

Value at Risk: Climate Change and the Future of Governance

CERES Sustainable Governance Project Report

prepared by

Innovest Strategic Value Advisors, Inc.

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FOREWORD FROM CERES

The CERES Sustainable Governance Project is commissioning a set of research papers to explore the convergence of best practice in sustainability and corporate governance. Such convergence can already be seen in capital markets around the world and is likely to be recognized as one of the most significant economic and financial developments of the early twenty-first century.

In the face of overwhelming scientific data, all of us must come to terms with an unpleasant but inescapable conclusion: we are now facing the largest and potentially most damaging changes to our physical world in all of human history. Because these changes will have an intensifying impact on all economic sectors, climate risk is now embedded, to some degree, in every business and investment portfolio in the United States. Prudence and common sense mandate that those who are responsible for preserving the value of our businesses and investments analyze this risk and take steps to mitigate it.

It is our hope that this report will increase awareness among corporate directors, institutional investors, and others about how responsible behavior on climate change builds shareholder value, and, conversely, how a failure to address embedded climate risk raises profound questions about the proper exercise of governance and fiduciary duty.

We would like this report to be the beginning of a conversation. We look forward to hearing the ideas of people from many backgrounds and disciplines. Above all, we intend for this report to challenge the leaders of our corporations, institutional investors, and governments to rethink their assumptions and to take clear, measurable actions that will insure that we are not putting the long-term prosperity of our economy and our planet at risk.

Robert Kinloch Massie

Executive Director

CERES

FOREWORD FROM INNOVEST

Much has already been written about climate change, but in the United States, regrettably, the debate so far has generated at least as much heat as it has light. This report should serve as a welcome antidote; it is one of the first to make explicit the direct link among climate change, fiduciary responsibility, and shareholder value.

The evidence is increasingly compelling: companies' performance on environmental issues does indeed affect their competitiveness, profitability, and share price performance. Since climate change is arguably the world's most pressing environmental issue, it follows logically that companies' response to the threats and opportunities of climate change – or their lack of response – could have a material bearing on their financial performance and therefore on shareholder value.

The stakes are high: depending on what sector companies are in and what their specific risk exposures are, climate change could cost companies and their shareholders tens of millions of dollars and require major strategic shifts. In a worst case yet plausible scenario, companies' very survival could be threatened.

Under these circumstances, prudent fiduciaries simply cannot afford to be uninformed about the level of risk exposure – and, possibly, the opportunities – in their companies or investment portfolios. And if the risks and opportunities are material, they must act. Inaction would be tantamount to an abdication of their fiduciary responsibilities.

James S. Martin

Chairman

Innovest Strategic Investment Advisors

Mr. Martin is Chairman, Innovest Strategic Value Advisors, and former Chief Investment Officer at TIAA-CREF, one of the largest pension funds in the world.

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EXECUTIVE SUMMARY

Climate change is rapidly becoming one of the core challenges of the 21st century for corporate directors and institutional investors. As this report documents, in the absence of preventive and adaptive measures, multi-billion dollar financial losses are distinctly possible if not probable. As the potentially devastating economic consequences for investors, individual companies and entire industry sectors come into clearer focus, the onus is being placed squarely upon company directors, pension fund trustees, and institutional investors to respond.

Unfortunately, U.S. corporate directors and institutional investors are, virtually without exception, in a state of double denial. First, they are in denial about the very existence, much less the magnitude, of the threat itself. Second, and paradoxically, they also seem oblivious to both the practicality and the affordability of early mitigation measures.

Company directors and institutional investors in the United States currently control – and have legal responsibilities for – roughly \$7.4 trillion of financial assets invested in corporate equities, and a significant proportion of it could be at risk from climate change.¹

The risks here are two-fold: (1) the economic/financial risk from the damages and remediation due to climate change itself (directly to companies and indirectly through general socio-economic disruptions in the US and abroad), and (2) exposure to the costs of greenhouse gas emissions in any regime to mitigate climate change. These are not necessarily applicable to the same corporate entities. The first set of risks affects companies vulnerable to sea level rise, weather extremes, temperature and precipitation changes, etc.; the second set of risks affects carbon-intensive companies, which would face the costs of any mitigation regimes.

Neglecting to assess these risks is neither prudent nor responsible. The more information on climate-related damage accumulates, the more the refusal to examine these risks carries the potential for breach of fiduciary duty. Corporate board members and institutional investors can no longer ignore corporate practices that, over time, could result in tens of billions of dollars of losses to companies and their shareholders. To fulfill their fiduciary duties, investors and directors now must understand which industry sectors and companies are exposed to the greatest risks, what measures if any are being taken to reduce them, and how effective they are likely to be.

Company directors and institutional investors in the United States currently control – and have legal responsibilities for – roughly \$7.4 trillion of financial assets invested in corporate equities, and a significant proportion of it could be at risk from climate change.

The bottom line, as this report documents, is straightforward: climate change represents a potential multi-billion dollar risk to a wide variety of U.S. businesses and industries. It should, therefore, command the same level of attention and urgency as any other business risk of this magnitude.

In contrast to their European counterparts and competitors, U.S. companies and financial institutions are lagging behind. However, four powerful forces are converging rapidly to accelerate the need for action: strengthening political consensus within governments for action to address the climate change threat; growing evidence that environmental and social issues are directly linked to companies' financial performance; rising shareholder activism; and increasing demands for greater corporate disclosure.

Sadly, U.S. fiduciaries have been slow to respond to these challenges. They have tended either to ignore the climate change phenomenon altogether, or to subscribe to the increasingly discredited view that solutions must inevitably be costly, both to individual companies and to the entire U.S. economy. When compared to the traditional U.S. enthusiasm for innovation and technological substitution, this is an uncharacteristically pessimistic and timid point of view with little grounding in fact. Recent studies by the National Academy of Sciences and others create serious doubts about the economic cost thesis.² Indeed, it is increasingly evident that the costs of inaction are likely to far outweigh the costs of action.

The bottom line, as this report documents, is straightforward: climate change represents a potential multi-billion dollar risk to a wide variety of U.S. businesses and industries. It should, therefore, command the same level of attention and urgency as any other business risk of this magnitude.

But what, precisely, must company directors and institutional investors do to discharge their fiduciary duties in a responsible and prudent fashion in the face of the economic threats posed by climate change?

Corporate Directors

Both by law and by convention, company directors have a very clear set of duties. The most important of these are: to set and monitor overall company strategy and direction; to select, compensate, monitor, and evaluate the CEO; to protect the long-term assets of the shareholders; and to ensure the integrity and clarity of the company's reporting to key stakeholders.

In light of these duties, company directors should:

1. **Ensure that the company has sufficient expertise to make informed and responsible decisions regarding climate change.**

New conditions have arisen in the twenty-first century that are very different from those in which most corporate directors have professional experience. This means that most board members and company executives are under-informed and under-prepared for these new challenges. Board members should commit to ensuring that both the board itself and senior management have access to and use the necessary specialized expertise to make informed decisions in this area.

❑ ***2. Insist that company executives undertake a thorough assessment of the company's current and probable risk exposure to the financial and competitive consequences of climate change.***

As a first step, this will involve measuring the company's greenhouse gas emissions throughout its entire value chain. The best available reporting framework with which to do this is the Greenhouse Gas Reporting Protocol. The Protocol was jointly convened by the World Resources Institute and the World Business Council for Sustainable Development, and is included in the comprehensive Global Reporting Initiative (GRI) Guidelines.³

❑ ***3. Insist that company executives have also thoroughly examined the opportunities which climate change may also present for new or expanded business activity and/or cost reduction.***

Climate change is not only about risk; it is also about opportunities. A few leading multinationals have already shown impressive results cutting greenhouse gas emissions significantly at no net cost whatsoever.

❑ ***4. Require that the company benchmark itself against its industry competitors, as well as against best practice from other industry sectors.***

This will not only give the board and senior executives a much clearer idea of the company's relative risk exposure, but could also be a source of concrete ideas about effective new initiatives.

❑ ***5. Develop, announce, and implement an explicit strategy on climate change that it is integrated into the company's overall business strategy.***

This could mean anything from including "cost of carbon" calculation scenarios when examining potential projects to creating long-term strategies for changing the company's portfolio of businesses to remain competitive in the coming transition to a carbon-constrained business environment.

❑ ***6. Link executive compensation to the company's performance on climate change objectives.***

Risk exposures, and therefore specific responses and quantitative performance targets, will vary with each company. What is important is that the targets exist, that they are both ambitious and realistic, and that executives' compensation is tied in part to their success in meeting or exceeding those targets.

❑ ***7. Explore new strategic alliances and business arrangements.***

This could take many forms, from choosing new, less carbon-intensive suppliers, to new collaborations with NGOs, to investing in new carbon-mitigation technologies.

❑ **8. Ensure that the company develops and follows best practice standards for disclosing its climate change exposures to investors and to other external and internal stakeholders.**

Institutional shareholders and the company's other key stakeholders reward companies for candor, transparency, and genuine efforts to improve their environmental performance, and will assume the worst when little or no information is forthcoming. The Global Reporting Initiative, recently launched as an international standard setting body, provides a comprehensive and widely accepted format for communicating with stakeholders on climate change and other social/environmental performance issues.

❑ **9. Create formal lines of accountability.**

Establish formal, board-level accountability mechanisms to monitor and report on the company's progress in addressing climate-driven business risks and opportunities, and to ensure that any necessary remedial actions are taken promptly.

Institutional Investors

Institutional investors in the United States have a legal duty to act prudently and solely in their beneficiaries' best interests. Embedded climate risk is a serious long-term threat to the preservation of investment value. For fiduciaries to fulfill their duties under these conditions they must:

❑ **1. Seek expert advice on climate risk.**

Very few investment managers and securities analysts have the specialized skills or experience necessary to quantify companies' exposure to climate risks. There are, however, a growing number of world-class authorities with expertise in the technical, policy, and financial aspects of climate change mitigation. Institutional fiduciaries would be derelict in their responsibilities if they failed to utilize those resources where necessary.

❑ **2. Undertake a portfolio-wide assessment of risk exposures.**

Climate risk varies widely among industry sectors. Even within the same sector the risk can vary by as much as sixty times.⁴ As fiduciaries of other people's money, institutional investors must understand and control their relative level of risk exposure. Over time, this should become part of investment managers' overall risk management processes.

❑ **3. Incorporate climate change considerations into overall investment strategies.**

Pension fund trustees need to state their policy toward embedded climate risk in their statement of investment principles. Mutual fund portfolio managers must incorporate climate risk into their assessments of individual companies, industry sectors, and entire investment portfolios.

❑ **4. Request – and if necessary, demand – greater disclosure of climate risks by companies wishing to be considered as investment candidates.**

Clearly, investors cannot factor climate risk into their decision-making processes if they lack basic information on company-specific risk levels. In some European countries, such disclosure is now being mandated by legislation or demanded by the largest institutional investors.

❑ **5. Encourage best practice among their portfolio companies.**

As owners of the firms in which they hold shares, institutional investors and/or their outside fund managers must encourage the senior executives of their portfolio companies to pursue best practice in climate change risk management. Such encouragement will most likely need to be both through private discussions and public support for shareholder resolutions. Institutional investors can also join their peers in informal alliances such as the CERES Sustainable Governance Project or the U.K.-based Carbon Disclosure Project that encourage companies to make their risk exposures and performance more transparent to investors and other stakeholders.

