and shareholder resolutions; and
- The September 18, 2007 “Petition for Interpretive Guidance on Climate Risk Disclosure” that was sent to the SEC.

The SEC should provide interpretive guidance because climate change poses wide-ranging financial risks—climate risks—to companies across a wide spectrum of industries. Energy-intensive businesses face risks from anticipated national greenhouse gas regulations, as well as from emerging and existing state and international regulations, that will make greenhouse gas emissions more costly. Insurers and other companies face risks from climate-related physical impacts such as prolonged drought, melting permafrost, wildfires and other severe weather events. Litigation related to climate change is another risk, especially for large greenhouse gas emitters.

At the same time, climate change also offers significant opportunities for investors and companies, such as investing in and developing clean technologies and renewable energy, selling carbon credits, or capturing new markets. Opportunities that are not pursued can turn into risks for companies, when their competitors pursue such options. This is in evidence already in the automotive sector, where automakers that have focused more attention on cleaner, more fuel-efficient cars are gaining market share.

Climate risk is an important financial issue recognized by the largest investment banks and institutional investors in the U.S. and abroad

In the last few years, climate risk has become a top-tier investor and business issue, as demonstrated by new reports about regulatory and physical risks; Wall Street research reports on climate risk exposure and new business opportunities; and institutional investor responses to

climate change. Climate risk *disclosure*, however, has not kept pace with these developments, as discussed later.

Companies, investors and money managers are in the business of examining how market shifts—whether as a result of regulatory change, consumer preference shifts, or other market movers—affect share value, earnings, future cash flow projections, and capital investment decisions. The risks and opportunities posed by climate change *today and in the future* are becoming increasingly apparent. Regulatory risks posed by legislative proposals, if passed into law, are expected to add costs to doing business in many sectors. For example, one analysis suggests that U.S. electric power companies that have not prepared for a future cost of carbon associated with carbon regulations could see earnings losses¹ of up to 17%, whereas companies with less polluting fuel mixes could see financial gains of up to 15%—real bottom-line impacts for investors and company managers.²

Physical risks resulting from rising sea levels, changing weather patterns, and warming climates are happening faster than expected and are being felt by businesses and their investors today. For example, 2007's hot, dry summer left Alabama rivers so hot (in excess of 90 degrees) and low that the state had to shut down a nuclear power plant. At least four pulp and paper mills also had to suspend wastewater discharges for days at a time to avoid violating their discharge permits, reducing revenues for shareholders and putting employees out of work.

Likewise, thawing permafrost (frozen ground necessary for oil & gas infrastructure) has already caused serious impacts in Alaska, and the 800-mile Trans-Alaska Pipeline, which carries about 17% of the nation's oil production, has been threatened. New pipeline supports have been

¹ EBITA: Earnings Before Interest, Taxes, Depreciation, and Amortization

installed in an attempt to guard against heaving or collapse as the permafrost thaws. Replacing the supports is estimated to cost about \$2 million per mile, a hefty price tag for the shareholders of the oil & gas companies that operate the pipeline.

In the U.S., investment banks are waking up to these risks, and there has been a rapid increase in the last two years in the number of Wall Street reports analyzing climate risk and opportunities. In just the past 12 months, climate-related research reports have been prepared by firms such as Citigroup, Goldman Sachs, JP Morgan, Lehman Brothers, Merrill Lynch, Morgan Stanley and UBS.

These reports are evidence that climate risk is viewed not only as an environmental risk but also as a financial one, since major banks are now using their financial models to estimate the impacts of climate change on earnings per share, future cash flows, and capital investment decisions. Several rating agencies and banks have shifted stock ratings or buy/sell/hold decisions based on a company's relative climate risk exposure and preparedness.

A Lehman Brothers report explains that climate risk has become a core business and investor issue:

“In the world of business and finance, climate change has developed from being a fringe concern, focusing on the company's brand and its Corporate and Social Responsibility, to an increasingly central topic for strategic deliberation and decision-making by executives and investors around the globe.”³

A Morgan Stanley report strongly supports the need for improved climate risk disclosure:

² Sanford C. Bernstein & Company, Bernstein Research, U.S. Utilities: The Implications of Carbon Dioxide Regulation, October 2007.

³ John Llewellyn, Lehman Brothers, The Business of Climate Change: Challenges and Opportunities (February 2007), p. 1.

“Even though climate change is a long-term trend, financial markets need to price in the risks today. Investors therefore need to review their long-term growth, inflation and risk projections in light of climate change.”⁴

These investment banks have responded to the needs of their clients, institutional investors, who in large numbers have pushed for increased climate risk disclosure for the last four years. The Investor Network on Climate Risk (INCR) has grown from 14 to 60 investors in that time. INCR members now represent \$4 trillion of assets under management, and include asset managers and some of the nation’s largest institutional investors: CalPERS, CalSTRS, State Street Global Advisors, AIG Global Investment Group, F&C Asset Management, the NY City and NY State Comptrollers, and the California Treasurer and Controller.

The Carbon Disclosure Project (CDP), which conducts an annual survey seeking climate risk disclosure from 2,000 of the largest companies worldwide, is sent on behalf of 315 institutional investors representing \$41 trillion. S&P 500 companies are among the companies surveyed. A sampling of signatories includes some of the world’s largest financial companies and investment banks: Barclays Group, Credit Suisse, Deutsche Bank, Goldman Sachs, HSBC Holdings, Mitsubishi UFJ Financial Group, Morgan Stanley Investment Management, and State Street Corporation. Globally, two other groups of institutional investors are focused on this issue: Institutional Investors Group on Climate Change (U.K.) and Investor Group on Climate Change (Australia/New Zealand).

Although climate risk has become a top-tier investor and business issue, the information provided by voluntary disclosure does not come close to meeting investors’ needs. Investment banks have begun tackling this issue, but their reports focus mainly on regulatory risks, because

⁴ Elga Bartsch, Morgan Stanley, *The Economics of Climate Change – a Primer* (October 3, 2007), p. 1.

corporations are disclosing little or no information about physical risks, litigation risks, and strategic analysis of climate risk and emissions management.

Ways in which investors seek voluntary climate risk disclosure and the limits of that disclosure

In the absence of mandatory federal disclosure guidance, a large number of investors are seeking better disclosure by writing to companies and filing shareholder resolutions. These investors are simultaneously seeking mandatory disclosure guidance from the SEC, because “[e]ven as corporate disclosure of the business impacts of climate change is increasing, it remains intermittent, inconsistent and incomplete,” according to Connecticut State Treasurer Denise Nappier, principal fiduciary of the \$23 billion Connecticut Retirement Plans and Trust Fund.

In the U.S., large institutional investors have written letters to groups of companies whose operations or products result in high greenhouse gas emissions. For example, in July 2005, 15 U.S. investors managing more than \$550 billion of assets wrote to 43 of the country's 50 largest investor-owned electric power companies, requesting that they report within a year ways in which future greenhouse gas limits are expected to affect their bottom lines, as well as steps they are taking to reduce those impacts and improve their competitive positioning.

Twenty leading U.S. investors sent a similar climate-disclosure request letter to 30 insurance companies in December 2005. “Shareholders need to know if the companies they own are adopting strategies that will enable them to survive, or even thrive, as greenhouse gas limits begin taking effect,” said California State Treasurer Phil Angelides, a board member of CalPERS and CalSTRS, two of the country's largest public pension funds, which signed both letters.

Three issues severely limit the usefulness of voluntary disclosure for investors. First, companies decide whether to answer the CDP questionnaire or disclose using other means, and too many companies do not disclose.

Second, unlike disclosures in SEC filings, which are available to all investors, companies decide whether to keep their CDP responses private. This is a significant problem, because CDP signatories have access to these private responses, but millions of individual investors and other institutional investors that are not signatories to the CDP cannot analyze these responses, which contain information that is material to investment decisions.

Finally, companies decide what to disclose, how to measure risks, and how to describe mitigation activities. Most importantly, unregulated disclosure is not standardized. An analysis of the CDP responses of the S&P 500 finds that, “while most S&P500 respondents can identify regulatory and physical risks associated with climate change, few have attempted to quantify these risks in dollar terms or have discussed them in securities filings.”⁵

Although shareholder resolutions help improve corporate climate disclosure, they are an inefficient method of obtaining high quality disclosure from all U.S. companies

Due to the lack of climate risk disclosure by companies, investors have filed over 150 shareholder resolutions with U.S. companies in the past several years to seek such information from companies, especially power companies, automobile manufacturers, insurers and other businesses with significant risk exposure from anticipated climate regulations and other climate-related impacts. These resolutions and subsequent engagements with companies produce positive results, including new corporate climate change policies, reports, and support for national climate policy from unexpected sources like electric power companies.

⁵ Carbon Disclosure Project Report 2007: USA S&P 500, authored by RiskMetrics Group, p. iii.

However, shareholder resolutions are inadequate for addressing a problem that affects most companies and sectors. Resolutions only allow investors to engage with one company at a time, and resolutions must be re-filed with some companies for several years before they agree to shareholder requests: an inefficient, slow process for improving climate risk disclosure.

Because climate change represents a newer and vastly different type of risk than those which companies usually manage, it often goes unaddressed by companies. Proposals addressing climate change commonly urge companies to report on their operational and product-related CO₂ emissions, or to address the regulatory and physical risks the company faces. Of course, shareholder votes on these resolutions are advisory in nature—such votes do not force a company to take specific actions.

Despite this, the SEC often limits investors' rights to file resolutions related to climate change by omitting them from proxy voting. A resolution may be omitted if the SEC finds the proposal addresses "ordinary business" issues that are properly under the control of management, and not an issue for shareholders or the board to consider. Such approvals are often subject to inconsistent handling by SEC staff.

This leaves shareholders with no recourse if a company is unwilling to engage with shareholders on the climate issue. Such exclusions make it difficult for investors to assess climate change risks in their portfolios. The inconsistency in applying the "ordinary business" exclusion should be addressed by the SEC in order to ensure fair and accurate assessments of risk, as well as consistency in financial reporting.

These resolutions cannot take the place of uniform, consistent guidance on corporate disclosure of climate-related risks. The significant financial risks and opportunities posed by

climate change, and investor requests for SEC guidance on climate risk disclosure, should compel the SEC to examine this issue promptly and produce the requested guidance.

How investors seek SEC guidance to improve climate risk disclosure

A group of U.S. investors has been working since 2003 to persuade the SEC, through meetings with Commissioners and Staff, to improve climate risk disclosure. On March 19, 2007, more than 60 investors (including one dozen companies) representing over \$4 trillion in assets called on the SEC to issue guidance on which material issues related to climate change companies should disclose in SEC filings.

In part due to the lack of SEC guidance, a group of 14 institutional investors and other groups, including CalPERS, CalSTRS, and the Connecticut Treasurer's Office, developed the Global Framework for Climate Risk Disclosure to encourage standardized climate risk disclosure and to make it easy for companies to provide this information, and for investors to compare companies. Released in October 2006, it offers companies guidance on disclosing emissions data, physical and regulatory risks, and strategic management of climate risk using SEC filings and other common disclosure mechanisms. Investors who created the Framework are asking companies to use it, and they are asking securities regulators and governments to ensure that corporate climate risk disclosure in financial statements adheres to the Framework.

Benefits for companies that assess and disclose their climate risk and opportunities

Companies are increasingly discussing climate risks and opportunities internally and with investors. While some companies are not acting to address the issue, others are taking steps to disclose risks to investors, reduce emissions, and take advantage of strategic opportunities. When companies track their emissions and disclose climate risk, they also tend to reduce their emissions and continue to seek out further opportunities to do so (e.g., by investing in efficiency

and clean energy technologies, processes and products). These actions offer cost savings to companies, reputational advantages, better employee retention, and other significant benefits.

Several examples of good voluntary climate risk disclosure illustrate why it benefits companies by raising their awareness of climate change and by leading them to address risks and seize opportunities. Entergy, a major electric utility company serving the Southeastern U.S., has provided excellent climate risk disclosure in the wake of Hurricane Katrina. Climate risks to communities and companies in the Mississippi Delta are a material risk—Entergy itself sustained recovery costs of about \$1.48 billion from Katrina and Rita, which doesn't include revenue losses due to the hurricane, which is estimated in the hundreds of millions. In its disclosure, Entergy points to the troubling findings of the Intergovernmental Panel on Climate Change's (IPCC) recent report on climate change adaptation, which indicates that much of Entergy's customer base and "billions of dollars of investment" could be severely impacted due to future loss of wetlands, storm surges, and sea level rise. Entergy also sees opportunity in the national response to climate change—namely regulations that may benefit less carbon intensive generators like themselves. The company discloses its emissions data dating back to 1990.

Wisconsin-based Johnson Controls is another leader in corporate climate disclosure. Johnson Controls reports on the opportunities it sees in designing and manufacturing products that help maximize energy efficiency in buildings, cars, and batteries, but also points out financial risks from climate impacts. The company has publicly communicated its climate change strategy, stating that it intends to reduce its emissions by 18% by 2012 and has an overall goal to reduce the carbon footprint not only of its own operations, but also of the customers who buy its products.

Between 1990 and 2004, DuPont reduced its energy usage by over 7 percent and GHG emissions by 70%, increased production by over 33%, and experienced cost savings of over \$2 billion. When General Electric announced its EcoMagination program in 2005, the company expected to have \$20 billion in sales of “green” products by 2010. Last year, the program had \$15 billion in sales, and they now have \$50 billion in back orders and are on track to “blow away” their original estimation of \$20 billion by 2010.

Finally, AIG has disclosed information about its business impacts from the physical effects of climate change. AIG suffered after-tax catastrophic losses of \$2.44 billion from Hurricanes Rita and Katrina, an indication of the future losses firms can anticipate as climate change creates ocean temperature increases in many parts of the world that scientists believe will lead to more intense and frequent hurricanes. The company publicly discloses both short and long-term physical effects of climate change, from increased occurrence of drought to rising sea levels. AIG discusses how this will impact its business—by affecting its customers as well as assets, like its Stowe, Vermont ski resort—and what measures the company can take to adapt to these changes through modifying their underwriting process, among other approaches. AIG also reports that predicted increased severe weather events could lead to steeper rates and more limited coverage.

Why the SEC should provide guidance on climate risk disclosure

Because voluntary disclosure cannot adequately provide investors the information they need, the SEC should provide guidance on climate risk disclosure. Without SEC guidance, climate reporting rates in SEC filings will remain low in every sector the utilities sector. Because many industries affected by climate change do not raise the issue in their SEC filings, investors face significant difficulty in assessing the true long-term value of their portfolios.

For example, SEC climate risk disclosure rates for the largest companies in three affected industries are low: 28% in petrochemicals, 19% in insurance, and 26% of auto manufacturers.⁶ Disclosure rates are low in the insurance industry, despite the industry's acute exposure to sea-level rise and more intense hurricanes and wildfires, all of which scientists tie to global warming. Moreover, disclosure occurs in various places in corporate filings (Description of Business, Management's Discussion and Analysis of Financial Condition and Results of Operations, and Notes to Consolidated Financial Statements) and is difficult to compare from company to company. Also, the quality of the reporting is generally low. In one industry—electric power—most companies mention climate change in their filings, but they do an inadequate job of assessing the risks and opportunities.⁷

Petition to the SEC for Interpretive Guidance on Climate Risk Disclosure

A group of investors, state officials, and others sent a petition to the SEC on September 18, 2007, which builds on requests over the past four years, seeking a measured and reasonable approach to improving climate risk disclosure, in which companies analyze whether the climate risks they face are material.⁸ If regulatory, physical or litigation-related risks are in fact found to be material, companies then disclose information about those risks in quarterly and annual securities filings. Specifically, the petition “requests that the Commission issue an interpretive

⁶ Michelle Chan-Fishel, Friends of the Earth, Fifth Survey of Climate Change Disclosure in SEC Filings of Automobile, Insurance, Oil & Gas, Petrochemical, and Utilities Companies (October 2006) at 1, available at <http://www.foe.org/camps/intl/SECFinalReportandAppendices.pdf>.

⁷ See *Id.* at 22-28.

⁸ Petitioners are California Public Employees' Retirement System; California State Controller, John Chiang; California State Teachers' Retirement System; California State Treasurer, Bill Lockyer; Ceres; Environmental Defense; F&C Management; Florida Chief Financial Officer, Alex Sink; Friends of the Earth; Kentucky State Treasurer, Jonathan Miller; Maine State Treasurer, David G. Lemoine; Maryland State Treasurer, Nancy K. Kopp; The Nathan Cummings Foundation; New Jersey State Investment Council, Orin Kramer, Chair; New York City Comptroller, William C. Thompson, Jr.; New York State Attorney General, Andrew M. Cuomo; New York State Comptroller, Thomas P. DiNapoli; North Carolina State Treasurer, Richard Moore; Oregon State Treasurer, Randall

release clarifying that material climate-related information must be included in corporate disclosures under existing law.”⁹

It must be emphasized that petitioners *do not* seek an onerous new disclosure routine. Because climate risk varies between sectors and can change because of quickly evolving regulatory regimes and scientific information about the physical risks of climate change, general guidance from the SEC—as suggested by the petition—is appropriate, so companies can determine for themselves if they face material risks. This disclosure would give investors a baseline for comparison between companies and adequate information to make investment decisions.

Petitioners believe current law requires disclosure of material climate risks

The SEC’s existing disclosure regulations speak in expansive and flexible terms that reflect the broad range of information investors consider when they assess corporate value. For many companies, climate risk clearly meets the standard of materiality established by the SEC and the courts, and falls directly within several of the specific disclosure requirements of Regulation S-K.

The fundamental principle underlying the Commission’s disclosure requirements is that a public corporation must fully and fairly disclose all facts about its performance and operations that would be material to a shareholder’s investment decision. This disclosure obligation springs from the core requirement of the 1933 and 1934 Acts that investors receive financial and other significant information concerning securities offered for public sale. Under both Supreme Court

Edwards; Pax World Management Corporation; Rhode Island General Treasurer, Frank T. Caprio; and Vermont State Treasurer, Jeb Spaulding.

⁹ File No. 4-547, Request for Interpretive Guidance on Climate Risk Disclosure (September 18, 2007), available at <http://sec.gov/rules/petitions.shtml>, p. 2.

and Commission precedent, the existence of significant investor demand for information helps to guide the determination of whether that information is material and hence required to be disclosed. “A fact is material if there is a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the ‘total mix’ of information made available.”¹⁰

The Supreme Court has made clear that the determination of whether a fact is material is a holistic inquiry that cannot be reduced to a simple numeric formula. Determinations of materiality require “delicate assessments of the inferences that a ‘reasonable investor’ would draw from a given set of facts, and the significance of those inferences to him”¹¹ In Staff Accounting Bulletin No. 99, Commission Staff reiterated this principle and rejected the practice of using a simple numeric threshold for determining whether an omission or misstatement in a financial statement is material.¹² Instead, Staff have made clear that the question of what information is material must take into account both quantitative and qualitative factors. This interpretation of materiality is also supported by the Financial Accounting Standards Board (FASB).¹³

The steadily growing demand from investors for information about climate risk described above demonstrates that “reasonable investors” exercising human judgment increasingly consider climate risk part of the total mix of information they assess to make investment decisions. Members of the Investor Network on Climate Risk have repeatedly requested SEC

¹⁰ SEC Staff Accounting Bulletin No. 99, 64 Fed. Reg. 45,150 (Aug. 12, 1999) (quoting *TSC Industries v. Northway, Inc.*, 426 U.S. 438, 449 (1976)).

¹¹ *TSC Industries*, 426 U.S. at 450.

¹² See SEC Staff Accounting Bulletin No. 99, *supra* note 10.

¹³ FINANCIAL ACCOUNTING STANDARDS BOARD, STATEMENT OF FINANCIAL ACCOUNTING CONCEPTS NO. 2: QUALITATIVE CHARACTERISTICS OF ACCOUNTING INFORMATION 45 (1980), available at <http://www.fasb.org/st/>.

action to clarify the need for climate risk disclosure.¹⁴ Corporate leaders themselves have also recognized the critical importance of climate risks, in the form of both regulatory developments and physical risks, to the global economy.¹⁵

The financial markets have judged that climate risk is important to investors' ability to assess corporate operations and performance. This judgment, along with the importance of climate risk for many companies' financial prospects, compels the conclusion that material climate risk should be disclosed under the Commission's regulations. The Commission should promptly issue guidance that clarifies that climate risk demands the same careful attention and disclosure given to other forms of risk.

¹⁴ *See, e.g.*, Letter from Bradley Abelow, Treasurer, State of New Jersey et al. to SEC Chairman Christopher Cox (June 14, 2006), available at <http://www.ceres.org/pub/publication.php?pid=98>.

¹⁵ *See, e.g.*, the United States Climate Action Partnership's list of corporate members, available at <http://www.us-cap.org/about/index.asp>.

**Written Testimony
Prepared for the U.S. Senate Banking
Subcommittee on Securities, Insurance and Investment**

October 31, 2007

**By
Russell Read
Chief Investment Officer
California Public Employees' Retirement System**

Chairman Reed, Ranking Member Allard and members of the Subcommittee, I am pleased to provide the perspective of an institutional investor on the issue of the necessary corporate disclosure of information related to climate change.

The California Public Employees' Retirement System, known as CalPERS, provides pension and health benefits to 1.5 million state, local public agency and school employees, retirees and their families.

A 13-member Board of Administration oversees the management of CalPERS assets, which total more than \$250 billion. Our Fund began in 1932, initially investing only in bonds. Over the years, we diversified our assets into four major classes: global equity (public stocks), fixed income, real estate, and – beginning in 1990 – in private equity.

The goal of diversification has always been the same – to balance our portfolio against risk and to add value based on our ability to take advantage of market opportunities.

The CalPERS Board recognizes that the way it deploys investment capital can not only shape the financial future of its investment portfolio, but also the future of our communities, our society, and our environment for decades to come. We also recognize that environmental responsibility and climate risk is a financial issue as well as a health security issue that affects everyone.

Environmental Disclosure and Why It's Important

It is important for the Senate and particularly the Subcommittee to address the issue of environmental disclosure by corporations. Increasing evidence indicates that climate change presents material risks to numerous sectors of the economy and to the financial market place. These risks may include operational, market, liabilities, policy, regulatory, and reputation risk. Accordingly, CalPERS has advocated for the right of shareowners to obtain information on environmental risks and opportunities to make informed investment decisions.

The fundamental principle underlying the Securities and Exchange Commission's disclosure requirements is that a public corporation must fully and fairly disclose all facts about its performance and operations that would be material to a shareowner's investment decision. This disclosure obligation springs from the core requirement of the 1933 and 1934 Acts that investors receive financial and other significant information concerning securities offered for public sale.

Under both Supreme Court and Commission precedent, the existence of significant investor demand for information helps to guide the determination of whether that information is material and hence required to be disclosed. "A fact is material if there is a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the 'total mix' of information made available."¹

As a long-term investor, CalPERS believes that environmental issues can affect the performance of investment portfolios (to varying degrees across companies, sectors, regions, and asset classes through time.)

CalPERS is also interested in the sustainability of companies that may be threatened by climate change as well as those that can find new opportunities in a carbon-constrained market. Sustainability is potentially undermined by climate change. This is the concern that drives our environmental investment program -- including initiatives seeking transparent reporting of greenhouse gas emissions, the design of corporate measures to reduce those emissions, and clean technology investments.

Addressing climate change is part of our overall corporate governance policy, which says that "to ensure sustainable long-term returns, companies should provide accurate and timely disclosure of environmental risks and opportunities,

through adoption of policies or objectives, such as those associated with climate change."

We want portfolio companies that are well positioned to avoid the financial risks associated with climate change and that can capitalize on new opportunities emerging from the regulation of greenhouse gases, including alternative energy technologies.

But we cannot assess companies' financial viability unless we know their potential exposure to climate change-related risks and potential benefits.

Why Voluntary Environmental Disclosure is Insufficient

CalPERS recognizes that some companies have chosen to include climate risk in voluntary sustainability reports or more general corporate responsibility reports, often filed in response to shareholder activism. However, there are many companies that do not provide voluntary disclosure of their climate risk.

Further, the information that is voluntarily disclosed often lacks the material information required by a reasonable investor to properly assess companies' financial viability. The lack of SEC guidance on or a standardized format for climate risk disclosure has resulted in reports with very little consistency in the format or level of detail of information presented. A recent report found that "while

almost all companies reported on climate change in their sustainability reports, on closer examination companies reported far more on potential opportunities rather than financial risks for their companies from climate change.”²

Sustainability reports often include additional information on environmental trends and business strategies but they are primarily directed towards an audience of environmental interest groups and the general public, rather than investors. These reports more often acknowledge the science of climate change and discuss efforts to build awareness rather than presenting the specific effects of climate change on their performance and operations.

While sustainability reports provide a solid foundation on which the companies can base the disclosures required under the Commission’s existing reporting requirements, they do not provide the information investors require. Reporting must be consistent and must support comparisons among companies. The 10-K report is and will remain the gold standard for reporting information to investors, and investors need to know that material information relating to companies’ performance and operations will be in those required reports. Given the significance of climate risks for many corporations’ financial position and competitive prospects in a new, carbon-constrained environment, reporting on climate issues is no longer a mere virtue, but a legal obligation and a necessity for investors.

CalPERS Efforts to Improve Environmental Disclosure

CalPERS has worked with CERES, the Investor Network on Climate Risk (INCR) and a coalition of other public pension funds and institutional investors both in the United States and abroad to advocate for improved disclosure of companies' climate risk. Examples of CalPERS' efforts include:

- The Carbon Disclosure Project: CalPERS is a member and signatory – An annual questionnaire is sent to companies on behalf of institutional investors representing \$41 trillion of assets under management requesting information on the business implications of climate change and the companies' greenhouse gas emissions.
- The Global Reporting Initiative Sustainability Reporting Guidelines: Reporting mechanism by which companies can disclose their ESG performance. The CalPERS Core Principles of Accountable Corporate Governance also recommend that "Corporations strive to measure, disclose, and be accountable to internal and external stakeholders for organizational performance towards the goal of sustainable development. It is recommended that corporations adopt the Global Reporting Initiative Sustainability Reporting Guidelines to disclose economic, environmental, and social impacts."
- The Global Framework for Climate Risk Disclosure: CalPERS helped draft the Global Framework, which encourages standardized climate risk

disclosure to make it easy for companies to provide information and for investors to analyze and compare companies. The CalPERS Core Principles of Accountable Corporate Governance expressly provide that “[t]o ensure sustainable long-term returns, companies should provide accurate and timely disclosure of environmental risks and opportunities, such as those associated with climate change. Companies should apply the Global Framework for Climate Risk Disclosure when providing such disclosure.”

The Global Framework for Climate Risk Disclosure consists of four elements of disclosure that investors require in order to analyze a company's business risks and opportunities resulting from climate change, as well as the company's efforts to address those risks and opportunities. The four elements of disclosure include:

- 1) Emissions Disclosure: As an important first step in addressing climate risk, companies should disclose their total greenhouse gas emissions. Investors can use this emissions data to help approximate the risk companies may face from future climate change regulations.
- 2) Strategic Analysis of Climate Risk and Emissions Management: Investors are looking for analysis that identifies companies' future challenges and opportunities associated with climate change. Investors therefore seek management's strategic analysis of climate risk, including a clear and straightforward statement about implications for competitiveness. Where

relevant, the following issues should be addressed: access to resources, the timeframe that applies to the risk, and the firm's plan for meeting any strategic challenges posed by climate risk.

- 3) **Assessment of Physical Risks of Climate Change:** Climate Change is beginning to cause an array of physical effects, many of which can have significant implications for companies and their investors. To help investors analyze these risks, investors encourage companies to analyze and disclose material, physical effects that climate change may have on the company's business and its operations, including their supply chain.
- 4) **Analysis of Regulatory Risks:** As governments begin to address climate change by adopting new regulations that limit greenhouse gas emissions, companies with direct or indirect emissions may face regulatory risks that could have significant implications. Investors seek to understand these risks and to assess the potential financial impacts of climate change regulations on the company.

All companies have climate risk and opportunity embedded in their operations that will vary across sectors. Regardless, all companies should be required to disclose the four elements highlighted in the Global Framework whether or not they are high emitters of greenhouse gas emissions. For example in the past year, CalPERS was approached by a major global soft drink company to discuss how climate change is affecting the company's water sourcing.

While we encourage all companies to disclose their climate risk, CalPERS has, as part of its corporate governance environmental strategic plan, actively targeted the highest emitting industries including electric utilities. In January 2007, CalPERS and the California State Teachers' Retirement System (CalSTRS) released a CDP-affiliated report on global utilities emissions.

We asked 265 global power companies about commercial risks and opportunities posed by climate change, the impacts of greenhouse gas regulation, physical risks associated with climate change, relevant technologies and innovations, and related management responsibilities. We also asked about energy costs, and emissions in terms of total annual generation, emissions from products and services, reduction programs and targets, and emissions trading arrangements.

Few of the 112 companies that responded to the survey were creating overall economic value once they accounted for the costly environmental impact of their carbon emissions. This is the kind of disclosure that investors need to evaluate not only the earnings of companies, but also costs stemming from greenhouse gas emissions.

Further, the electric utilities industry is heavily exposed to regulatory risks. Absent a federal program to control greenhouse gas emissions, state and local regulation of greenhouse gas emissions has already become a significant force in the United States economy.

In 2007, the Governors of Arizona, California, New Mexico, Oregon, Utah, and Washington, as well as several Canadian provinces and Indian tribes, entered into the Western Climate Initiative to establish a regional greenhouse gas reduction goal and develop market-based strategies to achieve emissions reductions. This is just one of many initiatives being taken at the state and local level to control greenhouse gas emissions.

The lack of federal policy on climate change causes uncertainty that creates risks for both investors and businesses as they engage in long-term strategic planning, asset management, and capital budgeting. To address this uncertainty, CalPERS played a key role in a national effort to seek federal regulations to address climate change. The "Call to Action" campaign, which was organized by CERES and the INCR and included both investors and businesses, held a press conference in Washington, D.C., in mid-March and issued a letter urging the federal government to take three specific actions to address the uncertainty created by the lack of national policy on climate change. The three action items are:

- 1) Establish a mandatory national policy to contain and reduce national greenhouse gas emissions economy-wide, making the sizable, sensible, long-term cuts that scientists and climate models suggest are urgently needed to avoid the worst and most costly impacts from climate change.

This approach will also enable businesses and investors to make investments with a known long-term planning horizon. Wherever possible, this policy should utilize market-based mechanisms, such as cap-and-trade systems, to create an economy-wide carbon price.

- 2) Realign incentives and other national policies to achieve climate objectives, including a range of energy and transportation policy measures to encourage deployment of new and existing technologies at the necessary scale. Only governments can create the infrastructure needed to underpin the new clean energy system.
- 3) Guidance from the Securities and Exchange Commission and other financial regulatory bodies to businesses and investors on what material issues related to climate change companies should disclose in their regular financial reporting, so that investors can assess more accurately the effects of climate risk and opportunity in their portfolios.

With regard to action item 2, CalPERS believes it is a good idea for governments to subsidize infant technologies to achieve lift-off and commercial scale in short order. Currently though we see a problem, at least at the federal level, as subsidies are not provided for alternative fuels or clean technology in general. Rather, the federal government is subsidizing very specific technologies to the comparative detriment of others. For example, corn-based ethanol is subsidized while methane from municipal waste is not subsidized. The narrowness of the current subsidy structure could actually be inhibiting the development of those

clean technologies which could have better long-term viability. To remedy this problem, there should be a broad-based subsidy for alternative and clean energy technologies over conventional and dirty technologies.

Consistent with our request for guidance from the Securities and Exchange Commission in action item 3, CalPERS recently joined several other leading institutional investors to petition the Securities and Exchange Commission to ask it to require publicly-traded companies to assess and fully disclose their financial risks from climate change. Specifically, we are asking the Securities and Exchange Commission to require companies to disclose information:

- On the physical risks associated with climate change – including potential physical damage to facilities.
- About the financial risks stemming from the present or probable regulation of greenhouse gases, and their prospects for new business opportunities by responding to the changing physical and regulatory environment.
- About potential exposure and costs arising from legal proceedings that are related to climate change.

CalPERS Environmental Investment Initiatives**Investment Strategies**

The CalPERS Board has been a leader in environmental investing. CalPERS recognizes the financial risks as well as the opportunities created by climate change.

- **Public Equity:** In November 2005, the CalPERS Board approved the hiring of five investment firms to manage \$500 million in stock portfolios that use environmental screens.
- **Private Equity:** In 2005, CalPERS initiated the Environmental Technology Program – a \$200 million program that targets investments in environmental technology solutions that are more efficient and less polluting than existing technologies. In 2007, CalPERS committed an additional \$400 million to the program.
- **Real Estate:** In our core real estate portfolio, the Board has set an energy reduction goal of 20 percent over the next five years. CalPERS also supports green building initiatives and continues to explore investments that fit within the Leadership in Energy & Environmental Design requirements.
- **Corporate Governance Environmental Strategic Plan:** The objective is to improve environmental data transparency and timely disclosure.
 - **Environmental Company Engagement program:** CalPERS engages companies in the airline, auto, utilities, and oil and gas industries

that are underperforming relative to their industry peers and lack disclosure on the four elements highlighted in the Global Framework for Climate Risk Disclosure;

- Carbon Disclosure Project: Support the Carbon Disclosure Project through our membership and as a signatory;
- Investor Network on Climate Risk: Participate in the INCR; and
- Support of Environmental Shareowner Resolutions for Improved Disclosure: As a shareowner in many different companies, CalPERS generally supports shareowner resolutions requesting improved environmental disclosure. These resolutions generally suggest that companies assess and report on how they are responding to the business risks and opportunities of climate change or adopt and report on quantitative goals for reducing total greenhouse gas emissions from the company's products and operations.

We appreciate this opportunity to represent institutional investors on what we believe is a very important issue. Improved environmental disclosure is required in order for investors to properly assess the material impact of companies' climate risk and opportunities on their portfolios.

¹ SEC Staff Accounting Bulletin No. 99, 64 Fed. Reg. 45,150 (Aug. 12, 1999) (quoting TSC Industries v. Northway, Inc., 426 U.S. 438, 449 (1976)).

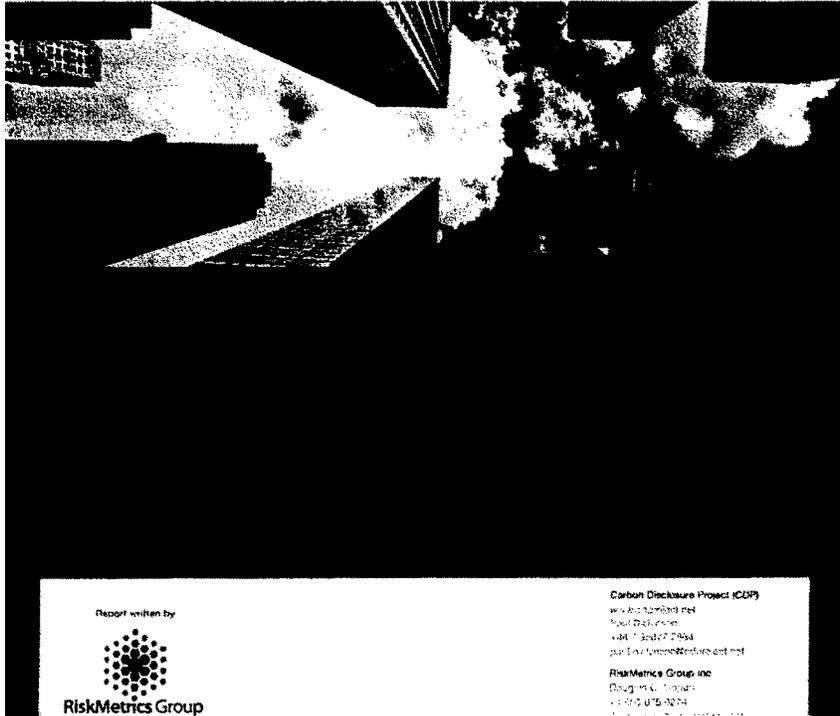
² Global Reporting Initiative & KPMG Global Sustainability Services., Reporting the Business Implications of Climate Change in Sustainability Reports (2007)

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

CARBON DISCLOSURE PROJECT

Carbon Disclosure Project Report 2007 USA S&P500

On behalf of 315 investors with assets of \$41 trillion



Report written by



RiskMetrics Group

Carbon Disclosure Project (CDP)

www.cdp.net
New York, NY
USA
Tel: +1 212 254 2544
Fax: +1 212 254 2544

RiskMetrics Group, Inc.