❑ **6. Explore the commercial potential of new, “climate-friendly” investment products.**

Some innovative asset managers have recently created new mutual funds whose stock selection is oriented towards companies with superior strategic positioning and lower risk regarding climate change. These funds have already demonstrated both marketing and financial performance benefits.⁵

❑ **7. Channel more investment capital into “clean energy” opportunities.**

In addition to the large multinational companies which are the primary focus of the mutual funds described above, there are many promising investment opportunities among smaller companies which are developing and commercializing new clean energy technologies such as fuel cells,

microturbines, and solar power. Most major institutions are already investing more heavily in unlisted, privately held companies in general anyway; all that would be required is a greater willingness to examine the growing opportunities specific to climate-friendly technologies. These companies are making a very direct contribution to minimizing the adverse effects of climate change, and the economic prospects of the best of them are attractive indeed.

❑ **8. Promote the universal adoption of the Greenhouse Gas Reporting Protocol recommended in the Global Reporting Initiative's reporting guidelines.**

The more that greenhouse gas reporting can be done using a *common, standardized format*, the easier it will be for institutional investors and other stakeholders to assess and compare company performance, and to encourage both top performers and laggards to move to a higher performance level.

❑ **9. Support collective industry initiatives promoting a lower-carbon economy.**

While institutional investors have considerable power and influence over company performance as individual actors, that influence can be increased many times through *collective industry action*. A number of fora already exist to do precisely this, including CERES, the Council of Institutional Investors, the Global Reporting Initiative, the International Corporate Governance Network, and the United Nations Environment Programme's Finance Initiative, among others. In addition, investors can and should make their views known to both national governments and key multinational institutions such as the World Bank and its sister institutions.

INTRODUCTION

Climate change has emerged as a major issue for the investment community, corporate executives and their board members. The increasingly global nature of industrial competition, institutional investment patterns, and new disclosure requirements will mean that company directors, trustees, and other fiduciaries can only ignore the risks at their peril.

In recent years global climate change has evolved from a largely technical issue to one of the most critical, widely discussed challenges for public and private sectors alike. Within the private sector in particular, climate change has rapidly developed into a major strategic – and operational – issue for both industrial corporations and their investors.

Compelling evidence now exists that the competitive and financial consequences for individual companies under ‘business-as-usual’ scenarios will be immense. Both the impacts of climate change itself and the need to cut greenhouse gas emissions will create new risks. Indeed, even within the same industry sector, corporate exposures to the risks of climate change can vary greatly according to, for example, companies’ “greenhouse gas intensity”.

In short, the financial impacts – both for individual companies and for entire industry sectors – are real and potentially very serious. This makes climate change a critical issue for fund managers, trustees, and corporate board members alike.

In contrast to their European counterparts, many of whom have already begun to take action, few U.S. companies and institutions are responding to the threat in a proactive or constructive way. This attitude not only threatens the international competitive performance of U.S. companies and investors, it also runs the risk of jeopardizing the shareholder funds entrusted to their care by pension plan contributors and other investors.

The message for U.S. corporate executives and board members, institutional investor trustees, and asset managers is clear: they must regard addressing climate change as a major and urgent fiduciary duty.

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1. KEY FACTORS ARE CONVERGING

A number of powerful forces are currently converging to propel climate change to what should be a much more prominent place on the agendas of company directors, executives, and institutional investors:

Strengthening Scientific Consensus

The Third Assessment Report released in 2001 by the Intergovernmental Panel on Climate Change (IPCC), the world's most authoritative body of climate scientists, intensified warnings from its earlier reports regarding the rate, extent and consequences of climate change.⁶ The report confirmed that:

- greenhouse gases have accumulated in the atmosphere over the past century to levels unprecedented in a thousand years and very likely for millennia
- human activity is responsible for the rise in concentrations of greenhouse gases in the atmosphere
- this has contributed to global temperature increases
- the frequency and severity of extreme weather events are increasing
- the impacts of global warming on sea levels, ice and snow cover, plant and agricultural productivity, coastal erosion and other indicators of global biological and physical integrity are potentially catastrophic

The report also moved up the time frame for severe impacts by 100 years, and suggested that at some unknown threshold, sudden, rapid and largely irreversible shifts in global climate patterns may occur. New reports by the U.S. National Academy of Sciences released in June 2001 and March 2002 corroborated the IPCC findings, adding that exceeding the threshold limits could precipitate sudden and abrupt changes to the climate system.⁷ [For more on climate science, see page 17.]

Growing Recognition of the Potential Financial Impacts of Inaction

Over the past fifteen years, the world has already suffered nearly \$1 trillion in economic losses due to "natural" disasters, roughly three-quarters of which were directly weather and climate-related.⁸

Munich Re, one of the world's largest reinsurers, recently estimated that climate change will impose billions of dollars of costs on the public and private sectors in order to deal with the effects of extreme weather events in vulnerable areas each year unless urgent measures are taken to reduce greenhouse gas emissions.⁹ In the year 2000, global damage reached \$100 billion, mostly uninsured, and already simulation modeling shows that each year now brings 5.5 times as many weather-related natural disasters as 40 years ago, resulting in 13.6 times the insurance losses (equivalent to an extra \$9.2 billion per year).¹⁰ These concerns have now been corroborated

by other leading mainstream financial institutions including Swiss Re, Credit Suisse and Deutsche Bank.¹¹

The studies, and others like them, make plain the growing costs of continued inaction, yet there is growing evidence that solutions need not cause the economic harm and dislocation initially feared by many conservative economic commentators.¹² Simply put, the costs of inaction now outweigh the costs of action, and the sooner positive action is taken, the greater the economic benefits.

Increasingly Aggressive Actions by Governments

The most significant recent development for U.S. investors and businesses is that the E.U. nations, Russia, and Japan are moving toward ratifying the Kyoto Protocol to the United Nations Framework Convention on Climate Change. The treaty calls for industrialized countries to cut their greenhouse gas emissions by an average of 5 percent from 1990 levels by 2010, among other provisions.¹³

Given the strong support of E.U., Russia, Japan, and former Eastern bloc nations wishing to join the E.U., the Kyoto Protocol may soon enter into force as international law even without the participation of the United States. According to the United Nations, 84 Parties have signed and 53 Parties have ratified or acceded to the Kyoto Protocol as of April 11, 2002.¹⁴

The E.U. has in fact committed itself to a legally binding timetable for Kyoto implementation, including compulsory taxes on greenhouse gas emissions above prescribed limits, starting in 2005. For example, the U.K. government has committed itself to reduce greenhouse gas emissions by 12.5 percent below 1990 levels by the period 2008–2012, and has already enacted a Climate Change Levy to tax company emissions beyond agreed limits.

Even in advance of ratification of the Kyoto Protocol, some national and regional governments are already taking steps to encourage or require the private sector to reduce greenhouse gas emissions and invest in clean, non-fossil fuel based energy technologies.

In addition, a number of governments, including those of the U.K. and the E.U., are also establishing emissions trading regimes designed to secure the maximum greenhouse gas reductions using the most cost-effective solutions. The German, Dutch, French, Swedish, Canadian, Australian, and Japanese governments are among the countries currently in the process of establishing concrete national emissions abatement plans.

Momentum among World Opinion Leaders

Numerous high profile, well-respected non-governmental organizations have also declared that serious action on climate change is critical to the health of both the global economy and the international political system. The stature of these organizations – and the fact that they have not tradi-

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tionally been associated with environmental causes – will only help to galvanize world opinion even further.¹⁵ For example,

- Senior business executives (among others) at the World Economic Forum decisively voted climate change to be the leading challenge for the 21st century at the Forum’s 2000 meeting in Davos, Switzerland
- The OECD has declared climate change to be “one of the key concerns of the 21st century, with serious implications for economies, societies and the environment”
- The World Energy Council believes that climate change, as part of the broader challenge of sustainable development, is “an immediate business concern having to do with the present and unequivocal preoccupation of employees, customers and investors”
- The Paris-based International Energy Agency calls climate change one of the most prominent and controversial problems facing the world’s environment

It is now difficult to identify a sector of the economy that would not be affected in some way by climate change. The question is no longer whether any given portfolio contains climate risk, but how much.

New Understanding of the Breadth of Sectoral Impacts

The impacts of climate change itself and climate change policies will obviously have a powerful effect on sectors directly associated with the energy value chain (including petroleum, natural gas, pipelines and electric utilities on the downside, and renewable energy on the upside) and on those industries consuming large amounts of energy (steel manufacturing, chemicals, cement production, smelting and such like).

In addition, it is now evident that climate change will also have significant impacts on sectors as diverse as: telecommunications and high-technology; forestry; automotive; electronics; agriculture; and tourism, among many others. A 2001 study warned that the water industry alone could face \$47 billion of extra costs annually by 2050, or nearly \$1 trillion by 2070.¹⁶

Indeed, it is now difficult to identify a sector of the economy that would not be affected in some way by climate change. The question is no longer whether any given portfolio contains climate risk, but how much.

New Evidence on Company-Specific Impacts

In addition to the potentially huge aggregate risk exposures noted above, recent evidence on company-level impacts has revealed that in some high-impact sectors such as energy and electric utilities, the climate change-driven threat to shareholder value can represent as much as 15 percent of the total market capitalization of major companies.¹⁷ The substantial differences among U.S. electric utilities’ greenhouse gas emissions and climate risk exposures were documented in a March 2002 report undertaken jointly by CERES, the Natural Resources Defense Council, and PSEG, a NJ-based electric utility. The report used data reported by utilities to the government

to compare the year 2000 emissions performance of the 100 largest electric generation owners in the U.S.¹⁸

As a result of these differences, firm-specific climate risk expressed in terms of the percentage of share price 'at risk' from the added cost of meeting greenhouse gas emissions constraints or carbon taxes can vary by a factor of nearly 60 times, even within the same sector.¹⁹ Financial implications of this magnitude cannot be ignored, and should be satisfactorily investigated by every responsible director, corporate executive, and fund manager. To avoid the charge that they may be violating their fiduciary duties, investors and directors must analyze which industry sectors and companies are exposed to the greatest risks, and what measures if any are being taken to manage those risks.

The Globalization of Pension Fund Investment

During the 1990s, global pension funds' total assets grew, on average, 15 percent a year, from \$4.6 trillion to \$15.9 trillion. At the same time the equity holdings of pension funds increased from \$1.6 trillion to \$8 trillion – or from 35 percent to 51 percent of total assets. By 1999, pension fund equity holdings represented fully 22.9 percent of global equity market capitalization, up from 17 percent in 1990. This growth was driven mainly by the big three pension markets – the US, Japan and the UK – which together account for over 80 percent of global assets.²⁰

In 1990, only 3.3 percent of U.S. pension funds' equity investments were in non-U.S. company securities. By the end of 2001, that proportion has more than tripled to over 11 percent.²¹ A similar internationalization of pension fund investing is occurring in virtually every OECD country.

As a result of this globalization of investment strategies, U.S. fiduciaries simply cannot ignore climate change policy and regulatory developments in other parts of the world.

New Awareness in Mainstream Investment Institutions

In the past, corporate directors or investment trustees could plausibly argue that they could not examine climate risk because investment firms did not have the tools to provide this information. This has now radically changed, as major international investment houses such as AMP Henderson and Friends Ivory & Sime have developed sophisticated guidelines for assessing companies' strategic and operational responses to the climate change threat. In addition, these firms have begun to communicate the importance of the issue and their concerns to their clients.

Such developments suggest that U.S. financial houses are in serious danger of finding themselves behind the curve in the global equities markets, corporate fixed income markets, and even the nascent greenhouse gas emissions credit markets, which authoritative sources believe could be as large as \$60 billion a year.²² As awareness of the scope and magnitude of climate change-related risks spreads within the asset management, insur-

ance and credit risk rating communities, companies who remain oblivious to climate risk may well face direct financial penalties in the form of an increased cost of capital, higher insurance premiums, and poorer debt ratings.

Expanding View of Fiduciary Duties

In the United States, the fiduciary duties of pension fund trustees – and, by extension, their money managers – are set out in Section 1104 of the Employee Retirement and Income Security Act (ERISA). Those responsibilities are essentially two-fold:

- The duty of care: fiduciaries must act in a “prudent” and “reasonable” fashion; and
- The duty of loyalty: they must act solely in the interests of the institution’s beneficiaries.

In short, U.S. fiduciaries are legally obligated to have the long-term interests of their beneficiaries as their sole objective. In practice, it has been the interpretation of the ERISA legislation rather than any specific prescriptions in the legislation itself which has determined what is and is not “reasonable”, “prudent” behavior by fiduciaries.

Conventional wisdom among investment professionals has long held that measures taken to improve companies’ environmental performance would be injurious or at best irrelevant to financial returns, and therefore beyond the legitimate purview of fiduciaries. This ethos has now begun to shift dramatically: a growing body of research is making it clear that superior environmental performance does indeed improve companies’ financial returns and that, as a consequence, environmental performance is a wholly legitimate concern for fiduciaries.²³ Reforms of pension legislation in the U.K. and other European countries are already codifying this new ethos into legal obligations.

The expansion of fiduciary duty to include environmental performance leads inevitably to a much greater focus on climate change.

Growing Shareholder Activism

Environmental and social issues have long been concerns for shareholder activists, and climate change has recently become an increasingly important focus of attention. Internationally, pension funds with assets of over \$1 trillion have begun to use their collective financial muscle to promote greater climate change disclosure and accountability from the world’s largest corporations.

In the U.S., shareholder activists filed 19 climate change resolutions in the 2002 proxy season, nearly three times as many in any previous year of an eight-year campaign, with the following companies: AES, Allegheny Energy, American Electric Power, American Standard, Bristol-Myers Squibb, CSX, Campbell Soup, Caterpillar, ChevronTexaco, Eastman Chemical, Exelon, ExxonMobil, General Electric, Occidental, Sprint, Southern Company,

Unocal, United Technologies, and Wisconsin Energy. Shareholder resolutions on global warming are the fastest-growing category tracked by the Investor Responsibility Research Center and the Social Investment Forum.²⁴

What is particularly noteworthy here is the changing nature of the shareholder activists. Traditionally, the most active proxy filers have been umbrella organizations such as the Interfaith Center for Corporate Responsibility, other faith or issues-based groups, and socially responsible investors. Over the last few years, however, there has been a major sea change: some of America's most powerful mainstream institutional investors are becoming increasingly activist on environmental and social issues.

In December 2001, for example, veteran corporate governance advocate Robert Monks filed a resolution with ExxonMobil to "reign in the company's top executive and protect shareholder value from reputational damage" from Exxon's position on global warming. Monks, Chairman of LENS Investment Management and Ram Trust Services, filed a resolution calling for a separation of the Chairman and CEO positions at ExxonMobil. Monks said the move was sparked by his growing concern that the ExxonMobil Board of Directors is failing to protect long-term value in the company from Chairman and CEO Lee Raymond's increasingly extreme position and public image on global warming and other social and environmental issues. Monks' activism with Exxon Mobil indicates a growing recognition that climate change is a corporate governance issue.²⁵

In addition to growing support for climate change resolutions from corporate governance activists, two of the largest U.S. institutional investors – New York City and the State of Connecticut retirement systems – have already filed shareholder resolutions on climate change. The momentum for action on climate change is clearly building, and it is almost certain to be irreversible.

Domestic Political Momentum

In the U.S., activity on climate change has intensified considerably over the past 15 months since the Bush Administration entered the White House. Nearly twice as many climate change bills were introduced in the past year compared to the four previous years combined, and many of these have bipartisan support.²⁶ This action is partly due to the growing international consensus on working to reduce greenhouse gas emissions and partly due to a greater appreciation of some of the competitive issues at stake for U.S. businesses. The most prominent Congressional responses include:

- A bill introduced by Senator Kerry that would establish mandatory tracking and reporting of greenhouse gas emissions
- A bipartisan bill introduced by Senators Byrd and Stevens which would see millions of dollars channeled towards "climate-friendly" research and development

- Senator Jeffords' bill on power plant emissions, renewable energy, and the need to track and reduce carbon dioxide emissions along with the other major power plant emissions
- A bipartisan initiative backed by Senators Lieberman and McCain that would establish an economy-wide cap-and-trade system for greenhouse emissions. The senators envision legislation that would include a comprehensive cap on greenhouse emissions, paired with an allowance trading system, in order to encourage innovation for reducing emissions

Bills that would have increased corporate average fuel economy (CAFE) standards – supported by a majority of the American public – were defeated only after a massive lobbying and advertising assault by the U.S. auto companies. There continues to be interest in the Senate's Environment and Public Works Committee in examining the business risks of climate change and the implications of climate change for U.S. fiduciaries.²⁷

The determination to act on the climate change issue is not just building in Washington, D.C. Individual states across the country have initiated or have already advanced legislative or other actions pertaining to the management of greenhouse gas emissions and the development and implementation of cleaner, less greenhouse gas-intensive technologies.

Other recently-announced initiatives will also increase the transparency of corporate climate risk exposures and increase accountability for both corporate directors and investment fiduciaries. For example, on February 20, 2002, EPA Administrator Christine Whitman launched the Climate Leaders program. The initiative encourages companies to report on their emissions of the six major greenhouse gases, using the Greenhouse Gas Protocol reporting framework developed by a multi-stakeholder collaboration convened by the World Resources Institute and the World Business Council for Sustainable Development. Taken together, the momentum created by these developments should serve to focus the minds of fiduciaries on the business implications of climate change. This flurry of domestic activity is relevant to U.S. corporate directors and institutional investors for two main reasons:

- 1. It creates momentum within the U.S. governmental community for positive action on climate change and simultaneously introduces the possibility that companies failing to protect shareholder's interests by taking the appropriate steps to manage climate-related risks may face increased regulation or litigation; and*
- 2. U.S. companies with operations in countries or regions which have made emissions reduction commitments will be required to comply with local regulations and may be at a competitive disadvantage against international competitors more used to operating in a carbon-conscious business regulatory environment.*

Momentum for Stronger Disclosure Requirements

The Enron debacle has seriously shaken the confidence of the media, investors, and the public in the adequacy of corporate disclosure requirements and practices. President George W. Bush demanded tougher disclosure requirements in his 2002 State of the Union address. The convergence of the corporate transparency, shareholder activism, and sustainable development agendas guarantees that U.S. companies' performance on climate change issues will come under closer public and regulatory scrutiny.

Internationally, the global momentum and high profile of the Global Reporting Initiative (GRI) will accelerate the recognition of climate change as a significant new source of business and investment risk, and therefore as a central concern for fiduciaries.

New Insights into the Economics of Climate Change Mitigation Measures

The economics of climate change have been a source of uncertainty and controversy. Several high-profile studies have estimated the costs of mitigation to be extraordinarily high, particularly in the U.S.²⁸ However, these estimates were premised on a number of worst case scenarios: by assuming, for example, highly limited or non-existent emissions trading activity, a need to meet short-term targets, or limited use of non-carbon fuels and new clean energy technologies.

By contrast, more realistic studies give grounds for optimism that the right blend of policies can substantially reduce the direct and indirect costs of mitigation and perhaps even produce a net economic benefit.²⁹ A September 2000 study by Resources for the Future indicates that under a standard carbon tax or permit system, the potential adverse impacts on key energy-intensive industries can be avoided.³⁰

The Union of Concerned Scientists issued a report recently which concluded that greater fuel efficiency and market penetration of renewables in vehicles, buildings and industry could save up to 5.9 million barrels of oil per day by 2020, push consumer savings to \$150 billion by 2020 and help the U.S. and Canada surpass their greenhouse gas reduction quotas under the Kyoto Protocol.³¹

These studies, and others like them, strongly suggest that a balanced course of risk management can be adopted successfully to address the risks associated with climate change.

Taken together, these trends form a kind of “perfect storm” which will redefine the duties of fiduciaries in the early 21st century, and which is moving climate change to a position of prominence on the corporate and institutional investor agendas.

The Bottom Line? A Perfect Storm for U.S. Fiduciaries is Brewing...

Few of these trends are sudden or radically new. What is new, however, is their confluence at a single point in time. Taken together, these trends form a kind of “perfect storm” which will redefine the duties of fiduciaries in the early 21st century, and which is moving climate change to a position of prominence on the corporate and institutional investor agendas. Given the potential magnitude and scope of the risks involved, and given that risk management options are becoming clearer, fiduciaries must act now if they are to avoid breaching the duties of care and loyalty entrusted to them and placing the wealth of their beneficiaries at risk.

2. THE RISKS OF CLIMATE CHANGE ARE BOTH REAL AND URGENT

The Scientific Evidence

Today there is general agreement within the scientific community that the emission of heat-trapping greenhouse gases is contributing to climate change.

The Intergovernmental Panel on Climate Change (IPCC) was established by the United Nations and World Meteorological Organization in 1988 to provide unbiased assessments of climate change science. Since its formation, the IPCC has released three reports on the state of climate change science.

In its most recent Third Assessment, issued in 2001, IPCC documented substantial scientific evidence of global warming and concluded that “there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.”³²

Following the release of the IPCC Third Assessment, the Bush Administration asked the National Academy of Sciences (NAS) to review the document and its conclusions. In June 2001, the NAS issued a report fundamentally in agreement with the IPCC assessment and stated unequivocally, “greenhouse gases are accumulating in the Earth’s atmosphere as a result of human activities, causing surface temperatures to rise.”³³

Important scientific findings documenting the evidence of global warming in the IPCC Third Assessment include:

- Global average surface temperature has increased by 0.6°C (1.08°F) since the late 19th century
- It is very likely that the decade of the 1990s was the warmest decade in the last ten centuries
- 1998 was the warmest year in the instrumental record since that record began in 1861

Atmospheric concentrations of heat-trapping carbon dioxide were 368 parts per million in 2000, up from approximately 280 parts per million for the period 1000–1750. IPCC scenarios indicate that global average temperature will likely increase by between 2.2°F and 10.4°F and possibly higher over the next century, depending largely on what actions are taken. The impacts will be even greater in some regions and during some seasons – for example northern high latitudes in winter.