One Liberty Plaza
New York, NY 10006
USA
Tel: +1 212 254 2544
Fax: +1 212 254 2544

Carbon Disclosure Project 2007

This report is based on the submissions of S&P500 corporations in response to the fifth information request sent by the Carbon Disclosure Project (CDP5) on 1st February 2007. This summary report, the full report and all responses from corporations are available without charge from www.cdproject.net. The contents of this report may be used by anyone providing acknowledgment is given.

CDP Members 2007

In 2007, CDP launched a Membership option for signatories. CDP Membership allows signatories to have a leading role in the development of CDP and gives the ability to perform improved comparative analysis of company responses through the new online database. The following investors are CDP Members in 2007:



ABN AMRO Bank N.V.
Netherlands

ABP Investments **Netherlands**

AIG Investments **U.S.**

ASN Bank **Netherlands**

AXA Group **France**

BlackRock **U.S.**

BNP Paribas Asset
Management
(BNP PAM) **France**

BP Investment Management
Limited **UK**

Caisse de Dépôts et Placements
du Québec **Canada**

Caisse des Dépôts **France**

California Public Employees
Retirement System **U.S.**

California State Teachers
Retirement System **U.S.**

Calvert Group **U.S.**

Canada Pension Plan
Investment Board **Canada**

Catholic Super **Australia**

Ethos Foundation **Switzerland**

Folksam **Sweden**

Generation Investment
Management **UK**

Hermes Investment
Management **UK**

HSBC Holdings plc **UK**

KLP Insurance **Norway**

London Pensions Fund
Authority **UK**

Merrill Lynch **U.S.**

Morgan Stanley **U.S.**

Morley Fund Management **UK**

Neuberger Berman **U.S.**

Newton Investment
Management Limited **UK**

Pictet Asset Management
Switzerland

Rabobank **Netherlands**

Robeco **Netherlands**

SAM Group **Switzerland**

Schroders **UK**

Signet Capital Management Ltd
UK

Sompo Japan Insurance Inc.
Japan

Swiss Reinsurance Company
Switzerland

The Ethical Funds Company
Canada

The RBS Group **UK**

Zurich Cantonal Bank
Switzerland

CDP Signatories 2007

315 investors were signatories to the CDP5 information request dated 1st February 2007 including:

Aachener Grundvermögen Kapitalanlagegesellschaft mbH Germany	Boston Common Asset Management, LLC U.S.	Co-operative Insurance Society UK
Aberdeen Asset Managers UK	BP Investment Management Limited UK	Credit Agricole Asset Management France
ABN AMRO Bank N.V. Netherlands	Brasileir Seguros e Previdência S.A. Brazil	Credit Suisse Switzerland
ABP Investments Netherlands	British Coal Staff Superannuation Scheme UK	Daegu Bank South Korea
ABRAPP – Associação Brasileira das Entidades Fechadas de Previdência Complementar Brazil	British Columbia Investment Management Corporation (bcIMC) Canada	Daewoo Securities Group Inc. Japan
Acuity Investment Management Inc Canada	BT Financial Group Australia	Deka FundMaster Investmentgesellschaft mbH Germany
Aegion N.V. Netherlands	BVI Bundesverband Investment und Asset Management e.V. Germany	Deka Investment GmbH Germany
Aeneas Capital Advisors U.S.	CAAT Pension Plan Canada	DekaBank Deutsche Girozentrale Germany
AIG Investments U.S.	Caisses de Dépôts et Placements du Québec Canada	Delta Lloyd Investment Managers GmbH Germany
Aicyone Finance France	Carne des Dépôts France	Deutsche Bank Germany
Allianz Group Germany	Caixa Econômica Federal Brazil	Deutsche Postbank Privat Investment Kapitalanlagegesellschaft mbH Germany
AMP Capital Investors Australia	California Public Employees Retirement System U.S.	Development Bank of Japan Japan
AmpegaGerling Investment GmbH Germany	California State Teachers Retirement System U.S.	Development Bank of the Philippines (DBP) Philippines
ANBID – National Association of Brazilian Investment Banks Brazil	California State Treasurer U.S.	Dexia Asset Management France
ASN Bank Netherlands	Calvert Group U.S.	DnB NOR Norway
Astra Investimentos Ltda Brazil	Canada Pension Plan Investment Board Canada	Domini Social Investments LLC U.S.
Australia and New Zealand Banking Group Limited Australia	Canadian Friends Service Committee Canada	DPG Deutsche Performance-essungs-Gesellschaft für Wertpapierportfolio mbH Germany
Australian Ethical Investment Limited Australia	Carison Investment Management Sweden	DWS Investment GmbH Germany
Australian Reward Investment Alliance (ARIA) Australia	Carmignac Gestion France	Environment Agency Active Pension Fund UK
Aviva plc UK	Catholic Super Australia	Epworth Investment Management UK
AXA Group France	CCLA Investment Management Ltd UK	Erste Bank der Oesterreichischen Sparkassen AG Austria
Baillie Gifford & Co. UK	Central Finance Board of the Methodist Church UK	Ethos Foundation Switzerland
Banco Bradesco S.A. Brazil	Cesna U.S.	Eureko B.V. Netherlands
Banco do Brazil Brazil	CERES-Fundação de Seguridade Social Brazil	Euronext Capital SGR Italy
Banco Fonder Sweden	Cheyne Capital Management (UK) LLP UK	Evli Asset Management Finland
Banco Pine S.A. Brazil	Christian Super Australia	F&O Asset Management UK
Bank Sarasin & Co. Ltd Switzerland	CI Mutual Funds Signature Funds Group Canada	FACULCE – Fundação Coelce de Seguridade Social Brazil
Barclays Group UK	CIBC Canada	FAPES – Fundação de Assistência e Previdência Social do BNDPS Brazil
BayernInvest Kapitalanlagegesellschaft mbH Germany	Citizens Advisors Inc U.S.	Federis Gestion d'Actifs France
BSC Pension Trust Ltd UK	ClearBridge Advisors Social Awareness Investment U.S.	FIPESCo – Fundação de Previdência Complementar dos Empregados e Servidores Brazil
Beutel Goodman and Co. Ltd Canada	Cisco Brothers Group plc UK	First Affirmative Financial Network, LLC U.S.
BlackRock U.S.	Comité syndical national de retraite Bâtirente Canada	First Swedish National Pension Fund (AP1) Sweden
BMO Financial Group Canada	CommerzbankAG Germany	FirstRand Ltd. South Africa
BNP Paribas Asset Management (BNP PAM) France	Connecticut Retirement Plans and Trust Funds U.S.	Five Oceans Asset Management Pty Limited Australia

Carbon Disclosure Project

Folksam Sweden	Hermes Investment Management UK	Mentis Mutual Funds Canada
Fondation Canada	HESTA Super Australia	Merrill Lynch U.S.
Fonds de Réserve pour les Retraites – FRR France	Hospitals of Ontario Pension Plan (HOOPP) Canada	Metzler Investment GmbH Germany
Fortis Investments Belgium	HSBC Holdings plc UK	Midas International Asset Management South Korea
Fourth Swedish National Pension Fund, AP4 Sweden	I.D.E.A.M. – Integral Development Asset Management France	Mitsubishi UFJ Financial Group (MUFG) Japan
Frankfurt Trust Investment-Gesellschaft mbH Germany	Ilmarinen Mutual Pension Insurance Company Finland	Mitsui Sumitomo Insurance Co.Ltd Japan
Frankfurter Service Kapitalanlage-Gesellschaft mbH Germany	Indexchange Investment AG Germany	Mizuho Financial Group, Inc. Japan
Franklin Templeton Investment Services GmbH Germany	Industry Funds Management Australia	Monte Paschi Asset Management S.G.R. – S.p.A Italy
Fraser Asset Management South Africa	ING Investment Management Europe Netherlands	Morgan Stanley Investment Management U.S.
FUNCEF Brazil	Inhance Investment Management Inc Canada	Morley Fund Management UK
Fundação Assistencial e Previdenciária de Extensão Rural no Rio Grande do Sul- FAPERGS Brazil	Insight Investment Management (Global) Ltd UK	Münchener Kapitalanlage AG Germany
Fundação Atlântico de Seguridade Social Brazil	Instituto Infraero de Seguridade Social – INFRAPREV Brazil	Munich Re Group Germany
Fundação Banerli de Seguridade Social Brazil	Instituto Sabeae De Seguridade Social – SEBRAE-PPREV Brazil	National Australia Bank Limited Australia
Fundação CESP Brazil	Interfaith Center on Corporate Responsibility U.S.	National Bank of Kuwait Kuwait
Fundação Cozaco de Seguridade Social Brazil	Internationale Kapitalanlagegesellschaft mbH Germany	National Pensions Reserve Fund of Ireland Ireland
Fundação Copel de Previdência e Assistência Social Brazil	Jarislowsky Fraser Limited Canada	Natixis France
Fundação Corsan – dos Funcionários da Companhia Riograndense de Saneamento Brazil	Jupiter Asset Management UK	Neobank Group South Africa
Fundação Real Grondaza Brazil	KBC Asset Management NV Belgium	Needmor Fund U.S.
Fundação Rede Ferroviária de Seguridade Social – Refer Brazil	KLP Insurance Norway	Neuberger Berman U.S.
Fundação São Francisco da Seguridade Social Brazil	KPA AB Sweden	New York City Employees Retirement System U.S.
Fundação Vale do Rio Doce de Seguridade Social – VALIA Brazil	La Banque Postale AM France	New York City Teachers Retirement System U.S.
Gartmore Investment Management plc UK	LBBW – Landesbank Baden-Württemberg Germany	New York State Common Retirement Fund U.S.
Generation Investment Management UK	Lazard & General Group plc UK	Newton Investment Management Limited UK
Genus Capital Management Canada	Libra Fund U.S.	NHU Mutual Insurance Society UK
Gjensidige Forsikring Norway	Light Green Advisors, LLC U.S.	Nikko Asset Management Co., Ltd. Japan
Goldman Sachs & Co. U.S.	Local Authority Pension Fund Forum UK	Norinchukin Zerkovoren Asset Management Co., Ltd Japan
Green Century Capital Management U.S.	Local Government Superannuation Scheme Australia	Northern Trust U.S.
Green Kay Asset Management UK	Lombard Odier Darier Hentsch & Cie Switzerland	Old Mutual plc UK
Groupo Investissement Responsable Inc. Canada	London Pensions Fund Authority UK	Ontario Municipal Employees Retirement System (OMERS) Canada
Guardians of New Zealand Superannuation New Zealand	Maclif Gestion France	Ontario Teachers Pension Plan Canada
Hastings Funds Management Limited Australia	Marine State Treasurer U.S.	Opplysningsvesenets fond (The Norwegian Church Endowment) Norway
Helaba Invest Kapitalanlagegesellschaft mbH Germany	Mas Group plc UK	Oregon State Treasurer U.S.
Henderson Global Investors UK	Maryland State Treasurer U.S.	Orion Energy Systems, Ltd U.S.
	Meag Munich Ergo Kapitalanlagegesellschaft mbH Germany	Pax World Funds U.S.
	Maesduert Asset Management France	Pension Plan for Clergy and Lay Workers of the Evangelical Lutheran Church in Canada Canada
	Meiji Yasuda Life Insurance Company Japan	PETROS – The Fundação Petrobras de Seguridade Social Brazil

PSGM Netherlands	Sierra Club Mutual Funds U.S.	Third Swedish National Pension Fund (AP3) Sweden
Philips, Hager & North Investment Management Ltd. Canada	Signal Iouna Gruppe Germany	Threadneedle Asset Management UK
PhiTrust Active Investors France	Signal Capital Management Ltd UK	Tokio Marine & Nichido Fire Insurance Co., Ltd. Japan
Pictet Asset Management Switzerland	SNS Asset Management Netherlands	Trilium Asset Management Corporation U.S.
Pioneer Investments Kapitalanlagegesellschaft mbH Germany	Société Générale France	Triodos Bank Netherlands
Portfolio 21 and Progressive Investment Management U.S.	Société Générale Asset Management UK UK	Tri-State Coalition for Responsible Investing U.S.
Portfolio Partners Australia	Sampo Japan Insurance Inc. Japan	UBS AG Switzerland
Prado Epargne France	Standard Chartered PLC UK	Unibanco Asset Management Brazil
PREVI Caixa de Previdência dos Funcionários do Banco do Brasil Brazil	Standard Life Investments UK	UniCredit Group Italy
Prudential Plc UK	State Street Corporation U.S.	Union Asset Management Holding Germany
PSI Investments Canada	State Treasurer of North Carolina U.S.	Unitarian Universalist Association U.S.
Rabobank Netherlands	Storebrand Investments Norway	United Methodist Church General Board of Pension and Health Benefits U.S.
Railpen Investments UK	Status Banco de Negócios Brazil	Universal Investment Gesellschaft mbH Germany
Rathbone Investment Management / Rathbone Greenbank Investments UK	Sumitomo Mutual Financial Group Japan	Universitas Superannuation Scheme (USS) UK
Heynders McVeigh Capital Management U.S.	Sumitomo Trust & Banking Japan	Vancity Group of Companies Canada
RLAM UK	Superfund Asset Management GmbH Germany	Vermont State Treasurer U.S.
Robeco Netherlands	Swedbank Sweden	VicSuper Proprietary Limited Australia
Rock Crest Capital LLC U.S.	Swiss Reinsurance Company Switzerland	Vital Forsikring ASA Norway
Royal Bank of Canada Canada	Swisscanto Switzerland	Wachovia Corporation U.S.
SAM Group Switzerland	TD Asset Management Inc. and TD Asset Management USA Inc. Canada	Walden Asset Management, a division of Boston Trust and Investment Management Company U.S.
Samsung Investment Trust Management Co., Ltd. South Korea	Teachers Insurance and Annuity Association – College Retirement Equities Fund (TIAA-CREF) U.S.	Warburg-Henderson Kapitalanlagegesellschaft mbH Germany
Santam Investment Management South Africa	Terra Kapitalforvaltning ASA Norway	West Yorkshire Pension Fund UK
Sauren Finanzdienstleistungen GmbH & Co. KG Germany	HL Pension Fund UK	WestLB Mellon Asset Management (WVAM) Germany
Savings & Loans Credit Union (S.A.) Limited. Australia	The Bullitt Foundation U.S.	Winslow Management Company U.S.
Schroders UK	The Central Church Fund of Finland Finland	YES BANK Limited India
Scotiabank Canada	The Collins Foundation U.S.	York University Pension Fund Canada
Scottish Widows Investment Partnership UK	The Co-operative Bank UK	Zurich Cantonal Bank Switzerland
SEB Asset Management AG Germany	The Co-operators Group Ltd Canada	
Second Swedish National Pension Fund (AP2) Sweden	The Daily Foundation Canada	
Seitson & Co Fund Management Plc Finland	The Drayus Corporation U.S.	
Service Employees International Union U.S.	The Ethical Funds Company Canada	
Seventh Swedish National Pension Fund (AP7) Sweden	The Local Government Pensions Institution (LGPI/Keval) Finland	
Sehnan Bank South Korea	The RBS Group UK	
Shinkin Asset Management Co., Ltd Japan	The Russell Family Foundation U.S.	
Shinsei Bank Japan	The Shiga Bank, Ltd (Japan) Japan	
Siemens Kapitalbeteiligungsgesellschaft mbH Germany	The Standard Bank Group Limited South Africa	
	The Travelers Companies, Inc. U.S.	
	The United Church of Canada – General Council Canada	
	The Wellcome Trust UK	

Carbon Disclosure Project



New York, August, 2007

Message from the President

Earlier this year, as a founding member of the Carbon Disclosure Project and a strong supporter of CDP's mission to create a rigorous global database of corporate carbon emissions, Merrill Lynch assisted the CDP in distributing a survey to more than 2,400 of the world's largest publicly traded companies, seeking detailed information on the business risks and opportunities presented by climate change and global greenhouse gas emissions.

Concurrently, Merrill Lynch sponsored an extension of the survey to cover all S&P500 companies, which are located mainly in the United States. A total of 56% responded, representing a significant increase over last year's response rate of 47%.

While I urge you to read the accompanying report for further details and results, among the most intriguing findings is the fact that a wide majority of responding companies from the S&P500 view climate change as posing a material commercial opportunity as well as a significant commercial risk.

In fact, while 81% of responding companies reported that they regard climate change as posing a commercial risk, 69% of those firms also consider it an important business opportunity.

Furthermore, half of the responding firms considered the issue significant enough to warrant attention from board members or upper management.

On behalf of Merrill and the CDP, I'd like to personally thank all of the companies that participated in the survey, and urge all respondents to continue to support an institution dedicated to providing an objective benchmark of carbon production and corporate contributions to its mitigation.

We're confident that as CDP5 deepens our collective understanding of the myriad risks and responsibilities associated with climate change, a majority of leading companies worldwide will join us in achieving our common objective of rigorously measuring and managing an issue described as the greatest long-term challenge facing the international community today.

A handwritten signature in black ink, appearing to read "Gregory J. Fleming".

Gregory J. Fleming
President, Merrill Lynch & Co., Inc.

Foreword

RiskMetrics Group is pleased to present the survey results of the second Carbon Disclosure Project (CDP5) questionnaire addressed to S&P500 Index companies. That more than half of the S&P500 — 56% — responded to this year's survey is a further sign that American industry is getting ready to address climate change in a meaningful way. Significantly, a vast majority of respondents see risks and opportunities presented by this issue. America's leading companies are pursuing energy efficiency programs and promoting renewable energy development. Yet hard work remains in setting and attaining goals to curb greenhouse gas emissions, which is at the root of this challenge.

This report describes recent activities of the Carbon Disclosure Project and of U.S. firms in tracking GHG emissions, providing disclosure to investors and embarking on GHG management programs. The report also contains eight guest commentaries that make the following points:

Science is certain (#1)

Dr. Michael MacCracken, Climate Institute

Rising CO₂ concentrations, global average temperature and sea level rise all point to rapid changes in our climate brought about by human activity.

More disclosure is needed (#2)

Jane Ambachtsheer and Craig Metrick, Mercer Investment Consulting

Disclosure on climate change remains in its infancy, but synergies between CDP and other initiatives, such as the U.N. Principles for Responsible Investment, will enhance corporate disclosure and make data more accessible to investors.

Physical risks affect the environment and economy (#3)

Dr. Paul Epstein, Harvard Medical School

Climate change is affecting human health, agriculture, forests, marine life and water resources. A life-cycle analysis can help avoid unintended consequences of some proposed solutions, such as clean-coal technology and nuclear power.

Sea level rise is putting coastal development at risk (#4)

Dr. Stephen Leatherman, International Hurricane Research Center

The rate of sea level rise has increased up to 50% in the last decade, adding to coastal erosion, inundation and salt-water intrusion. Better testing procedures are needed in order to upgrade safety standards and building codes.

Business is taking an active role in setting climate change policy (#5)

Hon. Eileen Claussen, Pew Center on Global Climate Change

This has been a milestone year when American business has stepped forward to help lead the drive toward federal GHG legislation. CDP can help by calling on companies to disclose their positions on climate change policy proposals.

Congress is likely to act soon (#6)

Jason Grunet, National Commission on Energy Policy

The broad elements of federal legislation are falling into place. A key issue is whether a 'safety valve' to limit prices on carbon emissions might eventually give way to a firm emissions cap to provide greater environmental certainty.

Renewable energy development is booming (#7)

Angus McCrone, New Energy Finance

U.S. investment in clean energy has quadrupled in three years and is quickly catching up to Europe, but most major U.S. corporations have not yet made major investments in renewables. This may be a case of 'watch this space.'

A massive transformation of our economy and energy sources is needed (#8)

Dr. William Moormaw, Fletcher School, Tufts University

Developed and developing countries must approach climate change as the central challenge to sustainable development, not as just another pollution problem. Long-term GHG reduction goals with intermediate benchmarks will be required to assure investors and companies that there is an enduring market for low-carbon energy supplies and energy-efficient equipment.

Lead authors of this report:

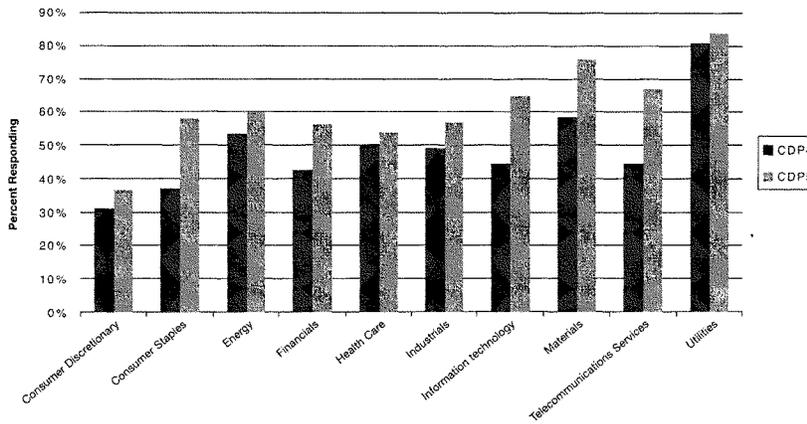
Douglas G. Cogan
*Director of Climate
Change Research
RiskMetrics Group Inc.*

Heidi Welsh
*Research Manager
Social Issues Service
RiskMetrics Group Inc.*

Written on behalf of 315 institutional investors, representing more than \$41 trillion of assets under management, CDP5 provides investors with a unique analysis of how S&P500 Index companies are responding to climate change. The report summarizes key trends identified in companies' responses to the CDP5 questionnaire and highlights commercial risks and opportunities that climate change is presenting to these widely held, American-based companies. Through increased support and improved quality of responses, CDP5 shows that the private sector in the United States is increasingly engaged in addressing the global challenges presented by climate change. This Executive Summary provides a summary of key findings from the CDP5 S&P500 respondents.

Executive Summary

CDP Response Rate



Disclosure Trends

¥ **S&P500 response rate increases.** 56% (282) of S&P500 companies answered the CDP5 survey, compared with 47% for CDP4. (The CDP4 survey was the first addressed specifically to S&P500 companies.) The response rate increased across all industry sectors represented in the index.

¥ **S&P500 response rate still lags FT500.** 77% of the world's largest publicly traded companies, as represented in the FT500 index, responded to the CDP5 survey. However, the large percentage increase in this year's S&P500 response rate is in line with historical trends for the FT500 CDP survey (see table).

¥ **Electric utilities have the highest response rate.** Nearly 84% of S&P500 utilities (26 of 31) responded to CDP5. Materials companies also had a high response rate of 78% (22 of 29). These are the two most carbon-intensive industries represented in the S&P500 Index.

¥ **Most industry sectors have response rates exceeding 50%.** Nine of the 10 industry sectors represented in the S&P500 had a CDP5 response rate of greater than 50%. The Consumer Discretionary sector had a response rate of only 37% (32 of 87 companies).

¥ **More S&P500 companies see strategic risks than opportunities from climate change.** 81% of responding companies consider climate change to present commercial risks for their businesses, compared to only 69% that see climate change as presenting commercial opportunities. This is largely the reverse of the FT500 survey sample, where 82% see commercial opportunities, and 79% have identified commercial risks.

More than 50% of S&P500 companies responded to this year's CDP survey, providing more evidence that American industry is getting serious about global warming

CDP response rate	1st survey	2nd survey	3rd survey	4th survey	5th survey
FT500 index	47%	59%	71%	72%	77%
S&P500 index	47%	56%	(2008)	(2009)	(2010)

Few companies report on climate change in their securities filings, and fewer still factor carbon pricing in their capital investment decisions

Management Response

- **Climate issues are receiving more attention from management and directors.** Fully half of the S&P500 responding companies have assigned board and/or upper-level management responsibility for overseeing climate related issues. 65% of respondents have publicly disclosed greenhouse gas (GHG) emissions data.
- **Action to reduce emissions lags well behind climate awareness.** Only 29% of responding companies have implemented GHG reduction programs with specific targets and timelines. This includes companies that have set targets to reduce the intensity of their GHG emissions, without setting limits on their absolute emissions.
- **Energy efficiency and renewable energy are drivers of GHG emission reductions.** 78% of respondents are engaged in energy efficiency initiatives, and 37% are involved in renewable energy projects or have set targets for renewable energy purchases. In addition, 36% of respondents are considering or are actively engaged in carbon emissions trading.

Financial Implications

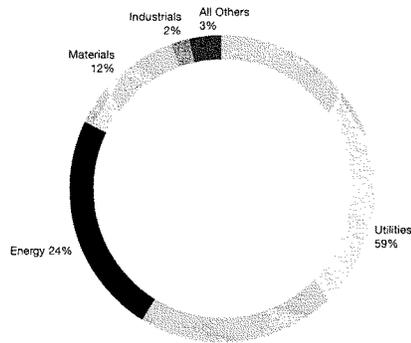
- **Material effects of climate change remain largely undetermined and undisclosed.** While most S&P500 respondents can identify regulatory and physical risks associated with climate change, few have attempted to quantify these risks in dollar terms or have discussed them in securities filings. Just nine respondents in the Utility sector disclosed the potential for a material business impact in their latest Form 10-K filings. Although risk assessments were more substantive in CDP5 responses, only two firms (an automobile manufacturer and a utility) indicated that climate change regulation poses a potential material risk to their businesses. A third firm (a beverage bottler) disclosed in its CDP response that physical risks of climate change could result in a material impact on its operations. Though respondents in all sectors acknowledged potential adverse impacts — even 'significant' impacts — no firm placed a dollar value estimate on that risk.
- **Carbon pricing is rarely factored into capital investment decisions.** While many capital investment decisions involve multi-year planning processes and have long payback periods, only 8% of survey respondents say they are factoring projected costs of carbon emissions into their decisions. Half (12 of 24) that are doing so are electric utilities. Only a few have set an explicit carbon price (or range of prices) as part of their decision-making process.
- **Energy cost disclosure is mixed.** Just over half of the companies that responded to CDP5's question on energy costs (55 of 107) provided figures. These S&P500 firms reported spending more than \$87 billion on energy in 2006.

Emissions Trends

- **More S&P500 firms are disclosing their GHG emissions.** 65% of S&P500 respondents provided emissions data, compared with 54% of respondents in CDP4. By comparison, 79% of FT500 companies disclosed emissions data in their CDP5 responses. Total emissions reported by S&P500 respondents were 2,013,518,771 metric tonnes of carbon dioxide equivalent. This represents approximately 6% of global GHG emissions (CO₂e).
- **Most reported GHG emissions are Scope 1 (direct) emissions.** Scope 1 emissions accounted for two-thirds of the total emissions reported by S&P500 respondents. Scope 2 (purchased power) emissions accounted for 11%. Scope 3 (indirect) emissions accounted for 22%. Most of Scope 3 emissions disclosures were for business travel, although one petroleum company estimated emissions from customer end-use of its products.
- **Three industry sectors account for 90% of reported Scope 1 and 2 emissions.** In the CDP5 survey of S&P500 companies, the Utility, Energy and Materials sectors reported combined Scope 1 and 2 emissions of 1,403,741,186 tonnes of CO₂e.
- **Four sectors account for 76% of Scope 2 emissions from purchased electricity.** Respondents in the Utilities sector accounted for 38% of the Scope 2 total; Energy companies 17%; Consumer Staples 12%; and Consumer Discretionary 9%.
- **Scope 3 reporting by S&P500 firms lags the FT500.** S&P500 respondents reported 429,311,922 tonnes of Scope 3 emissions, including emissions from business travel, upstream suppliers and product end-use. These Scope 3 emissions represented 22% of the total emissions reported by S&P500 respondents, compared to 50% for FT500 respondents in the CDP5 survey. Calculating the 'carbon footprint' of company operations remains one of the most elusive and vexing challenges of carbon emissions accounting.

Calculating the 'carbon footprint' remains one of the biggest obstacles to full accounting of the climate change effects of a company's operations

Reported Scope 1 Emissions by Sector



Reported Scope 2 Emissions by Sector

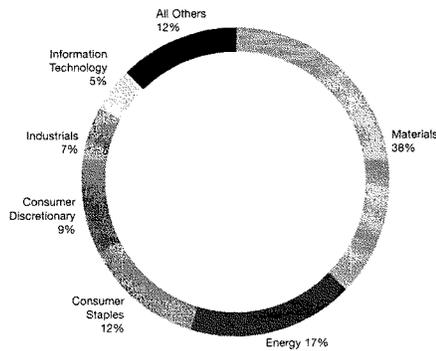


Table of Contents

Contents

1. The Carbon Disclosure Project (CDP)	2
2. Global Key Trends	6
3. America Wakes Up to Climate Change	10
Climate Disclosure Standards Board	15
4. Climate Governance Index	18
5. Disclosure of Greenhouse Gas Emissions	24
6. Climate Disclosure Practices	32
7. GHG Emissions Management	50
8. Conclusion	66
9. Appendices	68
Appendix I: Scores and Emissions	69
Appendix II: CDP's Questionnaire	73
Appendix III: S&P500 Company Responses to CDP4 & 5	76
Guest Commentaries	
Climate Past, Climate Future: Key Findings from the IPCC <i>Dr. Michael MacCracken</i>	16
Factoring "ESG" in Investment Analysis: Carbon Disclosure Project Helps Set the Standard <i>Jane Ambachtsheer and Craig Melnick</i>	22
Changing Climate: Effects on Health, Environment and Economy <i>Dr. Paul R. Epstein</i>	30
Coastal Collision Course: Sea Level, Hurricanes and Development <i>Dr. Stephen P. Leatherman</i>	39
Business in the Driver's Seat: A New Standard for Corporate Engagement in Climate Policy <i>Hon. Eileen Claussen</i>	48
Climate Change Legislation: The Time is Now <i>Jason Gurnet</i>	54
Renewable Energy Finance: Big Steps for US Investors, Smaller Ones for Industry <i>Angus McCrone</i>	58
Catching Up to Climate Change: Prospects for the Kyoto Protocol after 2012 <i>Dr. William R. Moomaw</i>	64

1 CDP provides a coordinating secretariat and innovative forum for investor and corporate collaboration on climate change. Based on answers to its questionnaire, CDP provides the investment community with information about corporations' greenhouse gas emissions and climate change management strategies. Through CDP's database, this information is available in a comparable format that adds value for investors and a wide range of stakeholders.

CDP's mission is to facilitate a dialogue between investors and corporations, supported by high quality information from which a rational response to climate change will emerge.

The Carbon Disclosure Project (CDP)

In February 2007, CDP issued its fifth information request on behalf of 315 institutional investors with assets of USD 41 trillion under management. The request was sent to 2,400 of the largest quoted companies in the world by market capitalization for disclosure of investment-relevant information concerning the risks and opportunities facing these companies due to climate change. These companies included the largest listed companies in Asia, Australia, Brazil, Canada, France, Germany, India, Italy, Japan, New Zealand, Scandinavia, South Africa, Switzerland, UK, US, and the Electric Utilities and Transport sectors.

As in previous years the request focused upon the issues CDP has identified in conjunction with many signatory investors, corporations and other experts as being most pertinent to the effect of climate change on company value. Those issues include regulatory risk/opportunity (e.g. limits on emissions); physical risk/opportunity (e.g. changes in weather patterns impacting operations); consumer sentiment risk/opportunity (e.g. reputation); total company wide global greenhouse gas emissions and steps taken to manage and reduce emissions.

USD 41 trillion of assets under management represents more than one third of total global invested assets and is a marked increase from the USD 4.5 trillion that participated in the first CDP request in 2002.

77% of FT500 companies and a total of 1,300 corporations answered the fifth CDP request in 2007, evidencing a significant increase in support for CDP's work from the 45% of FT500 companies and 235 corporations that answered the first request in 2002.

Having launched at No.10 Downing Street in 2000, CDP has become the global standard mechanism by which companies report their greenhouse gas emissions to investors. Its process has been applauded by Al Gore (Former US Vice President), Sir John Bond (then Chairman HSBC), Jeff Immelt (CEO, General Electric), Angela Merkel (German Chancellor) and Tony Blair (former UK Prime Minister) among others. CDP is proud to have assisted the pioneering efforts of global investors in creating this comprehensive and international system of disclosure.

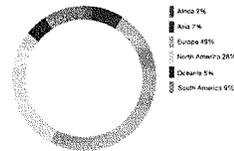
CDP data has also enabled stakeholders such as policymakers, service providers, and NGO's to accelerate their own initiatives. Last year CDP reports were produced in English, French, German, Japanese and Portuguese and launched at a series of high profile events in the main capital markets in the world. CDP now hosts the largest registry of corporate greenhouse gas data in the world, and this information along with reports analyzing it can be downloaded free of charge at www.cdproject.net. The CDP Secretariat extends sincere thanks to the signatory investors, responding corporations and regional partners for their participation in CDP5.

New CDP Initiatives in 2007

In addition to the expansion of its existing activity in 2007, CDP is delighted to have evolved its service offering in a number of exciting directions:

Improved database. CDP is launching a user-friendly interface to its comprehensive database of responses. This will enable users to easily and quickly perform comparative analysis by sorting company information by sector, geography, emissions and the CDP questions.

CDP5 Signatories by Region



"The aim of CDP is to gradually improve information on CO₂ emissions and climate strategies as well as to initiate long-term plans for the future. I wish the Carbon Disclosure Project success with its further efforts both in Germany and worldwide."

Angela Merkel,
German Chancellor

Carbon Disclosure Project

"The first step towards managing carbon emissions is to measure them. Because in business what gets measured gets managed. The Carbon Disclosure Project has played a crucial role in encouraging companies to take the first steps in that measurement and management path. If more businesses progress further down that measurement and management path, within the context of public policy, which spurs on the business leaders and drags up the business laggards, then we will be able --- and at surprisingly small economic cost --- to offset the dangers which climate change poses to our world."

Lord Adair Turner,
Standard Chartered plc

CDP Membership. CDP is now providing a premium service for those signatory investors who have become CDP members. This service provides members with enhanced recognition and access to the entire functionality of the database.

Supply Chain Initiative. In 2007, CDP was delighted to enter into partnership with Wal-Mart Stores to send the CDP information request to a subset of their suppliers. This contract represents the start of an exciting development for CDP as it begins to mirror its activity with shareholders and corporations via corporations and suppliers. The Wal-Mart work is now being developed for broader reach and impact with the launch of the Supply Chain Leadership Collaboration project (SCLC project) aimed at working with key sector leaders including: Retail, Brands, Aviation, Automotive and Government among others. This work will help identify and reduce emissions within their supply chains. The CDP Secretariat expresses sincere thanks to Wal-Mart for their leadership in developing this new system for corporate disclosure of emissions from supply chains.

Climate Disclosure Standards Board (CDSB). CDP became a member of the CDSB consortium convened by the World Economic Forum in January 2007 and has been funded by the UK Department for Environment to provide the Secretariat to CDSB, supporting its activities focused upon climate change reporting standards.

Going Forward

CDP's primary goal is to continue to improve the quality and quantity of responses for its core disclosure activity and in doing so better inform the decision-making of investors and corporations regarding the implications of climate change.

CDP will also continue to respond to stakeholder requests to expand, and in addition to the new initiatives for 2007, is developing further projects including:

- Expansion of the CDP process into further geographies and sectors.
- Expansion of the CDP process into private equity and private companies.
- Workshops for corporations and investors.
- Further development of the CDP database.
- Assisting Pension Funds to develop mandates incorporating climate change criteria.

CDP would be delighted to hear from parties interested in participating or partnering with CDP and invites them to approach the Project through info@cdproject.net

"It's not surprising that investors are worried and that they are supporting the Carbon Disclosure Project. In BT we share their concern – and we have good business reasons for doing so. We have a huge investment in the UK telecommunications infrastructure and that will be increasingly at risk... the Carbon Disclosure Project does us all a great service in bringing these matters to the attention of the investment and business communities. It is an important catalyst for change — the change without which the world will be a very dangerous place."

Sir Christopher Bland,
Chairman BT Group

"...the members of the Carbon Disclosure Project have recognised that the cost benefit analysis points to it being in the interest of business to take action. The growth of the Carbon Disclosure Project itself shows that investors are increasingly aware of the impact climate change will have on shareholder value... this is a project that has considerable momentum and that in itself is significant."