The IPCC Third Assessment also confirmed the possibility of “discontinuity scenarios” in which continued greenhouse gas emissions exceed danger thresholds, leading to unpredictable, high-impact, abrupt, and irreversible changes in the Earth’s physical and biological systems. This may include a weakening of thermal ocean currents, large-scale changes in soil fertility characteristics, and accelerated melting of polar ice sheets.³⁴

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Forecasted Impacts of Global Warming on The United States

The vulnerability of different regions and different economies around the world to climate change varies greatly, and depends to a large extent on economic capacity, technological infrastructure, and geographic and hydro-geological characteristics, among other things. Understanding these region-specific impacts has been, and continues to be, a key aim of the IPCC.³⁵ To date, IPCC modeling work indicates that *within North America* the effects of climate change could include:

- an increase in temperatures by 1.8–5.4°F over the next century even with wider use of clean fuels, or by as much as 6.3–13.5°F in the fossil fuel-intensive ‘business as usual’ case
- reduced lake levels and outflows, reduced water quality and increased stress on aquatic ecosystems
- changes in the frequency, intensity, and duration of heavy precipitation events may require changes in land-use planning and infrastructure design to avoid increased damages arising from flooding, landslides, sewerage overflows, and releases of contaminants to natural water bodies
- changes will be seen in the nature and extent of several “disturbance factors” affecting forests such as fire, and pest outbreaks
- potential loss of specific ecosystem types, such as high alpine areas and specific coastal and inland wetland types
- altered food production dynamics; overall agricultural productivity is projected to benefit from a warmer climate for a limited period, but there probably will be strong regional effects, with some areas in North America suffering significant loss of productivity compared to others
- potential for increased drought in the U.S. Great Plains
- increased frequency and severity of heat waves, which may lead to an increase in illness and death, particularly among young, elderly, and frail people, especially in large urban centers
- more frequent flood events and other extreme events, which may result in an increase in deaths, injuries, infectious diseases, and stress-related disorders, as well as other adverse health and economic effects associated with social disruption, environmentally forced migration, and settlement in urban slums

Increasing incidence of vector-borne diseases, including malaria and dengue fever, and tick-borne Lyme disease, placing increased pressures on the public health system.³⁶

Finally, it is worth noting that although much remains uncertain in both the science of climate change and the actions that must be taken to address it, this uncertainty should not be used as an excuse for inaction or inertia. Uncertainty cuts both ways: while the damages from climate change could be lower than currently expected, they could also be even higher. Indeed, given the prospective risks and costs of inaction, corporate managers and

investors should be highly motivated to reduce uncertainty by taking concrete steps to manage embedded climate risk in a prudent, responsible manner.

International Initiatives are Creating Pressure

There is increasing international political momentum in favor of greenhouse gas emissions reduction and greater utilization of clean, non-fossil fuel based energy alternatives.

The most significant recent development for U.S. investors and businesses is that the E.U. nations and Japan are moving toward ratifying the Kyoto Protocol. The treaty calls for industrialized countries to cut their greenhouse gas emissions by an average of 5 percent from 1990 levels by 2010, among other provisions. The Japanese parliament announced its decision to pursue ratification of the Kyoto Protocol on February 15, 2002. On the same day, the Keidanren (the Federation of Japanese Economic Organizations) reiterated its support for the Protocol. For their part, the European Union environment ministers formally agreed on March 4, 2002 that all 15 E.U. Member States would ratify the Kyoto treaty by June 1, 2002.³⁷

Given the strong support of Europe and Japan, the Kyoto Protocol may soon enter into force as international law even without the participation of the United States.

- The Kyoto Protocol will take effect after it has been ratified by at least 55 nations, including developed countries accounting for at least 55 percent of carbon dioxide emissions in 1990.³⁸
- The 15 E.U. nations, plus Russia and Japan, make up about 50 percent of the industrial world's carbon dioxide emissions. In addition to ratification by the E.U., Russia, and Japan, all that is needed for the Kyoto Protocol to enter force, according to one recent analysis, is ratification by the former Eastern bloc nations including Czech Republic, Bulgaria, Poland, Hungary, Slovakia, and Romania, which together were responsible for approximately 7 percent of the 1990 emissions from developed nations.³⁹ Two such nations – the Czech Republic and Romania – have already ratified the treaty.
- In all, according to the United Nations Framework Convention on Climate Change, 84 Parties have signed and 53 Parties have ratified or acceded to the Kyoto Protocol as of April 11, 2002.⁴⁰

Even in advance of Kyoto Protocol ratification, many governments are enacting new climate change and renewable energy policies. For example:

- The E.U. intends to introduce a single greenhouse gas emissions permit trading system by 2005, which will require all 15 member states to develop the necessary national administration systems. The European Commission has proposed that starting in 2005 mandatory limits will be placed on emissions from all big industrial and energy intensive businesses on a continent-wide scale. These firms would then be able to trade permits.⁴¹

- The United Kingdom, Germany, the Netherlands, Norway, and Denmark have developed various climate change action plans involving emissions trading, energy taxes and other fiscal and regulatory mechanisms. For example, the U.K.'s new "climate change levy" has already generated £215 million to encourage a new London-based greenhouse gas emissions trading regime.⁴²
- E.U. directives will require countries to open up at least 20 percent of their domestic electricity markets over the next few years which should open the way for renewable energy technologies and natural gas to gain greater market share going forward. Policy support for renewables is also growing: the E.U. has already surpassed its plans to generate 6 percent of its energy needs for renewables by 2010 – it aims for 50 percent by 2050. At an average of \$1–\$1.5 million per megawatt to install, this represents a potential investment of some \$90–\$135 billion in clean energy.

In this context, the U.S. refusal to participate in these coordinated global measures is a particularly acute form of denial, as though opposing an international treaty is somehow equivalent to solving the underlying problem. Ironically, the U.S. government's refusal to take any comprehensive policy steps on climate change will have the perverse effect of *intensifying* the medium to long term risk to U.S. portfolios and firms, as other governments and investors take actions that may penalize the U.S.

The Need for the Long View

Ultimately, addressing climate change effectively can only be achieved via the adoption of more sustainable development pathways that simultaneously attend to interdependent social, economic and environmental challenges. This, almost by definition, requires a long-term perspective.

The IPCC's Special Report on Emissions Scenarios describes various combinations of future development situations in which emissions of greenhouse gases could be significantly reduced by amounts that would bring us much closer to long-term climate stability.⁴³ The most effective of them require that a long-term perspective be added to the very real imperatives for action in the short-term.

From a security and geopolitical perspective, looking several decades ahead is imperative to appreciating how climate change might exacerbate critical socio-environmental pressures such as agricultural productivity problems, water shortages, and natural resource depletion. Such issues are often linked with civic unrest and have been identified as causal factors in the escalation of regional conflicts.⁴⁴

The technological solutions associated with a non-fossil fuel-based economy are beginning to compete commercially with current fossil technologies and will become more competitive within the next ten to twenty years. Judging the economics of these clean technologies over 20 years, instead of

over 10 years, paints a very different, and much more attractive, picture for investors. A price for carbon, while not yet reflected in today's markets, will make them more competitive. Such a trend towards clean energy technologies would also reduce U.S. dependency on oil imports, thereby enhancing domestic energy security.

From an economic planning perspective, corporate strategists investing in large energy infrastructure or industrial plant projects often need to project cost and cash flow assumptions over 20 or 30 years. The U.S. Department of Energy reports that over 77 percent of 2010's electricity supply and 63 percent of 2020's supply have already been built.⁴⁵ There is therefore a pressing need to look beyond simply improving energy efficiency toward replacing existing greenhouse gas-intensive power plants with newer, less greenhouse gas-intensive ones.

3. CLIMATE CHANGE AND THE NEW FIDUCIARY

Social and environmental issues (often grouped under the broad, unifying rubric of “sustainability issues”) and corporate governance issues have historically been viewed as separate concerns, but are now becoming increasingly intertwined.

As powerful, socially-active institutional investors join forces to press for better corporate policies on social, environmental, and governance issues, corporate CEOs and directors can expect to hear increasingly insistent questions about their climate policies, strategies, and performance. Already, pension funds representing over \$1 trillion in assets have begun to organize informally to call the world’s largest corporations to account on climate change risk exposures.

The convergence of the corporate governance and sustainable development agendas is a compelling trend for fiduciaries. One might say that the era of climate change is a new era of fiduciary responsibility and obligation.

The Rise of the “Universal Owner”

Institutional investors currently own over 60 percent of the total outstanding equity of the United States’ largest 1,000 corporations.⁴⁶ U.S. pension funds alone have roughly \$6 trillion in assets.⁴⁷ Shareholdings are now so broad and diverse that they represent a broad cross-section of the whole economy. As Nell Minow and Robert Monks put it, big institutional investors are now “universal owners.”⁴⁸

As a result of their status as universal owners, institutional investors’ financial returns are determined to a large extent by the performance of the economy as a whole. This creates a direct alignment between their economic interests and the long-term interests of society as a whole.

While relatively few institutions seem to have recognized or acted upon this fact, institutional investors have both a strong interest in and considerable power to affect major public issues such as health, education and training, corporate disclosure and transparency, and the environment.

Since climate change is arguably the greatest of world’s environmental challenges, it follows that major institutional investors have a duty to minimize the potential adverse impacts of climate change on their beneficiaries.

Major institutional investors tend to hold their shares for the long term; their size precludes them from selling significant holdings without disrupting the market, and a large proportion of their assets are indexed to broad stock market indices in any case. Since as a practical matter they rarely sell their holdings, their preferred option for improving the financial perform-

ance of their portfolio companies is to express their views forcefully to company executives and directors as activist shareholders.

Growing Shareholder Activism

Since the late 1980s, shareholder activism has played an increasingly important role in influencing companies' policies on social, environmental, and governance issues. More recently, the increase in shareholder activism has converged with two other powerful investment trends: a dramatic rise in institutional shareholdings, and a rapid growth in the attention paid to corporate social responsibility and sustainable development issues. Fund managers are increasingly using shareholder activism to improve the performance of firms rather than divest and risk inadequate diversification.

In a recent decision that could expand shareholder activism even further, Harvey Pitt, the head of the Securities and Exchange Commission, has asserted that money managers should view proxy voting as a fiduciary duty.⁴⁹ In other words, it is no longer acceptable for fund managers to vote reflexively for the view advocated by management. They must reflect and then act in a manner which is consistent with their broader responsibilities as owners.

A March 2002 study released by the Investor Responsibility Research Center and the Social Investment Forum confirmed the expansion of shareholder advocacy in the U.S. The report found that "filers of traditional corporate governance resolutions and so-called 'social' resolutions are finding common ground to an unprecedented extent this year as they work to head off Enron-like problems at other corporations."⁵⁰

The study reported 712 shareholder resolutions filed so far in 2002, with more than a third (261) considered "social." A substantial percentage of these are a hybrid of social and corporate governance concerns. The report quoted Social Investment Forum Chairman Timothy A. Smith, who also is senior vice president and director of social responsible investing of Walden Asset Management: "The long shadow that Enron is casting over the 2002 shareholder resolution season was very evident in the Securities and Exchange Commission (SEC) chairman's recent call for mutual funds to exercise more diligence in voting their proxies...We expect this and other factors to result in an increasing number of investors supporting social and governance resolutions."⁵¹

The report also found that the fastest-growing area of focus for shareholder activism is climate change. In 2001, global warming resolutions were filed with seven companies. In 2002 that number had nearly tripled, as proponents filed 19 resolutions.⁵²

Sustainable Governance and the New Fiduciary

As the negative social and environmental impacts of companies have become more obvious, these costs, which have historically largely been externalized onto society, are being internalized through increasing regulations, customer demands, taxes, and other mechanisms. To an increasing degree, companies are being called on to expand their operating focus to include acting as responsible corporate citizens and reducing their harmful impacts. Companies failing to move in this direction likely will face growing financial risks and penalties directly from government imposed regulations, not to mention from customers, investors and capital markets.

In earlier decades institutional investors have often accepted unquestioningly the unsubstantiated prejudice that the pursuit of environmental excellence in companies could only be achieved at the cost of lower financial returns for investors.

The new century has brought a new set of views, since there is now incontrovertible evidence that superior environmental and social performance does affect the risk level, profitability, and stock performance of publicly-traded companies, fiduciaries would be derelict in their duties if they did *not* consider environmental factors such as climate change. Indeed, the law firm of Baker & McKenzie found that fiduciaries may be obliged to consider environmental and social issues beyond allowing environmental and social screening.⁵³ Other studies find that, in some cases, the duty to monitor and the duty of obligation place fiduciaries under a clear legal requirement to consider environmental and social issues.⁵⁴

4. CLIMATE CHANGE, CORPORATE COMPETITIVENESS AND SHAREHOLDER VALUE

Financial and Environmental Performance are Inextricably Linked

To an increasing degree, leading-edge financial analysts and investors are recognizing that there is a strong, positive, and growing correlation between industrial companies' "sustainability" performance and their competitiveness and financial performance, whether measured as return on investment, return on equity or total stock market return.

Indeed, recent back-test evidence indicates that a diversified portfolio of more "sustainable" companies can be expected to out-perform one comprised of their less efficient competitors by anywhere from 150 to 240 basis points (1.5–2.4 percent) or more per annum. In particularly high-risk sectors such as chemicals and petroleum, Innovest's own research has revealed that this "out-performance premium" for top-quintile companies can be as great as 500 basis points (5 percent) or even more.⁵⁵

These earlier findings were confirmed and extended in a recent analysis conducted in early 2001 by the independent quantitative analysis specialist firm QED. This study used a sophisticated "time-series" methodology, to examine the financial performance of an "eco-enhanced" Standard & Poor's 500 index portfolio.

For purposes of the study all of the other known investment factors which could have explained the out-performance were normalized away. The potential financial impact of differences in companies' market capitalization, price/earnings ratios, industry sector, interest rate sensitivity, volatility, and exposure to oil price shocks were among the value drivers eliminated through sophisticated portfolio optimization techniques. The objective was to isolate that portion of the financial return that could be attributed solely to the quality of the companies' environmental management.

It is indeed possible to enhance shareholder returns by over-weighting companies exhibiting superior environmental management. Depending on the level of emphasis given to environmental factors, the out-performance margin ranged from 180–440 basis points (1.8–4.4 percent). Significantly, the greater the emphasis, the greater the financial return. None of this out-performance can be explained by traditional securities analysis; it appears to be pure "eco-value."⁵⁶

Of perhaps even greater significance for fiduciaries, however, is the confluence of macro-level, structural trends that give every indication of creating an even larger “eco-value” premium over the next 3-5 years:

Of perhaps even greater significance for fiduciaries, however, is the confluence of macro-level, structural trends that give every indication of creating an even larger “eco-value” premium over the next 3-5 years.



And no environmental factor is more likely to be more important than climate change.

Companies involved in the resource extraction, manufacturing or heavy industry sectors are more apt to face exposure to these issues than others, due to the high profile of environmental and social factors in their core strategic operations. However, investors in virtually *all* sectors are now facing increasing levels of business risk stemming from corporate environmental and social practices that impact shareholder value.

These risks can take many forms:

Balance sheet risks: *Historical and contingent liabilities can exert a tangible negative influence over a company's net asset value and even under certain circumstances its market value. The cleanup of derelict industrial sites, for example, can be a serious financial burden if appropriate preparatory measures have not been taken. The threat of litigation on a large scale due to past business practices can also dam-*

age a firm's stock price severely. Halliburton and Dow recently each lost roughly 40 percent of their total market capitalization over investor fears of retroactive asbestos litigation in the US.

Market and 'Reputational' risk: Major corporations remain heavily dependent on their "social license to do business", license that can be revoked summarily over perceived environmental transgressions. The Brent Spar North Sea oil platform incident, for example, cost Royal Dutch/Shell fully 30 percent of its market share in Germany within one month, and it took over eighteen months to recover it. Exxon is still recovering from the reputational damage it suffered from the Exxon Valdez oil spill, an event which, research has shown, resulted in 'significant cumulative and lasting negative abnormal returns' for Exxon shareholders. The current "Stop Esso" boycott campaign in the U.K. and elsewhere – specifically because of ExxonMobil's stance on climate change – is a more recent example.

Indeed, brand or reputational value can be so large – measured in billions of dollars for some firms – that the Financial Accounting Standards Board is currently considering a proposal that would recognize this vital "intangible asset" on corporate balance sheets.

Capital cost risk: Pollution control expenditures, product redesign costs and other capital outlays due to environmental standards and regulations can be significant budgetary items. The Oil and Gas Journal estimated that during the 1990s, the oil refining industry spent roughly \$30 billion to comply with government regulations, a trend which looks set to continue thanks to ever-tightening fuel quality standards.

Operating risk: Managing emissions and waste product discharges, coping with product liability risk, dealing with permitting issues and 'eco-taxes', and handling delayed or canceled acquisitions or divestitures can draw substantial financial and management resources away from more productive business endeavors. Typically, resource industry companies record environmental expenditures totaling between 10 and 30 percent of total annual operating costs, which is significant enough to make the difference between profit and loss during lean times.

Business sustainability risk: Companies in many industries face risks arising from the intrinsic sustainability of their products and services. For example, government intentions to address climate change concerns, enshrined within the Kyoto Protocol, could disrupt coal markets and significantly curtail demand, particularly for bituminous thermal coal types.

By the same token of course, companies achieving performance leadership in each of these areas can also create competitive advantage, boost

Of all the environmental challenges facing us today, however, climate change has the greatest potential to influence corporate competitiveness and profitability, the market's valuation of the company's stock and, by extension, the creation and erosion of shareholder value.

profits, and reinforce “brand equity” and shareholder value by enhancing key “value drivers”, including superior stakeholder satisfaction and innovation capacity. Companies such as DuPont, Johnson Matthey and Interface, for example, are already producing top-line revenue growth with new products and services predicated on environmental out-performance. Executives at Merck and Suncor are convinced that their superior environmental performance and reputations have generated concrete shareholder value through improved relations with regulators, customers, suppliers, and employees. And STMicroelectronics, Bristol-Myers Squibb, and Tembec can all point to examples where environmental innovations have helped create an entirely new corporate ethos and have elevated the companies’ overall “innovation quotient” considerably.

Of all the environmental challenges facing us today, however, climate change has the greatest potential to influence corporate competitiveness and profitability, the market’s valuation of the company’s stock and, by extension, the creation and erosion of shareholder value.

Innovest’s research highlights the following areas where climate change or the policies put in place to tackle it could impact shareholder value:

A. Via direct cash flow and earnings:

- Increase/decrease in market share due to customer appetites for greenhouse gas-intensive technologies
- Greater competitive advantage for energy efficient and low-emissions goods and services
- Increase/decrease in operating costs for greenhouse gas-intensive operations either through direct greenhouse gas reduction requirements or higher cost of fuel and/or power owing to extra carbon ‘charge’
- Increase/decrease in project or capital investment returns stemming from additional cash from tradable emissions permits generated during project or unanticipated costs of having to reduce own greenhouse gas emissions

B. Via brand or reputation:

- Companies perceived by the general public as being major emitters of greenhouse gas and who appear obstructive to mitigation efforts or ‘anti-Kyoto’ may face boycott or other consumer protest actions (particularly in Europe)
- Poor reputation of climate change management may impair firm’s ability to recruit top staff, or enjoy constructive relationships with regulators, local communities or other stakeholders

C. Via cost of capital

- Major emitters may face higher debt charges from climate-conscious investors if sufficiently strong emissions mitigation steps are not factored into project or business economics
- Likewise, insurance premiums may well be forced up for companies unprepared to take risk management steps around extreme-weather exposure or emissions mitigation
- Credit risk ratings may become impaired due to exposure to weather changes and future regulations if appropriate risk management steps not taken proactively. For example, Standard & Poor's states that environmental regulations are a key rating consideration in the water industry, and can impact credit quality.

Demand for low-carbon technologies, goods and services will heighten as industrialized nations strive to meet their commitments under global climate change treaties. The automotive, chemicals, coal, electric power, manufacturing, oil and gas, refining, steel, rail and consumer goods businesses will all be in need of energy efficiency and low-carbon energy solutions. Regulatory and other public policy initiatives around the world are also creating compelling export opportunities for U.S. companies developing clean energy and low greenhouse gas-intensive technologies. Cummins Engine, for example, is already supplying compressed natural gas engines to the Chinese government in order to switch several thousand of Beijing's city buses from diesel to cleaner-burning gas.⁵⁷

Innovest estimates that potential disruptions to consumption of oil and coal in industrialized regions due to efforts to meet greenhouse gas emissions commitments could create an additional 4 Quadrillion BTUs of energy demand for renewables over the next 10 years, or roughly 15 percent of the world's total energy needs.⁵⁸

There is also growing evidence to suggest that clean energy providers may be able to command significant premiums over fossil fuel-produced power, at least for the time being. Canadian Hydro Developers, for example, claims to be able to extract a 10 percent "clean energy" premium over market prices in its long-term power delivery contracts. Large industrial users like Shell are preferring to purchase clean energy for marketing and PR purposes. Vision Qwest, a Canadian wind technology developer, reports premiums of between \$5 and \$15 per month for its clean power.⁵⁹

Finally, the cleaner emissions profiles of alternative energy and efficiency technologies also present companies with opportunities to participate in the emerging markets for energy and environmental commodities (green certificates, greenhouse gas credits, etc), which may provide additional revenue streams. The concept of carbon emissions trading is a fundamental

element of the Kyoto Protocol, and international emissions trading is rapidly becoming a reality even before the final climate change accords are agreed or ratified. A number of respected industry analysts project that this new market will expand exponentially over the next decade:

Source	Projection of Size of Greenhouse Gas Emissions Trading Market
<i>World Bank</i>	\$10 billion by 2005
<i>U.S. Council on Foreign Relations</i>	\$2.3 trillion of trades completed by 2012
<i>Energy Policy Journal</i>	\$24–37 billion of trades completed annually during the period 2008–2012
<i>Resource and Energy Economics</i>	\$46.6 billion of trades annually (unspecified time frame)
<i>The Economist</i>	\$60 billion – \$1 trillion of trades annually (unspecified time frame)

These are just some of the areas where business might expect to be affected by climate change itself and by public policy attempts to reduce greenhouse gas emissions. There are many more indirect ways in which companies may be affected, and some of these are highlighted in the sections that follow. The next section shines a spotlight on some examples of best practice in managing corporate and investor climate change issues, and in doing makes the case that business interests are fully aligned with positive action on climate change.

Corporate Boards and CEOs – Current Best Practice

Corporate CEOs are increasingly recognizing that climate change is a major strategic, economic, and competitive issue, and this has led a number of firms to embark on proactive, leading-edge response strategies. Some examples of fiduciary leadership are provided below, and many more exist in the literature. However, what ties these examples together is a realization by “best practice” senior executives, board members and other fiduciaries that:

1. Good governance means adopting a strategic position around sustainability imperatives affecting their businesses,
2. Climate change is the key sustainability challenge of the current era, and
3. Taking action on climate change would actually improve the competitive position of their companies in the marketplace.

Importantly, leading firms appear to recognize the relevance of climate-related business risks and opportunities to their long-term investment strategies. In the metals and mining sector, for example, Alcoa’s work on inert anodes and fuel cell-powered smelters could take the smelting and refining process to a new dimension by drastically reducing energy needs,

decreasing greenhouse gas emissions and lowering capital and operating costs. Although uncertainty remains over the time to market for the new inert anode and fuel cell approaches (reports indicate between 2–5 years for the former, 10 years or more for the latter); the cost and environmental footprint of aluminum production look certain to fall.⁶⁰

In addition to these kinds of technological and new product breakthroughs, leading firms are also paying serious attention to reducing their own greenhouse gas emissions. Former Royal Dutch/Shell CEO Sir Mark Moody-Stuart echoed this within the context of describing Shell's own commitments to greenhouse gas reductions. Under a voluntary scheme, companies appear to be motivated to adopt greenhouse gas emissions reduction targets for a variety of reasons, including:

- risks associated with future regulations
- ecoefficiency gains (e.g., reduced energy costs)
- concern over future climatic changes and the implications for business
- concern over reputation
- a desire to improve competitive positioning.