Rt Hon Margaret Beckett MP,
**then Secretary of State
for Environment,
Food & Rural Affairs
UK Government**

"CDP works to improve the information flow, seeks to improve City engagement, to improve understanding and ultimately to improve economic performance... and it tackles it at the highest level with a cross border span, with force and with directness... CDP represents a very positive aspect of shareholder engagement and if there are more shareholders ready to sign up that can only be, from my perspective, a very good thing."

Derek Higgs,
**author Higgs Report on
Corporate Governance**

"Initiatives such as the Carbon Disclosure Project (CDP) can play a meaningful role in our shared endeavours to reduce greenhouse gas emissions. The project shows that both companies and investors have key roles to play. It is very positive and inspiring that the capital markets are considering climate related aspects more and more in their investment decisions. It proves that the climate challenge is not only a matter of technology it is also an important economic issue. As Deputy Prime Minister and Minister of Enterprise and Energy it is especially encouraging to see that companies go ahead without state intervention."

Maud Olofsson,
Deputy Prime Minister Sweden

"It has been a really interesting experience to watch the development of the Carbon Disclosure Project and I congratulate those who have worked so hard. It's extremely significant because there is a major shift in awareness of the climate crisis and the need to integrate the behavior of companies public and private towards the climate crisis, both its risks and its opportunities in the investment market place and in the business market place generally."

Al Gore,
**speaking at the CDP2006
launch in New York**

"CDP's reporting mechanism offers a trusted solution for consistent and transparent reporting of our energy and carbon numbers, as well as a way to share our reduction strategies with our shareholders and other companies. News Corp. is still at the very beginning of our energy and climate change work and we're delighted to have access to the wealth of information that CDP provides for us to learn from."

News Corporation

2 Following successful expansion in CDP4, the CDP5 universe was expanded even further in 2007 to include over 2,400 companies. This was made possible by sixteen geographical and two sector expansions. This section provides details of these partnerships, the overall response rates, and some headline analysis of the key trends.

Global Key Trends

from CDP Geographic and Sector Expansions

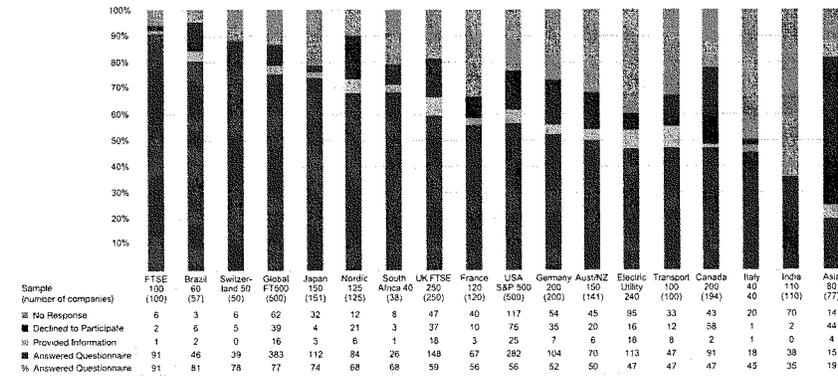
Please visit the CDP website www.cdproject.net in order to view and download the analytical reports based on the responses from the specific geographical locations. Reports will be available for the Asia, Australia & New Zealand, Brazil, Canada, France,

Germany, India, Japan, Scandinavia, South Africa, Switzerland, UK and USA samples.

The key trends from CDP expansions highlighted in the table overleaf produce a number of interesting findings, including

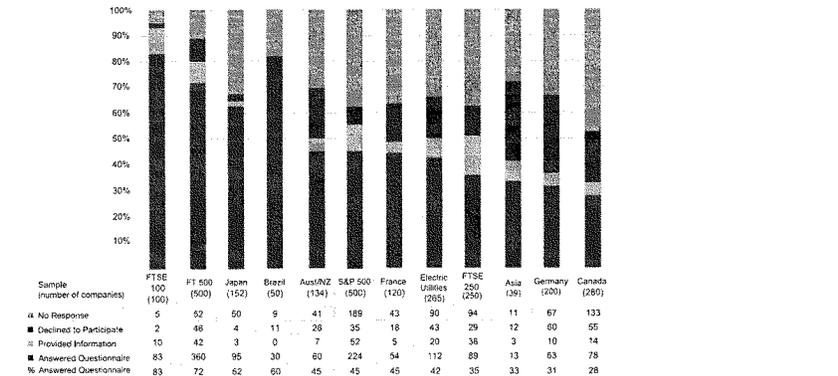
the fact that the majority of responding companies around the world see climate change as posing commercial risks. With the lowest rate of companies recognizing potential impacts showing 72%, it is telling that the majority of businesses are identifying climate change as an

CDP5 Response by Region / Sector



Unlike other analysis, the graph above reflects all responses received up to August 2007. The graph below shows the response rates from the various regions last year in CDP4.

CDP4 Response by Region / Sector



Carbon Disclosure Project

	Key Trends						Number of Responses Analysed**
	Responding companies that said they consider climate change to represent commercial risks	Responding companies that said they consider climate change to represent commercial opportunities	Responding companies that disclosed their GHG data	Responding companies that allocated board-level or upper management responsibility for climate change-related issues *	Responding companies that considered emissions trading opportunities *	Responding companies that implemented emission reduction programs with targets *	
Asia 80	77%	79%	49%	38%	47%	38%	15
Aust/NZ 150	97%	89%	60%	93%	77%	36%	68
Brazil 60	100%	100%	59%	59%	61%	52%	46
Canada 200	85%	86%	66%	53%	27%	24%	86
Exotic 181/250	90%	95%	79%	70%	54%	44%	113
France 120	88%	84%	72%	34%	31%	43%	67
FTSE500	80%	82%	79%	64%	46%	77%	378
FTSE100	98%	82%	83%	53%	38%	41%	91
FTSE250	83%	80%	69%	24%	2%	37%	151
Germany 200	77%	80%	67%	38%	20%	35%	104
India 110	79%	84%	39%	39%	47%	34%	38
Italy 40	89%	83%	89%	33%	33%	22%	18
Japan 150	78%	82%	95%	93%	69%	81%	112
Nordic 125	81%	80%	76%	41%	37%	23%	77
S&P500	81%	69%	65%	50%	36%	29%	269
South Africa 40	80%	92%	56%	60%	44%	44%	25
Switzerland 50	72%	77%	72%	36%	15%	44%	39
Transport 100	83%	85%	77%	79%	42%	46%	48

* Section B responders only

** some responses will have been received after this analysis was carried out, the analysis was carried out by different report writers

imminent threat. With the Brazilian rate at 100% of responding companies recognizing hazards, the FTSE 100 at 98%, and the Australia 150 at 97%, these samples are showing that corporate awareness of risks is high. If business wants to be a significant force in addressing climate change, it is equally important that corporations recognize the opportunity and potential to adjust to shifting markets, resource availability, government regulation and consumer demand. The recognition of business opportunities corresponds accordingly to the trends concerning risks, showing that the potential for development is already being integrated into corporate planning. In ten of the samples, the recognition of opportunities was actually higher than the recognition of risk, showing market foresight alongside possible product development.

It should be noted that the questions regarding management strategies and trading opportunities were only answered by corporations who completed the entire questionnaire (Section B). As it was not mandatory, this can account for the lower percentages witnessed in the table outlining key trends above. Additionally, the question regarding emissions trading schemes is expected to be lower, with many companies falling outside the scope of such schemes. Interestingly, the number of companies in developing countries such as Brazil, India and South Africa who see emissions trading opportunities is higher than companies based in Europe showing high interest in the CDM market.

Country/Expansion	Partner	Web Address
Asia	Association for Sustainable and Responsible Investment in Asia (ASRIA)	www.asria.org
Australia & New Zealand	Investor Group on Climate Change (IGCC)	www.igcc.org
Brazil	Banco ABN Amro Real	www.abnamro.com
Brazil	ABRAPP	www.abrapp.org.br
Brazil	Fabrica Ethica	www.fabricaethica.com.br
Canada	Conference Board of Canada	www.conferenceboard.ca
Electric Utilities	CDP Secretariat	www.cdproject.net
France	AXA	www.axa.com
France	Agence de L'Environnement et de la Maitrise de l'Energie (ADEME)	www.ademe.fr
France	BNP Paribas	www.bnpparibas.com
Germany	BVI Bundesverband Investment und Asset Management e.V	www.bvi.de
Germany	WWF Germany	www.wwf.de
India	Confederation of Indian Industry	www.cionline.org
India	WWF India	www.wfindia.org
Italy	CDP Secretariat Europe	www.cdproject.net
Japan	CDP Secretariat Japan	www.cdproject.net
Nordic Region	CDP Nordic Secretariat	www.cdproject.net
Nordic Region	KLP	www.klp.no
Nordic Region	Folksam	www.folksam.se
Nordic Region	Nutek (Swedish Agency for Economic & Regional Growth)	www.nutek.se
South Africa	Incite	www.incite.co.za
South Africa	National Business Initiative (NBI)	www.nbi.org.za
Switzerland	Ethos	www.ethosfund.ch
Switzerland	Pictet Asset Management	www.pictet.com
Transport	CDP Secretariat	www.cdproject.net
UK	Department for Environment, Food and Rural Affairs (DEFRA)	www.defra.gov.uk
UK - Adaptation	UK Climate Impacts Programme	www.ukcip.org.uk
U.S.	Merrill Lynch	www.ml.com
U.S.	CDP Secretariat	www.cdproject.net

Emission Target Trends

While the emissions target question is located within Section B, there is an opportunity for companies to disclose target information at the end of Section A, Question 1(d), so all responses should have been included in the analysis. All companies were asked if they have an emissions reduction target. Many companies do have reduction programmes in place, however the question specifically asks for targets and unless those were disclosed, the response was not counted in the analysis. As such, the average number of companies with a specific reduction target stands close to 50%, showing robust leadership in setting reduction targets. The FT500 and Japanese 150 companies stand out as the two samples working most stringently to limit their emissions. Whilst we have seen a great increase in the number of companies setting emission reduction targets, this remains an area for global improvement.

3 In embracing greenhouse gas controls, American industry will have greater certainty in investment planning decisions and new business opportunities to exploit.

America Faces Up to Climate Change

America has reached a turning point in the fight against global warming. The science has grown stronger, and the need for action more compelling. Industry opposition to greenhouse gas (GHG) controls is melting away. Now the federal government is poised to adopt GHG control measures, ending a decade-long impasse that has put the United States out of step with its major trading partners.

Just how America will address climate change through legislation remains to be seen. But for the next U.S. president taking office in 2009, the issue will be a top priority. Not only are there international calls to re-engage in the Kyoto Protocol, the international control agreement adopted by Europe, Canada and Japan; the U.S. Supreme Court also ruled this spring that the federal government has a duty to act under the Clean Air Act when pollutants — including greenhouse gases — threaten human health and safety.

Meanwhile, American sentiment in addressing global warming has reached an all-time high:

- More than three-quarters of the American public say they are ready to take action on climate change, according to recent polls conducted by Gallup, Opinion Research and others.
- Mayors of more than 600 cities, representing some 70 million people in all 50 states, have signed onto the U.S. Mayors Climate Protection Agreement, an initiative to advance the goals of the Kyoto Protocol within their communities.
- More than a dozen states have adopted GHG control regulations. California leads these efforts, and ranks as the world's twelfth largest carbon emitter.
- Fully half of U.S. states have adopted Renewable Portfolio Standards to shift their electricity supplies away from reliance on carbon-based fuels.

More major U.S. corporations and influential trade organizations are also now embracing

the need for mandatory GHG controls. On the one hand, they want greater certainty in their investment planning decisions. On the other, they want to exploit new business and investment opportunities in a carbon-constrained world.

Yet time is running out on the Kyoto Protocol — the control agreement the U.S. opted out of in 2001, citing economic concerns and lack of binding controls on developing nations. With the Kyoto framework due to expire in 2012, the European Union is pressing the United

States to re-engage in the Kyoto Protocol. For the next U.S. president taking office in 2009, climate change will be a top priority.

Recent U.S. industry statements on climate change

U.S. Climate Action Partnership: "We are committed to a path that will slow, stop and reverse U.S. emissions while expanding the U.S. economy.... In our view, the climate change challenge will create more economic opportunities than risks for the U.S. economy.... Policies are needed to realize the full potential of energy efficiency as a high-priority energy resource and a cost-effective means of reducing GHG emissions." — **A Call to Action, January 2007**

More than 25 major U.S. firms or operating subsidiaries as well as six leading environmental groups have joined USCAP. They support a goal to achieve a 60-80% reduction in U.S. CO₂ emissions by 2050.

Business Roundtable: "[W]e support collective actions that will lead to the reduction of GHG emissions on a global basis with the goal of slowing increases in GHG concentrations in the atmosphere and ultimately stabilizing them at levels that will address the risks of climate change.... [T]here is a range of views and preferences among our members about the policy tools that will best achieve that objective. Some companies support mandatory approaches; others do not." — **Climate Change Statement, July 2007**

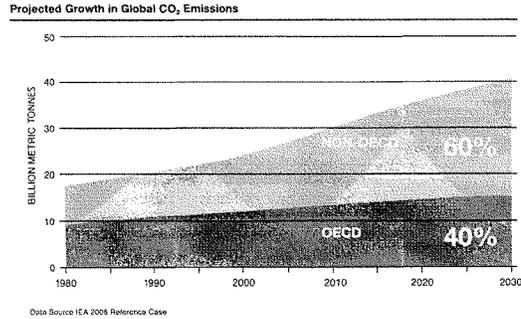
Business Roundtable is an association of CEOs of 160 major firms, with more than \$4.5 trillion in combined annual revenues. This policy statement "marks the first time that a broad cross-section of business leaders from every sector of the U.S. economy have reached consensus on the risks posed by climate change and the need for action," according to Business Roundtable President John Castellani.

National Petroleum Council: "The world is not running out of energy resources, but there are accumulating risks to continuing expansion of oil and natural gas production from the conventional sources relied upon historically. These risks create significant challenges to meeting projected energy demand.... Policies aimed at curbing CO₂ emissions will alter the energy mix, increase energy-related costs, and require reductions in demand growth." — **Facing the Hard Truths About Energy, July 2007**

The National Petroleum Council is an advisory body of oil and gas firms to the U.S. Secretary of Energy. The chairman for this report was former ExxonMobil CEO Lee Raymond.

Carbon Disclosure Project

Baseline forecasts call for a 50% increase in energy demand over the next quarter-century, with most CO₂ emissions growth occurring in developing countries



States for a deal that will bring it back into the agreement. The U.S., in turn, wants China, India and the other fastest-growing developing nations to join. Since it takes time for all the member countries to ratify a new agreement, the hard bargaining is about to begin.

Hard Math

The current Kyoto agreement calls on the nation's major industrial nations to reduce their GHG emissions by an average of 5.2% by 2012, relative to 1990 emission levels. Despite this modest objective, progress to date has been spotty at best.

- The European Union has faced a steep learning curve in implementing a first-of-its-kind, regional GHG emissions trading scheme. Because the E.U. was too generous in allocating emission credits to industrial firms in the first round of trading, it now faces a tougher task of reaching its compliance goals for 2012.
- In North America, Kyoto's targets for 2012 are well out of reach. Both Canada, which has ratified the agreement, and the United States, which has not, are expected to have GHG emissions 20% above their 1990 levels by 2012 — a far cry from Kyoto's goals.
- China, meanwhile, has just surpassed the United States as the world's largest carbon emitter. Under business-as-usual forecasts, global energy use and carbon emissions are expected to increase by more than a third through 2030. Fossil fuels — oil, coal and natural gas — are projected to provide as much of the world's energy supply then as now, some 80% of the total, absent major shifts in energy policy.

Yet, by 2050, scientists advising the world's governments believe a 60 to 80% *reduction* in GHG emissions may be necessary to keep Earth's climate from spinning dangerously out of control. This puts business-as-usual forecasts of energy use and economic growth on a collision course with global warming inertia. Like a speeding train spotting trouble down the tracks, the emission brakes must be applied forcefully and soon to prevent a collision — unless there is another track the train can switch onto.

Stabilization Wedges

Fortunately, there are other options. But they won't come easily. To head off CO₂ levels in the atmosphere that are twice pre-industrial levels, or 550 parts per million, there must be tens of trillions of dollars of investment in low- and no-carbon technologies that is sustained over the next several decades.

To put this investment challenge in perspective, two Princeton University professors have identified strategies that could return CO₂ emissions to today's levels by shortly after 2050 — even as world energy use is projected to double. This would hold the future atmospheric level of CO₂ to under 550 ppm. To achieve this, the professors have identified about 20 options, or "stabilization wedges," each of which would be capable of offsetting about 1 billion metric tonnes of annual CO₂ emissions from fossil fuels.

Seven of these wedges would have to be put in place over the next 50 years in order to offset 7 billion tonnes of carbon coming from projected annual growth in fossil fuel use over the period. The global

investment implications of employing these wedges to back out of fossil fuels are enormous. They include:

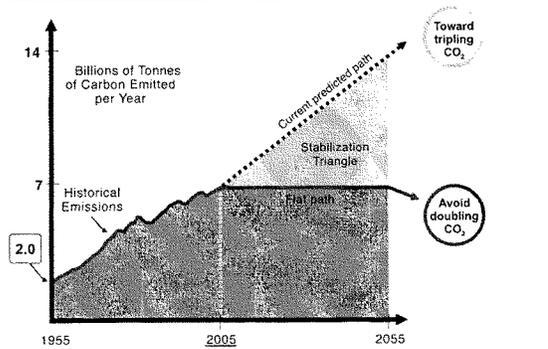
- A 30-fold increase in wind power by building the equivalent of nearly one million 2-megawatt wind turbines.
- A 700-fold increase in solar photovoltaics, covering a land area the size of New Jersey.
- Using natural gas in place of coal at 1,400 new 1,000 megawatt generating plants.
- Capturing and storing CO₂ emitted at 800 (1,000 MW) coal plants or 1,600 gas-fired generating plants.
- Tripling the world's nuclear power capacity by building 700 new (1,000 MW) reactors.
- Producing 34 million barrels of bio-fuels daily, utilizing around 250 million hectares of arable land (around one-sixth of the world's available agricultural resources).
- Increasing fuel economy in cars so that 2 billion vehicles in 2050 run at an average of 60 miles per gallon rather than at the current average of 30 mpg for 1 billion vehicles.
- Replacing every incandescent light bulb in the world with a compact fluorescent bulb and changing building codes, especially in the developing world, so that energy use and CO₂ emissions from buildings are cut by at least 25%.

between asset owners and asset managers will hasten the pace and scale at which the low-carbon energy revolution unfolds in the 21st century.

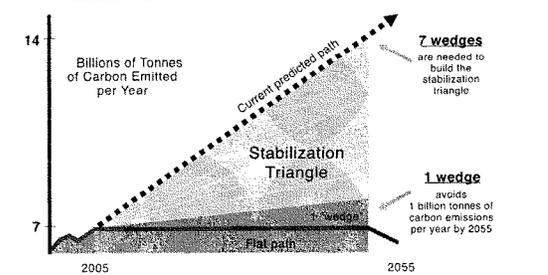
Here in the United States, the Investor Network on Climate Risk (INCR), a group of more than 50 institutional investors with \$4 trillion in assets under management, is helping to spearhead these efforts. As part of a 10-point 'Call for Action,' INCR members have asked money managers to demonstrate their capabilities and strategies to assess the

Seven wedges are needed to build the stabilization triangle. Each wedge avoids 1 billion tonnes of carbon emissions per year by 2054

Predicted Path of CO₂ Emissions



Stabilization Triangle to Flatten CO₂ Emissions



Investor Call to Action

Given the pivotal role that investment capital will play in the success or failure of this Herculean effort, it's little wonder that institutional backing of the Carbon Disclosure Project has grown nearly 10-fold over the last five years. The investment community's burgeoning interest in climate change has also spurred investment banks, brokerage firms and insurance companies to channel their expertise into identifying climate risks and opportunities, with new analytical tools emerging in the field of carbon finance. Such positive interplay

<p>Efficiency & Conservation</p> <ul style="list-style-type: none"> Increased transport efficiency Reducing miles traveled Increased heating efficiency Increased efficiency of electricity production 	<p>Fossil-Fuel-Based Strategies</p> <ul style="list-style-type: none"> Fuel switching (coal to gas) Fossil-based electricity with carbon capture & storage (CCS) Coal synfuels with CCS Fossil-based hydrogen fuel with CCS 	<p>Nuclear Energy</p> <ul style="list-style-type: none"> Nuclear electricity <p>Renewables and Bio-storage</p> <ul style="list-style-type: none"> Wind-generated electricity Solar electricity Wind-generated hydrogen fuel Biofuels Forest storage Soil storage
---	--	---

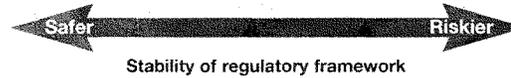
Source: R. Socolow and S. Pacala, Princeton University

Carbon Disclosure Project

Investor support is growing for a shareholder proxy campaign that seeks to standardize corporate disclosure on climate change

Past Regulatory Policy
Regulatory framework is fully developed, predictable and stable; high expectation of timely recovery of costs and investments

Current Regulatory Uncertainty
Framework is still being developed, undergoing considerable change and may have to remain flexible and adaptable



financial risks and opportunities posed by climate change. In addition, INCR members have pledged to invest \$1 billion of their own capital in companies with carbon-reducing technologies — a goal they surpassed in late 2006.

The INCR has for many years worked in partnership with CDP, and is forging alliances with like-minded groups such as the Global Reporting Initiative. Recognizing that “what gets measured gets managed,” these groups recently joined a consortium convened by the World Economic Forum to support activities around the globe on the reporting of GHG emissions and the creation of consistent corporate reporting standards on climate change.

This new Climate Disclosure Standards Board (CDSB) has selected CDP to serve as its Secretariat. Its objective is to make it common practice for corporations to include four climate change-reporting elements in their annual shareholder reports — and for investment banks and credit ratings agencies to do the same in their assessments of companies.

Shareholder Campaign

Forward-looking shareholders have long recognized the profound effects that climate change will have on changing the regulatory landscape. Rules of commerce

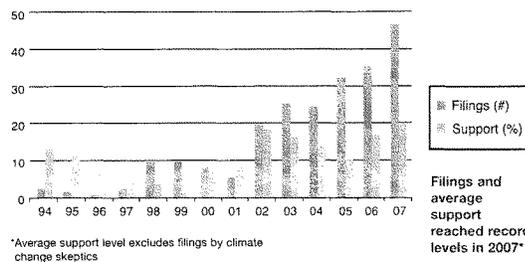
that were well established and allowed for predictable rates of investment return are entering a state of flux. A new regulatory framework is being created that will factor in a price for carbon dioxide emissions — until now a market externality.

Investors in U.S. securities have been fortunate in that they have been able to pose questions directly to corporate boards and managers about their plans to respond to this changing regulatory environment. As part of the annual meeting process, shareholders started with filing one proxy proposal at **Exxon Corp.** in 1990. The campaign has been growing ever since, with the number of resolutions, filings and industries targeted all increasing substantially in recent years. More than 150 climate change resolutions have been filed in the last five years alone, including a record 47 proposals filed in 2007. Most of these resolutions share the common objective of a new set of reporting criteria, like those espoused by the Climate Disclosure Standards Board.

Results of this shareholder campaign reveal a strong upsurge in investor support for increased corporate disclosure on climate change. Average support levels for these proxy proposals have nearly doubled in the last three years. Just as important, about half of the companies receiving such proposals now typically negotiate withdrawals, based on their willingness to stay engaged with concerned shareholders and provide added disclosure on climate change.

The longer-term objective of investors leading this campaign is to create an accounting regime for climate reporting that becomes part of the generally accepted standards used in financial reporting. Only then — when the private sector, professional bodies and governments embrace such disclosure on a routine basis — can markets expect to deploy capital efficiently and effectively in a carbon-constrained world.

Global Warming Shareholder Proposals



*Average support level excludes filings by climate change skeptics

Creating a Generally Accepted Climate Reporting Framework

Climate Disclosure Standards Board

CDP has been appointed Secretariat to a consortium of seven business and environmental organizations called the Climate Disclosure Standards Board (CDSB or 'the Board'). CDSB's mission is to build upon the work of their members to create and advocate a generally accepted framework for reporting by corporations with respect to climate risks and opportunities, carbon footprints, and carbon reduction strategies and their implications for shareholder value. By aligning basic requests for information, the Board's aim is to make carbon-related reporting by companies in their Annual Reports and related analysis by the investment research community common, and not just best practice.

Background

In recent years, important progress has been made in raising awareness of the importance of climate-related disclosure among corporations and their boards and shareholders as evidenced by the response to CDP. Disclosure frameworks and tools have seen considerable elaboration and refinement, helping companies to understand better how they should disclose footprints, reduction strategies and the related implications for shareholder value. Disclosure has increased substantially and more firms have begun to manage their emissions, whether because of the scrutiny that greater transparency brings, the prospect of government regulation or other considerations.

It is widely recognized that although they are evolving fast and becoming ever more sophisticated, current climate reporting initiatives are at a relatively early stage of development. Opinions, suggestions and conclusions are emerging from interested parties at different rates and times. All of these help to enhance consensus but can appear fragmented when originating from multiple sources. In response, CDSB aims to identify where there are consistencies and opportunities for harmonizing regimes

and where there are recurring themes on best practices and to build upon these to create a single unified Framework for climate reporting.

Objectives

- Disclosure of actual and projected GHG emissions, using a reporting standard consistent with the Greenhouse Gas Protocol developed by the World Business Council for Sustainable Development and the World Resources Institute
- Assessment of the physical impacts that climate change could have on the company's business and operations
- Assessment of the material legal and finance effects that climate-related regulation may have on the company's business and operations
- Management's discussion and analysis of the actions it is taking to address identified climate risks and opportunities.

Facilitation of Dialogue on Accounting Standards

The accounting community and regulators remain at an early stage of dialogue on the establishment of carbon-related financial accounting standards. In the interest of assisting this process, CDSB member organizations will offer a common venue for such discussions among the industrial, financial, accounting, governmental and other relevant communities.

Advisory Committee

CDSB is supported by an Advisory Committee to guide its work, comprised of leading industrial, financial services and accounting firms, as well as distinguished governmental and non-governmental specialists. The Board and the Advisory Committee were first convened at the World Economic Forum's 2007 Annual Meeting with representatives of Alcan, American International Group, Capital Group, Duke Energy Corporation, Ernst and Young, Royal Dutch/Shell, JP Morgan Chase, PricewaterhouseCoopers, SUN Group of Companies, Swiss Re and Tokyo Electric Power as well as UK Foreign Minister David Milliband, State of California Assembly Speaker Fabian Núñez, and UNEP Director General, Achim Steiner.

Founding CDSB members:

California Climate Action Registry; Carbon Disclosure Project; Ceres; The Climate Group; International Emissions Trading Association; World Economic Forum Global Greenhouse Gas Register and World Resources Institute

GUEST COMMENTARY

Climate Past, Climate Future: Key Findings from the IPCC*by Dr. Michael MacCracken*

In 1965, the President's Science Advisory Committee warned President Johnson that continuing reliance on combustion of coal, oil and natural gas would cause further increases in the atmospheric carbon dioxide (CO₂) concentration and lead to global warming. In 1985, scientists and government representatives brought together by the World Meteorological Organization warned that nations should no longer rely on past climatic conditions as a basis for future planning. In 1990, 1995, 2001 and again in 2007, the international scientific community — through the Intergovernmental Panel on Climate Change (IPCC) — has prepared scientific assessments regarding human-induced climate change that have gained *unanimous* acceptance and approval by the world's nations.

The IPCC's Fourth Assessment Report (www.ipcc.ch), even in the very measured tone of scientific discourse, makes clear that there is 'unequivocal' evidence that 'the climate is changing due to human activities. Near surface air temperatures at stations around the globe average almost 1.5°F higher in the early 21st century as compared to the late 19th century; changes have been larger in higher latitudes, over land, and in winter, and smaller in low latitudes, over the ocean, and in summer. The effects of these changes include shortening the cold season and lengthening the warm season, leading to fewer frost days and longer growing seasons; loss of snow and sea ice cover; intensified evaporation and dry periods that increase the likelihood of wildfires; and shrinking habitats for cold-favoring species.

While the Earth's climate has always varied to some extent, human activities have become the dominant influence, overwhelming the influences of variations in the Sun's output and major volcanic eruptions. Considering all of the possible natural and human-induced factors that could be affecting the climate, the

"Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.... Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations." — **IPCC, 2007**

IPCC assessment makes clear that only human influences could be causing the temporal and spatial pattern of changes that are now occurring.

While data provide a solid basis for understanding past conditions, looking ahead 100 years is a major challenge. The world is so complex that constructing a laboratory model to conduct more than rudimentary experiments is not possible. Understanding how Earth's atmosphere, oceans, land surface and land cover interact and have changed in the past does provide a good indication, although great care must be taken with analogs because of the much more rapid pace of human-induced change. Theoretical analyses provide many insights and constraints — among them that we cannot expect to forecast the weather on particular days in the future. All we can expect is to generate a sense about potential changes in the likely statistical distributions of future conditions (e.g., likely decadal averages of typical summer conditions). As a result, projections of future change have had to rely on numerical models. These models subdivide the globe into many small 'tiles' (or boxes) and then couple them together based on the universally applicable laws of conservation of mass, momentum, energy and species (like water vapor and ozone). IPCC's 2007 assessment report described substantial progress in quality checking the model simulations, finding that, for example, they quite reasonably represent the latitudinal and longitudinal distribution of climate change over the 20th century.

To project conditions through the 21st century, economists and energy experts have prepared a range of scenarios of how the global population, economy, productivity and energy system are likely to evolve. Assuming ongoing efficiency improvements and that no additional actions are taken to curb emissions of greenhouse gas (GHG) concentrations, plausible scenarios suggest that emissions of CO₂ and other GHGs in 2100 are likely to be one to four times greater than at present, reflecting a likely increase in population to 8-10 billion and a significant increase in the standard of living (and so in energy use). Even the lowest-emission scenario takes the atmospheric CO₂ concentration to roughly double its pre-industrial level, while the highest ones cause the concentration to reach at least three times the pre-industrial level — and keep rising.

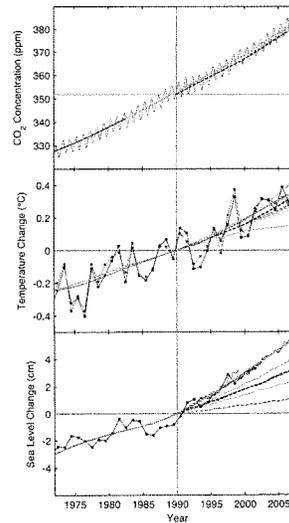
Imposing the scenario-based projections of changes in GHG concentrations, climate model simulations project that annual-average surface air temperatures around

Dr. Michael MacCracken

the world in 2100 will be roughly 4 to 8°F above their pre-industrial levels (about 3 to 7°F above present). The changes will be larger in high latitudes (due to reductions in snow cover and sea ice allowing greater absorption of solar radiation) and less in low latitudes (due to the limiting influence of evaporation of water), larger over land areas than over the ocean, and larger at night and during winter than during the day and the summer. Rapid reductions in emissions and stabilization of atmospheric composition over the next several decades have the potential to limit the warming to roughly 4 to 5°F above their pre-industrial level — still quite a large change relative to changes during Earth's history, but hopefully low enough to avoid the most detrimental environmental and societal impacts.

The temperature increase is only the most general indication of the changes in climate — and indeed in the weather — that are likely. Faster evaporation will dry out soils and lead to more rapid onset of drought. More evaporation will also lead to more intense precipitation events and more powerful, rain-dumping hurricanes. Warmer conditions will lead to higher snowlines and less springtime snowpack, reducing water available for irrigation and communities during hotter summers. And warming oceans and melting glaciers, which have already caused sea level to rise about 8 inches in the 20th century, are projected to lead to a further increase of perhaps 20 inches by 2100 — and quite likely even more as the warming starts to cause deterioration of the Greenland and West Antarctic ice sheets. Evidence of the potential for much larger increases in sea level comes from study of the last interglacial (about 125,000 years ago), when global average temperatures were perhaps 1-2°F higher than at present — and sea level was roughly 13-20 feet higher.

As was made clear in the special international panel report done for the U.N. Commission on Sustainable Development in February 2007 (see www.confrontingclimatechange.org), there is no more time to wait — modest changes are already occurring, and what was once just a risk of significant climate change is becoming a likelihood and soon will be a reality. Although there is still much to be learned to be able to assist society in adapting to the inevitable further changes that will result from past and future emissions, failing to act aggressively now will leave a legacy to future generations that will require them to devote increasing resources to making up for coastal inundation and damage from extreme weather — resources those generations (our children and grandchildren) will have to divert from sustaining and enhancing their standard of living.



While IPCC projections reflect consensus positions in the world's scientific community, recent observations indicate that CO₂ concentration, global average temperature and sea level are rising at higher rates than IPCC assessments have been projecting. This suggests that the magnitude and pace of human-induced global warming may be underestimated.

(Rahmstorf et al., 2007: Recent Climate Projections Compared to Observations, *Scienceexpress*, www.scienceexpress.org, 1 February 2007. 10.1126/scienc.1136843)

— Michael C. MacCracken is Chief Scientist for Climate Change Programs with the **Climate Institute** in Washington, DC. Previously, he was a climate modeler and led atmospheric studies at the Lawrence Livermore National Laboratory. He then served as executive director of the Office of the U.S. Global Change Research Program and its National Assessment Coordination Office.

4 This Climate Governance Index provides an evaluation of S&P500 companies responding to the Carbon Disclosure Project 2007 survey (CDP5).

Ranking S&P500 Company Responses to Climate Change

Climate Governance Index

Today's business and political leaders must recognize that Earth's climate is no longer a static boundary condition for conducting their affairs. Strategic investment decisions now have a direct bearing on the climate and the natural environment that supports economic growth. New governance principles must emerge that account for the effect of human decisions on the globe, and innovative strategies must be developed to sustain economic growth while reducing the drivers of climate change, especially dependence on fossil fuels.

This will be an intergenerational challenge that causes the planning horizon for key investment decisions to expand beyond the time that a CEO or government leader typically stays in office. While investment returns typically are pegged to periods of five years or less, they often create assets — automobiles, appliances, housing stock, factories and power plants — with life spans from a decade to 50 years or more. Even after these assets are retired, the greenhouse gases associated with them may linger in the atmosphere for 100 years or more.

This creates a 'governance gap' in decision making whereby investments made in real time by industry and government leaders have century-long implications. To bridge this gap, conventional thinking must be turned on its head: those pursuing fundamental changes in production methods and energy use may realize the greatest investment opportunities. Those intending to carry on with business as usual may bear the greatest investment risks and liabilities resulting from climate change.

Since 2003, the Investor Network on Climate Risk, comprised of more than 50 U.S. institutional investors with \$4 trillion in assets, has supported research on the relationship between corporate

governance and climate change. In 2004, INCR published an *Investor Guide to Climate Risk* to serve as an action plan and resource guide for asset owners, money managers and corporations. This report is available at www.incr.com.

In addition, through Ceres, an investor and environmental coalition that serves as the secretariat for INCR, two editions of *Corporate Governance and Climate Change: Making the Connection* have been published, in 2003 and 2006. CDP is pleased to have worked with Ceres and INCR during this formative time.

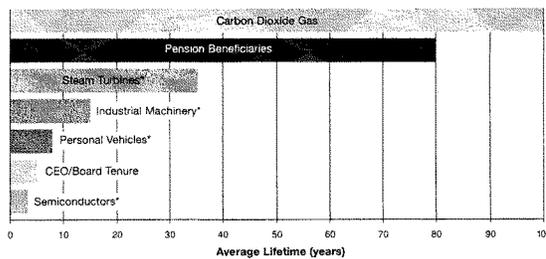
For these earlier reports, Institutional Shareholder Services (now a division of RiskMetrics Group) created a 14-point **Climate Governance Index** to evaluate corporate climate change activities in five main governance areas:

- ¥ Board oversight
- ¥ Management execution
- ¥ Public disclosure
- ¥ Emissions accounting
- ¥ Emissions reductions and strategic opportunities

This Climate Governance Index has been adapted to provide an evaluation of S&P500 companies responding to the CDP5 survey.