For example, twelve of the thirteen U.S. primary aluminum producers, representing 96 percent of the U.S. primary aluminum production capacity, have joined EPA's Voluntary Aluminum Industrial Partnership. Companies participating in this program have committed to make reductions in two potent greenhouse gases, tetrafluoromethane (CF₄) and hexafluoroethane (C₂F₆). The program met its 2000 goal to reduce PFC emissions from U.S. primary aluminum smelting by 45 percent – equivalent to 1.8 million metric tons of carbon – using cost-effective approaches that make both economic and environmental sense for the partners.⁶¹

For two leading companies from the telecommunications sector, energy costs are a primary driver for action on greenhouse gas emissions. Deutsche Telekom, for example, reports that it has saved over DM 8 million in energy costs and reduced carbon dioxide emissions simply by adjusting the output of air-conditioning systems.

Dupont, another major energy user, has committed to aggressive greenhouse gas reduction targets without any guarantee of receiving credit for their early emissions reduction accomplishments.

And NTT, which will need roughly 4.7-billion kWh of electricity in 2000 and is Japan's largest single purchaser of electric power, is pursuing an energy conservation vision that aims to produce savings of 100 billion yen over 10 years over a business-as-usual scenario, thereby reducing indirect greenhouse gas emissions.⁶²

Many firms are also leading the way in emissions trading. Entergy, for example, that is clearly not yet formally obliged to reduce emissions, purchased 10,000 metric tons of carbon dioxide allowances for under \$5 per metric ton as part of its recently announced efforts to voluntarily

cut greenhouse gas emissions over the next few years working with the Environmental Defense Partnership for Climate Action. By virtue of this action, Entergy will be able to lock in relatively cheap emissions reduction credits and take significant steps towards meeting its voluntary targets. The U.K. Department of Environment, Food and Rural Affairs estimates that industry could almost cut the cost of reducing greenhouse emissions in half (from \$350 million to \$188 million over 5 years) by trading emissions.

Other firms are able to demonstrate leadership through the development of new low- carbon technologies or products that support a low carbon economy. ABB, the Swedish engineering and power equipment firm, has already adopted product specifications around greenhouse gas intensity to help distinguish its products in the market place.

In the U.K. for example, businesses that invest in low carbon technologies will reportedly see greater cash flow from a tax break that would provide a 100 percent first year capital allowance for such investments. U.S. companies may be able to see similar benefits depending upon the renewable energy tax breaks applicable in their particular operating regions.

Finally, a growing number of companies are participating in voluntary, NGO-led programs and initiatives directed towards greenhouse gas emissions reductions and climate change leadership. The World Wildlife Fund's Climate Savers program, Environmental Defense's Partnership for Climate Action, the Pew Center for Global Climate Change and many others are helping companies take positive action on the issue.

Ultimately, leadership on climate change response involves a combination of:

1. Company greenhouse gas emissions reduction
2. Examining risks and opportunities relating to altered weather conditions and altered biophysical conditions
3. Looking at how changing market and regulatory conditions may benefit or penalize a firm's products and services
4. Assessing how company strategy may affect and be affected by climate change across all aspects of business activity.⁶³

Board directors and fiduciaries need to be satisfied that the company's climate change stance on all these fronts makes good business sense, and that the cost of inaction is not an impaired valuation of a firm's assets or investment underperformance. Leadership in this sense involves taking a progressive approach to climate change management so that company standards become industry standards.

Institutional Investors – Current Best Practice

While the majority of institutional investors have yet to accord climate change the level of attention, seriousness and urgency it deserves, there are notable exceptions. Unfortunately, most of them are in Europe.

1. *In the United Kingdom, the Universities Superannuation Scheme (the third largest pension fund in the U.K. with \$30 billion in assets), has already staked out a singularly pro-active leadership position. It commissioned an excellent discussion paper on the implications of climate change for institutional fiduciaries, and is using its considerable “convening powers” to pull together a number of leading U.K. institutions to debate and discuss it on an ongoing basis.⁶⁴ This gives climate change a level of visibility and credibility among U.K. institutions which it would not likely have achieved otherwise, and USS is also pressing its own portfolio companies directly to become more engaged and active on the issue.*

2. *In the Netherlands, Europe’s largest pension fund, ABP, has recently begun to address climate risk systematically in its stock selection process, beginning with two \$100 million “experimental” portfolios. On the basis of the portfolios’ early out-performance, the fund is currently considering expanding the use of this “environmental risk overlay” to a larger proportion of its \$140 billion portfolio. Initiatives such as these by large, high profile institutions such as USS and ABP are clearly beginning to legitimize climate change as both an investment and fiduciary issue for European institutions.*

Unfortunately, this level of institutional activism has yet to be achieved in North America. To date, none of the 90 insurance and asset management signatories of the UN Environment Programme’s Finance Initiative is from the United States. At one point there was one U.S. company involved, but it subsequently withdrew.

Going forward, it is clear that the inherently global nature of both investment strategies and the climate change phenomenon itself will inevitably create a more aware and activist institutional investor community in the United States. This trend towards greater institutional investor action on climate change will only be accelerated as the sectoral risks and opportunities become clearer, as regulatory momentum builds, and as trustees and directors realize that a risk of this magnitude and depth demands a full and thorough assessment.

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Sectoral Overview of Risks and Opportunities

A review of the key source categories within the U.S. reveals the extent to which greenhouse gas emissions are distributed throughout the domestic economy.⁶⁵ Key source categories are sectors where mitigation techniques are being implemented, where significant changes in emissions are expected, or where uncertainty surrounding emissions is high. Most recent data indicate that major greenhouse gas emissions sources (in descending order of magnitude) include:

- Stationary combustion of coal (in power plants)
- Mobile combustion (primarily automobiles)
- Stationary combustion of gas (in power plants)
- Stationary combustion of oil (in power plants)
- Emissions from agricultural soils
- Methane emissions from solid waste disposal sites (landfills)
- Aviation industry emissions
- Fugitive emissions from oil and gas
- Methane emissions from livestock
- Marine industry emissions
- Coal mining and handling emissions
- Cement production
- Electrical equipment manufacturing (SF6)
- PFC emissions from aluminum production
- PFC and SF6 emissions from semiconductor manufacturing

With this in mind, the following sections describe some of the key risks and opportunities arising in different segments of the economy from either changes in climatic conditions or governmental efforts to mitigate greenhouse gas emissions.

Transportation (including Auto and Rail)

Risks

- New regulatory measures including emissions restrictions and incentives for clean fuels/greater fuel efficiency place **competitive premium on advanced vehicle technology**. Companies unable to keep pace face increased risk of losing market share to high-efficiency, low-emitting technology alternatives.
- **Fuel intensive rail, aviation and marine transportation firms face increased cost** of doing business as carbon charges raise fuel prices.
- High greenhouse gas-intensity of U.S. vehicle manufacturers **undermines competitive positioning** relative to European and Japanese manufacturers when competing for new markets in climate-conscious emerging economies (notably India, China and Brazil). For example, the European Automotive Manufacturers Association (ACEA)

is now committed to reducing the average CO2 emissions of its new car fleet by 25 percent to 140g/km by 2008, mainly through technology changes.⁶⁶

- Rail and some marine transportation firms face **reduction in coal transportation** to electric utilities and steel companies as firms switch from coal to natural gas. Coal freight provided Class 1 railroads with \$7.7 billion in revenues and roughly 22 percent of all freight revenue earned.⁶⁷

Opportunities

- Low greenhouse gas-intensive, **high-efficiency vehicle engine technologies gain rapid market share**, particularly in both domestic and overseas growth markets, due to concerns over climate change. The Bush Administration's climate change program proposes expanding the development of fuel-efficient motor vehicles and trucks, including new options for producing cleaner fuels and fuel cell research.⁶⁸
- **Increasing opportunity for public-private collaboration** on research into cleaner transportation approaches. In September 2001, the first-ever licensing agreement between EPA and an automobile company (Ford) involving vehicle powertrain technology was announced.
- **Increasing demand for light rail systems and intermodal infrastructure** in Europe as a more sustainable form of transportation under the E.U.'s sustainable development program.

Key Implications for Fiduciaries

Transportation companies unaware of the implications of greenhouse gas emissions mitigation regulations may face unexpected costs associated with either direct charges to reduce emissions or higher fuel costs. On the other hand, substantial new opportunities may open up for proactive firms capable of meeting demand for cleaner, more efficient technologies in the global marketplace.

Water and Waste Industry

Risks

- Climate change disrupts natural hydrogeological cycles, **reduces access to water** resources and places greater stress on water bodies and reservoirs.
- Floods and drought may **exacerbate requirements for large-scale, systematic capital expenditures** to upgrade existing infrastructure. Governmental concerns regarding climate change creates the possibility of legislation to manage water resources more efficiently, which in turn may require greater upgrade and compliance costs from water companies. Firms unable to pass these costs on to consumers may be particularly badly hit.
- **Increased costs of energy used in pumping activities** may drive up operating expenditures and put downward pressure on profitability.

Opportunities

- New business opportunities in **supply of clean power and renewables from landfill gas and/or other waste sources** are expanding. The Bush Administration intends to provide new tax credits of 1.0 cent-per-kilowatt hour through 2010 for energy produced from landfill gas regulated by the EPA to collect and flare methane, and 1.5 cents-per-kilowatt hour for unregulated landfills.⁶⁹
- With clean water at a premium, high water consuming industrial users (e.g., semiconductors, mining) may be prepared to **pay higher rates for water supply**, thereby increasing prospects for water company profitability.
- New opportunities as resource-strapped governments **turn to private sector for investment capital and management know-how for modernizing** and expanding drinking water supply and sanitation services.

Key Implications for Fiduciaries

Companies unprepared for potential water cycle disruptions may face substantial and unanticipated costs relating to infrastructure modernization and an increasing scarcity of accessible water resources. Substantial and potentially highly profitable opportunities may be available for harnessing methane emissions for 'clean' power production.

Petroleum Industry

Risks

- Potential **long-term disruption to core company businesses** if growth in fossil fuel usage is dampened by governmental actions to curb greenhouse gas emissions or by competing 'cleaner' or more efficient fuel substitutes.
- OPEC estimates a **drop in global oil demand** of 6.5 million barrels per day due to carbon taxes introduced to help meet Kyoto targets.
- Disruptions to future fossil fuel usage in a carbon-constrained economy will also be spurred by **greater market penetration of clean energy** and renewables technology, which may be major risk if activities are not 'hedged' between fossil fuels and renewables.
- **Increasing pressure to reduce direct company emissions** of greenhouse gases arising during daily operations. Depending on the type of fuel used, refinery operators may be particularly prone to large-scale greenhouse gas emissions.
- Capital spending decisions are made on timescales that stretch beyond the current Kyoto agreement and **may be exposed to carbon constraints** that have not yet even been negotiated.

Opportunities

- Technological advancements are now making it increasingly more economical to transport natural gas rather than flare it off. Commercializing produced gas is also creating **more opportunity for liquefied natural gas technologies**.
- Growing demand for renewables and other clean energy technologies are creating **growth opportunities for diversified energy firms**.
- Consumer demand and regulatory trends are also **favoring more efficient, less greenhouse gas -intensive transportation fuels**.
- Greater demand for natural gas in general as primary fuel supply into developed and developing economies.

Key Implications for Fiduciaries

Company directors should focus on understanding company exposure to direct greenhouse gas reduction requirements and to potential disruptions to fossil fuel demand in key sales regions. A lack of involvement in renewable or clean fuel technology development may over-expose firms to fossil fuel market turbulence.