While investment returns are usually based on periods of five years or less, they often create assets designed to last 10 to 50 years — and greenhouse gases that stay in the atmosphere for a century or more

Capital Life Cycles vs. Natural Life Cycles



*Source for capital cycles: U.S. Department of Commerce, Bureau of Economic Analysis

See Appendix 1 of this report for a complete list of Climate Governance Index scores, calculated as a percentage grade, for S&P500 respondents to the CDP5 questionnaire

RiskMetrics Climate Governance Index Adapted to CDP5 Report Analysis

The tables below explain the scoring system used to evaluate the responses of S&P500 Index companies to the CDP5 questionnaire; it has been adapted from the RiskMetrics Climate Governance Index. The points awarded are based on disclosure from CDP5 responses (25 points maximum) and from the respondents' climate change disclosure in their most recent Form 10-K filings with the Securities and Exchange Commission (three points maximum).

Board oversight and management execution scores (four points maximum) are included only for industry sectors where a majority of S&P500 respondents completed Section B of the CDP5 questionnaire. To make scores comparable, RiskMetrics calculated a percentage grade for each company based on the amount of points it achieved out of the total points available for its sector, up to a maximum of 100%.

Emissions intensity targets are normalized reductions relative to units of production or revenue. (Such targets may allow a firm's absolute emissions to grow.)

Absolute emissions targets are set to achieve total emission reductions below a specified baseline.

Targets must be company-wide in order to receive scores for emission reductions. Targets do not have to include Scope 3 (indirect) emissions from upstream suppliers or downstream product end-use. In some industry sectors, Scope 3 emissions are much greater than Scope 1 (direct) emissions or Scope 2 (purchased power) emissions.

See Appendix 1 of this report for a complete list of Climate Governance Index scores, calculated as a percentage grade, for S&P500 respondents to the CDP5 questionnaire.

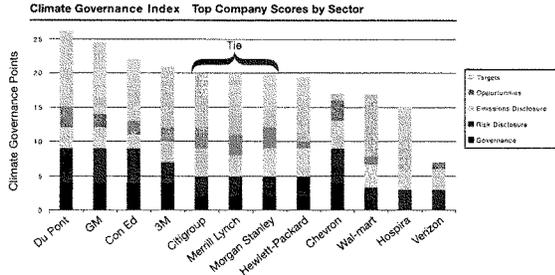
Section B Company Responses	
Board Oversight	Management Execution
2	2

Section A & B Companies — Disclosure and Opportunities									
Risk Disclosure (6 pts. max.)			Emissions Disclosure (4 pts. max.)				Commercial Opportunities		
Regulatory	Physical	Scope of Emissions Accounting				(# opportunities listed:			
CDP 10-K	CDP 10-K	1*	2*	3*	Global only	1 if 1, 2 if 2, 3 if >=3)			
2	2	1	1	2	1	1	2	1-3	

Section A & B Companies — Efficiency and Renewables					
Efficiency/Renewables Targets					
Energy Efficiency (pick one, two pts. max)			Renewables (pick one, two pts. max)		
Facility	Region	Company	Facility	Region	Company
1	1.5	2	1	1.5	2

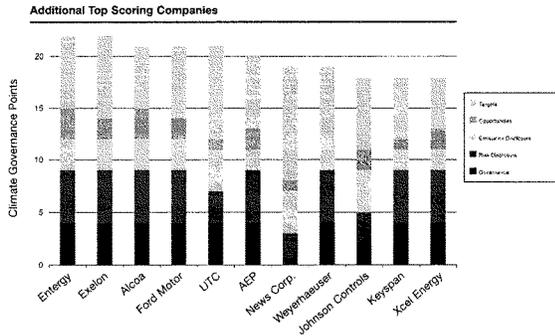
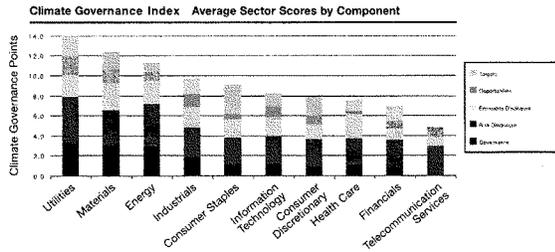
Section A & B Companies — Emission Targets			
Emissions Reductions** (7 pts. max.)			
Target Type	<1%/yr	1-2%/yr	>2%/yr
Intensity	1	2	3
Absolute	5	6	7

*Scope 1 = direct emissions; Scope 2 = purchased power emissions; Scope 3 = indirect emissions
 **Annualized emission reduction figures are calculated as follows: Total target percentage reduction / Total reduction program years (target year - baseline year = reduction program years). To account for companies with second-generation targets, emissions reductions achieved in earlier periods (often with a 1990 baseline) are summed with second-generation emission targets to determine a projected combined percentage reduction in emissions from the original baseline



"It can take over two decades for newly commercialized vehicle technology to be incorporated into the vehicle fleet actually on the road. Improvements in building efficiency are made slowly — because buildings can stand for many decades, and retrofitting efficiency steps such as increased insulation and better windows can be difficult and costly. Power plants and industrial facilities often last 50 years or more, limiting the rate of capital turnover in these sectors. Achieving any significant increase in efficiency, shift in fuels used, and capture of CO₂ emissions for storage will require major changes over decades to vehicles, buildings, industrial plants, electric generation facilities, and infrastructure."

— "Hard Facts about Energy,"
National Petroleum Council,
July 2007



GUEST COMMENTARY

Factoring ESG in Investment Analysis: Carbon Disclosure Project Helps Set the Standard

by Jane Ambachtsheer and Craig Metrick

The success of the Carbon Disclosure Project (CDP) speaks to the increasing attention paid to climate change by the world's largest corporations. But equally important and impressive is the commitment by many of the world's largest investors to address the impact of climate change on their portfolios. Integrating environmental, social and governance (ESG) issues into corporate engagement and stock selection is now a trend that the CDP has helped to create.

Increasingly, the institutionalization of ESG factors by institutional investors and asset managers occurs because issues such as climate change pose real risks and business opportunities, not just moral and ethical concerns. As evidence of climate change and models of its impact are further established, it becomes clearer that climate change will have real long-term impacts on the physical and financial future of investment beneficiaries. In this light, the moral perspective coincides with the financial one — reinforcing the fiduciary argument for considering ESG factors within the investment and ownership processes.

In April 2006, a set of global Principles for Responsible Investment (PRI) was launched by the United Nations Secretary General at the New York Stock Exchange after a year-long process led by the UN Environment Programme Finance Initiative and the UN Global Compact. The PRI provide a valuable framework for ESG integration and include six broad principles and suggested actions,¹ all of which are designed to encourage and promote the integration of ESG factors into investment processes. At the time of launch, owners with more than \$10 trillion of assets under management had signed up to the principles, with more than 220 signatories (40% asset owners, 40% asset managers and 20% professional service partners).

Synergies between CDP and the UN Principles for Responsible Investment will enhance corporate disclosure on climate change and make data more accessible

The PRI has also formalized a detailed assessment review that seeks to demonstrate progress and change in mainstream practices — both key factors for maintaining the credibility and legitimacy of the initiative over time.

As part of the first PRI assessment review process, some exciting trends and innovations were identified that highlight the various ways environmental factors are being integrated into how institutional investors and their agents oversee the management of their portfolios.

Mercer sees important and encouraging synergies between the CDP and the PRI. The first two principles under the PRI commit signatories to consider ESG issues in their investment and ownership decisions. There are many ways this can be done. Signatories have an opportunity to formalize their own ESG considerations and/or encourage their managers to do the same. The thorough and compatible nature of responses makes CDP an ideal tool for complying with these principles. Moreover, the development of a user-friendly database housing responses by the CDP secretariat will make more accessible the current and historical responses to the CDP questionnaire.

Through Mercer's work with PRI signatories and our investment manager research, we know that investment analysts are increasingly building sustainability criteria into valuation models and investment standards to support their search for alpha. Sell-side firms and an increasing number of mainstream investment managers are also finding it useful to reconcile climate change indicators with financial criteria in their research processes. Previously, this was the domain of managers specializing in socially responsible mandates. Now the PRI, CDP and others are encouraging increased uptake of climate-specific and ESG data by the broader investment community through education, research, provision of information and collaboration.

Jane Ambachtsheer and Craig Metrick

Another PRI principle (# 3) requires investor signatories to encourage portfolio companies to further disclose information on ESG matters. Again, CDP offers a way to fulfill this requirement. Signing on to the CDP grows the assets represented by the initiative and applies more pressure to companies to respond, while sending market signals that investors want companies to consider climate change in their strategic policies, planning and disclosures. The results and responses of CDP demonstrate the growing success of this approach.

The risks and opportunities related to climate change have now been documented, and investment managers and asset owners around the world increasingly have internalized the 'investment case' for proactive responses to the issue. As a result there are now hundreds of sustainability 'branded' funds available in the market globally, launched and managed by a combination of mainstream and specialist investment firms whose products are available to both retail and institutional investors.

There are various investment strategies that sustainability funds might adopt, such as negative screens to eliminate exposure to high-polluting sectors and companies within those sectors. Other strategies include a best-in-class approach that is underpinned by a sustainability 'rating' of companies. These funds overweight highly rated sustainability companies and underweight those with poor ratings. Another quickly growing category of emerging investment products involves clean technologies. These funds often include both listed and private equities (and sometimes real estate and other asset classes), and focus on generating alpha by investing in the companies that will be winners in the global shift towards a lower-carbon economy.

Despite the flurry and seeming appeal of sustainability funds, there are still relatively few examples of mainstream investment managers who have formally integrated ESG criteria into the core stock selection and value enhancement of their traditional fund offerings. Fortunately, the outlook is improving. According to a recent PRI assessment, more than half of asset owners adhering to the principles in some way, now assess the capacity of managers to integrate ESG considerations.² Request for proposals and investment management agreements are additional indicators of how and to what extent the investment community views ESG issues as important.

More than half of asset owners supporting the PRI now assess the capacity of investment managers to integrate ESG considerations into their research

Expect to see more progress and examples of investors and investment managers integrating ESG factors into valuations and the identification of future investment opportunities. Initiatives such as CDP and the PRI will continue to bolster this trend, while encouraging collaboration, fiduciary responsibility and flexibility in approaches.

— Jane Ambachtsheer and Craig Metrick are with Mercer Investment Consulting's global Responsible Investment business.

MERCER

Investment Consulting

¹ See www.unpri.org.

² See www.unpri.org/report07/

5 Disclosure of GHG emissions by CDP5 respondents in the S&P500 jumped from 54% to 65%, but the completeness of reporting still varies widely by sector.

Disclosure of Greenhouse Gas Emissions

Corporate tracking and disclosure of greenhouse gas emissions is one of the most basic elements of climate change reporting — and one of the most difficult. As companies enter this process, they must decide which GHG emissions to track and the scope and rotation of emission inventories. Baselines must be set to track emissions trends over time, and accounting procedures must be put in place to adjust for acquisitions, divestitures and joint ventures that affect aggregate emissions totals. To ensure accuracy and consistency of reporting, companies need to carefully document their accounting assumptions and data collection methods, which may evolve as reporting standards are refined.

Fortunately, companies do not have to figure this out all on their own. Since 1999, the World Resources Institute and the World Business Council for Sustainable Development have convened an open, international, multi-stakeholder effort to design and promote an international protocol for reporting GHG emissions. Respondents to the CDP questionnaire are urged to use the 'Greenhouse Gas Protocol' that this group has developed.

Among this year's S&P500 respondents:

¥ 65% (175 out of 269 responses analyzed) reported their GHG emissions, a sizeable jump from 54% of CDP4 respondents. Of the companies that reported, 146 agreed to make their emissions figures public.

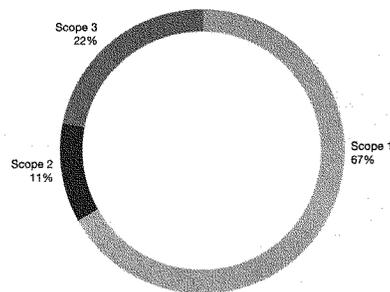
¥ The largest proportion (150 respondents) reported Scope 1 (direct) emissions; a somewhat smaller proportion (133) reported Scope 2 (purchased power) emissions; and a much smaller number (43) reported Scope 3 (indirect emissions)

Calculating the 'carbon footprint' of a company's operations — all the way from upstream suppliers and energy providers through downstream customer end-use of products — remains one of the most vexing challenges of carbon emissions accounting. Until there is greater consistency in disclosure in each industry sector, with clear boundaries set on declaring direct and indirect emissions, comparing company disclosures will remain largely an 'apples-and-oranges' exercise.

Emissions Reporting by Scope

S&P500 companies reported 2,013 million tonnes of CO₂e emissions, although they did not break down 70 million tonnes of this amount by scope. Of the amount broken down, two thirds — or 1,304 million tonnes — were in the GHG Protocol Scope 1 category of direct emissions. Another 11% — 211 million tonnes — were Scope 2 purchased power emissions. The final 22% — 429 million tonnes — were Scope 3 indirect emissions.

Emissions Reporting by Scope



In all, S&P500 respondents to the CDP5 survey reported an aggregate total of 2,013 million tonnes of carbon dioxide equivalent (CO₂e) emissions, equivalent to about 6% of global annual GHG emissions

Emissions totals would change dramatically if more oil, auto and durable goods companies included Scope 3 indirect emissions in their carbon footprints

Companies sometimes reported only a global emissions total, with no further detail. Most often, they did not include Scope 3 amounts in their reported global total, while some reported only partial totals, excluding some regions or countries.

Y **Scope 1:** Among S&P500 respondents, electric utilities dominated Scope 1 (direct) emissions; these firms accounted for nearly three-fifths of the total. Energy companies accounted for another quarter of these emissions, while the Materials sector contributed 12% of the total.

Y **Scope 2:** Reporting of emissions from purchased power was more evenly distributed among the industry sectors. Materials companies accounted for more than one-third of these emissions, followed by Energy (17%) and Consumer Staples (12%).

Y **Scope 3:** Only a small proportion of respondents reported on their indirect emissions. Of these, emissions from business travel were most commonly reported (31 respondents). Just five firms reported on emissions from their products. Two were of particular note: **Chevron**, with 395 million tonnes from customer end-use of its products; and **Citigroup**, with 21.3 million tonnes reported from new capacity at fossil-fired power plants it has financed. Four respondents reported on supply chain emissions, and three on emissions from logistics and distribution.

Emissions totals would change dramatically if more oil, auto and durable goods companies included Scope 3 indirect emissions in their carbon footprints. However, this would also lead to a problem of double counting of emissions, since, for example, oil and auto companies might both account for the fuel used in vehicles.

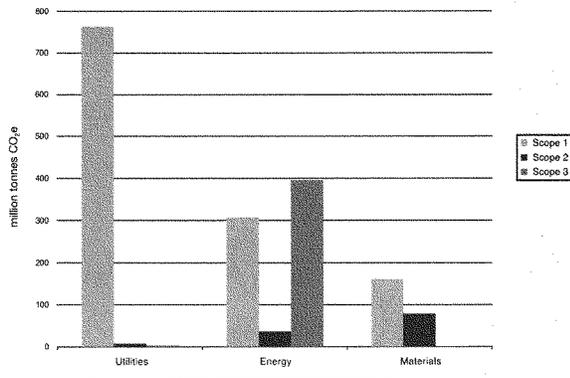
Emissions Reporting by Sector

Emissions disclosed by S&P500 respondents varied significantly by sector.

Y **Utilities** reported 821 million tonnes of CO₂e emissions, about 40% of the total reported by all sectors. Of this amount, 764 million tonnes, or 93%, were reported as Scope 1 (direct) emissions. These Scope 1 emissions from utilities represent 59% of all such emissions reported by S&P500 respondents.

Y **Energy** companies had the second highest amount of aggregate reported emissions for any sector, with 739 million tonnes. The overall figure is heavily skewed by Chevron's response, however, whose Scope 3 (indirect) emissions accounted for 53% of the emissions reported by all Energy sector respondents. Had the other respondents in this sector made similar disclosures of their estimated Scope 3 emissions, they would have far outranked Utilities in terms of aggregate emissions totals.

Top Emitting Sectors by Scope



Materials came in a clear but distant third in terms of aggregate emissions, with 241 million tonnes reported. Both it and Industrials — the next highest emitting sector with 65 million tonnes aggregated emissions — had Scope 1 emissions roughly twice their Scope 2 amounts.

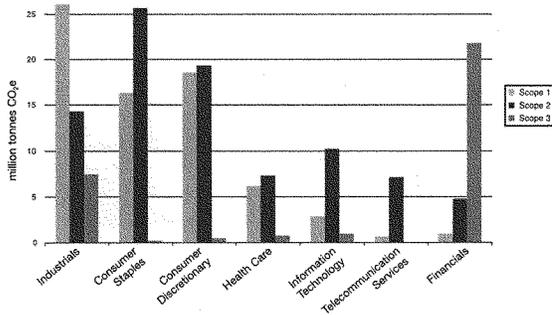
Among the six remaining lower emitting sectors, Consumer Staples, Information Technology and Telecommunications companies stood out for having Scope 2 emissions significantly higher than Scope 1 emissions, while Consumer Discretionary and Health Care firms reported largely equivalent amounts of Scope 1 and 2 emissions. For all these firms, energy efficiency programs are most likely to improve their emissions profiles, with a positive impact on their bottom lines, given rising energy costs.

Emissions Intensity by Sector

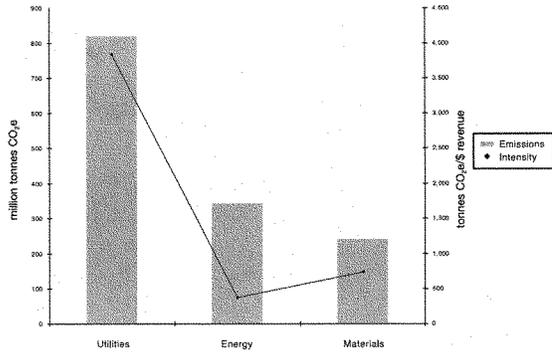
Another useful gauge of respondents' GHG emissions is to measure their Scope 1 and Scope 2 emissions against the firms' annual revenues; this provides a measure of their emissions intensity of production. For the most part, industries with higher absolute emissions also have higher emissions intensity rates.

Not surprisingly, the Utility sector ranks far above all others in emissions intensity, because its revenues derive largely from combustion of fossil fuels to generate electricity. Respondents in the Materials and Energy sectors have emissions intensity ratings that are only about one-fifth and one-tenth that of the Utility sector, respectively. However, the Energy sector's intensity rating would exceed that of the Utility sector if Scope 3 emissions from customer end-use were taken into account. Except for Industrials, all other sector respondents in the CDP5 survey have average emissions intensity ratings of less than 100 tonnes of CO₂e per dollar of revenue generated.

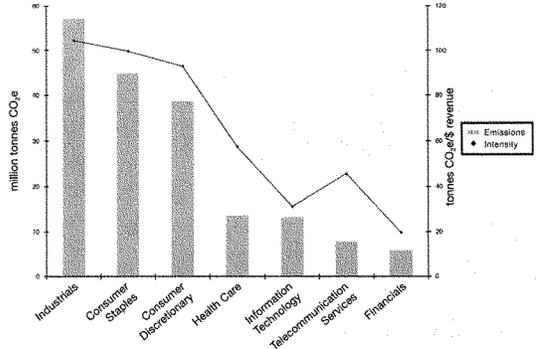
Lower Emitting Sectors by Scope



Top Carbon Intensity Sectors



Lowest Carbon Intensity Sectors



Carbon Disclosure Project

Carbon Intensity by Sector				
Sector	S&P500 Respondents		Total Emissions ¹	Emissions Intensity ²
Utilities	Sector Response		819,838,866	3,842
	Highest	American Electric Power	145,400,000	11,520
	Lowest	FPL Group	4,914,112	313
Materials	Sector Response		240,598,247	738
	Highest	United States Steel	48,500,456	3,086
	Lowest	Ecolab	294,872	60
Energy	Sector Response		343,304,073	377
	Highest	Occidental Petroleum	16,220,000	474
	Lowest	Halliburton	3,150,000	140
Industrials	Sector Response		57,118,829	104
	Highest	3M	6,540,000	285
	Lowest	Rockwell Automation	169,163	30
Consumer Staples	Sector Response		44,984,009	100
	Highest	Kimberly-Clark	6,849,439	409
	Lowest	Altria Group	513,453	7
Consumer Discretionary	Sector Response		38,736,726	93
	Highest	Carnival	9,005,483	761
	Lowest	Nike	77,684	5
Health Care	Sector Response		13,510,191	57
	Highest	Eli Lilly	2,296,224	146
	Lowest	McKesson	42,248	0
Information Technology	Sector Response		13,044,249	31
	Highest	Corning	1,002,457	194
	Lowest	Microsoft	152,600	3
Telecommunications	Highest/Lowest	Verizon	7,171,103	81
Financials	Sector Response		5,880,104	19
	Highest	Simon Property Group	574,976	167
	Lowest	Freddie Mac	41,000	1

¹ Scopes 1 & 2 or total global emissions where companies reported only a total figure; tonnes CO₂e.

² Emissions total noted above divided by annual revenue.

Top Emitting Companies by Sector									
Sector	S&P500 Respondents	Scope 1&2 Emissions ¹	Emissions Intensity ²	Disclosure					
				Scope 1	Scope 2	Scope 3			
						Products	Supply Chain	Logistics/ Distribution	Business Travel
Energy	Exxon Mobil	158,800,000	474	✓	✓				
	Chevron	65,850,331	321	✓	✓	✓			
	ConocoPhillips	62,289,206	372	✓	✓				
	Marathon Oil	19,590,000	327	✓	✓				
	Occidental Petroleum	16,220,000	918	✓	✓				
Utilities	American Electric Power	145,400,000	11,520	✓					
	Southern	145,000,000	10,100	✓					
	Duke Energy	98,400,000	6,481	✓					
	Xcel Energy ³	62,208,515	6,322	✓					
	Progress Energy	53,580,026	5,599	✓					
Materials	Alcoa	60,100,000	1,978	✓	✓				
	United States Steel	48,500,456	3,086	✓	✓				
	Dow Chemical	37,700,000	787	✓	✓				
	Air Products & Chemicals	18,000,000	2,034	✓	✓				
	International Paper	14,766,407	671	✓	✓				
Consumer Staples	Wal-Mart Stores	20,388,574	59	✓	✓				
	Kimberly-Clark	6,849,439	409	✓	✓				
	Coca Cola	4,867,779	202	✓	✓				✓
	Arheuser-Busch	3,032,000	193	✓	✓				
	Procter & Gamble	2,889,000	42	(combined)					
Consumer Discretionary	General Motors	11,021,420	53	✓	✓				
	Carnival	9,005,483	761	✓					
	Ford Motor	6,800,000	42	✓	✓				
	Target	2,634,300	44	✓	✓				
	Johnson Controls	2,497,804	77	✓	✓	✓			✓
Industrials	General Electric	10,835,295	67	✓	✓				
	United Parcel Services	7,373,000	155	✓	✓		✓		
	3M ⁴	6,540,000	285	✓	✓				
	United Technologies	2,345,176	49	✓	✓				✓
	Caterpillar	2,343,115	56	✓	✓				
Telecoms	Verizon Communications	7,171,103	81	✓	✓				
	Intel	3,870,000	109	✓	✓				
Information Technology	Inf'l Business Machines	2,624,361	31	✓	✓				
	Hewlett-Packard	1,598,500	17	✓	✓				✓
	Corning ³	1,002,457	194	✓	✓				
	Xerox ⁴	447,991	26	✓	✓				
Health Care	Pfizer	2,408,317	50	✓	✓				✓
	Eli Lilly	2,296,224	146	✓	✓				
	Merck ³	1,146,000	51	✓	✓			✓	
	Wyeth	1,106,626	54	✓	✓				
	Bristol Myers Squibb	997,776	56	✓	✓				✓
Financials	Citigroup	1,387,412	9	✓	✓	✓			✓
	Bank of America	1,380,000	12	✓	✓				
	Fifth Third Bancorp ³	778,068	96	✓	✓				
	Simon Property Group	574,976	167	✓	✓				
	Wells Fargo ⁴	551,437	11	✓	✓				

¹Emissions are for period ending in 2006 unless otherwise footnoted.

²Emissions total (Scope 1 & 2 or total global emissions where companies reported only a total figure) divided by annual revenue.

³Emissions reporting year ending in first half of 2007

⁴Emissions reporting year 2005

GUEST COMMENTARY

Changing Climate: Effects on Health, Environment & Economy*by Dr. Paul R. Epstein*

Earth's climate is changing. Human activities are contributing, biological systems are responding, and weather is growing more extreme. These were the main conclusions of the Intergovernmental Panel on Climate Change (IPCC) Report in 2001.

Since then we've learned a great deal more: polar ice melt is accelerating, ocean warming is spawning more intense storms, and — most ominously — global wind patterns have shifted. These changes indicate growing instability in Earth's climate regime.

Over the last half century, Earth's vast oceans have absorbed 22 times more heat than the atmosphere. Coral bleaching from higher sea surface temperatures and increased acidification from CO₂ absorption threaten ocean organisms and ancient coastal habitat.

Over land, global warming is increasing evaporation from plants and soils, intensifying droughts, while greater evaporation from warmed seas creates conditions for heavier downpours. When droughts yield to heavy rains, destructive flash flooding can occur.

By the end of this century, Earth could be warmer than at any time in human history, and since the age of the dinosaurs 60 million years ago.

Rising CO₂ levels

The IPCC's first assessment in 1990 calculated that a 60-80% reduction in carbon dioxide (CO₂) emissions would stabilize atmospheric concentrations. Nearly two decades later, CO₂ emissions and concentrations are still rising. Atmospheric levels of CO₂ now exceed 380 parts per million (ppm), well outside the 180-280 ppm envelope in which they remained for more than 700,000 years.

- At 180 ppm, large ice caps extended well into the United States, and the average global temperature was 10°C (50°F).
- At 280 ppm, ice caps receded and the global average temperature was 15°C (59°F).

- At 380 ppm, we are headed for small ice caps and rising sea levels — or a 'cold reversal' from melting glaciers and release of Greenland and West Antarctic ice.

Models based on CO₂ alone underestimate the full effect of warming on our planet. As calculated in the IPCC 2007 Report, the combined global warming potential of all heat-trapping gases minus toxic coolants is approaching 460 ppm of 'CO₂-equivalent' concentrations.

Reviewing our options

The impacts of climate change are broad and will be long-lasting. The financial services sector — the central nervous system of the global economy — senses the possibilities, both good and bad. Substantially reducing GHG emissions will require a concerted effort, comprehensive plans and a well-coordinated suite of financial and policy instruments.

Oil — the current lifeblood of our economy — demands utmost scrutiny. Using a health and environmental lens, oil — throughout its life cycle — exacts an enormous toll on human health, the environment and social systems. Coal, tar sands and shale oil contain heavy metals and carcinogens that present their own health and ecological hazards.

Carbon capture and storage (CCS) — pumping CO₂ underground or into ocean beds — may be a way of ameliorating the carbon problem. But more study is needed. A special report of the IPCC lists the concerns: possible leaching of lead and arsenic, altered microbial communities, limestone fractures and, with increased pressure, leaks and releases of CO₂ that are toxic to mammals and forests.

Meanwhile, nuclear power is seeking a revival. But replacing carbon pollution with radioactive pollution carries its own risks. While nuclear plant safety may be 'containable,' security and safe storage — against earthquakes (like that in Kashiwazaki, Japan, in July 2007) — may prove intractable. Moreover, burying high-level waste from an expanded nuclear program would soon fill the proposed Yucca Mountain site in Nevada (which faces its own seismological questions), and an additional site every five to 10 years until 2050.

Some renewable energy sources also deserve scrutiny. Biofuels, for example, are a promising fuel for

D r . P a u l R . E p s t e i n

transportation. But an estimated one-sixth of the world's cropland would need to be devoted to ethanol to offset a billion tons of carbon emissions annually. Corn-based ethanol has already contributed to food price increases. In Southeast Asia, land-clearing fires for palm oil plantations to produce biodiesel harm habitat and primates, and release a huge carbon pulse. Non-edible cellulose fibers offer more long-term promise, but burning anything generates pollution.

Some proposed solutions — such as corn-based ethanol, clean-coal technology and nuclear power — still face considerable obstacles. A life-cycle analysis can help avoid unintended consequences.

Life cycle analysis

A life-cycle analysis (LCA) of practices and technologies can help separate solutions for near-term adoption from those warranting further study. Those meeting multiple goals of adaptation and mitigation — and having health, environmental and economic co-benefits — rise to the top of the list.

Conservation and efficiency can halve energy demand. Decreased vehicular miles traveled, improved public transport and plug-in hybrids with better batteries can help meet transportation goals. For the built environment, 'green buildings,' rooftop gardens, biking paths, and 'smart urban growth' will create healthier cities and boost enterprises focused on innovative technologies.

Natural lighting and insulating windows, computer-optimized switches and meters, and technologies for distributed power generation, including cogeneration and fuel cells, can constitute a resilient, 'smart, self-healing' grid — improving adaptation and mitigation. To power the utility grid, solar thermal arrays in the Southwest, wind farms in the Plains states and geothermal in the West could replace fossil generating stations.

All of this will take time and money. But aligning investments, loans and underwriting with regulations and rewards — and removing financial and bureaucratic 'disincentives' — can create the foundation for a healthy, environmentally-sound, low carbon economy.

— Paul R. Epstein, M.D., M.P.H., is Associate Director of the Center for Health and the Global Environment at Harvard Medical School.

Climate Impacts: Health, Environmental and Economic

Human health: Prolonged heat waves and smog-related air quality alerts; expanded range of infectious diseases (malaria, dengue fever, Lyme disease); clusters of water-, mosquito- and rodent-borne diseases following floods; increased asthma-producing ragweed pollen and strengthened poison ivy from higher CO₂ levels.

Agriculture: Crop damage from drought, flooding and hail; more pests, pathogens and weeds.

Forests: Spread of pests such as pine bark beetles and ash borers with warmer winters; increased wildfires from reduced winter snowpack, hot dry summers, and pest damage.

Wildlife and livestock: Spread of diseases; herd losses from heat waves, drought and winter ice storms.

Marine life: Widespread coral bleaching and disease, harmful algal blooms and 'dead zones'.

Drinking water: Reduced water quality from droughts and floods; water scarcity that generates refugees.

Sea level rise: Coastal infrastructure undermined; island nations produce refugees.

Security and conflict: Regional conflicts spawned by food, water and resource shortages; military protection of natural resources.

Energy sector: Blackouts from heat waves and storms; thermal plant shutdowns from too warm/too little cooling water; subsidence of pipelines, ice roads and drilling platforms on Arctic permafrost; increased hurricane damage to offshore rigs and coastal refineries.

Finance: Volatility and losses affecting underwriting, investments, equity and fixed income markets.

6 The rate and quality of climate disclosure among S&P500 Index CDP5 respondents varies across and within industry sectors.

Climate Disclosure Practices

Perhaps surprisingly, the most sophisticated climate risk analyses are not limited to the heavy GHG emitting sectors for which regulation is widely anticipated. Companies in the Consumer Discretionary, Consumer Staples and Financial Services sectors provided high quality CDP5 responses that often discussed indirect regulatory risks and direct or indirect physical risks. The Utilities sector is a leader in terms of the quality of regulatory risk disclosure. By contrast, companies in the Energy, Industrials and Materials sectors — all of which are likely to be exposed to future climate change regulations — provided comparatively limited and variable risk disclosure in their CDP5 responses.

To further analyze respondents' climate change disclosure practices, a review of Form 10-K securities filings also was conducted. In these filings, companies are required to disclose competitive, regulatory, legal and environmental risks that may have a material impact on their operations and/or financial condition. Form 10-K disclosure on climate change was rare across all sectors, and predominately limited to regulatory risk.

While S&P500 respondents were more forthcoming with information about regulatory and physical risks in their CDP5 responses, discussions of 'material impacts' were also rare. As expected, Utilities are most likely to state that climate-related regulation could potentially have a material effect on their business; yet only one utility and two other firms actually used the word 'materiality' in addressing climate change risks in their CDP5 responses. Nevertheless, 219 firms across all sectors acknowledged the possibility for some climate-related risk, and many stated or implied that such risks have the potential to be "substantial" or "significant."

CONSUMER DISCRETIONARY

The Consumer Discretionary sector responses indicate that physical risks are a greater commercial risk than regulation, except for the automobile manufacturers. The automakers are the only firms in this sector to discuss climate change impacts in their Form 10-K filings.

CDP5 Disclosure

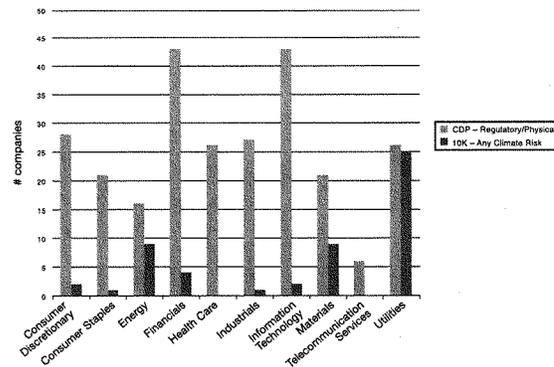
Regulatory risk

Few companies in the Consumer Discretionary sector expressed concern about climate-related regulation. By way of explanation many noted that regulation does not currently target their business line, that they are not direct emitters of greenhouse gases, or that their energy consumption and/or GHG emissions are relatively low.

Bed Bath & Beyond acknowledged that all of the non-climate risk factors mentioned in its Form 10-K "can conceivably be impacted directly or

Companies in the Consumer Discretionary, Consumer Staples and Financial Services sectors provided high quality CDP5 responses that often discussed indirect regulatory risks and direct or indirect physical risks

Risk Disclosure by Sector



To view individual company responses to CDP5, please visit www.cdproject.net

indirectly by climate change," however, the potential risks are not unique to its company operations, it said. **Carnival** is one of the few firms with operations that do result in unique risk exposure, because it is subject to changing regulations based on the jurisdiction of ports of call.

Despite the sentiment that regulation will have little direct effect on the Consumer Discretionary sector, nine firms explicitly stated that regulation could result in increased energy costs; others mentioned increased operating costs more generally. Several companies expect that regulation or increased energy costs could affect their supply chain, cost of raw materials or cost of transport.

Johnson Controls was the sole company in this sector to find the impacts of climate-related legislation to be overwhelmingly positive for its energy-efficiency products and services. Nonetheless, the company stated that a patchwork of state and local regulation was a burden on its operations. **Nike** reported that it addresses the problem of varying regulations by applying the most stringent regional standard to its global operations.

Physical Risk

Most firms expressed more concern that the physical ramifications of climate change could pose a business risk, but also felt this risk is not sector-specific. At least six firms noted that their emergency preparedness plans mitigated their risk exposure. In addition, **Bed Bath & Beyond**, **Nike** and a third unnamed firm

felt that their store locations in diverse geographical areas buffered their risk exposure. Companies including **Nike** and **Black & Decker** mentioned that supply chain redundancy insulated them from risk.

A few companies faced unique risks from the physical impacts of climate change. **Starbucks** was concerned about the physical impacts on its coffee growers. A cable programming company said it could foresee programming interruption from severe weather events that affect satellite providers, which would result in lost advertising revenue. Tourism-related enterprises also cited some vulnerabilities. Although **The Walt Disney Company** stated that it had not identified any material physical risks, it did acknowledge that extreme weather could affect tourism at its theme parks and perhaps cause damage to its extensive outdoor physical infrastructure. **Carnival** and **Starwood Hotels & Resorts Worldwide** both noted that extreme weather could destroy ports or other local infrastructure, transform the outdoor environment and keep tourists away from certain destinations that are dependent on outdoor activities.

Timeframe

Office Depot was one of the few companies that provided a timeframe for the physical risk impacts. The company stated that it is already affected by hurricanes but that the time frame for sea level rise is hard to predict.

Materiality

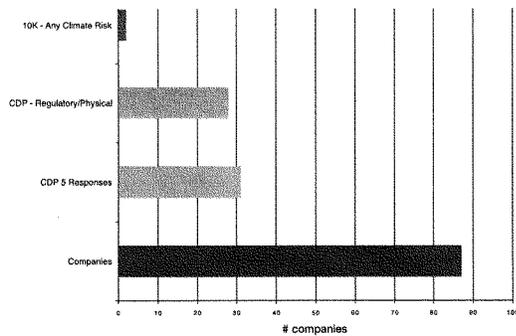
Only **General Motors** indicated in its CDP5 response that climate change regulation is a potential material risk to the company. Nine other firms in this sector stated specifically that regulation was *not* a material risk to their operations. No firm stated that physical impacts of climate change posed a material business risk, and six firms explicitly stated that the risk was not material.

Form 10-K Disclosure

With the exception of automobile manufacturers, none of the CDP5 respondents in the Consumer Discretionary sector included a climate change discussion in their 2006 Form 10-K filings.

The two automobile manufacturers, however, **Ford** and **General Motors**, report at length about current and

Consumer Discretionary Sector Climate Risk Disclosure



pending climate-related regulation and litigation. **Ford** provides a comprehensive litany of regulatory and legal activity, and notes that its ability to comply may be constrained by changes in consumer demand. **Ford** recounts vehicle specific regulation including California Assembly Bill 1493 that tasks the California Air Resources Board with tightening greenhouse gas emissions standards for light-duty vehicles starting with 2009 models, the Bush administration's request for the U.S. Congress to provide the needed authority to reform the current Corporate Average Fuel Economy (CAFE) standards, and the UK's vehicle excise duty and company car tax implemented in 2001, which other EU member countries plan to adopt. **Ford** says it also faces risk from litigation, including petitions in the United States for judicial review of the light truck CAFE standards, and a public nuisance lawsuit by the State of California, alleging that the state has sustained global warming damages from automobile manufacturing.

General Motors is similarly concerned with government regulations, noting that it may have to severely restrict its product offering to comply, or failing that, it may face large civil penalties. Either scenario may result in "substantial adverse impacts on GM operations, including plant closings, reduced employment, and loss of sales revenue," GM says in its Form 10-K.

regulated, but **Coca Cola**, **General Mills**, **H.J. Heinz**, **Reynolds American**, **Sara Lee** and **Wal-Mart Stores** all expect to be indirectly affected by future regulation through increased energy costs.

Physical Risk

With regard to impacts and mitigation strategies for physical risks, the Consumer Staples sector and the Consumer Discretionary sector look very similar. Five companies referenced their standard emergency planning procedures, and two others noted that their facilities were not located in low-lying or coastal areas.

Several companies in this sector are dependent on water and/or agricultural commodities, and they are cognizant of the risks climate change poses to their supply chain and business model. **Altria Group**, **Anheuser-Busch**, **Coca Cola**, **Colgate-Palmolive**, **General Mills**, **H.J. Heinz**, **Kimberly-Clark**, **Molson Coors Brewing**, **PepsiCo**, **Sara Lee** and **William Wrigley Jr.** and two others that declined to make their response public all noted the existence of climate change-related physical risks. **Sara Lee** also noted the potential for reduced availability of petroleum-based plastics for packaging materials.

A small number of companies provided a high level of detail in their risk evaluation, including **Molson Coors Brewing**, which discussed the major physical risk each of

Several companies in the Consumer Staples sector are dependent on water and/or agricultural commodities, and they are cognizant of the risks climate change poses to their supply chain and business model

CONSUMER STAPLES

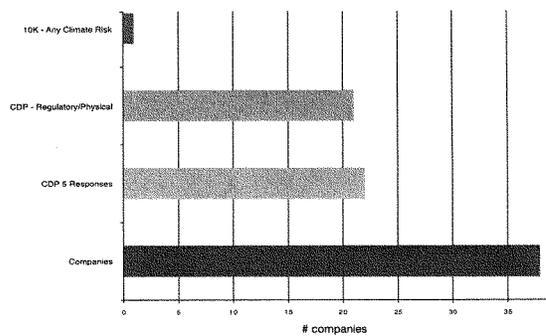
As noted in their CDP responses, four companies face current climate change-related regulation in the European Union, and 13 face physical risks from possible climate impacts on agricultural commodities. However, none identified these as material risks in their Form 10-K disclosures. A small number of firms in this sector state in their CDP response that sales could fall if consumers purchase fewer discretionary items.

CDP5 Disclosure

Regulatory Risk

Two firms, **Altria Group** and **Molson Coors Brewing**, will begin participating in the European Union Emissions Trading Scheme (EU ETS) starting in 2008. **Kellogg** and **William Wrigley Jr.** both pay the UK Climate Change Levy. No other company in this sector is directly

Consumer Staples Sector Climate Risk Disclosure



For the Energy sector, CDP disclosure is much more substantive than Form 10-K disclosure

its facilities faces, and **William Wrigley Jr.**, which evaluated the impact of low-, mid- and high-range climate change scenarios on its operations. The company predicts that mid-range changes would primarily have a "minor impact" on energy supplies and costs. It does not think that very dramatic, high-range weather shifts are very likely; however, this scenario could reduce its supply of raw ingredients as well as sales if consumers reduce consumer discretionary purchases.

Timeframe

Firms in this sector generally do not attempt to determine a timeframe for climate change risk. **PepsiCo** states that it considers both near and long term risks, but it does not elaborate further.

Materiality

While many companies indicated the potential for significant business impacts from extreme weather or other related events, which would reasonably be viewed as material, only **Coca Cola Enterprises** actually stated that "Global or regional catastrophic events... could have a material impact on our sales volume, cost of raw materials, earnings and financial condition."

Form 10-K Disclosure

The Consumer Staples sector was quiet with regard to climate change risk in its Form 10-K disclosures. Only **Kellogg** referred to its climate related emissions —

not in its Form 10-K, but in the company Annual Report. Kellogg simply stated that it is a member of the U.S. Environmental Protection Agency's Climate Leaders program, and that it is committed to reducing its GHG emissions.

ENERGY

For the Energy sector, CDP disclosure is much more substantive than Form 10-K disclosure, which focuses exclusively on regulatory risk. Only one gas and oil services company mentioned climate change in its latest 10-K filing.

CDP5 Disclosure

Regulatory Risk

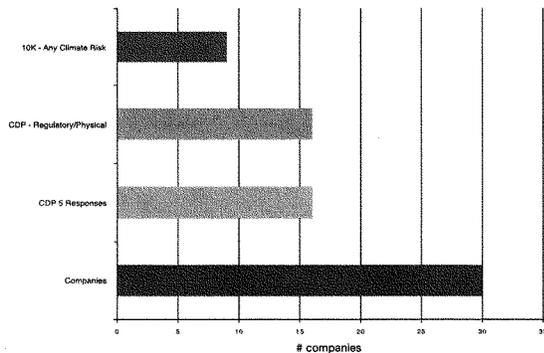
The Energy sector consists of oil and gas exploration, production, refining and transport firms as well as oil rig operators and other product and service providers to the oil and gas industry; most face current or near-term risk from GHG regulation. All firms in this sector mention some type of regulatory risk in their CDP response. The oil and gas producers generally provided more sophisticated risk analysis than did the oil and gas service providers. Three of the services firms explicitly state that regulatory risk is not expected to be material. The oil and gas producers are more likely to anticipate a potential adverse impact, but many state that the extent of the impact cannot be reliably estimated.

ExxonMobil notes that regulation has always been a risk factor for the oil and gas industry and states that policy developments could affect the viability of its long-term infrastructure investments. **Devon Energy** and **El Paso** noted that regulation or changes in consumer behavior could reduce demand for fossil fuels.

At least one firm views natural gas as a hedge against the impact of future carbon regulation. **Anadarko Petroleum** states that its portfolio is "relatively balanced" between oil and natural gas, which would spread out the risk. **El Paso**, which owns the largest natural gas pipeline in North America, notes that regulation may cause "changes in demand" for natural gas and oil.

Most of the Energy sector respondents report that they participate in the policy

Energy Sector Climate Risk Disclosure



development process. **ExxonMobil** elaborated at length on its view as to what factors should be part of any climate change regulation. The Energy sector also reported on participation in voluntary programs to reduce GHG emissions as part of their risk management strategy. **Anadarko Petroleum** cited the U.S. Environmental Protection Agency's Natural Gas STAR program and the American Petroleum Institute's Climate Action Challenge. **Occidental Petroleum Corporation** mentioned the California Climate Action Registry and the U.S. Climate VISION program.

Some of the services firms, including **Halliburton**, expect that regulation will improve the chances for carbon capture and storage as a commercial opportunity.

Physical Risk

Fourteen Energy sector companies discuss physical risks from climate change. Nine respondents said climate-related physical risk could manifest in general business disruption. Six firms cited the risk of extreme weather events in general, and 12 cited hurricane activity as an explicit risk factor. Others named freezing pipelines and thawing permafrost as potential physical risks. Some firms differentiated between onshore and offshore operations in discussing physical risks. **Devon Energy** mentioned that past physical damage from hurricanes has prompted insurance premium increases for its offshore drilling platforms. No other firm cites increased insurance costs as a risk, although **The Williams Companies** mentions insurance as a risk mitigation factor.

At least two firms that declined to make their response public anticipate little physical risk from climate change, describing the risk as "miniscule" and "insignificant."

Form 10-K Disclosure

While every firm in the sector identified some type of potential climate-related risk in their CDP5 response, six of these 16 firms — mostly the oil and gas services firms — fail to disclose climate change related risks in their Form 10-K. **XTO Energy** and **Halliburton** are among those that make no mention of climate change in their Form 10-Ks.

Of the 10 companies with some Form 10-K disclosure, all but one imply that climate change regulation poses some

type of commercial risk to their business; only four indicate that it could be significant. None explicitly state that the costs could be material. No company mentions physical risk in its latest 10-K filing.

To view individual company responses to CDP5, please visit www.cdproject.net

FINANCIALS

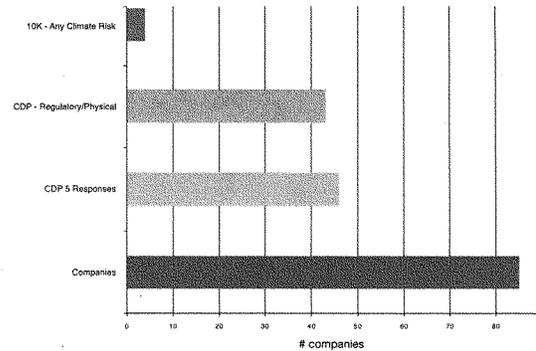
The Financial Services sector had fairly substantive CDP responses, especially considering that its GHG emissions come mainly through indirect sources. Form 10-K risk disclosure was scant, however. The sector faces high indirect regulatory risk through its client base and high indirect physical risk exposure through investment portfolios and managed assets.

CDP5 Disclosure

Regulatory Risk

The Financials sector, which includes banks, insurers and real estate service firms, generally had comprehensive CDP responses. Many firms explained that as indirect GHG emitters, the risk from regulation was remote. However, some companies said that the situation could change in the future. **Citigroup** acknowledged the potential for second or third generation GHG legislation that could target energy consumers. **Morgan Stanley** made similar comments, as did **JP Morgan Chase**, which referenced New York City's PlanNYC to mandate improved building energy efficiency standards.

Financials Sector Climate Risk Disclosure



Fifteen financial services firms observed that climate regulation might directly affect clients and in turn present a new risk to their firms

Despite the low probability of direct regulation, several firms provided a more sophisticated assessment of indirect regulatory risk beyond the much-cited prospect of increased energy costs. **ACE Limited**, a provider of insurance and reinsurance, noted that the U.S. state-based regulatory environment for insurance hampers efforts to price hurricane risk appropriately. **Safeco** also noted that state insurance commissioners could change the rules for property and casualty insurers.

At least 15 firms observed that climate regulation might directly affect clients, and in turn present a new risk to their firms. On the other hand, some also saw an opportunity for client advisory services or the increased provision of capital to help clients meet such regulatory mandates. Banker **BB&T Corp.** recognized that some of its direct emitting clients may not be prepared for an increased regulatory burden, which could in turn affect BB&T. **Citigroup** noted that insufficiently prepared clients pose a credit risk that is more significant than direct risks to the company, such as rising energy costs. **Synovus Financial Corp.** was the only firm to acknowledge the reputational risk that could result from lending to, or otherwise supporting, environmentally negligent clients.

Physical Risks:

Physical risks identified by the Financials sector include damage to property and assets, higher insurance premiums, power outages, severe weather that prevents employees from getting to work, and adverse regional or macroeconomic impacts. Insurers such as **The Hartford Financial Services Group** view physical impacts as the greatest risk from climate change. **Citigroup** is concerned that droughts, biodiversity loss and other environmental problems exacerbated by climate change would negatively influence its growth prospects in developing countries.

A majority of firms in this sector also mentioned general business interruption from severe weather events, but most also indicated that they had an emergency preparedness or business continuity plan in place. At least two firms said they have a source of backup power as a risk mitigation tool. One unnamed firm explicitly stated that its lack of geographical diversity increased its exposure to physical risks.

Timeframe

Financial firms generally did not provide a timeframe to estimate climate risks. **American International Group** views extreme weather events as a near-term physical risk of climate change, while stating that longer-term structural climate shifts will take several decades or more to materialize. **Citigroup** has conducted a five-to-10 year, and a 20-year physical risk analysis based on the Intergovernmental Panel on Climate Change's (IPCC) latest analysis.

Materiality

While the sector as a whole cited potentially significant or even "dramatic" risks to their operations, no company went so far as to predict a material impact on its operations or financial condition.

Form 10-K Disclosure

The Financials sector has virtually ignored climate change in its Form 10-K reporting. Out of 46 firms, only **Morgan Stanley**, **Simon Property Group**, **The Travelers Companies** and a fourth firm that declined to make its CDP response public made any mention of climate change in their 2006 Form 10-K filings. Only Travelers and the unnamed firm identified climate change as a potential commercial risk. Travelers stated: "Catastrophe losses could materially reduce our profitability and adversely impact our ratings, our ability to raise capital and the availability and cost of reinsurance." The company goes on to note that changing climate conditions have increased the unpredictability and the frequency of severe weather events.

GUEST COMMENTARY

Coastal Collision Course: Sea Level, Hurricanes and Development

by Dr. Stephen P. Leatherman

In the face of rising sea levels, shoreline recession and heightened storm activity, a growing coastal population and attendant development in low-lying areas have put much of our nation's coasts on a collision course with climate change.

More than half of the U.S. population now lives within 50 miles of the coast; it seems that everyone wants ready access to the beach or a waterfront view. Beachfront property has become some of the most coveted and expensive real estate in the country, with some high-rise, waterfront condominium complexes approaching eye-popping \$500 million valuations. The "gold coast" of Florida from Palm Beach to Miami has an appraised value exceeding \$1.3 trillion.

At the same time, sea level rise is eroding many beaches and hurricanes are becoming a more regular occurrence along the U.S. East and Gulf Coasts. The heightened hurricane activity in recent years has been attributed to both the Atlantic Multidecadal Oscillation (AMO) and to global warming. Increased activity since 1995 appears to be linked to the AMO. In any case, global warming certainly has the potential to make hurricanes more powerful by raising sea surface temperatures that fuel these storms. This increased activity and the tremendous amount of coastal

Satellite data indicate that the rate of sea level rise has increased 50% in the last decade, adding to coastal erosion, inundation and salt-water intrusion.

construction have resulted in greatly increased storm damage per annum in recent years:

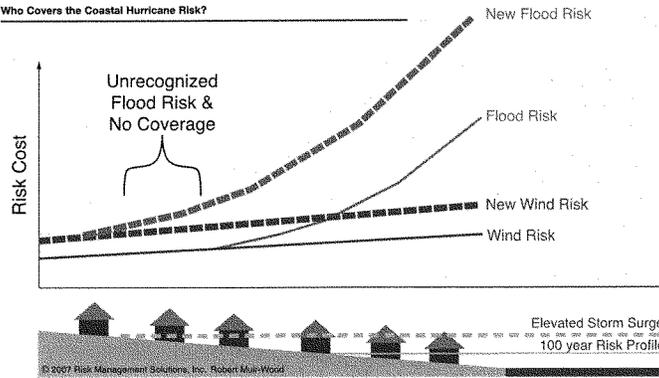
- \$1.3 billion from 1949-1989
- \$10.1 billion from 1990-1995, and
- \$35.8 billion during the past five years.

The four hurricanes that struck Florida in 2004 caused \$42 billion in damage, only half of which was insured. The 2005 hurricane season was exceptionally destructive with Katrina pushing annual damages over \$100 billion.

Climate change is adding to coastal stresses through erosion, inundation and salt-water intrusion. Sea level rise is a significant driver of beach erosion. The rate of erosion is two orders of magnitude greater than the rate of sea level rise, so that even small changes in sea level result in significant beach loss. While the rate of sea level rise during the 20th century was fairly low, estimated at 0.2 centimeters per year, satellite altimeter data show that the rate has increased 50% during the last decade.

continued

Who Covers the Coastal Hurricane Risk?



Dr Stephen P Leatherman

Coastal Collision Course *continued*

The rate of sea level rise is expected to increase in coming decades as a result of thermal expansion of the oceans and melting glaciers. Ice sheets slipping off Greenland and West Antarctica may accelerate the rate of erosion, threatening more and more incredibly valued beachfront properties, while making it far more expensive and difficult to arrest this process.

Coastal inundation and salt-water intrusion are the primary problems for low-lying mainland areas. A one-meter rise in sea level — which could happen during this century — would result in coastal inundation many miles inland, as the ratio of the amount of sea level rise to the horizontal extent of inundation can be up to four orders of magnitude. Coastal storms often hasten this action by tipping the ocean onto the land. Storm surges have already caused abandonment of small islands in the Chesapeake Bay and elsewhere.

Better testing procedures are needed in order to upgrade safety standards and building codes.

Coastal wetlands are being drowned where these ecosystems cannot keep pace with the rapid rate of sea level rise. A preview of wetland disintegration can be seen in coastal Louisiana where the delta is rapidly subsiding due to soil compaction and lack of soil replenishment, as well as the withdrawal of oil, gas and water so that relative sea level rise approaches 1 cm/yr. The resulting loss of wetlands is about 25 square miles annually, which is increasing the vulnerability of developed areas to storms. Wetland remediation has been largely unsuccessful in Louisiana and other large wetland systems, such as Blackwater Wildlife Refuge in Cambridge, Maryland.

Reducing coastal risk and increasing resiliency is a difficult proposition. Beach nourishment is often seen as a panacea, but it is expensive, has to be repeated fairly often in most areas, and does not work everywhere (e.g., the sediment often washes away within a year or two). Armoring the coastline with seawalls can stabilize the shore, but at the cost of the beach, which is the draw for tourists and hence the economic engine for many coastal communities.

The National Flood Insurance Program of FEMA has provided a measure of coastal protection by providing incentives for new homes to be elevated above storm surge levels and to strengthen buildings against

windstorm damage. Unfortunately, there has been no provision to deal with the degree of shoreline recession that is presently occurring, or to accommodate the accelerating pace of sea level rise, beach erosion and the likelihood of more intense hurricanes.

The storm resilience of coastal structures is an essential element of planning and sustainability of the economy, which depends in turn upon available and affordable windstorm insurance. Away from the immediate coastline, most hurricane damage is caused by wind, but our housing stock is not performing well. Witness that barely category 2 Wilma in 2005 resulted in \$16 billion in damages in South Florida, which has the best building codes in the country.

Roof design, materials and construction methods need to be tested in a repeatable and scientific manner in order to upgrade standards and building codes. Essential to this effort is the full-scale, destructive testing of houses, which is analogous to the automobile crash testing undertaken by the insurance industry that has made automobiles much safer in recent years.

While wind tunnels have been useful in understanding loading on structures, such miniature testing cannot provide full understanding of wind dynamics and failure modes. The International Hurricane Research Center (IHRC) is developing an apparatus for first-of-its-kind testing of houses and low-rise commercial structures. Such full-scale, destructive testing of buildings can open the public's eyes to the need for safety improvements and lead to the development of a 'culture of mitigation' that helps take coastal properties off their collision course.

— Dr. Stephen P. Leatherman is the *We Will Rebuild* Chair Professor and Director of the **International Hurricane Research Center** in Miami. The IHRC is developing a *Wall of Wind* 24-fan prototype that can simulate the effects of categories 1 to 5 hurricanes, wind, rain and debris against a two-story house, with support from the State of Florida and private contributors. Leatherm@flu.edu; www.ihrc.flu.edu

 To view a video demonstrating 'Wall of Wind' hurricane testing on a full-scale house, visit this website:

www.nbc6.net/newsnet/10062514/detail.html

HEALTH CARE

Although several firms in this sector are subject to climate regulation under the EU ETS, none considered it sufficiently material to disclose in securities filings. Physical risk exposure was similarly disclosed only in CDP responses and viewed as generally minimal.

CDP5 Disclosure

Regulatory Risk

The Health Care sector includes hospital operators, medical benefit providers and health care products and research firms. Their CDP5 responses were generally brief. Most firms noted that as indirect emitters, they are not affected by current climate-related regulation. Those that are affected by current regulation have European operations covered by the European Union Emissions Trading Scheme (EU ETS). These include **Eli Lilly, Wyeth, Schering Plough, Bristol Myers Squibb, Baxter International** and **Pfizer**. None of these six companies indicated that the regulatory burden has had, or is expected to have, an adverse financial impact.

While most Health Care firms determined that the risk from either current or future regulation is minimal, three companies, **Baxter International, Becton Dickinson** and **Humana** acknowledged the potential for a broader regulatory focus that might one day include their operations.

A small number of companies believe that they could face unique business risks from GHG regulation. **Bristol Myers Squibb** noted that direct and indirect impacts could make producing medicines more expensive. **PerkinElmer** acknowledged the competitive risk that could arise, should regulation mandate energy efficiency standards on the equipment it produces. **Schering Plough** noted that its asthma treatment products use Kyoto-regulated greenhouse gases (that are also ozone-depleting substances) as propellants and that while research into replacements is ongoing, acceptable alternatives have yet to be found.

Nine firms mentioned that regulations currently have or will have an indirect impact through higher energy costs. This was the most frequently cited regulatory-related impact, but no firm stated that the risk was expected to be significant.

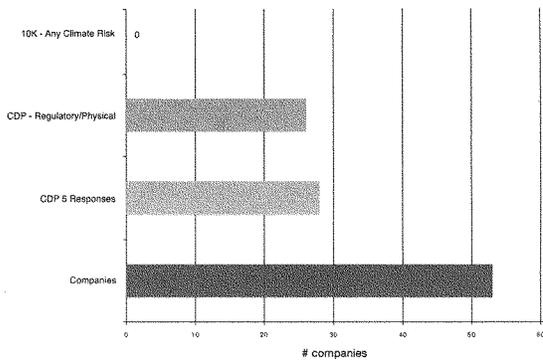
Physical Risk

Physical risk disclosure by this sector was similarly constrained. The risks disclosed in CDP responses mirrored those of other sectors; no industry-specific risk was identified. Two firms did mention a unique opportunity and responsibility. **Becton Dickinson** and **Medco Health Solutions** noted that extreme climate events and associated human health impacts are expected to increase the need for medical and pharmaceutical products.

Many companies view climate-related physical events as similar to other emergencies or natural disasters, and they say they plan accordingly. Eleven firms stated that they had company-wide business continuity plans and a few others, such as **Zimmer** said that facilities located in at-risk areas engage in contingency planning. Two unnamed firms have operational or supply chain redundancies to help manage extreme weather or other risk.

Two health care firms noted that extreme climate events and associated human health impacts are expected to increase the need for medical and pharmaceutical products

Health Care Sector Climate Risk Disclosure



To view individual company responses to CDP5, please visit www.cdproject.net

Timeframe

Few companies attach a time frame to their expectation of physical or regulatory risk impacts. Some firms simply indicated that they did not anticipate risks "in the near term." Only **Baxter International** was more precise, defining "near-term" as 2007-2010; it does not elaborate on longer-term physical risk. **Aetna** expects that climate change will be a major campaign issue in the 2008 U.S. presidential elections, but it did not venture a guess as to when climate legislation might be enacted.

Materiality

No company indicated in its CDP response that it anticipates material commercial impacts from climate change risks.

Form 10-K Disclosure

No companies in the Health Care sector identified climate change risks in their Form 10-K securities filings. Even the six firms that indicated in their CDP response that they had facilities subject to the EU ETS did not address this regulation in their Form 10-K filings, apparently because they did not consider the risk to be material.

INDUSTRIALS

Most firms in this sector are not currently subject to climate related regulation and therefore 10-K disclosure is virtually non-existent. CDP responses indicate that, while potentially significant, firms do not expect regulatory and physical risks to be material.

CDP5 Disclosure

Regulatory Risk

The Industrials sector includes firms in such diverse businesses as package delivery, military contracting and consumer and industrial product manufacturers. Although many firms are relatively large direct or indirect GHG emitters, only **3M** discloses that it currently faces regulation in the European Union. The company notes "... existing GHG regulations have not had a significant financial or regulatory impact on 3M."

Many firms indicate that they expect future regulation and are closely following the policy process, but most refer to generic regulation only. **Caterpillar** states, "As a global company, the potential for adoption of country-specific or other regional approaches to climate change policy creates uncertainty for Caterpillar." **Cummins**, notably, evaluates an array of policy options "from an economy-wide cap-and-trade program to fuel economy standards" to determine potential impacts on the company.

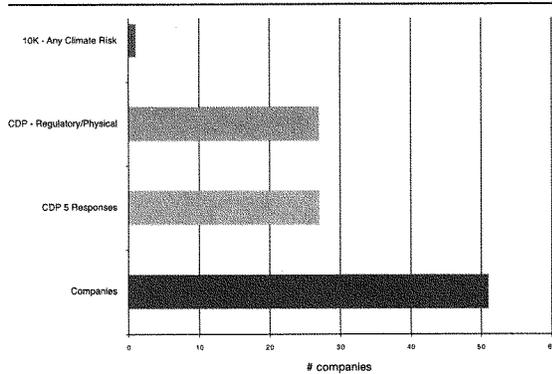
Seven firms specified the type of policy that posed the most risk, namely product energy efficiency standards, policies that target aviation and policies that target waste management. **Eaton**, **Ingersoll-Rand**, **Tyco International** and a fourth unnamed firm all say they are at risk from product standards regulation. **Ingersoll-Rand** notes that product standards, especially for engines, could lead to the need for product design adjustments and increased product development time. **United Parcel Services** anticipates European aviation regulation.

Eight firms indicate that regulation will indirectly increase energy costs.

Physical Risk

The physical risks that were identified are not unique to the Industrials sector. Firms acknowledged the chance of supply chain

Industrials Sector Climate Risk Disclosure



or general business interruptions due to severe weather events. Companies explained that their business continuity planning helped insulate them from physical risks from climate change. Nine firms mentioned company wide contingency planning, and a tenth, **Northrop Grumman**, indicated it was incorporating lessons learned from Hurricane Katrina. One firm, **Cummins**, has a Chief Risk Officer. **Rockwell Collins** had the most comprehensive physical risk analysis, discussing the impact of wind, drought, heavy rain, extreme heat and sea level rise on its supply chain and operations.

Six firms failed to answer the question or stated that they were not subject to physical risks from climate change.

Timeframe

Few firms indicate the timeframe used in their risk analysis. **General Electric** expects that many jurisdictions will move forward with climate change legislation "in the near term" and **Northrop Grumman** anticipates federal regulation "in the next few years." **Tyco International** anticipates energy cost increases in the next five to ten years.

Materiality

It is not uncommon for companies in this sector to cite apparently significant impacts from regulation and severe weather events that could lead to higher compliance costs, loss of inventory or temporary shutdowns, but no firm explicitly states that the risk is material. One unnamed firm estimates that costs of carbon dioxide emissions could reach \$15 per ton.

Form 10-K Disclosure

Only one firm in this sector, which declined to make its CDP response public, had a reference to greenhouse gas emissions in its Form 10-K. The firm highlighted vehicle, aircraft and facility improvements that have resulted in a reduced GHG emissions footprint, but it did not address climate change related commercial risks.

INFORMATION TECHNOLOGY

Information Technology firms identified business-specific regulatory risks such as perfluorocarbon (PFC) rules and energy efficiency product standards and general physical risks in their CDP5 responses; 10-K responses were

few and lacked climate-related risk assessments.

CDP5 Disclosure

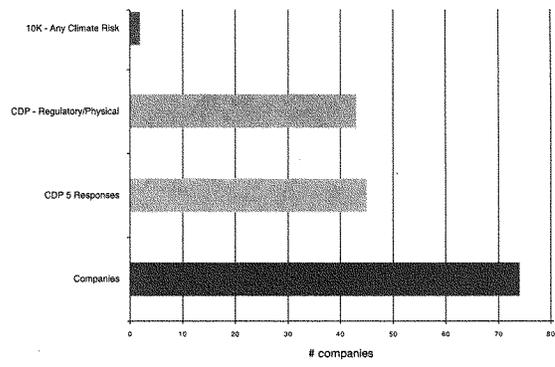
Regulatory Risk

The Information Technology sector is not directly targeted by current climate-related regulation, except for companies in the semiconductor business potentially subject to perfluorocarbon use and emissions regulations; PFCs are one of the six classes of greenhouse gases regulated under the Kyoto Protocol. Six Information Technology firms mentioned PFC regulation: **Advanced Micro Devices, Intel, IBM, National Semiconductor** and two others that declined to make their response public. **Advanced Micro Devices** distinguished between PFC emissions caps, which it determines is not a risk, and a PFC substance ban, to which it would be vulnerable. **Intel** also notes that the risk is a substance ban. One of the unnamed firms recently sold its semiconductor products business and thereby nearly eliminated its risk from putative PFC regulation.

CDP responses indicate that the sector expects that other direct regulatory risk may come from energy efficiency product and equipment standards. Twelve firms anticipate such standards, although not all of the firms presented it as a risk factor. Several, like **Microsoft** and **Motorola** simply make a statement about their efforts to improve product efficiency. Other firms are more forthcoming. **Cisco Systems** states, "Emerging product energy

CDP responses indicate that the Information Technology sector expects that direct regulatory risk may come from energy efficiency product and equipment standards

Information Technology Sector Climate Risk Disclosure



The majority of CDP respondents in the Materials sector state that increased energy prices pose the greatest commercial risk to their business

efficiency regulations impacting Cisco products may increase compliance costs."

Indirect regulatory impacts, primarily increased energy costs, were mentioned by 13 companies, and for many of these firms, it was the only regulatory risk mentioned.

Physical Risk

Extreme weather events that cause infrastructure or facility damage or power outages were the most frequently cited physical risks. Most companies mentioned these risks briefly, or immediately noted that they have business continuity plans that mitigate the risk. Three firms were less dismissive and used language suggesting that the risk is real. **Sun Microsystems** noted that it had facilities that could be harmed by sea level rise, as did **Juniper Networks**. They were among the few firms to provide facility-specific risk assessments.

At least two firms stated that they had not specifically evaluated the impact of physical risks from climate change on their businesses. Approximately 11 firms do not perceive risks from physical climate change impacts and others noted that the risk was not unique to their business.

Timeframe

NVIDIA expects energy costs will increase over the next five to 10 years. No other firm provides a specific timeframe for anticipated regulatory or physical risks. **Juniper Networks** states that emissions caps may be implemented "in the near term."

Materiality

While some companies acknowledged that significant harm could result from climate change regulation or physical events, no company used the term "material" to describe these risks. Twenty-three firms either stated or implied that physical risk was not material. Similarly, 24 firms dismissed the possibility of a material impact from regulatory risk.

Form 10-K Disclosure

Intel and **Sun Microsystems** were the two firms that referred to climate change in their Form 10-K filings. Intel mentioned climate change as part of a broader discussion of environmental initiatives. Sun Microsystems' discussion focused on energy efficient computing technology and was slightly more climate specific. The company noted that its technology

would encourage climate friendly industry shifts. Neither firm named climate change as a commercial risk.

MATERIALS

The energy intensive Materials sector faces some risk from future direct regulation, and companies highlighted upward pressure on energy prices as their major concern. Few firms considered either risk of sufficient magnitude to disclose in 10-K filings, which typically contained minimal or no climate risk evaluations despite the high disclosure rate.

CDP5 Disclosure

Regulatory Risk

The Materials sector, which includes forest products, chemicals, metals and other diversified product manufacturers, is largely unregulated by existing climate policies despite being a significant energy consumer. The majority of its CDP respondents state that increased energy prices pose the greatest commercial risk to their business. Higher energy prices as a result of the EU ETS have had negative repercussions for **Alcoa**, which closed one of its European smelters in response.

DuPont, **International Paper** and **PPG Industries** are all regulated under the EU ETS, but none mentioned a negative impact. Both **International Paper** and **PPG Industries** have sold excess allowances. **DuPont** anticipates that additional facilities will fall under the next phase of the EU ETS, resulting in higher administrative and compliance expenses.

International Paper and other forest products firms are uniquely exposed to risk — and opportunity — of policies that promote wood fiber as a source of fuel or as an alternative to more carbon-intensive building materials. **International Paper** is concerned that distortions in the wood market could appear if utility Renewable Portfolio Standards do not adequately address possible supply constraints. **MeadWestVaco** already sees additional fiber demand in Europe due to biomass energy policy incentives.

At least four firms anticipate potential for direct regulation including **Ashland**, **DuPont**, **Newmont Mining** and a fourth firm that declined to publicly disclose its response.

Physical Risk

Only mining companies and firms with a business line dependent on agriculture or timber commodities say they face unique, business-specific risks from physical effects of climate change. **Phelps Dodge** (now part of Freeport McMoRan Copper & Gold) noted that high water flows could damage equipment and result in mine shutdowns, while conversely drought conditions might require increased use of water for mineral processing and dust suppression. Phelps Dodge's new parent, **Freeport McMoRan**, is concerned that climate change, which is predicted to disproportionately hurt developing countries like Indonesia where it has operations, could destabilize these governments and social structures. **Newmont Mining** was much less specific in its risk evaluation.

DuPont, International Paper, MeadWestvaco, Monsanto and **Weyerhaeuser** noted potential risks due to climate changes that affect agriculture and standing timber, but their disclosure was generally brief and none of these firms attempted to quantify the risk.

Other firms in this sector face the same risks that other sectors have cited such as property damage and extreme weather related business interruptions. Many of these companies, including **Bemis, DuPont** and **Eastman Chemical**, noted that they had emergency preparedness plans to handle potential risks.

Timeframe

Materials firms generally did not attempt to determine a timeframe for potential risks. **Air Products & Chemicals** stated, "the magnitude and timing of potential regulatory risks posed by climate change is difficult to quantify." **Ecolab** believes it is prepared for medium-term physical risks since "climate change is predicted to occur gradually." **International Paper** stated that physical impacts to standing forests are a long-term prospect. **Newmont Mining** is the most specific. It expects to see both Australian and U.S. regulation enacted in 2009-2010 with an initial compliance period starting in 2012-2015.

Materiality

Firms in the Materials sector avoided speculating on the magnitude of prospective regulatory or physical climate change risks. Only one unnamed firm

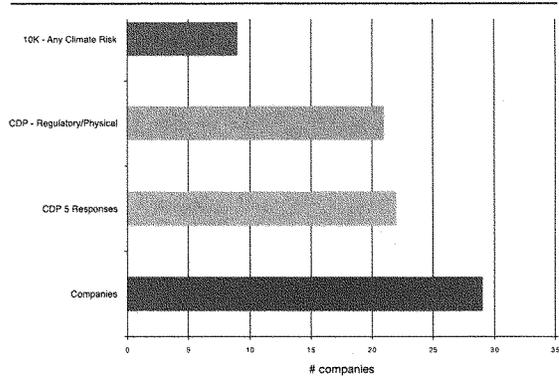
noted that the price of raw materials "could be materially increased due to climate regulation."

Form 10-K Disclosure

The Materials sector has one of the highest rates of Form 10-K disclosure among CDP5 respondents, with nine of 22 firms providing some mention of climate change. However the quality of the risk disclosure was fairly low, with few providing an actual risk assessment. **Alcoa, Dow Chemical** and **Weyerhaeuser** did not discuss climate change in terms of physical or regulatory risk. Other firms elaborated more. **DuPont** mentions its emissions reductions initiatives, but goes on to say that "the company faces the possibility of country-specific restrictions [on CO₂, HFCs and PFCs] in several countries where major reductions have not yet been achieved." **Phelps Dodge** stated that it is evaluating potential climate change impacts and even considered the possibility that federal legislation could be enacted in the United States in 2007, leading to higher energy costs. One unnamed chemical company noted that it is regulated under the Kyoto Protocol and that future U.S. legislation could affect the growth of its business. **United States Steel** also acknowledged the possibility of U.S. climate legislation but declined to estimate the impact.