Gas & Pipeline Industry

Risks

- Gas and pipeline companies are coming under increasing pressure to **reduce their own emissions** and become more efficient in their use of energy to move product along the pipeline. Fugitive emissions are the largest contributor to methane emissions from gas processing, transmission and storage.
- The estimated **100 billion cu. ft. of gas that escapes into the atmosphere** each year represents a loss to the industry of **\$200 million** (at \$2 per thousand cu. ft).
- Warmer weather has undoubtedly impeded profitability in the gas sector due to **lower demand for heating requirements**; milder winters in recent years had resulted in an annual 3.2 percent decline in total gas deliveries to consumers.⁷⁰

Opportunities

- Electricity “cogenerators” avoid new source review requirements under the Clean Air Act and benefit from regulatory support; the White House’s proposed **national energy plan calls for the creation of 2,000 new generating plants in the next six years**.
- A substantial **expansion of and investment into the natural gas pipeline and power generation industry** will be needed to accommodate shift towards less carbon-intensive fuels.
- Meeting future gas market demand could require an **extra 38,000 miles of transmission pipeline and 255,000 miles of distribution pipeline**, at an estimated cost of \$120-150 billion.

- International operators **may seek emissions credits** under Kyoto mechanisms as part of foreign direct investment in overseas energy markets.

Key Implications for Fiduciaries

Although gas firms should receive net benefits from increased demand for cleaner gas, companies should be careful to seek economic benefit for shareholders from reducing fugitive emissions via 'low hanging fruit' measures across a wide breadth of activities. The potentially damaging effects of warmer weather should provide sufficient motivation for companies to support proactive measures on climate change. Myriad benefits seem achievable in international energy and pipeline markets for firms familiar with climate change public policy measures.

Forestry/Pulp and Paper

Risks

- **Increased risk of fire and pest problems** due to altered weather conditions and possibility of higher insurance premiums and limited coverage add considerable management difficulties plus operating costs.
- **Higher energy costs** associated with carbon charge on electricity also raise operating costs for energy-intensive pulp and paper companies.
- Pulp and paper facilities face prospect of **direct emissions reduction requirements**.

Opportunities

- **Greater demand for biomass** as clean energy form, e.g., The Bush Administration's proposed national energy plan calls for credits for electricity produced from new biomass sources (amounting to 1.0 cent-per-kilowatt hour for three years, 2002-2004, of production).
- Additional source of revenue from **generation and sale of emissions reduction credits** arising from appropriate carbon sequestration activities (although transaction costs and scientific uncertainties are currently high).
- **Additional forest productivity, yield and overall biodiversity benefits** arising from enhanced stewardship of 'Kyoto forests', particularly in temperate regions.

Key Implications for Fiduciaries

Additional revenue streams due to carbon sequestration techniques may become a major opportunity for forest companies and augment other, complementary forest stewardship activities. Forest companies able to take full advantage of Kyoto mechanisms may see considerable upside, although any alterations to climatic conditions may introduce new risks requiring board and management attention.

Basic Industries (Steel, Chemicals, Mining)

Risks

- Basic industries – including chemicals, cement manufacturing steel and mining – are highly energy intensive and energy costs are a large portion of overall operating costs (often as much as 30 percent and sometimes higher). **Price increases due to carbon charges** have the potential to significantly impact corporate profitability in inefficient operations.
- **Risk of regulations** requiring direct greenhouse gas emissions to be reduced, and the added costs associated with mitigation may be substantial. The aluminum industry, for example, is a major emitter of greenhouse gases, particularly perfluorocarbons (PFCs), gases which have a global warming intensity over 6000-times that of CO₂⁷¹.

Opportunities

- **Use of alternative fuels and raw materials** (paper mill slurry, clinker, etc) in cement manufacture **substantially reduces energy costs**, cuts greenhouse gas emissions and reduces the amount of waste requiring disposal via landfill or incineration. Current use of such fuels is low (corresponds to only 12 percent of total fuel consumption in Europe, for example) and the potential for switching is considered to be significant.
- Similarly, in the aluminum industry, measures to reduce ‘anode effects’ – a major source of PFCs – bring about **significant energy savings** and other process efficiencies.
- The generation and use of emissions credits (either as offsets for internal emissions or in bringing in additional revenue from trading) may also **enhance the economics of switching to alternative fuels** or other efficiency measures.
- Increased demand for greater auto efficiency and lower emissions may **increase demand for lightweight aluminum in auto manufacturing**, or nickel in hybrid battery/fuel cars.

Key Implications for Fiduciaries

The critical issue facing basic industry companies is the energy- and emissions-intensity of their core operations, and the potential costs of mitigating emissions and fuel surcharges. These risks can be managed by proactive board and management actions, as various leadership examples make plain, and long-term strategies around new product lines may establish market leadership positions.

Tourism

Risks

- The tourism industry – which is one of the world’s largest, accounting for 11 percent of worldwide GDP – **may well face significant risks** due to more frequent and/or more **extreme weather events**.
- **Coral reefs, for example, may face continued decline**. 27 percent of the world’s reefs have been destroyed in the past 50 years due to water temperature changes and other weather-related effects, and 32 percent more are reported to be at risk of dying by 2050.⁷²
- Glaciers appear to be retreating rapidly, which may affect **Arctic cruise industry**, for example, or **mountain tourist destinations**.
- **Climate-related damage to complex habitats of animals and fisheries** in major tourist destinations such as Africa and Caribbean could be disrupted.
- **Increased storm damage to property held by tourism companies** in high-risk areas. Hotels and resorts are usually located on coastal areas and may be particularly high risk to flooding and storms.
- Increased temperatures have potential to impede business at range of tourist destinations, from **ski resorts** (where snowfall is clearly a key issue) to **beach resorts** (where extreme heat and beach loss could deter vacationers). Low-lying island states reliant on tourism may be especially vulnerable to latter.

Opportunities

- Increased business for tourist destinations and companies offering **ecofriendly destinations and travel conditions**. Ecotourism is reportedly growing at a very healthy rate, with 20 percent annual growth rate and over \$154 billion in receipts in 2000 (although greenhouse gas emissions from the travel industry are a growing problem).⁷⁵
- Greater eco-efficiency of resort operations can **enhance reputation of tourism** companies and cut operating expenditures through, e.g., use of renewable energy for off-grid power.

Key Implications for Fiduciaries

In light of the above, fiduciaries should be concerned to assess the potential climate-related susceptibility of their particular interests to weather changes or evolving consumer appetites for ecotourism-type vacations. The extent to which weather changes reduce the underlying value of their assets should be a key concern.

Building Construction and Real Estate

Risks

- Certain property types in high-risk locations may become **extremely expensive to insure**, subject to more stringent risk management mechanisms or even uninsurable because coverage is too risky.
- **Loss in property value due to the unavailability of insurance** may also have a ‘knock-on’ effect whereby large infrastructure projects (for example) become unviable for the project finance community and drive up the cost of capital for corporations.
- **Inefficient use of energy** (primarily in heating but also in other appliances) can unnecessarily raise building management costs.

Opportunities

- **Integration of clean energy technologies into the architectural design** of buildings and other structures in the built environment. In the U.S. home construction industry, for example, AstroPower struck a partnership with Shea Homes of San Diego, the U.S.’ 10th largest home builder, to design solar power as a standard feature of Shea’s new homes. Solar power reduces dependency on grid electricity, lower greenhouse gas emissions and be cheaper to run; capital costs are also decreasing rapidly.
- The **reduction of heating bills and electricity requirements** through the use of building energy efficiency measures, such as those detailed in the Energy Star program, can substantially lower operating costs and make space more valuable in the marketplace.
- Demand is expected to increase – and may even be required in new building codes – for **new construction materials** better able to withstand weather extremes associated with climate change.

Implications for Fiduciaries

Optimization of energy use in buildings should be a primary target of all firms but especially those with large real estate portfolios. However, a key cause for concern should be the possible exposure to extreme weather events and the concomitant shifts in insurance policies and building standards.

Manufacturing (including Electrical Equipment & Semiconductors)

Risks

- Large energy users face **increased cost of doing business** due to carbon fuel charges unless energy efficiency measures taken.
- Likewise, large water users (e.g., semiconductor companies) may face **price hikes and in some cases more restricted access to water** than in past. The semiconductor industry is often afforded a very low priority for water usage, behind agriculture and drinking water needs.⁷³

- Possible **regulatory risks** relating to need to mitigate own greenhouse gas emissions stemming from manufacturing. On March 13, 2001, EPA and the Semiconductor Industry Association signed the PFC Reduction Climate Partnership to reduce emissions of perfluorocarbons (PFCs) by 10 percent from 1995 levels by the end of 2010.⁷⁶
- In extreme cases, companies manufacturing goods for carbon-intensive industries may face **reduction in demand for products**.
- **Physical damage to manufacturing facilities** and properties due to extreme weather events, particularly in the developing world and those regions considered to be most at risk.

Opportunities

- **Increased demand for manufactured goods** integral to a low-carbon economy. In August 2001, new partnerships totaling \$500 million were announced between the government and 6 industrial technology manufacturers to accelerate commercialization of fuel cells and related technologies.
- **Increased demand for power electronics**, uninterruptible power sources and other ‘micropower’ devices such as flywheels and superconductors that provide manufacturing firms with backup power and power quality enhancement.
- **Greater opportunity for product differentiation** on the basis of energy efficiency or low greenhouse gas emissions.

Implications for Fiduciaries

Considerable opportunities are becoming available to manufacturers of low emissions, high efficiency technologies in practically every industrial setting. By the same token, manufacturers must examine their own resource consumption and emissions profile to assess possible regulatory and market risks.

Agriculture and Food

Risks

- Higher maximum temperatures and more complex temperature variations across North America **increase risk of crop damage and possible reduced crop yields** due in part to degradation of soil quality; attendant insurance coverage difficulties increase risk profile in some cases⁷⁷.
- Increased risk of **heavy precipitation or coastal zone flooding** may affect rangeland productivity and reduce quality of soil fertility.
- Unpredictable crop yield responses, depending on a variety of location-specific factors, increases **uncertainty on farming livelihoods**.
- Possible increase in **heat stress-related deaths among livestock** and **reduced access to water resources**. Agriculture is also the largest user of freshwater in many countries, and prices may well creep up as resources become more scarce.

- **Disruptions to fisheries** interests as habitat loss, water temperature changes and variations in freshwater ecosystems affect fish population numbers, breeding habits and migration trends.

Opportunities

- **Generation and sale of emissions credits** through soil tillage and agricultural land management practices is key issue. Use of fairly simple but powerful farming technology such as conservation tillage can substantially reduce atmospheric carbon dioxide emissions and erosion risk. Monsanto estimates that widespread adoption of conservation tillage and other management practices (such as crop intensification) could fulfill 20–30 percent of the U.S.’ commitment under Kyoto. Emissions credit trades involving agricultural practices have already been made between U.S. farmers and Canadian utilities, and more can be expected.
- Due to high levels of inefficiency in water use within the agricultural sector, even **small efficiency gains have the potential to produce considerable financial benefits** and water saving.⁷⁸

Implications for Fiduciaries

Exposure to weather pattern changes is the key risk issue for fiduciaries in this sector; some level of adaptation to new conditions may be inevitable. However, potentially lucrative opportunities exist in the form of land use management and emission credit generation.