The Materials sector has one of the highest rates of Form 10-K disclosure among CDP5 respondents, with nine of 22 firms providing some mention of climate change

Materials Sector Climate Risk Disclosure



Most firms in the Utilities sector believe that GHG regulation is imminent, but most decline to predict the regulatory impact, saying it will depend heavily on the structure of regulation

TELECOMMUNICATION SERVICES

The Telecommunication Services sector provided no 10-K climate disclosure. Brief CDP responses mostly highlight physical risks to infrastructure that are not expected to be material.

CDP5 Disclosure

Regulatory Risk

The Telecommunication Services sector is not directly regulated by current climate policies. Citizens Communications and Verizon Communications do not expect to face future regulation, either, although they did not altogether exclude the possibility of generic future regulations. Two more companies, Qwest Communications and an unnamed firm, specified that regulatory risk exists from GHG emissions inventory requirements or renewable energy directives that may require equipment updates or replacement.

Physical Risk

All but one firm acknowledged the risk of physical impacts to operations or communications infrastructure, but most indicated that emergency preparedness plans are already in place. Citizens Communications also noted that it could reroute service through unaffected parts of its network. Verizon Communications provided the most detailed response, explaining that its use of copper is especially vulnerable to the elements. The company also noted that central office equipment operates most efficiently within a certain temperature range, which may

become more difficult to maintain due to rising temperatures.

Timeframe

No company provided a timeframe for possible impacts from regulatory or physical risks.

Materiality

No company indicated that either regulatory or physical risk is expected to be material. With regard to physical risk, Citizens Communications states, "The types of resources and materials we use in our operations are unlikely to be materially affected by climate changes."

Form 10-K Disclosure

The six firms in this sector are not subject to current climate change regulation and generally do not expect to be in the future. Telecommunication services firms also do not consider physical risk from climate change to be material. None of the respondents included a discussion of climate change in their Form 10-K filings.

UTILITIES

The utility sector had the highest climate change disclosure rate in Form 10-K filings. Electric utilities generally provide more detailed information than natural gas utilities. For all utilities, regulatory risk is seen as the more pertinent risk. While nine utilities disclosed in their Form 10-K filings that the risk could be material, only one of these firms made a similar statement in its CDP response.

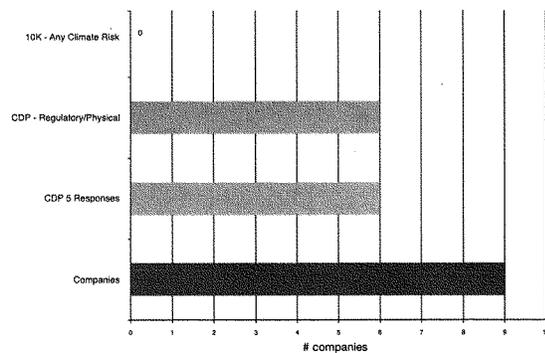
CDP5 Disclosure

Regulatory Risk

Most utilities are not yet regulated by climate change policies, although some have facilities that shortly will be subject to regional greenhouse gas controls, such as the Regional Greenhouse Gas Initiative (RGGI) in the Northeast. Most firms in this sector believe that GHG regulation is imminent, but most firms decline to predict the regulatory impact, saying it will depend heavily on the structure of regulation, on their ability to get cost recovery on emissions reduction investments, on the availability of emissions abatement or carbon sequestration technology, and on many other factors.

Two utilities said they are heavy GHG emitters relative to their peers, with a fuel

Telecommunication Services Sector Climate Risk Disclosure



mix that is weighted towards coal. **Duke Energy** says it is one of the nation's largest GHG emitters; **Xcel Energy** says it is the sector's fifth largest emitter.

Conversely, eight utilities said their regulatory risk exposure is low relative to their industry peers, typically because of large shares of nuclear, natural gas, or hydroelectric generation, or because of emissions reduction actions they have already taken. **Exelon, FirstEnergy, FPL Group, Keyspan** (now part of **National Grid**), **Nisource, PG&E, PPL** and **Public Service Enterprise Group** all believe they are well positioned to comply with future climate regulations.

FPL Group states that a carbon risk assessment has partly driven its growth strategy toward efficient and low carbon-emitting technologies. **Southern** and **Xcel Energy** incorporate carbon pricing into their planning processes.

Six utilities will be regulated under the Regional Greenhouse Gas Initiative (RGGI) starting in 2009. **Consolidated Edison** said that the impact of RGGI would vary by state but that it anticipates a 1 – 2.5% electricity price increase. The other firms did not predict the impact of carbon caps under RGGI.

Physical Risk

Many firms note that severe storms and extreme temperatures can damage or stress transmission and distribution infrastructure, but did not estimate the financial implications of these supply disruptions.

Ten utilities acknowledge that temperature fluctuations would likely alter electricity demand and consumption patterns.

American Electric Power, DTE Energy, Exelon, Nicor, Nisource, Progress Energy, Public Service Enterprise Group, Questar, and **Xcel Energy** all express this concern. **Xcel Energy** says "the odds favor increased [electricity] use." **Xcel** further noted that it might be able to sell electricity to other providers in the event of abnormal weather outside of its service territory.

At least five companies with coastal facilities, **Centerpoint Energy, Entergy, Exelon, FPL Group,** and **Keyspan** (now part of **National Grid**) raise the specter of more hurricane activity and sea level rise in their CDP5 disclosures. Utilities operating in dry climates, including **PG&E, Pinnacle West Capital** and

Sempra Energy, say they are more threatened by drought and lack of cooling water for thermal power plants. Utilities with hydroelectric generation like **Xcel Energy** also could suffer in the event of prolonged drought. Similarly, companies that rely on barge delivery of coal like **CMS Energy** and **DTE Energy** say they could be vulnerable to drought or floods that affect river traffic.

A small number of firms do not expect commercial risks to materialize from the physical effects of climate change. **Southern's** disclosure expressed some skepticism about the link between climate change and extreme weather, stating among other things, "It is interesting to note that not a single hurricane struck the United States or the Gulf Coast region during the 2006 season."

Timeframe

Utilities were hesitant to include a timeframe in their risk analysis. One unnamed firm indicated that the timeframe for regulatory risk impacts depends in part on the availability of emissions reducing or carbon capturing technology. **Constellation Energy Group** expects minimal near-term physical risks, but has not made a prediction on longer-term physical risks.

Materiality

Only **Pinnacle West Capital** says in its CDP response that regulation could have a material impact on its operations. Most other firms refer to adverse or significant impacts, without stating that the result could be material. With respect to physical risks, **Progress Energy** says

there could be a material impact if costs related to severe weather events are not sufficiently recovered.

Exelon states in its Form 10-K and CDP response that the cost of voluntary GHG emission reduction efforts "will not have a material affect on its future results of operations, financial condition or cash flows." **FirstEnergy** states that over the next half decade it plans to spend US\$50 million on GHG emissions reduction initiatives and invest an additional US\$50 million in nuclear power. **PG&E** plans to spend US\$1 billion on energy efficiency initiatives during 2006-2008.

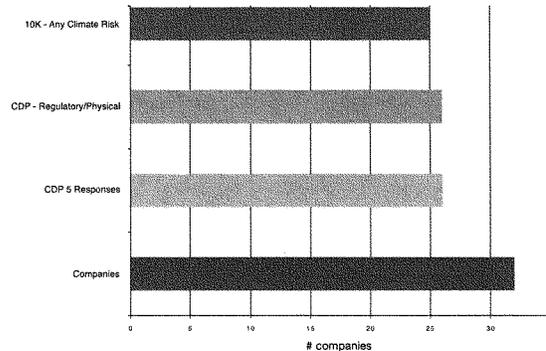
Form 10-K Disclosure

More than any other sector, utilities have acknowledged a potential material risk from climate change regulation in their Form 10-K filings. Nine firms made such disclosures in their latest filings: **AES, American Electric Power, Consolidated Edison, Constellation Energy, Edison International, FPL Group, PG&E, Pinnacle West Capital** and **Public Service Enterprise Group**.

Legal Action

Three firms, **Edison International, Xcel Energy** and a third unnamed utility note that climate-related lawsuits pending in U.S. courts pose an unspecified commercial risk. One such lawsuit draws a connection between GHG emissions, climate change and Hurricane Katrina, and seeks damages from large carbon-emitting electric utilities. Another suit does not seek damages, but alleges that GHG emissions constitute a public nuisance and asks the courts to mandate emissions caps.

Utilities Sector Climate Risk Disclosure



GUEST COMMENTARY

Business in the Driver's Seat: A New Standard for Corporate Engagement in Climate Policy

by Hon. Eileen Claussen

The evolution of climate change policy in the United States has followed a long and sometimes bumpy road. Along this road, we've made significant progress after persevering through rough patches, uphill stretches, and time-wasting detours. So are we there yet? No, but we're a lot closer, largely because the business world is now in the driver's seat leading us toward legislation that places mandatory constraints on greenhouse gas (GHG) emissions.

2007 is a milestone year when the business world has stepped forward to help lead the drive toward national GHG legislation

The signal event of the year was the formation of the U.S. Climate Action Partnership (USCAP), a coalition of now 25 major corporations and six leading nongovernmental organizations (NGOs), including the Pew Center, that has called on Congress for rapid enactment of legislation to establish binding, national limits on greenhouse gases to slow, stop and reverse the growth of emissions. Through lengthy negotiations, USCAP has been able to achieve an unprecedented level of detail on consensus policy recommendations that represent a workable compromise between diverse business interests and NGOs.

USCAP believes that Congress should pass legislation that sets firm short and medium-term binding emissions targets in the U.S., on a trajectory to reduce emissions by 60-80% by 2050, with the aim of stabilizing global GHG levels over the long-term at a CO₂ equivalent of between 450 - 550 parts per million. A cap-and-trade system should be the cornerstone of U.S. climate policy, with additional policies necessary for those sectors, including coal-based energy, buildings and efficiency, and transportation, in which the initial price signal from cap-and-trade will not sufficiently reduce emissions and advance new technologies. USCAP also calls for the development of a robust federal technology program with stable, long-term financing for low-GHG

As of August 2007, there were over 110 climate-related hearings and 150 climate-related bills introduced, setting a record for Congressional activity

technologies. And given the need for a global solution involving all major emitting nations, the coalition calls for renewed U.S. leadership in international negotiations.

The emergence of USCAP has had a discernible effect on Congressional efforts to pass mandatory climate legislation. Beginning with Feb. 13, 2007, testimony before both the Senate Environment and Public Works Committee and House Energy and Commerce Committee, CEOs from the coalition have addressed a range of influential committees in both houses of Congress. USCAP members have briefed dozens of Congressional offices and committee staff, including several actively drafting climate policy.

As of August 2007, there have been over 110 climate-related hearings, and 150 climate-related bills introduced, eclipsing the previous record of 105 introduced during the two-year span of the previous Congress. Ten of these bills would establish GHG gas cap-and-trade programs, either for the economy as a whole or for the utility sector.

Importantly, key moderates are getting involved in the debate. This summer, for example, two groups of Senate moderates — most of whom have never before voted for a cap-and-trade measure — offered language to address a key concern: cost containment. One group's proposal would allow the GHG cap to be exceeded if allowance prices rose above a certain level — the so-called 'safety valve' approach. The Pew Center remains concerned, however, that if the safety valve price is set too low, it could both render the emission levels set in the bill meaningless and undermine investment in the next-generation of climate-friendly technologies.

The other proposal for limiting costs would establish an appointed board that could authorize the borrowing of allowances from future years' caps if the program's costs started to hurt the economy. This approach appears more promising because it would not undermine the program's environmental objectives and the economic efficiency of a market-based system.

H o n o r a b l e E l e e n C l a u s s e n

Senators Lieberman (ID-CT) and Warner (R-VA) have announced their intention to move through their subcommittee of the Senate Environment and Public Works Committee a cap-and-trade bill that embraces this borrowing approach, as well as other provisions suggested by key Senate moderates. The Lieberman-Warner bill is likely to be the vehicle for Senate action on cap-and-trade.

While establishing a domestic policy that reduces GHG emissions is critical, meeting the challenge of climate change will require an equitable and effective international policy framework for the period after 2012, when the Kyoto targets expire.

To help develop workable options for a post-2012 agreement, three years ago the Pew Center brought together 25 senior policymakers and stakeholders from 15 countries, including major corporations from the Center's Business Environmental Leadership Council in the Climate Dialogue at Pocantico. The group's report calls for engaging all major economies through a flexible framework that allows them to take on different commitments to fit their national circumstances. To set the stage for such an agreement, the Pocantico group urged an informal, high-level dialogue among major economies to reach a broad political consensus on the general nature and scope of future multilateral efforts.

Key to achieving this consensus is cooperation. Concerns about rapidly growing emissions from China and India are valid, and clearly all major emitters including developing countries will need to take on commitments to reduce their emissions. However, Congress should be wary of legislative proposals that include punitive trade measures intended to prod the developing world into action. Threats of retaliatory action could have the perverse effect of alienating China and others, and actually delay the time when they take on meaningful commitments.

One of the most important ways of smoothing the economic impact of mandatory GHG limits on the U.S. is to stimulate domestic industry to catch up with the rapidly growing clean technology marketplace. With a well-designed climate policy that puts a clear price on carbon, U.S. businesses are more than capable of leading the world in producing climate-friendly technologies. Many of the USCAP companies are combining their public policy efforts with business strategies that seek to maximize the financial opportunities inherent for first movers in a carbon-constrained economy.

Companies that are ahead of the curve support market-based policies to limit GHG emissions. CDP can help by calling on companies to disclose their policy positions on climate change.

These and other forward-thinking companies are in the process of setting a new standard for what counts as leadership on the climate issue. Several years ago, the mere acknowledgement of the threat of climate change was enough to place a company out in front on the issue. Today, the companies truly ahead of the curve are those that publicly support market-based federal climate policies that include meaningful mandatory GHG limits.

Investors and the public ought to know whether companies are working to advance sound solutions to the climate challenge, or working to undermine them through lobbying against mandatory policy. Taking a constructive stance is a reasonable expectation from the standpoint of corporate social responsibility, but it also is an indication of whether a company fully understands how markets will change under climate regulations — a key to building future shareholder value. CDP can help by calling on companies to disclose their climate policy positions. With this information widely available, the public can press companies to work toward sensible climate change solutions, and investors can better allocate capital to the likely winners in a carbon-constrained world.

— Eileen Claussen is the President of the Pew Center on Global Climate Change and Strategies for the Global Environment. She is the former Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs, and was responsible for U.S. policy development on major international issues, including climate change.

7 S&P500 respondents to the CDP5 survey showed strong interest in implementing energy efficiency programs to abate their greenhouse gas (GHG) emissions.

GHG Emissions Management

S&P500 respondents to the CDP5 survey showed strong interest in implementing energy efficiency programs to abate their greenhouse gas (GHG) emissions. Less than half of the respondents said they were involved in renewable energy projects or green power purchases. While 78% of the respondents made reference to energy efficiency initiatives, only 37% discussed renewable energy projects or targets. Other major findings with respect to GHG emissions management include:

- 29% of respondents had set GHG reduction targets for their Scope 1 emissions
- Of those setting targets, 54% had set absolute targets (rather than intensity targets)
- 36% of respondents have considered emissions trading, but only 17% of those have actively traded GHG emission credits
- Most emissions trading (71%) is taking place through the European Union's Emissions Trading Scheme, which is implementing regional regulatory requirements under the Kyoto Protocol.

ENERGY EFFICIENCY

Respondents have widely embraced energy efficiency programs to abate GHG emissions and achieve cost savings at their firms. Among CDP5 respondents, consumer-oriented and Telecommunications firms were the most likely to promote these initiatives, with Energy and Health Care firms citing the least activity. However, among Energy and Health Care firms with energy efficiency initiatives, 31% of respondents had set targets to achieve actual reductions in energy use. Only the Consumer Discretionary sector had a greater percentage of respondents (59%) with energy initiatives involving efficiency targets. With the exception of Energy firms, most companies with energy

efficiency targets have set them for the company as a whole, rather than for specific facilities or regions of operation.

Consumer Discretionary

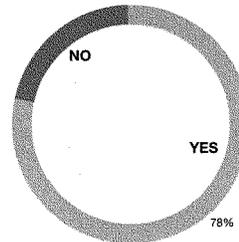
Carnival is one of the largest GHG emitters among respondents in this sector, owing to the large volume of fuel consumed in its cruise ships. (Airlines are also large fuel consumers in this sector, but none responded to the CDP5 survey.) Carnival is working on several initiatives to improve the energy efficiency of its operations. For example, it uses two shore power installations, in Juneau, Alaska, and in Seattle, Wash., that permit ships mooring in these ports to shut down their engines. These land-based power plants use non-carbon fuels, such as hydropower, which reduces the ships' air emissions. Carnival has also signed an agreement to use shore electrical power for ships docking at the Port of Los Angeles. In addition, the company is evaluating the use of a plasma incinerator for disposal of shipboard wastes. Plasma technology burns waste very efficiently and significantly lessens air emissions and ash byproducts.

Consumer Staples

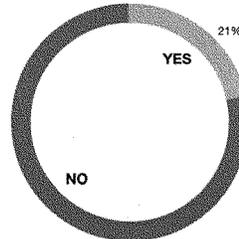
Wal-Mart has committed \$500 million annually to invest in sustainable technologies and innovations to achieve a 20% reduction in GHG emissions from existing stores over the next six years. It has also pledged to design and open a viable prototype store within three years that is 25 – 30% more energy efficient and will produce up to 30% fewer GHG emissions. It plans to improve its logistical efficiency through a combination of better fuel economy and aerodynamics in its trucking fleet, using less packaging in consumer items and other technological improvements. Wal-Mart will also show preference to suppliers that set their own energy efficiency goals and aggressively reduce their GHG emissions.

S&P500 respondents to CDP5 showed strong interest in implementing energy efficiency programs to abate their GHG emissions

Respondents with Energy Efficiency Programs



Respondents Setting Energy Efficiency Targets



Energy firms highlighting energy efficiency initiatives typically are expanding the use of cogeneration, which produces electricity and thermal steam simultaneously

Kimberly Clark has also focused on making energy efficiency improvements. From 1990 through 2005, it reduced its carbon emissions per sales dollar by approximately 40%.

Avon Products has a target to reduce its total energy consumption per unit of production by 10% at its manufacturing locations by 2008.

Sara Lee and several other companies in this sector are researching strategies to achieve GHG reductions mainly through energy efficiency improvements.

Energy

Energy firms highlighting energy efficiency initiatives typically are expanding the use of cogeneration, which produces electricity and thermal steam simultaneously. Companies involved in oil and gas production are also working to reduce the venting and flaring of methane, a potent greenhouse gas.

ExxonMobil has committed to improving the energy efficiency of its U.S. refining operations by 10% between 2002 and 2012, as part of its participation in the American Petroleum Institute's voluntary Climate Challenge Program. It has also invested more than \$1 billion in cogeneration projects, and now has interests in 100 such facilities with a combined capacity of 4,300 megawatts (MW)¹ of power. This cogeneration capacity is estimated to reduce carbon dioxide emissions by more than 10.5 million metric tonnes annually. The company plans to increase its cogeneration capacity to more than 5,000 MW by 2010.

ConocoPhillips U.S. refining unit has also set a goal of improving its energy efficiency by 10% through 2012. The company's upstream operations continue to pursue GHG abatement by reducing flaring and fugitive emissions of methane.

Occidental has an ongoing commitment to enhance the energy efficiency of its operations and has achieved a 39% improvement in the intensity of its energy use since 1996. To achieve this improvement, Occidental has invested heavily in energy conservation and cogeneration projects. Like ExxonMobil and ConocoPhillips, the company is also involved in methane flaring reduction programs for its upstream operations.

Financials

Citigroup is planning to set energy efficiency targets for all of its facilities this year.

JPMorganChase and many other financial services firms also are focusing on energy efficiency improvements in their corporate and branch offices to achieve emission reduction targets.

Industrials

Eaton owns a business that focuses on implementing energy efficiency programs for other companies, so putting its staff to work at its own company has been a natural fit. Eaton reports that from 2003 to 2006, this business unit conducted 14 audits and recommended 120 energy reduction projects that yielded a reduction of 9,000 tons² of carbon dioxide. This group will continue to conduct energy audits and trainings in 2007 and recommend other areas where Eaton can make progress.

United Parcel Service is working on increasing the fuel efficiency of its vehicles and aircraft, while supporting and maintaining a fleet of support vehicles that run on alternative fuels. UPS is testing and deploying new technologies for its air and ground fleet and facilities, including solar, wind and distributed power technologies.

Information Technology

Dell plans to conserve energy by implementing capital improvements to double its average Leadership in Energy and Environmental Design (LEED) building score.

Hewlett Packard plans to reduce the combined energy consumption of its operations and products by 20% below 2005 levels by 2010.

IBM has reduced or avoided CO₂ emissions by an amount equivalent to 40% of its 1990 emissions through 2005 as part of its global energy conservation program.

¹A 1 MW power plant can power 650 to 1,000 homes when running at full capacity.

²One short or English ton is equivalent to .91 metric tonnes.

Microsoft has reduced energy consumption by 72,000 kilowatts annually at its headquarters by reducing heating, ventilation, air conditioning and lighting during workdays, replacing high-energy lighting with more energy-efficient lighting and maintaining heating and cooling systems to operate at maximum efficiency. It has similar efforts underway at its other offices.

Materials

DuPont has a goal to keep total energy use flat between 1990 and 2010.

Dow has pledged to reduce the intensity of its energy use by 25% by 2015, using 2005 as a baseline.

Others in the industry also cited energy efficiency as the cornerstone of their emissions reduction programs.

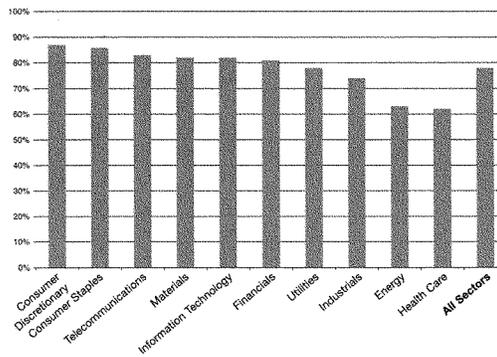
Utilities

Many electric utilities also are heavily involved in energy efficiency programs, both for their customers and their own operations.

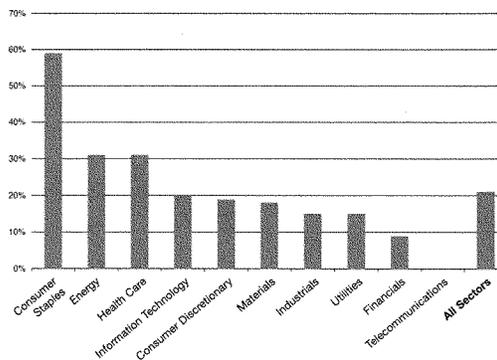
NISource, for example, committed in 2005 to improve the efficiency of its energy delivery by 7% between 2001 and 2012, as part of the EPA's Climate Leaders program. Total benefits of NISource's efforts are expected to reduce projected GHG emissions for 2012 by approximately 1.9 million tons.

Climate Leaders is an EPA industry-government partnership that works with companies to develop long-term comprehensive climate change strategies. Partners set a corporate-wide greenhouse gas (GHG) reduction goal and inventory their emissions to measure progress

Respondents with Energy Efficiency Programs



Companies Setting Energy Efficiency Targets



GUEST COMMENTARY

Climate Change Legislation: The Time Is Now*by Jason Grumet*

The case for legislation to limit U.S. greenhouse gas (GHG) emissions has become more compelling than ever. According to the federal Energy Information Administration, our nation's energy-related CO₂ emissions are likely to grow another 34% by 2030 if current trends continue. At the same time, we know from the latest assessment of the Intergovernmental Panel on Climate Change that the risks of climate change are real and growing. Meanwhile, there is mounting evidence that the costs of further delay in initiating reductions are likely to be substantial. The faster we get started, the smaller the burden of future mitigation and adaptation efforts and the smaller the human suffering and long-term environmental damage.

As the science grows stronger, so does consensus that we need a Federal legislative solution. New players are coming to the table, including labor unions, evangelical Christians, farmers, sportsmen, national security hawks and coal-based utilities. Members of Congress have responded with a variety of bills with different emissions targets and other features. One proposal by Sens. Jeff Bingaman (D-NM) and Arlen Specter (R-PA) is based on a mandatory climate program put forward by my organization. More bills are in the works that will likely combine many elements of existing proposals.

So the question is not whether there will be legislation, but rather what features will best meet the multiple goals of a comprehensive climate policy for the United States. The National Commission on Energy Policy has taken the position that six key components should be included in any mandatory GHG program.

Any legislation should contain six elements to send proper signals to investors, consumers and other nations

First, the immediate goal should be to put in place a policy framework that can last many years and be adjusted over time in response to evolving scientific, economic, technological and international developments. We must get started with a clear signal to investors, consumers and other nations.

Second, a climate change program should be market-based and economy-wide. Market-based approaches, like the landmark Acid Rain Program, have yielded the least cost emissions-reduction options and created

powerful technology incentives. Moreover, because CO₂ emissions arise throughout the economy, only an economy-wide program can deliver maximum reductions at the lowest cost.

Third, cost certainty is critical to forging the political consensus needed to move forward without further delay. Cost debates usually bog down in fruitless arguments over who is making the right assumptions about technology, fuel prices and other factors. Different assumptions can produce wildly different estimates of economic impact. The safety valve feature in our proposal — which would make additional emissions allowances available for purchase from the government at a predetermined, but steadily escalating price — helps to cut through these debates by assuring that the per-ton cost of emissions reductions required under the program cannot rise above a known level. At the same time, the Commission recognizes that the need for environmental certainty is likely to outweigh the need for cost certainty such that it would be appropriate — especially if significant progress has occurred at the international level — to transition away from the safety valve toward firm emission caps over time. Meanwhile, a healthy debate has begun about the best approach for managing cost uncertainty and economic risk. One Senate proposal has a cost-containment mechanism that involves permit borrowing governed by a 'Carbon Market Efficiency Board' akin to the Federal Reserve.

Fourth, allowance allocation is vitally important politically because it determines who bears the costs and benefits of a climate program. The Commission believes that allocation decisions should be guided by equity considerations and seek to maximize benefits to stakeholders and society as a whole. Based on economic modeling to assess the rough distribution of cost burdens associated with GHG regulation across different industry sectors, the Commission has recommended that no more than 50% of all emissions permits or allowances available in an economy-wide cap-and-trade program should be allocated for free, with the remainder devoted to finance other policy goals. Over time, the share of allowances allocated at no cost to industry should decline gradually as the economy adjusts to carbon constraints. This approach would provide adequate resources to compensate firms that confront significant un-recovered costs under the policy, would avoid conferring large windfall profits, and would generate major resources to speed the

J a s o n G r u m e t

development of low-carbon technologies, assist vulnerable areas with adaptation, and ease the burden of higher energy prices on low-income households.

Fifth, any successful national policy must place considerable emphasis on promoting wider international cooperation. By some accounts, China is now adding new coal capacity at the rate of one large power plant every week to ten days, and it has just surpassed the United States in total carbon emissions. In this context, it is clear that the U.S. must lead, but also that our major trade partners and other large emitters follow suit. The Commission has therefore proposed a domestic policy that (a) provides for periodic review (every five years) to assess international and scientific developments, (b) explicitly links continued tightening of program targets to progress in other countries, and (c) signals the United States' intent to work with other countries to forcefully address trade and competitiveness concerns if other major emitting nations fail to act within a reasonable timeframe.

Sixth, market-based efforts to limit GHG emissions must be paired with a major technology push to develop and deploy the low-carbon alternatives that will allow us to meet critical environmental objectives while maintaining secure, reliable and affordable means of meeting our energy needs. We believe that a combined strategy of market signals and robust technology incentives is the most effective and least costly way to achieve a meaningful shift from business-as-usual trends, while equitably sharing the burden of emissions mitigation among shareholders and taxpayers. Our approach therefore calls for a combined package of policies and public incentives to accelerate the development and early deployment of promising energy-efficiency and low-carbon-supply technologies.

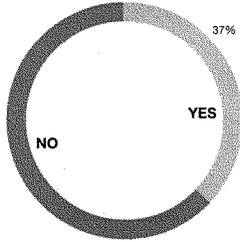
Finally, solutions to climate change must be pursued in concert with other critical energy policy goals such as improving America's energy security, reducing oil dependence, and ensuring that our energy systems are adequate and reliable to meet future needs. Thus, the Commission has also called for efforts to improve vehicle fuel economy; promote cost-effective energy efficiency investments; develop promising renewable energy resources, including biofuels; diversify available supplies of fossil fuels, especially natural gas, in an environmentally responsible manner; address obstacles to nuclear power; develop the technologies needed to preserve a major role for coal, especially technologies for carbon capture and storage; and invest in critical energy infrastructure.

Eventually, a 'safety valve' on carbon prices might give way to a firm emissions cap to provide environmental certainty in addressing global warming

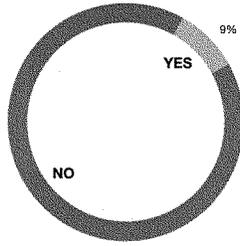
Of course, the devil is in the details when it comes to translating these principles into specific legislative language. But the urgent imperative to act — and act soon — must not get lost as the Congressional debate over U.S. climate policy intensifies in the days to come. Getting it right is essential. But so is getting started.

— Jason Grumet is the Executive Director of the **National Commission on Energy Policy**, a bipartisan group of energy experts from industry, labor, environmental and consumer groups and academia (www.energycommission.org). The Commission issued a comprehensive set of consensus recommendations for U.S. energy policy in December 2004 and updated these recommendations in April 2007. The Commission is a project of the Bipartisan Policy Center www.bipartisanpolicy.org.

Respondents with Renewable Energy Products



Respondents Setting Renewable Energy Targets



RENEWABLE ENERGY

Among S&P500 respondents to the CDP5 survey, 37% referenced involvement in renewable energy projects. Utilities lead in this category (70%), followed by companies in the Consumer Discretionary (48%) and Consumer Staples (41%) sectors. Despite a proliferation of "green power" purchase programs and Renewable Portfolio Standards at the state level, relatively few respondents have set targets for their own renewable energy use. The sectors with the most respondents setting targets are Consumer Staples (23%) and Consumer Discretionary (13%), followed by Information Technology (11%) and Utilities (11%). No respondents in the Telecommunications sector have set renewable energy goals.

Consumer Discretionary

Carnival is involved in a project that is testing bio-diesel fuels as a replacement for petroleum-based fuels in some ship engines.

Consumer Staples

Molson Coors has a Virginia facility that runs on biogas from anaerobic treatment of wastewater. In addition, it is investigating installing a small-scale solar photovoltaic system to supply electricity at the facility.

Financials

Citigroup, JPMorganChase, Wells Fargo and other banks plan to achieve GHG reductions in part through green power purchase programs.

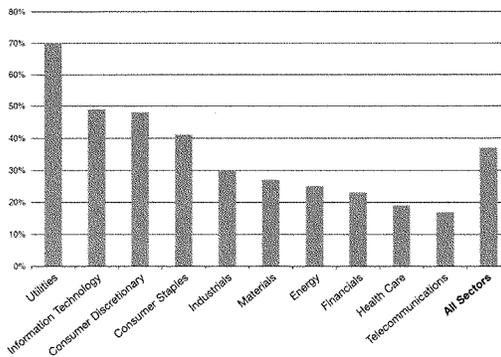
Health Care

Pfizer has pledged to meet 35% of its electricity needs through the use of renewable and cogeneration technologies by 2010.

Industrials

United Parcel Service is using solar power to meet approximately 70% of the power needs at its Palm Springs, Calif., sorting facility. In addition, UPS has several facilities in California using biomass sources as part of their electricity supply. UPS says that it continues to evaluate additional renewable energy projects in the area of solar, wind, hydrogen fuel cells and green power purchasing.

Companies with Renewable Energy Projects



Information Technology

Google is committed to creating 50 MW of new renewable generating capacity by 2012. Earlier this year, it completed the first major phase of a 1.6-megawatt photovoltaic solar panel installation at its Mountain View, Calif., headquarters. The company says that the installation is the largest one by a corporation in the United States to date.

Microsoft installed a solar electric system at its Silicon Valley Campus in Northern California in 2006. It generates 480 kilowatts at peak capacity, enough energy to meet approximately 15% of the facility's total energy needs. The system will reduce the campus' CO₂ emissions by 4,000 tons annually over the next 30 years.

Motorola plans to increase its purchases of renewable energy from 5.2% in 2006 to approximately 10% by 2008.

Dell is also considering direct purchases of renewable energy and purchases of renewable energy credits.

Materials

DuPont has a goal to increase renewable energy use to 10% by 2010 and is developing a pilot-scale 'bio-refinery.'

Dow is also committed to increasing green power purchases and makes a line of high-performance plastics from corn.

Utilities

Many electric utilities also are involved in renewable energy development, often through unregulated subsidiaries or under state mandates.

FPL Group is the largest wind energy developer in the United States; it owns more than 4,015 MW of wind generation in 16 states. In addition, the company's Sunshine Energy program in Florida installs 150 kilowatts of solar capacity for every 10,000 customers that sign up for this program.

Duke Energy plans to expand its renewable energy generating capacity to 2,100 MW by 2012.

Entergy owns 80 MW of wind capacity.

Public Service Enterprise Group (PSEG) has proposed to invest \$100 million to install solar photovoltaic panels throughout its local service territory in New Jersey. This initiative would provide funding for 30 MW of solar energy capacity, which is half of the New Jersey Board of Public Utilities' target for solar energy installations in PSEG's service territory in the state for 2010.

Sempra Energy's San Diego Gas & Electric subsidiary plans to meet California's 20% Renewable Portfolio Standard by 2010.

Despite a proliferation of "green power" purchase programs and Renewable Portfolio Standards at the state level, relatively few S&P500 respondents have set targets for their own renewable energy use

GUEST COMMENTARY

Renewable Energy Finance: Big Steps for US Investors, Smaller Ones for Industry

by Angus McCrone

In a film about Pearl Harbor, a Japanese admiral muses that his country's attack in 1941 had merely awakened a 'sleeping giant.' The same might be said of the current United States position on climate change. To outsiders, especially in Europe, the U.S. response to rising international concerns has appeared as 'sleepy,' if not 'sleeping.' Yet with formidable natural resources in wind, solar, geothermal and several other renewable energies, plus the money to invest in a shift away from fossil fuels, the U.S. giant might finally be awakening.

U.S. investment in clean energy has quadrupled in three years and is quickly catching up to Europe

Led by policy makers at the state level, heavyweight corporations, blue chip financial institutions and public opinion, America has thrown its muscle into clean energy. Data from New Energy Finance show that in 2006, the United States accounted for \$22.5 billion of the \$70.9bn invested in clean energy worldwide. This was up very sharply from \$12.6bn in the U.S. in 2005 and \$5.7bn in 2004.

The 2006 data showed the level of investment in the U.S. is closing the gap fast on the European Union's \$27.1bn. The capital has come from all directions —

private equity funds, hedge funds, public markets, large corporates and asset financing of projects via equity and debt.

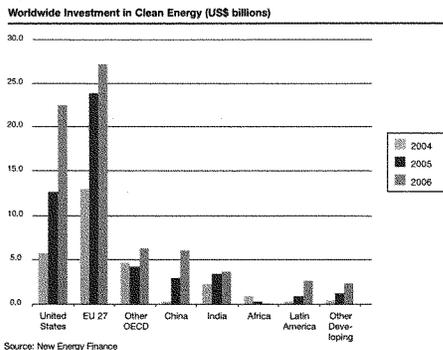
America's advance has so far been led by policymakers below the federal level, by financiers and investors, and by entrepreneurs. The big corporations in the S&P500 have been swinging into line in 2006 - 07, but most of them have yet to adopt spearhead roles. It may well be a case of 'watch this space.'

So what is awakening America from its slumber? Freak weather events such as Hurricane Katrina in 2005, the mild start of winter in 2006 - 07 and a rash of heat waves and floods this summer have raised awareness of the possible impacts of climate change and stolen thunder from climate change skeptics. At the same time, oil prices surging towards \$80 a barrel have renewed concerns about the security of supply.

Policy moves also have had a profound impact, albeit with a lower profile. One change has been the partial deregulation of the power sector, giving electricity suppliers a freer hand to build their own generating capacity. Another was the introduction of the Federal Renewable Fuels Standard in 2006, encouraging the use of ethanol and biodiesel blends in motor fuels.

In addition, individual U.S. states have adopted aggressive measures to encourage the use of clean energy in their localities. Fully half have adopted Renewable Portfolio Standards obliging local utilities to derive a portion of their electricity from renewable generation. The most ambitious of these, in Minnesota, has set a figure of 25% by 2020. Others are just behind. Oregon has decreed 25% from renewables by 2025. Other states have stressed the greenhouse gas reduction side. Florida Governor Charlie Crist (R) in July 2007 issued an executive order for a reduction in emissions to 1990 levels by 2017.

The response from U.S. companies has been varied. One group of large corporations has spotted opportunities to become providers of generating equipment, or capacity — for instance



Angus McCrone

General Electric in wind turbines and **FPL Energy** in wind farm development.

A second group has identified the use of renewably generated power as a good way of locking in a fixed price for electricity over the long term, possibly earning carbon credits in the future, or merely generating good public relations. **Macy's** announced in June 2007 that it plans to install solar power systems in 26 stores in California, while **Wal-Mart** has unveiled a number of schemes, including cuts in packaging, efficiency in electronic goods and the use of solar panels.

A third group, the investment banks, has identified renewable energy investment and carbon trading as new profit centers. **Goldman Sachs** has made numerous large venture capital commitments, including taking a \$210m stake in Brazilian biofuels firm **Vale Santelisa** and leading a \$25m financing of efficient air cooling firm **Ice Energy**. **Morgan Stanley** has committed to put \$3bn into carbon markets over five years.

A fourth group, including chemical firms **DuPont** and **Dow** and oil majors **Chevron** and **ConocoPhillips**, has dipped toes in the water by backing research into clean energy technologies or by investing in young clean energy firms.

Does this mean the big battalions of the S&P500 have embraced clean energy? Yes and no: intriguingly, even as of the third quarter of 2007, there is no pure-play U.S.-listed wind turbine manufacturer. The nearest, **Clippier Windpower**, is U.S. based but listed on London's AIM. Equally, the solar energy manufacturing industry remained largely European and Chinese based, and while there were a number of Chinese firms listed on U.S. exchanges, there has been no significant takeover of a solar firm by a U.S. corporation.

Even in biofuels, where U.S. owned businesses have proliferated in the last two years, the significant players — with the exception of integrated agribusiness giant **Archer Daniels Midland** — were generally mid-sized firms such as **Aventine**,

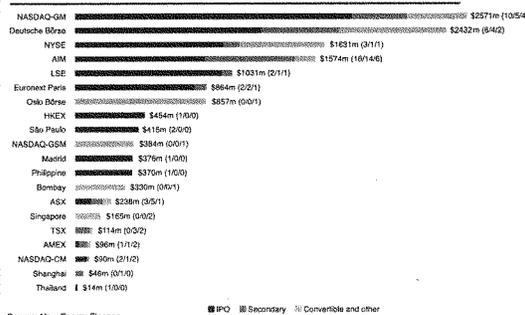
Major U.S. corporations have not yet made major investments in renewables. It may be a case of 'watch this space.'

VeraSun and **Imperium Renewables**. One reason for this may be that U.S. corporations remained somewhat leery of the valuations put on clean energy companies in 2007. This also extended to projects, with U.S. players often not paying top dollar for large wind farm portfolios — instead letting **Energias de Portugal** take **Horizon Wind** for an enterprise value of \$2.7bn in the spring of 2007, and U.K.-based **International Power** taking the **Trinergy** portfolio for \$2.5bn in August.

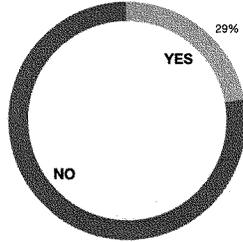
Nevertheless, U.S. investors have been in a bullish mood. In the year ending in the second quarter of 2007, **Nasdaq** saw a total of \$2.6bn clean energy equity financings, more than any other exchange worldwide. The **New York Stock Exchange** weighed in with a further \$1.6bn. Between the two, they accounted for nearly a third of the \$14bn invested in clean energy companies by public market investors over the 12-month period.

— Angus McCrone is chief editor for **New Energy Finance**. Based in London, England, **New Energy Finance** is a specialist provider of information and research to investors in renewable energy, low-carbon technology and the carbon markets.

Clean Energy Equity Offerings 7/1/2006 — 6/30/2007



Respondents Setting GHG Reduction Targets



GHG REDUCTION TARGETS

For some companies, energy efficiency and renewable energy programs are means toward the larger end of reducing greenhouse gas emissions. Among S&P500 respondents to the CDP5 survey, relatively few have declared formal GHG reduction goals. Altogether, 29% of respondents have set GHG targets; these include emission intensity targets as well as targets to reduce levels of absolute emissions.

Among survey respondents, Utilities lead in setting GHG reduction goals (59%), followed by Materials (45%) and Industrials (37%) firms. No respondents in the Telecommunications sector have set GHG reduction goals, and only 13% of Energy sector respondents and 19% of Financial Services respondents have set such goals.

A majority of Utilities setting GHG reduction targets have opted for intensity targets. Energy, Materials and Industrials companies are more evenly split between absolute and intensity targets. Among other sectors where respondents have set reduction goals, the vast majority of the Financial Services firms have set absolute targets (89%), followed by Health Care (71%), Consumer Staples and Consumer Discretionary firms (62%).

Most respondents with GHG reduction targets have chosen relatively short-term goals; 88% have set a target within six years, with only 12% setting longer-term goals. All of the Energy companies with

such targets look out no further than two years. A majority of the companies in the Financial Services, Industrials, Utilities, Information Technology, Consumer Staples, Health Care and Materials sectors with targets have opted for a three to six year window. Materials, Consumer Discretionary and Consumer Staples firms, as well as Utilities, are the most likely to have goals more than six years out.

Consumer Discretionary

American automobile manufacturers continue to focus on reducing their facility (Scope 1) emissions, while not directly addressing GHG emissions from their products (which are a far greater source of emissions).

Ford has a target to improve global manufacturing energy efficiency by 1% annually, following an improvement of more than 12% in 2000-2004 (normalized for changes in production). It has cut its North American facility GHG emissions by 10% by 2006, relative to a 1998-2001 baseline.

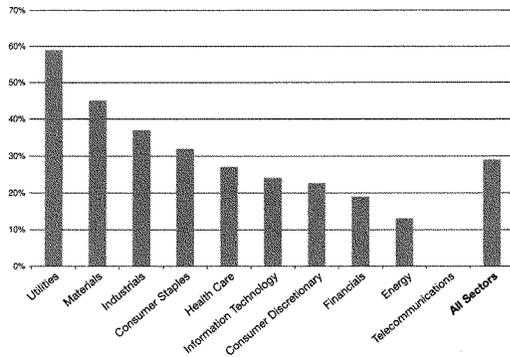
General Motors has set a global goal to reduce energy use at its facilities by 25%, and CO₂ by 21% by 2010, using a 2000 baseline.

Johnson Controls and several other companies in the Consumer Discretionary sector reference their participation in the Business Roundtable's Climate Resolve program. This industry initiative mirrors a goal set by the Bush administration in 2002 to achieve an 18% reduction in the GHG emissions intensity of the U.S. economy by 2012 (specific targets vary by industry). For its part, Johnson Controls says that it is looking beyond its Climate Resolve pledge and is working with the EPA's Climate Leaders program to set a more aggressive GHG reduction target. Johnson Controls also says that it is aiming to achieve carbon neutrality within the next 10 years. To get there, the company says it will rely on internal process and energy efficiency improvements, as well as on emissions credits obtained for delivering energy efficiency improvements to its customers.

Two others companies in the Consumer Discretionary sector have made reference to achieving 'carbon neutrality' in their operations.

Nike says it plans to have its facilities and business travel activities become carbon neutral by 2015.

Respondents Setting GHG Reduction Targets



News Corp. intends to reduce its use of non-renewable energy sources to decrease its total carbon footprint by 10% in 2012, compared with 2006, and says it is on its way to reaching net zero carbon emissions.

Consumer Staples

Colgate-Palmolive has set a goal to reduce its CO₂ emissions by 5% by 2010, using 2002 as a baseline.

As noted earlier, **Wal-Mart** has committed to investing approximately \$500 million annually to achieve a 20% reduction in GHG emissions from its existing stores over the next six years, and a 30% reduction from a new prototype store over the next three years.

Energy

While all of the respondents from the energy sector are managing GHG emissions to some degree, none have set targets to cut absolute emissions.

Chevron is managing the growth of its GHG emissions, using 2004 as a baseline. In 2005, it met its goal of having no net increase in GHG emissions from its operations, even though it added production capacity and explored for energy in more complex, remote and energy-intensive environments. Chevron's overall emissions grew in 2005 and 2006, although it met its goals for controlling emissions growth in both years. In 2007, Chevron aims to reduce its GHG emissions below 2006 levels (but still above 2005 levels).

Hess fell short of its goal to achieve a 5% reduction target in normalized emissions between 2001 and 2005; as of 2006, its normalized emissions were 4% below 2001 levels. Consulting firm DNV will complete a review of Hess's operations before it decides on any future targets.

As noted earlier, **ConocoPhillips**, **ExxonMobil** and **Occidental** have also set GHG emissions intensity targets for some of their operating units.

Financials

With minimal direct emissions, most financial services firms have focused on GHG reductions related to their energy purchases and business travel.

Citigroup has committed to reducing its GHG emissions from facility-related energy use by 10% between 2005 and 2011.

JPMorganChase plans to achieve an absolute reduction of 7% below its 1990 emissions by 2012.

Merrill Lynch has acquired credits to offset its GHG emissions related to electricity consumption, heat usage and business travel for the next three years. It is also striving to reduce its overall GHG emissions footprint by 2% a year.

Wachovia has pledged to reduce its absolute CO₂ emissions by 10% from 2005 levels by 2010.

Health Care

Most pharmaceutical companies are ahead of other companies in the manufacturing sector in terms of setting GHG reduction targets.

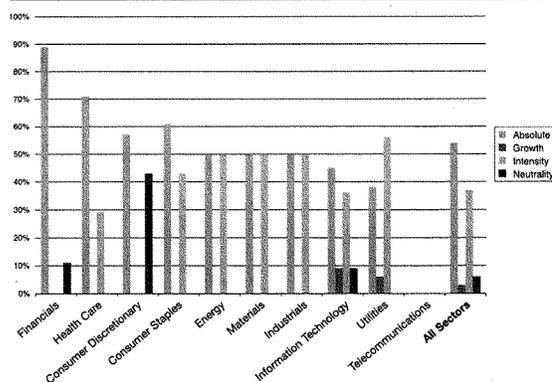
Johnson & Johnson, in partnership with the World Wildlife Fund, announced a goal in 1999 to reduce carbon dioxide emissions by 7% in absolute terms below 1990 levels by 2010. This goal includes all Scope 1 and Scope 2 emissions associated with its owned and controlled facilities worldwide.

Schering-Plough has established an absolute GHG emission reduction goal of 5% below 2002 levels by 2012, with the focus on stationary source emissions.

29% of respondents have set GHG targets; these include emission intensity targets as well as targets to reduce levels of absolute emissions

Most respondents with GHG reduction targets have chosen relatively short-term goals

Greenhouse Gas Target Types (for those setting targets)



To view individual company responses to CDP5, please visit www.cdproject.net

Several other pharmaceutical companies have set targets to reduce their GHG emissions intensity.

Baxter International set a goal to reduce its energy use and associated GHG emissions by 30% per unit of product value between 1996 and 2005, and achieved a 27% reduction over that time frame. In 2006, Baxter set a new goal that commits it to reduce its GHG emissions intensity by 20% between 2005 and 2010, indexed to sales.

Bristol Myers Squibb has established an enterprise-wide goal to reduce GHG emissions by 10% from 2001 to 2010, normalized to sales.

Eli Lilly has set a sales-related intensity goal to reduce its energy intensity and GHG emissions by one-third between 2003 and 2010. To date, it says, it has reduced its energy intensity by 13% and the intensity of its GHG emissions by 11%.

Pfizer aims to reduce the GHG emissions intensity by 35% between 2000 and 2007, relative to sales, as part of its participation in the EPA's Climate Leaders Program.

Merck also is working with the EPA's Climate Leaders Program to develop a GHG emissions reduction target.

Industrials

Several large industrial firms have set goals to reduce their absolute GHG emissions.

United Technologies has pledged a 12% absolute reduction in GHG emissions from 2007 to 2010.

General Electric, on the heels of the announcement of its 'ecomagination' campaign, pledged to reduce its total GHG emissions by 1% from a baseline of 2004 through 2012. It also pledged to cut the intensity of its emissions, relative to sales, by 30% by 2008.

Waste Management, as a founding member of the Chicago Climate Exchange, has committed to reduce its GHG emissions by 6% from 1998-2001 baseline emissions by 2010, including a 1% annual reduction from 2003 to 2006, and a 0.5% reduction from 2007 to 2010.

Information Technology

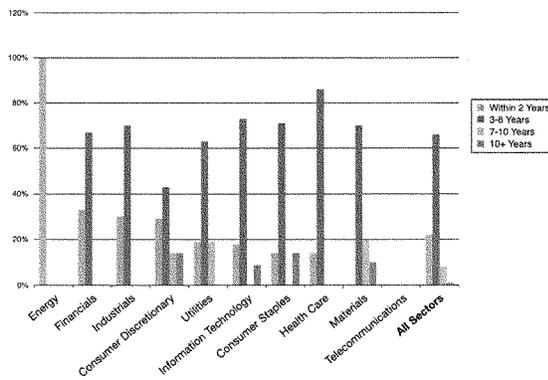
IBM has set a number of second-generation goals, including reducing CO₂ emissions associated with its energy use by 12% between 2005 and 2012, as part of its membership in the EPA's Climate Leaders Program. IBM has also agreed to reduce emissions of perfluorocarbons to 10% below 1995 levels by 2010, in line with the World Semiconductor Council's program to reduce emissions of this potent greenhouse gas. IBM also plans to cut CO₂ and PFC emissions in North America by 8% by 2010, as measured against annual average direct and indirect emissions over the period 1998 - 2001. This pledge comes under the Chicago Climate Exchange Phase II program.

Motorola has committed to achieve an absolute 6% reduction in its GHG emissions in 2000 - 2010, as part of its membership in the Chicago Climate Exchange. It has also pledged to decrease its normalized carbon footprint — including direct GHG emissions and indirect emissions from electricity use — by 15% between 2005 and 2010.

Intel plans to reduce its GHG emissions by 30% per unit of production between 2004 and 2010. It also is a member of the EPA's Climate Leaders Program and is a signatory to the World Semiconductor Council agreement to reduce emissions of PFCs.

Advanced Micro Devices (AMD) has pledged to reduce its energy intensity and GHG emissions intensity by 30% and 40%, respectively in 2002 - 2007, relative to production. AMD also plans to reduce PFC emissions by 50% between 1995 and 2010.

Greenhouse Gas Target Horizons (for those setting targets)



Dell has committed to reduce its GHG emissions intensity by 15% between 2006 and 2012 as part of its participation in the EPA's Climate Leaders Program.

Materials

Weyerhaeuser has set a long-term target to reduce its GHG emissions by 40% between 2000 and 2020. This is the most aggressive target in the forest products sector.

International Paper has set a goal of committing to reduce its GHG emissions by 15% in 2000 – 2010 as part of its participation in the Climate Leaders Program.

MeadWestvaco has set a target to cut its absolute emissions by 6% below 2002 levels by 2010 at its principal U.S. manufacturing facilities, as part of its participation in the Chicago Climate Exchange.

Alcoa has set a particularly ambitious target to reduce its direct GHG emissions to 25% below its 1990 baseline by 2010. It is working on several voluntary programs with regulatory authorities in the United States and Canada to reduce emissions from its smelters.

Dow has committed to a 2.5% per year reduction in the intensity of its GHG emissions per pound of produced product from 2005 to 2015. By 2025, Dow plans to halt the absolute growth of its GHG emissions and reduce them below its 1990 levels.

DuPont has set one of the most aggressive GHG reduction targets of any firm. In 1999, it established a GHG reduction goal of 65% from a 1990 baseline. By the end of 2003, it had reduced its GHG emissions by 72%. Taking divestitures into account, it says its total reductions were 56%. The company has further pledged that by 2015, it will reduce its GHG emissions by at least 15% from a base year of 2004.

Utilities

Several electric utilities, including **Constellation Energy** and **DTE Energy**, highlight their participation in a voluntary industry agreement to reduce sector-wide GHG emission intensity of electricity production by 3 – 5% by 2012, compared to average levels during 2000 to 2002.

Public Service Enterprise Group has gone a step further, committing to reduce its GHG emissions intensity by 18% between 2000 and 2008.

Energy in 2006 made its second five-year voluntary GHG stabilization commitment in partnership with Environmental Defense and Climate Leaders. It says it will stabilize CO₂ emissions from its power plants and from its controllable purchases of energy at 20% below 2000 levels from 2006 through 2010.

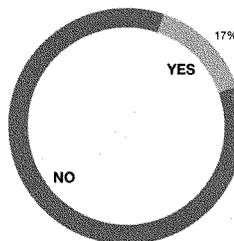
EMISSIONS TRADING

One other means that companies have to manage their GHG emissions is to enter markets where carbon credits can be bought and sold. Among S&P500 respondents to CDP's, this option has been used sparingly thus far. Only 36% of respondents say they have considered engaging in emissions trading, and just 17% have actually participated in any trades.

Utilities (78%), Materials firms (68%) and Energy firms (56%) are the most likely to have considered trading; half of the respondents in the Materials sector have traded already. Conversely, fewer than 20% of the respondents in the Consumer Discretionary, Information Technology and Telecommunications sectors report any consideration of emissions trading.

Most respondents' involvement in emissions trading has come as a result of the European Union's Emissions Trading

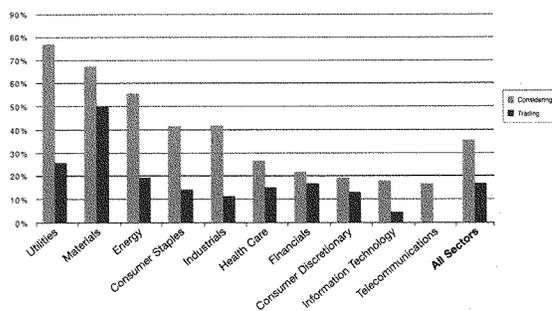
Respondents Trading Emissions



Scheme. This is a mandatory program for U.S. companies with facilities in Europe that are subject to GHG regulations under the Kyoto Protocol. A smaller percentage has participated in the voluntary Chicago Climate Exchange; credits bought and sold on this exchange do not count toward compliance with the Kyoto Protocol.

Only a handful of respondents have sought credits through the Clean Development Mechanism and Joint Implementation programs set up under the Kyoto Protocol.

Respondents Involvement in GHG Emissions Trading



GUEST COMMENTARY

Catching Up to Climate Change: Prospects for the Kyoto Protocol after 2012

by Dr. William R. Moomaw

Now that a consensus has emerged in government, business and among the public that climate change is happening, the debate has shifted to what can be done, and how much will it cost. The Kyoto Protocol expires in 2012, and requires only a miniscule 5% reduction in emissions below 1990 levels by the world's industrial nations. The United States, the world's leading annual and cumulative emitter of heat trapping gases, opted out of the Protocol's requirements and is now struggling to figure out how it can reenter the process, and meet the spirit of its commitments under the U.N. Framework Convention on Climate Change.

A massive transformation of our economy and energy sources will be needed in the next 50 years — but we have done it before

The cost of coastal damage from intense hurricanes is increasing, storm surges are becoming more intense and frequent as sea level rises; coastal infrastructure and trillions of dollars in beachfront property is in jeopardy as beaches erode; droughts and fires stalk the western United States and other countries; torrential downpours inundate communities and the free storage of fresh water in snowfields and glaciers is silently vanishing. We are learning that not paying for mitigation to slow climate change, and failing to adapt, leave us with major damage costs and much human suffering.

Europe and Japan are trying to meet their obligations under the Kyoto Protocol. In the United States, the voluntary and incremental actions taken to date by individuals, corporations, communities and states have provided some useful learning, but are scarcely enough to make the kind of difference that is required to avoid the worst climate impacts. To limit global warming to as little as 4° F in this century requires that all economies participate, but also that Americans and other industrial nations reduce their emissions 80% by the 2050s. This is equivalent to reductions of 3% per year (compounded) over the next half century. This sounds like a massive task to transform our economy and the energy sources that fuel it in such a short time.

But we have done it before just a century ago. In 1905, only 3% of American homes had electric lights, and Henry Ford had just introduced his first assembly line for the Model T car. Despite the fact that electricity cost

10 times more than gaslights did, and an automobile and the fuel to run it cost more than a horse and buggy, Americans made the change. Who could have imagined that 50 years later, electricity would be in most homes, and the automobile would profoundly transform mobility and lifestyles and create the suburbs?

Fast-forward to 2005, and we see that just under 3% of U.S. electricity was produced by non-hydro renewable technology, and highly efficient hybrid cars were still a curiosity. In the past 20 years, Denmark and some German states have shifted more than 20% of their electricity production to wind power. Is it so impossible to achieve such a radical technological and societal shift to low emitting homes, power plants, vehicles and industries by mid-century?

It is estimated that 80% of emissions come from cities, with half of that from our buildings and the electricity to power them. Given the large amount of underperforming buildings already in existence, a massive effort to upgrade their performance and standards for new construction can reduce energy requirements by half to two-thirds. Doubling and tripling the efficiency of electrical appliances is well within economic and technological capabilities. Over the next half-century most existing electrical power plants will have to be replaced, and the need for new ones can be dramatically reduced through improved efficiency in lighting and appliances.

Shifting to zero emitting renewable energy, and distributed combined heat and power systems can lower emissions and greatly reduce the cost of transmission and distribution, which accounts for more than half of our electrical power system investment. If coal is to continue to be used in existing or new power plants, the carbon dioxide emitted will need to be captured and stored for millennia in geological formations, depleted gas and oil fields, or else captured by algae or other photosynthesizing organisms to produce biofuels. Perhaps a new generation of nuclear power may make a contribution to future reductions in

Long-term reduction goals with intermediate benchmarks are needed to assure investors and companies that there is an enduring market for low-carbon energy supplies and energy-efficient equipment

Dr. William R. Moomaw

emissions if the problems of waste storage, weapons proliferation and vulnerability can be solved.

Finally, transportation emissions must be addressed through a combination of more efficient vehicles, and aircraft, through the use of low emission fuels, and by reducing the distance traveled through improved land use and transportation patterns. It is important to set long-term performance and adoption incentives rather than to dictate specific technologies.

So what is needed to induce such a massive transformation? The post-Kyoto agreement needs to set a framework, allocate responsibilities and then each nation must develop an appropriate system for implementation.

- First, there need to be long-term global emission reduction goals for the next 50-100 years with intermediate benchmarks to assure investors and companies that there is an enduring market for low emission energy supply systems and highly efficient appliances, lighting, vehicles and equipment.
- Second, there needs to be a set of policies that reward the most efficient and cleanest options while penalizing or restricting high emitting options.
- Third, all nations must participate in the process of lowering their emissions of heat trapping gases. In doing so, the development needs of developing countries must be recognized and technological innovations and financial instruments will need to be implemented that will allow them to develop without overburdening the atmosphere with heat trapping gases.
- Fourth, any agreement must address adaptation as well as mitigation and also the damages that will occur from the inevitable climate change that is already imbedded in our atmosphere and oceans.
- Fifth, to avoid the worst effects of climate change will require the mobilization of all policy tools available: international trade; the creation of new, climate dedicated international financing systems including possible tariffs on internationally traded fossil fuels and international travel; a Tobin type tax on currency exchanges to dampen speculation and raise revenue; an expanded Clean Development Mechanism with lower transaction costs and a reorientation of the World Bank and other regional Banks to finance only climate compatible projects.

Both developed and developing countries must address climate change as the central challenge to sustainable development rather than treating it merely as another pollution problem

The most critical change that is required is for both developed and developing countries to address climate change as the central challenge to sustainable development rather than treating it merely as another pollution problem. Structuring the rules to promote a more energy efficient economy that utilizes a much higher percentage of locally produced clean energy will also reduce air and water pollution, require less land degradation, increase energy and economic security and remove a source of resource based conflict.

— William R. Moomaw is Professor of International Environmental Policy and Director of the Center for International Environment and Resource Policy at the Fletcher School, Tufts University. He is the lead author of several reports by the Intergovernmental Panel on Climate Change addressing energy and energy efficiency issues.

8 Results of the CDP5 survey of S&P500 companies show that American industry is making progress in confronting the challenges posed by global warming, but hard work lies ahead.

Conclusion

More than half of S&P500 firms responded to the CDP5 survey. The increase in respondents to 56% represents a jump of almost 10 percentage points compared to the CDP4 survey results.

The highest-emitting sectors are providing the most disclosure. Electric utilities and Materials companies had the highest response rates and generated the best Climate Governance Index scores. Only the Consumer Discretionary sector had a response rate below 50%.

Management and directors are paying more attention to climate issues. Half of the S&P500 respondents have assigned board and/or upper-level management responsibility for overseeing climate-related issues. Two-thirds of respondents are tracking and have reported greenhouse gas emissions data. Four-fifths of respondents recognize commercial risks posed by climate change.

Results of the CDP5 survey are not uniformly positive, however. American industry still lags behind its international competitors in some key respects.

S&P500 firms lag the FT500 in responding to CDP. Three-quarters of the world's largest publicly traded companies (in the FT500) responded to CDP5, compared to 56% of the S&P500. However, the large increase in the S&P500 response rate this year is in line with historical trends for the FT500 survey.

Action to reduce emissions lags well behind climate awareness. Only 29% of S&P500 respondents have implemented GHG control programs with specific targets and timelines. Many of the targets set do not limit absolute emissions. The lack of federal GHG controls is clearly a factor in this low percentage.

Material effects of climate change remain largely undetermined and undisclosed. While most S&P500 respondents can identify regulatory and physical risks associated with climate change, few have attempted to quantify these risks in dollar terms or have discussed them in securities filings. In addition, carbon pricing is rarely factored into their capital investment decisions, even though such decisions typically require a multi-year planning process and have long payback periods.

Looking forward, three trends are clear.

Energy efficiency and renewables will be drivers of GHG emission reductions. The U.S. now rivals Europe in total annual investment in clean energy. More than one-third of S&P500 respondents are involved in renewable energy projects or purchases, and three-quarters are engaged in energy efficiency initiatives.

Much more investment will be required to achieve major cuts in GHG emissions over the next half-century. This will require a massive transformation of the global economy and a sustained commitment to low-carbon energy supplies and energy-efficient equipment.

Companies that are ahead of the curve support mandatory, market-based policies to achieve emission reductions. In embracing greenhouse gas controls, these companies know they will have greater certainty in their investment planning decisions and new business opportunities to exploit, giving them an edge over companies that hang on to business-as-usual strategies.

Four-fifths of respondents recognize commercial risks posed by climate change and two-thirds are tracking and have reported greenhouse gas emissions data. But less than a third have set GHG reduction targets

9 Appendices

Appendix I

Scores and Emissions

Company	Climate Governance Grade (%)	Emissions			Disclosure					
		Total Amount ¹	Rank ²	Intensity ³	Scope 1	Scope 2	Products	Supply Chain	Logistics & Distribution	Business Travel
3M	75	6,540	40	285	✓	✓				
Abbott Laboratories	29	415	112	18	✓	✓				
ACE Limited	13	-	-	-						
Adobe Systems	13	-	-	-						
Advanced Micro Devices	29	341	117	60	✓	✓				
AES	32	-	-	-						
Aetna	25	90	147	4	✓	✓				
Air Products & Chemicals	46	18,000	22	2,034	✓	✓				
Alcoa	75	60,100	8	1,978	✓	✓				
Allergan	36	92	146	30	✓	✓				
Altria Group	38	513	107	7	✓	✓				✓
American Electric Power	71	145,400	2	11,520	✓	✓				
American Express	17	-	-	-						
American International Group	42	273	123	2	✓	✓				✓
American Standard	46	932	84	83	✓	✓				
Anadarko Petroleum	46	5,331	43	523	✓	✓				
Anheuser-Busch	56	3,032	54	183	✓	✓				
Applied Materials	58	124	140	14	✓	✓				
Ashland	43	730	93	101	✓	✓				
Avery Dennison	21	-	-	-						
Avon Products	54	116	142	13						
Bank of America	63	1,380	70	12	✓	✓				
Baxter International	42	731	92	70	✓	✓		✓	✓	✓
BB&T	13	-	-	-						
Becton Dickinson	29	485	108	80	✓	✓				
Bed Bath & Beyond	17	-	-	-						
Bemis	25	681	96	187	✓	✓				
Black & Decker	29	295	120	46	✓	✓				
Boston Scientific	21	177	131	23	✓	✓				
Bristol Myers Squibb	50	996	83	56	✓	✓				✓
CA	25	47	155	12	✓	✓				
Carnival	25	9,005	34	761	✓	✓				
Caterpillar	43	2,343	62	56	✓	✓				
CB Richard Ellis Group	50	-	-	-						
Centerpoint Energy	36	-	-	-						
Charles Schwab	0	-	-	-						
Chevron	61	65,850	5	321	✓	✓	✓			
Cisco Systems	42	339	118	12	✓	✓				✓
Citigroup	75	1,367	69	9	✓	✓	✓			✓
Citizens Communications	17	-	-	-						
CMS Energy	39	-	-	-						
Coca Cola	44	4,666	46	202	✓	✓				✓
Coca-Cola Enterprises	38	-	-	-	✓	✓				
Colgate-Palmolive	46	672	97	55	✓	✓				
Comcast	0	-	-	-						
Comerica	13	-	-	-						
Comverse Technology	13	-	-	-						
ConocoPhillips	54	62,289	8	372	✓	✓				
Consolidated Edison	79	6,240	41	514	✓	✓				

continued

Appendix I Scores and Emissions *continued*

Company	Climate Governance Grade (%)	Emissions			Disclosure					
		Total Amount ¹	Rank ²	Intensity ³	Scope 1	Scope 2	Scope 3			
							Products	Supply Chain	Logistics & Distribution	Business Travel ⁴
Constellation Energy Group	50	20,800	19	1,079	✓					
Cooper Industries	17									
Corning	17	1,002	82	194	✓	✓				
Cummins	36	614	101	54	✓	✓				
Dell	33	384	114	7	✓	✓				
Devon Energy	29	-								
Dow Chemical	50	37,700	14	767	✓	✓				
Dow Jones	4	-								
DTE Energy	46	42,200	12	4,677	✓	✓				
Duke Energy	43	96,400	4	6,481	✓	✓				
E.I. du Pont de Nemours	93	12,100	29	427	✓	✓				
Eastman Chemical	25	-								
Eastman Kodak	67	2,350	60	177	✓	✓				
Eaton	29	835	87	67	✓	✓				
Ebay	17	-								
Ecolab	32	295	119	60	✓	✓				✓
Edison International	36	-			✓	✓				
El Paso	32	-								
Electronic Data Systems	50	46	156	2	✓	✓				✓
Eli Lilly	29	2,296	63	146	✓	✓				
Embarq	17	-								
EMC	33	264	124	24	✓	✓				
Emerson Electric	25	641	99	32	✓	✓				
Entergy	79	29,124	16	2,664	✓	✓				
Exelon	79	13,000	28	830	✓	✓				
Exxon Mobil	57	168,800	1	474	✓	✓				
Fidelity Nat'l Information Services	17	-								
Fifth Third Bancorp	13	778	90	96		✓				
First Horizon National	13	-								
FirstEnergy	46	46,761	11	4,066						
Ford Motor	75	5,800	38	42	✓	✓				
FPL Group	54	4,914	44	313	✓	✓				
Fredie Mac	29	41	159	1	✓					
Freeport-McMoran Copper & Gold	39	3,032	33	524	✓	✓				
General Dynamics	7	-								
General Electric	57	10,835	31	67	✓	✓				
General Mills	33	1,083	81	93	✓	✓				
General Motors	88	11,021	30	53	✓	✓				
Gilead Sciences	8	-								
H&R Block	13	-								
H.J. Heinz	17	901	85	100		✓				
Halliburton	32	3,150	52	140	✓	✓				
Hartford Financial Services Group	29	123	141	5	✓	✓				✓
Health Management Associates	0	-								
Hess	57	5,357	42	181	✓	✓				
Hewlett-Packard	73	1,599	67	17	✓	✓				✓
Hospira	63	284	121	106	✓	✓				
Humana	13	-								
Ingersoll-Rand	18	-								
Intel	29	3,870	49	109	✓	✓				
International Business Machines	63	2,824	56	31	✓	✓				
International Paper	61	14,766	26	671	✓	✓				
JC Penney	29	1,144	78	57	✓	✓				
Johnson & Johnson	54	810	88	15	✓	✓				
Johnson Controls	64	2,498	58	77	✓	✓	✓			✓
JP Morgan Chase	46	-								
Juniper Networks	38	30	160	13	✓	✓				✓
Kellogg	21	1,100	90	101	✓					
Keyspan	64	9,028	33	1,257	✓					
Kimberly-Clark	36	6,849	37	409	✓	✓				
Kroger	4	-								
Lexmark International	38	204	129	40	✓	✓				✓
Marathon Oil	43	19,590	21	327	✓	✓				
Marsh & McLennan	29	165	133	14						✓

Appendix I Scores and Emissions *continued*

Company	Climate Governance Grade (%)	Emissions			Disclosure					
		Total Amount ¹	Rank ²	Intensity ³	Scope 1	Scope 2	Products	Supply Chain	Scope 3 Logistics & Distribution	Business Travel
Masco	50	-								
Mattel	21	99	145	18						
MBAIA	13	-								
McKesson	13	42	157	0		✓				
MeadWestVaco	61	3,467	51	531	✓	✓				
Medco Health Solutions	21	61	152	1		✓				
Merck	39	1,146	77	51	✓	✓			✓	
Merrill Lynch	75	214	127	3	✓	✓				✓
MGIC Investment	13	-								
Microsoft	42	153	136	3	✓	✓				✓
Millipore	25	61	151	48	✓	✓				
Molex	17	-								
Molson Coors Brewing	33	1,179	76	202	✓	✓				
Monsanto	36	1,901	65	259	✓	✓				✓
Morgan Stanley	75	212	128	3	✓	✓	✓			✓
Motorola	63	383	115	9	✓	✓				✓
National Semiconductor	38	277	122	143	✓	✓				
NCR	17	-								
Newmont Mining	29	5,875	48	777	✓	✓				
News Corp.	79	582	103	23	✓	✓				✓
Nicor	21	-								
Nike	54	78	148	5	✓	✓				✓
Nisource	50	21,755	18	2,905	✓	✓	✓			
Northern Trust	33	66	150	15	✓	✓				✓
Northrop Grumman	32	-								
NVIDIA	33	18	165	6	✓	✓				✓
Occidental Petroleum	48	16,220	24	918	✓	✓				
Office Depot	42	461	109	31	✓	✓		✓		
Parametric Technology	4	-								
Pepsi Bottling Group	25	-								
PepsiCo	25	-								
PerkinElmer	29	59	153	38	✓	✓				
Pfizer	50	2,408	59	50	✓	✓				✓
PG&E	54	4,144	47	330	✓	✓				
Phelps Dodge*	39	1,257	73	106	✓	✓				
Pinnacle West Capital	57	17,808	23	5,235	✓	✓				
PMC-Sierra	21	-								✓
PNC Financial Services Group	13	-								
PPG Industries	39	6,690	39	604	✓	✓				
PPL	39	30,300	15	4,392	✓	✓				
Praxair	50	13,107	27	1,575	✓	✓			✓	
Procter & Gamble	39	2,889	55	42						
Progress Energy	46	53,580	9	5,599	✓					
Progressive	13	-								
ProLogis	46	6	170	-	✓	✓				✓
Public Service Enterprise Group	39	25,176	17	2,070	✓	✓				
QUALCOMM	33	56	154	7	✓	✓				
Questar	46	2,000	64	705						
Qwest Communications	17	-								
Raytheon	39	705	95	35	✓	✓				
Rockwell Automation	33	169	132	30	✓	✓				
Rockwell Collins	21	134	138	35	✓	✓				
Safeco	17	-								
Sanmina-SCI	17	-								
Sara Lee	25	-								
Schering Plough	57	579	104	55	✓	✓				
Sempra Energy	57	-								
Sherwin-Williams	21	616	100	79	✓	✓				
Simon Property Group	29	575	105	167	✓	✓				
Southern	43	145,000	3	10,100	✓	✓				
Staples	60	381	116	21	✓	✓				
Starbucks	19	-								
Starwood Hotels & Resorts	21	129	139	22			✓			
State Street	38	67	149	7	✓	✓				✓

Appendix I Scores and Emissions *continued*

Company	Climate Governance Grade (%)	Emissions			Disclosure					
		Total Amount ¹	Rank ²	Intensity ³	Scope 1	Scope 2	Scope 3			
							Products	Supply Chain	Logistics & Distribution	Business Travel
Sun Microsystems	63	255	125	20	✓	✓				
Symantec	29	42	158	8		✓				✓
Synovus Financial	13	-	-	-						
Target	33	2,634	57	44	✓	✓				
Tektronix	29	29	161	26	✓	✓				✓
Teradyne	25	19	163	14	✓	✓				
Travelers	21	-	-	-						
Tyco International	14	-	-	-						
Unisys	33	163	194	28	✓	✓				✓
United Parcel Services	46	7,373	35	155	✓	✓		✓		
United States Steel	39	48,500	10	3,086	✓	✓				
United Technologies	75	2,345	61	49	✓	✓				✓
Verizon Communications	29	7,171	36	81	✓	✓				
Wachovia	42	-	-	-						
Wal-Mart Stores	71	20,389	20	59	✓	✓				
Walt Disney	13	-	-	-						
Washington Mutual	17	-	-	-						
Wells Fargo	29	551	106	11	✓	✓				
Weyerhaeuser	68	10,700	32	489	✓	✓				
Williams Companies	25	-	-	-						
William Wrigley Jr.	17	220	126	47		✓				
Wyeth	32	1,107	79	54	✓	✓				
Xcel Energy	64	62,209	7	6,322	✓	✓				
Xerox	54	448	110	28	✓	✓				
XTO Energy	29	3,719	50	812	✓	✓				
Yahoo!	46	-	-	-						
Zimmer	13	-	-	-						

Emissions are for latest period reported (usually 2006). Where no checkmark appears under Disclosure, the company did not break down emissions according to GHG Protocol Scopes 1, 2 and 3. Twenty-nine companies, listed below, provided emissions data but did not make their CDP5 responses public; their emissions data all included in aggregate rankings but not disclosed individually.

¹Scopes 1 and 2, or total global emissions where companies reported only a total figure; units in thousand metric tonnes of CO₂e.

²Rank in descending order of Scope 1 and 2 total emissions; Scope 3 reporting not included.

³Scope 1 and 2 emissions totals divided by annual revenue.

⁴Now part of Freeport-McMoRan

CDP5 emissions reported but response not made public

- | | |
|----------------------|---------------------------|
| Agilent Technologies | Lehman Brothers Holdings |
| Allegheny Energy | McDonalds |
| Amgen | Navistar International |
| AT&T | Parker Hannifin |
| Ball | Prudential Financial |
| Bank of New York | Reynolds American |
| Boeing | Rohm and Haas |
| Convergys | Schlumberger |
| CR Bard | Sealed Air |
| Danaher | SYSCO |
| FedEx | Transocean |
| Forest Laboratories | Waste Management |
| Genzyme | Weatherford International |
| Goldman Sachs Group | Xilinx |
| JTT | |

Appendix II

CDP5 Questionnaire

Carbon Disclosure Project (CDP5) Greenhouse Gas Emissions Questionnaire

We request a reply to the following questions by the 31st May 2007. Please answer the questions as comprehensively as possible or state the reasons why you are unable to supply the information requested. If at this stage you can only provide indicative information we still welcome this, as a 'best guess' is more valuable to us than no response.

One of the main objectives this year is to improve the quality of the responses and standardize reporting to facilitate better comparison of data across and within sectors. We therefore request that answers to the following questions are provided for your company as defined in your consolidated audited financial statements. If you are unable to respond on this basis, please explain why and detail the reporting boundaries you have used.

We recognize GHG emissions and climate change have varying impacts on sectors and companies. We have therefore divided the questionnaire into two sections to reflect these differences. Companies are encouraged to answer both parts of the questionnaire where relevant.

Section A: For all companies to complete.

Section B: For the following companies to complete:

1. Companies with combustion installations with a rated thermal input exceeding 20 MW.
2. Companies involved in the following sectors:
 - automobiles & components
 - aerospace & defense
 - chemicals
 - construction materials
 - electric utilities
 - energy equipment & services
 - oil, gas & consumable fuels
 - metals & mining
 - paper & forest products
 - transportation
3. Companies in any sector that may be significantly influenced by GHG emissions or climate change.

New procedures for CDP in 2007.

Please use our website for direct data entry via www.cdproject.net/cdp5. If necessary, send your response electronically in English to the Project Coordinator at info@cdproject.net.

Your response will be made publicly available at www.cdproject.net in September 2007, unless you notify us to the contrary. If you inform us that you do not want your information disclosed, we will only use it in production of aggregate statistics.

For additional guidance and information please see the Further Information attached to this questionnaire, or refer to the Reporting Guidance section at www.cdproject.net.

Section A: For all companies to complete**1 Climate Change Risks, Opportunities and Strategy**

For each question please state the time period and where possible the associated financial implications.

- a Risks:** What commercial risks does climate change present to your company including, but not limited to, those listed below?
- i Regulatory risks associated with current and/or expected government policy on climate change e.g. emissions limits or energy efficiency standards.
 - ii Physical risks to your business operations from scenarios identified by the Intergovernmental Panel on Climate Change or other expert bodies, such as sea level rise, extreme weather events and resource shortages.
 - iii Other risks including shifts in consumer attitude and demand.
- b Opportunities:** What commercial opportunities does climate change present to your company for both existing and new products and services?
- c Strategy:** Please detail the objectives and targets of the strategies you have undertaken or are planning to take to manage these risks and opportunities. Please include adaptation to physical risks.
- d Reduction targets:** What are your emissions reduction targets and time frames to achieve them? What renewable energy and energy efficiency activities are you undertaking to manage your emissions? (This question not required if answering Section B.)

2 Greenhouse Gas Emissions Accounting¹

- a Methodology:** Please provide the following information on your company's emissions measurements:
- i The accounting year used to report GHG emissions.²
 - ii The methodology by which emissions are calculated.
 - iii Whether the information provided has been externally verified or audited.
 - iv An explanation for any significant variations in emissions from year to year, e.g. due to major acquisitions, divestments, introduction of new technologies, etc.
- b Scope 1 and 2 of GHG Protocol:** Direct and Indirect GHG emissions and electricity consumption.³
Please complete the table below for tonnes CO₂e emitted and electricity consumption:

	Globally	Annex B Countries
Scope 1 activity tonnes CO ₂ e emitted		
Scope 2 activity tonnes CO ₂ e emitted		
MWh of purchased electricity		
Percentage of purchased MWh from renewables		

- c Scope 3 of GHG Protocol:** Other Indirect GHG emissions. Where feasible please provide estimates for the following categories of emissions:
- i Use/disposal of company's products and services.
 - ii Your supply chain.
 - iii External distribution/logistics.
 - iv Employee business travel.

¹ The six main Greenhouse Gases are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).

² If you are responding to CDP for the first time, please provide details where available, of emissions for the last three measurement cycles.

³ For the purposes of responding to this section, please follow the World Resources Institute (WRI), World Business Council for Sustainable Development's (WBCSD's) Greenhouse Gas Protocol (corporate standard revised version), details of which can be found at www.ghgprotocol.org

Section B: To be completed by companies defined in the introduction to this questionnaire

3 Additional Greenhouse Gas Emissions Accounting

Using the methodology as set out in 2(a), please state your Scope 1 and 2 emissions as follows:

- a **Countries:** For each country in which you have operations, where available.
- b **Facilities:** For facilities covered by the EU Emissions Trading Scheme (EU ETS). Please also include the number of allowances you were issued under the applicable National Allocation Plans.
- c **EU ETS impact:** What has been the impact on your profitability of the EU Emissions Trading Scheme?

4 Greenhouse Gas Emissions Management

- a **Reduction programmes:** What emission reduction programs does your company have in place? Please include any reduction programs related to your operations, energy consumption, supply chain and product use/disposal.
 - i What is the baseline year for the emissions reduction program?
 - ii What are the emissions reduction targets and over what period do those targets extend?
 - iii What investment has been/will be required to achieve the targets and over what time period?
 - iv What emissions reductions and associated costs or savings have been achieved to date as a result of the program?
 - v What renewable energy and energy efficiency activities are you undertaking to manage your emissions?
- b **Emissions trading:** What is your company's strategy for trading in the EU Emissions Trading Scheme, CDM/JI projects and other trading systems (e.g. CCX, RGGI, etc), where relevant?
- c **Emissions intensity:** Please state which measurement you believe best describes your company's emissions intensity performance? What are your historical and current emissions intensity measurements? What are your targets?
- d **Energy costs:** What are the total costs of your energy consumption e.g. from fossil fuels and electric power? What percentage of your total operating costs does this represent?
- e **Planning:** Do you estimate your company's future emissions? If so please provide details of these estimates and summarize the methodology for this. How do you factor the cost of future emissions into capital expenditure planning? Have these considerations made an impact on your investment decisions?

5 Climate Change Governance

- a **Responsibility:**
 - i Which Board Committee or other executive body has overall responsibility for climate change?
 - ii What is the mechanism by which the Board or other executive body reviews the company's progress and status regarding climate change?
 - b **Individual performance:** Do you provide incentive mechanisms for managers with reference to activities relating to climate change strategy, including attainment of GHG targets? If so, please provide details.
-

Appendix III

S&P500 Company Responses to CDP4 & 5

Company	CDP4	CDP5	Company	CDP4	CDP5	Company	CDP4	CDP5
3M	AQ	AQ*	AutoZone	NR	NR	Coca-Cola Enterprises	AQ	AQ*
Abbott Laboratories	AQ	AQ*	Avaya Communications	AQ	AQ* (NP)	Cognizant Technology Solutions	NI	NR
ACE	NR	AQ*	Avery Dennison	AQ	AQ*	Colgate-Palmolive	AQ	AQ*
ADC Telecommunications	NR	AQ* (NP)	Avon Products	AQ	AQ*	Comcast	AQ	AQ*
Adobe Systems	AQ	AQ*	Baker Hughes	AQ	AQ* (NP)	Comerica	NR	NR
Advanced Micro Devices	NR	AQ*	Ball	NR	AQ* (NP)	Commerce Bancorp	NI	NR
AES	AQ	AQ*	Bank of America	AQ	AQ*	Compass Bancshares	NR	NR
Aetna	AQ	AQ*	Bank of New York	AQ	AQ* (NP)	Computer Sciences	NR	NR
Aflac	DP	NR	Bar Pharmaceuticals	NI	NR	Compusera	NR	NR
Agilent Technologies	IN	AQ* (NP)	Bausch & Lomb	AQ	DP	Converse Technology	NR	AQ*
Air Products & Chemicals	AQ	AQ*	Baxter International	AQ	AQ*	ConAgra Foods	NR	NR
Alcoa	AQ	AQ*	BB&T	AQ	AQ*	ConocoPhillips	AQ	AQ*
Allegheny Energy	DP	AQ* (NP)	Bear Stearns	NR	NR	CONSOL Energy	NI	NR
Allegheny Technologies	IN	AQ* (NP)	Becton Dickinson	AQ	AQ*	Consolidated Edison	AQ	AQ*
Allergan	AQ	AQ*	Bed Bath & Beyond	IN	AQ*	Constellation Brands	NR	DP
Allied Waste Industries	NR	NI	Bemis	NR	AQ*	Constellation Energy Group	AQ	AQ*
Alstare	NR	DP	Best Buy	AQ	AQ* (NP)	Convergys	AQ	AQ* (NP)
Altel	AQ	AQ* (NP)	Big Lots	NR	DP	Cooper Industries	AQ	AQ*
Altera	DP	AQ	Biogen Idec	NR	NR	Corning	AQ	AQ*
Altria Group	DP	AQ*	Bionet	NR	DP	Costco Wholesale	NR	DP
Amazon.com	NR	NR	BJ Services	NR	NR	Countrywide Financial	DP	DP
Ambac Financial Group	NR	NR	Black & Decker	DP	AQ*	Coverity Health Care	NR	NR
Ameron	IN	DP	SMC Software	AQ	AQ* (NP)	CR Bard	AQ	AQ* (NP)
American Electric Power	AQ	AQ*	Boeing	AQ	AQ* (NP)	CSX	NR	NR
American Express	AQ	AQ*	Boston Properties	NI	NR	Cummins	AQ	AQ*
American International Group	AQ	AQ*	Boston Scientific	IN	AQ*	CVS Caremark	NR	AQ* (NP)
American Standard	AQ	AQ*	Bristol Myers Squibb	AQ	AQ*	Danaher	AQ	AQ* (NP)
Ameriprise Financial	NR	DP	Broadcom	NR	DP	Darden Restaurants	IN	NR
AmerisourceBergen	NR	NR	Brown-Forman	NR	NR	Darden Foods	NI	NR
Amgen	AQ	AQ* (NP)	Brunswick	NR	DP	Deere	IN	IN
Anadarko Petroleum	AQ	AQ*	Burlington Northern Santa Fe	AQ	AQ*	Dell	AQ	AQ*
Analog Devices	AQ	NR	CA	AQ	AQ*	Devon Energy	AQ	AQ*
Anheuser-Busch	IN	AQ*	Campbell Soup	NR	DP	Dillard's	NR	NR
Aon	AQ	AQ	Capital One Financial	DP	IN	DIRECTV Group	DP	DP
Apache	AQ	AQ	Cardinal Health	AQ	DP	Dollar General	NR	DP
Apartment Investment & Management	NR	DP	Carnival	AQ	AQ*	Dominion Resources	IN	IN
Apollis Group	NR	NR	Caterpillar	AQ	AQ*	Dover	NR	DP
Apple Computers	AQ	NR	CB Richard Ellis Group	NI	AQ*	Dow Chemical	AQ	AQ*
Appera	AQ	DP	CBS	NI	DP	Dow Jones	NR	AQ*
Applied Materials	AQ	AQ*	Celgene	NI	NR	DR Horton	NR	IN
Archer Daniels Midland	DP	DP	Centerpoint Energy	AQ	AQ*	DTE Energy	AQ	AQ*
Archstone-Smith Trust	DP	DP	Centex	IN	NR	Duke Energy	AQ	AQ*
Ashland	AQ	AQ*	CenturyTel	NR	DP	Dynegy	IN	IN
AT&T	AQ	AQ* (NP)	Charles Schwab	IN	AQ*	E*TRADE Financial	NR	NR
Autodesk	NR	NR	Chesapeake Energy	NI	NR	E. W. Scripps	NI	NI
Automatic Data Processing	IN	IN	Chevron	AQ	AQ*	E.I. du Pont de Nemours	AQ	AQ*
AutoNation	NR	DP	Chicago Mercantile Exchange Hldgs	NI	AQ* (NP)	Eastman Chemical	AQ	AQ*
			Chubb	DP	DP	Eastman Kodak	AQ	AQ*
			CIGNA	AQ	AQ* (NP)	Easton	AQ	AQ*
			CIGNA	IN	AQ	Ebay	AQ	AQ*
			Cincinnati Financial	IN	AQ* (NP)	Ecolab	AQ	AQ*
			Cintas	NR	DP	Edison International	IN	AQ*
			Circuit City Stores	NR	NR	EI Paso	DP	AQ*
			Cisco Systems	AQ	AQ*	Electronic Arts	DP	DP
			CIT Group	NR	NR	Electronic Data Systems	NR	AQ*
			Citigroup	AQ	AQ*	ELI Lilly	AQ	AQ*
			Citizens Communications	NR	AQ*	Embarq	NI	AQ*
			Citrix Systems	AQ	NR	EMC	IN	AQ*
			Clear Channel Communications	AQ	NR	Emerson Electric	AQ	AQ*
			Clorox	NR	DP	Entergy	AQ	AQ*
			CMS Energy	DP	AQ*	EOG Resources	DP	AQ
			Cooper	NR	DP	Equifax	NR	DP
			Coca Cola	AQ	AQ*	Equity Residential	NR	NR

Key:

AQ Answered Questionnaire
 IN Provided Information (but did not answer questions)
 DP Declined to Participate
 NR No Response
 NI Not in Sample
 NP Response Not Public

Company	CDP4	CDP5	Company	CDP4	CDP5
Estee Lauder	NI	NR	KryCorp	NR	NR
Exxon	AQ	AQ*	Keyspan	AQ	AQ*
Express Scripts	NR	NR	Kimberly-Clark	AQ	AQ*
Exxon Mobil	AQ	AQ*	Kimco Realty	NI	NR
Family Dollar Stores	NR	NR	King Pharmaceuticals	NR	NR
Fannie Mae	DP	DP	KLA-Tencor	NR	NR
Federated Department Stores	IN	NR	KOZs	NR	NR
Federated Investors	AQ	AQ	Kroger	IN	AQ*
FedEx	AQ	AQ* (NP)	L3 Communications Holdings	NR	NR
Fidelity National Information Svcs	NI	AQ*	Laboratory Corp. of America Holdings	NR	NR
Fifth Third Bancorp	NR	AQ*	Legg Mason	NI	DP
First Data	NR	DP	Leggett & Platt	IN	DP
First Horizon National	AQ	AQ*	Lehman Brothers Holdings	DP	AQ* (NP)
FirstEnergy	AQ	AQ*	Lennar	NR	NR
Flisrv	AQ	AQ* (NP)	Luxmark International	AQ	AQ*
Fluor	NR	AQ	Limited Brands	NR	NR
Ford Motor	AQ	AQ*	Lincoln National	DP	DP
Forest Laboratories	AQ	AQ* (NP)	Linear Technology	NR	NR
Fortune Brands	IN	DP	Liz Claiborne	AQ	AQ* (NP)
FPL Group	AQ	AQ*	Lockheed Martin	IN	IN
Franklin Resources	NR	DP	Loews	NR	NR
Freddie Mac	IN	AQ*	Lowe's	IN	DP
Fresport-McMoran Copper & Gold	NR	AQ*	LSI Logic	NR	AQ*
Gannett	DP	DP	IMT Bank	NR	AQ* (NP)
Gap	AQ	AQ	Manor Care	NR	NR
General Dynamics	IN	AQ*	Marathon Oil	AQ	AQ*
General Electric	AQ	AQ*	Marriott International	AQ	NR
General Mills	AQ	AQ*	Marsh & McLennan	AQ	AQ*
General Motors	AQ	AQ*	Marshall & Isley	AQ	AQ* (NP)
Genuine Parts	NR	DP	Masco	AQ	AQ*
Genworth Financial	NI	AQ* (NP)	Mathel	NR	AQ*
Genzyme	AQ	AQ* (NP)	Maxim Integrated Products	AQ	NR
Gilead Sciences	AQ	AQ*	MBIA	AQ	AQ*
Goldman Sachs	AQ	AQ* (NP)	McCormick	NR	AQ* (NP)
Goodrich	NR	NR	McDonald's	AQ	AQ* (NP)
Goodyear Tire & Rubber	AQ	AQ* (NP)	McGraw-Hill	IN	IN
Google	NR	AQ* (NP)	McKesson	IN	AQ*
H&R Block	AQ	AQ*	MeadWestVaco	AQ	AQ*
H.J. Heinz	AQ	AQ*	Medco Health Solutions	IN	AQ*
Halliburton	AQ	AQ*	Medtronic	AQ	AQ* (NP)
Harley-Davidson	NR	DP	Mellon Financial	AQ	DP
Harman International Industries	NI	DP	Merck	AQ	AQ*
Harrar's Entertainment	NR	NR	Meredith	DP	DP
Hartford Financial Services Group	IN	AQ*	Merrill Lynch	AQ	AQ*
Hasbro	NR	NR	Mettle	DP	NR
Health Management Associates	NR	AQ*	MGIC Investment	AQ	AQ*
Hercules	NR	IN	Micon Technology	NR	NR
Hershey	NR	NR	Microsoft	AQ	AQ*
Hess	AQ	AQ*	Millipore	AQ	AQ*
Hewlett-Packard	AQ	AQ*	Molex	IN	AQ*
Hilton Hotels	NR	NR	Molson Coors Brewing	AQ	AQ*
Home Depot	AQ	AQ* (NP)	Monsanto	IN	AQ*
Honeywell International	IN	IN	Monster Worldwide	NR	NR
Hospira	AQ	AQ*	Moody's	IN	AQ* (NP)
Humana	AQ	AQ*	Morgan Stanley	AQ	AQ*
Huntington Bancshares	AQ	AQ* (NP)	Motorola	AQ	AQ*
IAC/InteractiveCorp	NI	DP	Murphy Oil	NR	NR
Illinois Tool Works	AQ	AQ* (NP)	Mylan Laboratories	NR	NR
IMS Health	NR	NR	Nabors Industries	NR	NR
Ingersoll-Rand	IN	AQ*	National City	AQ	AQ* (NP)
Intel	AQ	AQ*	National Oilwell Varco	NR	NR
International Business Machines	AQ	AQ*	National Semiconductor	NR	AQ*
International Flavors & Fragrances	NR	NR	Navistar International	AQ	AQ* (NP)
International Game Technology	NR	NR	NCR	AQ	AQ*
International Paper	AQ	AQ*	Network Appliance	NR	NR
Interpublic Group	NR	IN	New York Times	AQ	NR
Intuit	NR	NR	Newell Rubbermaid	NR	AQ* (NP)
ITT	AQ	AQ* (NP)	Newmont Mining	AQ	AQ*
Jabil Circuit	NR	AQ* (NP)	News	IN	AQ*
Janus Capital Group	DP	AQ* (NP)	Nicor	AQ	AQ*
JC Penney	AQ	AQ*	Nike	AQ	AQ*
JDS Uniphase	DP	DP	Nisource	AQ	AQ*
Johnson & Johnson	AQ	AQ*	Noble	AQ	DP
Johnson Controls	AQ	AQ*	Nordstrom	NR	NR
Jones Apparel Group	NR	NR	Norfolk Southern	IN	DP
JP Morgan Chase	AQ	AQ*	Northern Trust	AQ	AQ*
Juniper Networks	AQ	AQ*	Northrop Grumman	AQ	AQ*
KB Home	IN	IN	Novell	NR	NR
Kellogg	AQ	AQ*	Novellus Systems	AQ	NR

Appendices

Company	CDP4	CDP5
Nucor	NR	DP
NVIDIA	NR	AQ*
Occidental Petroleum	AQ	AQ*
Office Depot	AQ	AQ*
OfficeMax	NR	NR
Omnicom Group	AQ	AQ* (NP)
Oracle	AQ	AQ
PACCAR	NR	NR
Pactiv	NR	DP
Pall	NR	DP
Parametric Technology	NR	AQ*
Parker Hannifin	AQ	AQ* (NP)
Patterson	NR	NR
Paycom	DP	NR
Peabody Energy	NI	NI
Pepper Bottling Group	NR	AQ*
PepperCo	AQ	AQ*
PerkinElmer	AQ	AQ*
Pfizer	AQ	AQ*
PG&E	AQ	AQ*
Phelps Dodge ¹	AQ	AQ*
Phinacle West Capital	AQ	AQ*
Philly Bowler	NR	DP
Plum Creek Timber	NR	NR
PMC-Sierra	NR	AQ*
PNC Financial Services Group	AQ	AQ*
PPG Industries	AQ	AQ*
PPL	AQ	AQ*
Praxair	AQ	AQ*
Principal Financial Group	NR	NR
Procter & Gamble	AQ	AQ*
Progress Energy	AQ	AQ*
Progressive	DP	AQ*
ProLogis	AQ	AQ*
Prudential Financial	DP	AQ* (NP)
Public Service Enterprise Group	AQ	AQ*
Public Storage	NR	NR
Public Homes	NR	NR
QLogic	NR	DP
QUALCOMM	AQ	AQ*
Quest Diagnostics	NR	NR
Questar	NI	AQ*
Qwest Communications International	AQ	AQ*
R.F. Donnelley & Sons	NR	NR
Radioshack	NR	DP
Raytheon	AQ	AQ*
Regions Financial	DP	NR
Reynolds American	NR	AQ* (NP)
Robert Half International	IN	IN
Rockwell Automation	NR	AQ*
Rockwell Collins	AQ	AQ*
Rollin and Hase	AQ	AQ* (NP)
Rouse	NR	NR
Ryder System	IN	DP
Safeco	AQ	AQ*
Safeway	NR	NR
Sandisk	NI	DP
Sarmaha-SCI	AQ	AQ*
Sara Lee	AQ	AQ*
Schering Plough	AQ	AQ*
Schlumberger	AQ	AQ* (NP)
Sealed Air	IN	AQ* (NP)
Sears Holdings	DP	DP
Sempra Energy	AQ	AQ*
Shawin-Williams	AQ	AQ*
Sign-A-Rama	AQ	NR
Simon Property Group	AQ	AQ*
SLM	DP	DP
Smith International	NI	NR
Snap-on	NR	NR
Sollectron	NR	NR
Southern	AQ	AQ*
Southwest Airlines	IN	DP
Sovereign Bancorp	AQ	NR
Sprint Nextel	IN	NR
St. Jude Medical	DP	DP
Stanley Works	NR	NR
Staples	AQ	AQ*
Starbucks	AQ	AQ*

¹Now owned by Freeport McMoran Copper & Gold
^{*}Included in report analysis. A few companies also submitted amended responses after the analysis cut-off date; these and other late responses, if public, appear on the CDP website.

Company	CDP4	CDP5
Starwood Hotels & Resorts Worldwide	NR	AQ*
State Street	AO	AQ*
Stryker	AO	NR
Sun Microsystems	NR	AQ*
Sunoco	NR	NR
SunTrust Banks	IN	DP
SUPERVALU	NR	NR
Symantec	NR	AQ*
Synovus Financial	AO	AQ*
SYSCO	IN	AQ* (NP)
T. Rowe Price Group	AO	AQ* (NP)
Target	AO	AQ*
Teco Energy	AO	IN
Tektronix	AO	AQ*
Tollatec	NR	NR
Temple-Inland	NR	DP
Tenet Healthcare	IN	IN
Teradyne	NR	AQ*
Texas Instruments	AO	AQ* (NP)
Textron	NR	NR
Thermo Fisher Scientific	NI	NR
Tiffany	AO	AQ* (NP)
Time Warner	IN	IN
TJX	NR	IN
Torchmark	NR	NR
Transocean	AO	AQ* (NP)
Travelers	AO	AQ*
Tribune	NR	IN
TXU	AO	NR
Tyco International	IN	AQ*
Tyson Foods	DP	DP
U.S. Bancorp	AO	NR
Union Pacific	IN	NR
Unilever	AO	AQ*
United Parcel Services	AO	AQ*
United States Steel	AO	AQ*
United Technologies	AO	AQ*
UnitedHealth Group	AO	AQ* (NP)
UnumProvident	AO	NR
UST	NR	NR
Valero Energy	AO	NR
Verisign	NI	NR
Verizon Communications	AO	AQ*
VF	NR	NR
Viacom	AO	AQ* (NP)
Vornado Realty Trust	NR	NR
Vulcan Materials	NR	NR
W.W. Grainger	AO	IN
Wachovia	AO	AQ*
Walgreens	IN	IN
Wal-Mart Stores	AO	AQ*
Walt Disney	AO	AQ*
Washington Mutual	AO	AQ*
Waste Management	AO	AQ* (NP)
Waters	NR	DP
Watson Pharmaceuticals	NR	NR
Weatherford International	NR	AQ* (NP)
WellPoint	DP	DP
Wells Fargo	AO	AQ*
Wendy's International	NR	NR
Western Union	NI	DP
Weyerhaeuser	AO	AQ*
Whitpool	NR	NR
Whole Foods Market	NI	IN
William Wrigley Jr.	AO	AQ*
Williams Companies	AO	AQ*
Windstream	NI	DP
Wyeth	AO	AQ*
Wyndham Worldwide	NI	AQ* (NP)
Xcel Energy	AO	AQ*
Xerox	AO	AQ*
Xilinx	AO	AQ* (NP)
XL Capital	NR	NR
XTO Energy	NR	AQ*
Yahoo!	NR	AQ*
Yum! Brands	NR	NR
Zimmer	AO	AQ*
Zions Bancorporation	AO	AQ* (NP)

In addition to the support of the signatories, CDP has been made possible through the generous funding of:

Esmée Fairbairn Foundation, Food and Rural Affairs, Martin Smith Foundation, Oak Foundation, Polden Puckham Charitable Foundation, Rufus Leonard, The City Bridge Trust, The Department for Environment Food and Rural Affairs, The Nathan Cummings Foundation and WWF.



CDP would like to thank Merrill Lynch for sponsoring our expansion to the S&P500 companies in 2007 and for contributing towards this report.



Acknowledgements

RiskMetrics is grateful to all the guest authors for the generous contributions of their time, and to CDP staff for their leadership and dedication to this important initiative.

Doug Cogan and Heidi Welsh are the lead authors of this study. Cogan led the study's analysis and devised the scoring methodology for the Climate Governance Index. Welsh built and managed the database used to analyze CDP responses and operationalized the scoring system. Peter DeSimone authored the section on greenhouse gas emissions management. Geri Kantor authored the section on climate risk disclosure. Alan Sotelo and Hazel Lalas led Rainier Quilao, Joel Yamut and Niko Santos in collecting Form 10-K climate risk disclosure information. Meg Voorhes and Susan Williams analyzed CDP5 responses; Voorhes also edited sections of the report.

RiskMetrics Group is a leading provider of risk management, corporate governance and financial research solutions. It offers a multi-dimensional view into the risk profile of a company, enabling investors to more effectively manage multiple classes of interrelated risk. The company is headquartered in New York City with more than 1,000 employees across 23 offices worldwide. For more information on RiskMetrics Group, please visit www.riskmetrics.com.



The Carbon Disclosure Project's sincere thanks are extended to the following:

Brooklyn Bridge, www.tbli.org • California Climate Action Registry, www.climateregistry.org • CERES, www.ceres.org • Clifford Chance, www.cliffordchance.com • Enhanced Analytics Initiative, www.enhancedanalytics.com • GHG Protocol, www.ghgprotocol.org • Global Reporting Initiative, www.globalreporting.org • Institute for Sustainable Communication, www.sustaincom.org • Investor Network on Climate Risk, www.incr.com • Rockefeller Philanthropy Advisors, www.rockpa.org • The Climate Group, www.theclimategroup.org • United Nations Environment Programme Finance Initiative, www.unepfi.net • U.S. EPA Energy Star, www.energystar.gov • U.S. EPA Climate Leaders, www.epa.gov/stateply/ • World Economic Forum GHG Register, www.weforum.org/ghg • World Resources Institute, www.wri.org

art270, Inc. is a full-service graphic design studio located outside of Philadelphia, Pennsylvania. With more than 20 years experience in the industry, art270 has risen to the top, working with billion-dollar clients and the smallest non-profits. art270 provides a variety of services from print to web to branding. Visit us at www.art270.com.



Stora Enso is an integrated paper, packaging, and forest products company that produces publication papers, graphic papers, packaging boards and wood products, all areas in which the company is a global market leader. Stora Enso kindly donated the paper for printed copies of this report.



This report is printed on Stora Enso's Centura Silk Text and Cover which are FSC certified coated premium sheets containing 10% post consumer fiber. All of the pulp is bleached using an elemental chlorine free process (ECF). Portions of the pulp are bleached with an enhanced elemental chlorine free process (E-ECF) utilizing oxygen delignification and/or first stage ozone bleaching. The post consumer recycle content is bleached with a process

Using emissions factors provided by the US Office of the Federal Environmental Executive, the Institute for Sustainable Communication estimates that the production of the forest products used for this CDP Report generated 7.2 metric tonnes of carbon dioxide-equivalent greenhouse gas emissions. Visit www.sustaincom.org/CDP

James Cameron
Chairman

Paul Dickinson
Chief Executive Officer
paul.dickinson@cdproject.net

Paul Simpson
Chief Operating Officer
paul.simpson@cdproject.net

Jeremy Smith
Director
jeremy.smith@cdproject.net

Zoe Riddell
Vice President – USA
zoe.riddell@cdproject.net

Brittany Chamberlin
Project Officer – USA
brittany.chamberlin@cdproject.net

Tim Keenan
Executive Officer
tim.keenan@cdproject.net

Sue Howells
Partnership Coordinator
sue.howells@cdproject.net

Sylvie Giscaro
European Coordinator
sylvie.giscaro@cdproject.net

Amanda Haworth-Wiklund
Nordic Coordinator
amanda.haworth@cdproject.net

Daniel Turner
Project Manager
daniel.turner@cdproject.net

Lois Guthrie
Technical Director
lois.guthrie@cdproject.net

Joanna Lee
Communications
joanna.lee@cdproject.net

James Howard
Senior Project Officer
james.howard@cdproject.net

Alicia Ayars
Project Officer
alicia.ayars@cdproject.net

Nick Silver
Business Coordinator
nick.silver@cdproject.net

Vicky Grinnell-Wright
Supply Chain Project
vicky.grinnell@cdproject.net

Nigel Topping
Supply Chain Project
nigel.topping@cdproject.net

Take Sueyoshi
Director – Japan
take.sueyoshi@cdproject.net

**Carbon Disclosure Project—
USA**
437 Madison Avenue
37th Floor
New York 10022
info@cdproject.net
www.cdproject.net
Tel: +1 (646) 270 3675

Carbon Disclosure Project
40 Bowling Green Lane
London, EC1R 0NE
United Kingdom
info@cdproject.net
www.cdproject.net
Tel: +44 (0) 207 970 5667
Fax: +44 (0) 207 691 7316

RiskMetrics Group

Doug Cogan
Director
Climate Change Research
+1 603 675 9274
doug.cogan@riskmetrics.com

Heidi Welsh
Research Manager
Social Issues Service
+1 301 432 4721
heidi.welsh@riskmetrics.com

Peter DeSimone
Research Manager
Social Issues Service
+1 202 833 7626
peter.desimone@riskmetrics.com

Geri Kantor
Senior Research Analyst
ESG Analytics
+1 301 556 0437
geri.kantor@riskmetrics.com

Meg Voorhes
Director
Social Issues Service
+1 202 833 7619
meg.voorhes@riskmetrics.com

Susan Williams
Research Manager

Alan Sotelo
Senior Analyst

Hazel L alas
Senior Analyst

Rainier Quilao
Research Analyst

Joel Yamut
Research Analyst

Niko Santos
Research Analyst

Head Office
RiskMetrics Group
One Chase Manhattan Plaza
44th Floor
New York, NY 10015

Cheryl Gustitus
Communications
+1 301 556 0538
cheryl.gustitus@riskmetrics.com

CDP Advisory Board

Andrew Dlugolecki
Andlug Consulting

Alan Brown
Carbon Disclosure Project

Bob Monks
Lens

Caroline Williams
Nathan Cummings Foundation

Colin Maltby
Carbon Disclosure Project

Doug Bauer
Rockefeller Philanthropy Advisors

Eckart Wintzen
Ex tent

Martin Whittaker
Mission Point Capital Partners

Robert Napier
Carbon Disclosure Project

Jane Ambachtsheer
Mercer

Chris Schroder
Carbon Disclosure Project

Fiscal agent and sponsor liaison
Rockefeller Philanthropy Advisors
437 Madison Avenue
New York 10022
United States

The contents of this report may be used by anyone providing acknowledgment to given to Carbon Disclosure Project RiskMetrics Group. The information herein has been obtained from sources which the authors and publishers believe to be reliable, but the authors and publishers do not accept any accuracy or completeness. The authors and publishers make no representation or warranty, expressed or implied, concerning the timeliness, accuracy, or completeness of the information and opinions contained herein. All opinions expressed herein are based on the authors and publishers judgment at the time of this report and are subject to change without notice due to economic, political, industry and firm specific factors. The authors and publishers and their affiliated companies, or their respective shareholders, directors, officers and employees, may have a position in the securities discussed herein. The securities mentioned in this document may not be eligible for sale in some states or