Insurance

Risks

- Weather-related losses could **stress property & casualty (P&C) insurers to the point of impaired profitability**, consumer price increases, withdrawal of coverage, and elevated demand for publicly funded compensation and relief.⁷⁹ In 2001 insurance analysts at Lehman Brothers lowered earnings estimates to account for ‘a higher-than-normal level of catastrophes’.⁸⁰
- Potential climate-related impairment of the value of securities into which insurance firms invest as part of their asset management activities could leave companies **unable to cover future losses**. The second largest component of insurer revenues is investment income, derived from investing the funds set aside for loss reserves and unearned premium reserves.
- Convergence of asset management, underwriting and reinsurance may lead to **unanticipated compounding of risks** across breadth of insurance company activities.

Opportunities

- Insurance firms capable of understanding and managing climate-related risks may well be able to **step into new markets** considered uninsurable by others. Risk management techniques that make it possible for insurers to supply this potentially very large new market

would clearly be able to lay claim to a **potent source of competitive advantage**.

- **Climate and efficiency concerns may increase demand for conventional insurance products** (e.g. for homeowners) that link energy conservation and carbon risk to reduction in insurance risk, and therefore to superior insurance terms.
- Insurance companies can also **capitalize on demand for services** relating to the Kyoto Protocol market mechanisms (Joint Implementation Projects, Emissions Trading and Clean Development Mechanisms). New opportunities lie in assessing and insuring carbon liabilities of companies, insurance for project infrastructure, provision of commercial risk management/financing and liability coverage.
- **Weather derivatives and alternative risk transfer methods** such as catastrophe bonds offer an innovative solution and a new market for brokers and traders.

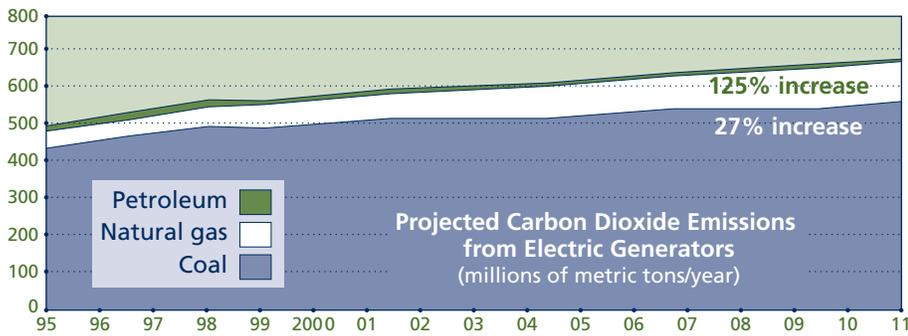
Implications for Fiduciaries

Fiduciaries should examine the potential synergistic risks arising from climate change across the full spectrum of both underwriting and asset management activities within insurance and reinsurance companies. The establishment of quantitative measurements of exposure to the risks of climate change is imperative.

SECTOR IN CLOSER FOCUS: THE ELECTRIC UTILITY INDUSTRY

Few industries can be as directly linked to the emission of greenhouse gases as the electric utilities sector. Fossil fuel-based power production contributes about 33 percent of total carbon dioxide emissions from the energy sector worldwide, and this percentage is expected to increase in the decades ahead. Experts project that worldwide electricity demand will more than double between 1990 and 2020. Achieving global electrification by 2050 will require about 10 million megawatts of new electricity generating capacity worldwide. About two thirds of this growth will occur outside of industrialized countries. The World Energy Council and International Energy Agency estimate that between \$1.7 and \$4 trillion will be needed in capital requirements for new power generation in developing countries by 2020.⁸¹

Under business-as-usual conditions, annual carbon emissions associated with electricity generation, including combined heat and power production, is projected to increase steadily (see chart) and surpass the 4,000 million metric tons mark by 2020.⁸² Because of this trend, and because emissions from large, centralized point sources are easier to control than other more



diffuse sources, the electricity sector will be a prime target under any future regulation or litigation scenarios involving greenhouse gas emission controls and mitigation. By the same token, the shift away from fossil fuel-based power production will clearly create major market opportunities in the next generation of commercialized clean power technologies.

A more detailed discussion of these risks and opportunities is presented below, together with some implications and recommendations for fiduciaries with interests in the electric utilities sector.

Risks

A. Reversing the emissions trend within the U.S. utilities sector will require substantial investment in new, cleaner power production technologies and methodologies.

Compliance with serious greenhouse gas reduction targets, for example, has been projected to increase sector fuel costs by \$10 billion annually as gas plants replace coal and the gas-fuel mix rises to 57 percent in 2010. Achieving this would also require significant increases in gas pipeline capacity. The White House's new climate change plan clearly does not require such targets to be met. However, the White House's goal of reducing "greenhouse gas emissions intensity" of the economy implies that firms in high-emitting sectors such as electric utilities must take action to address greenhouse gas emissions in some way. For many utilities, the low hanging efficiency fruit has already been harvested or, even if it still remains, it will only take them so far. Options open to utilities include:

- Improving the combustion efficiencies of existing plants
- Switching to less carbon intensive fuels such as natural gas
- Diversifying into "carbon-free" energy technologies such as wind power and solar
- Risk management through the use of the Kyoto Protocol's flexible mechanisms

The electricity sector will be a prime target under any future regulation or litigation scenarios involving greenhouse gas emission controls and mitigation.

- Encouraging reduction of the overall consumption of electricity through demand side energy efficiency and conservation initiatives

Each of these options may be seen as both a risk and opportunity, depending on the outlook of management, and some are discussed in more detail later in this section.

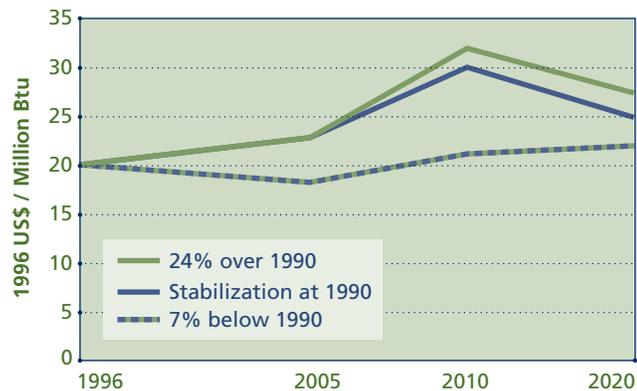
B. The up-front costs of reducing the greenhouse gas-intensity of electricity generation will reduce profitability if such costs cannot be passed on to consumers; if costs can indeed be passed on, such action will trigger an increase in the price of fuels.

Companies can reasonably be expected to see higher compliance costs and market entry barriers resulting from tightening air regulations going forward (e.g. emissions violations, mandatory repowering and installation of pollution control equipment). Importantly, firms may be unable to recover these costs from consumers in a deregulated marketplace, where customer pricing is a critical competitive variable.

The U.S. EIA has analyzed the effect of emissions reduction efforts on U.S. electricity prices under various carbon emissions reduction scenarios

Forecast of Effect of Carbon Costs on Electricity Prices

(Source: U.S. DOE/IEA, Impacts of Kyoto Protocol on U.S. Energy Markets, 199)



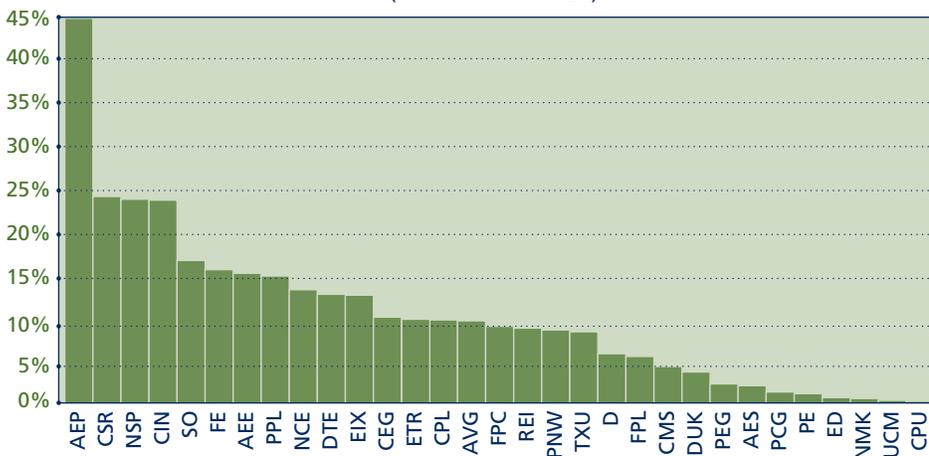
(24 percent above 1990 levels; stabilization at 1990 levels and 7 percent below 1990 levels). Perhaps surprisingly, the higher reduction scenarios did not result in overly high carbon costs (see chart above).

The Center for a Sustainable Economy has carried out a similar study, examining the “carbon charge burden” – the increase in price due to carbon mitigation efforts for a range of fossil fuels. Coal prices were found to be particularly affected. These studies not only raise the prospect of an additional “cost of carbon” on electricity and fuel prices, they also imply a need to incorporate such factors into corporate strategy, project returns, company profitability and equity risks.⁸³

C. The costs of reducing greenhouse gas emissions going forward will affect companies in different ways, depending on their carbon intensity, their management strategy and the range of technology options open to them.

Innovest has estimated the relative financial carbon risks facing 19 major U.S. utilities on account of various future emissions reduction requirements. For each company, total present-day carbon dioxide and methane emissions have been estimated from combined estimates of electricity production by fuel type (in MWh; for both regulated and Annex 1 non-regulated facilities) plus natural gas transportation through transmission pipelines. Future emissions reduction requirements were estimated according to a “soft” policy framework, i.e., fairly loose restrictions going forward and low marginal abatement costs.⁸⁴

Potential Carbon Tax as a % of Stock Market Capitalization (at Jan. 1/00)
Utility Rankings in Order of Decreasing Liability
Assumes \$20/Ton Carbon Tax
 (Source: Innovest/NRDC)



We calculate that the discounted future costs of stabilizing greenhouse gas emissions at 1998 levels range from \$1.2 billion for the most exposed firm (American Electric Power) to \$51 million for the least exposed firm (Public Service Enterprise Group). Exposure is not surprisingly greater for more stringent greenhouse gas emissions reduction scenarios, including adherence to the Kyoto Protocol itself. Expressed as a percentage of current market capitalization, this corresponds to a range of 11.5 percent of current market value “at risk” for coal-heavy American Electric Power to 0.9 percent for Exelon. The chart illustrates the breadth of financial impacts within the U.S. utilities sector based on straightforward “carbon intensity.”⁸⁵

D. Higher maintenance and repair costs and reliability concerns due to more frequent weather extremes and climatic disturbance (i.e. damage to the transmission and distribution network).

Physical damage to power sector infrastructure due to weather extremes, particularly in vulnerable location – e.g., U.S. coastal or hurricane regions,

emerging markets in South Asia and Latin America – may increase direct operating costs and capital expenditure requirements.⁸⁶ Moreover, insurers and lenders attuned to climate risks may well adjust the cost of capital according to new criteria. Loan securities threatened on a widespread basis may precipitate a loss of investor confidence in affected regions and induce a credit crunch.

E. Growing pressure from customers (residential, industrial and commercial), who have the power to choose their electricity supplier within deregulation trend in this sector and increasing environmental awareness.

Deregulation may well place a greater premium on a firm's ability to offer clean power, not only in terms of greater demand for such power but also in terms of the potential damage to a company's reputation should it be perceived as a major polluter. As the preceding pages have made clear, the growth in socially responsible investing and the increasing relevance of reputation to a company's overall financial valuation makes the risk of being brand erosion a concern for shareholders. Damage to corporate reputation can have multiple negative impacts including a diminution of market share, reduced customer acceptance, inability to attract and retain top employees, poor relations with labor unions and government regulators, poor pricing power and, ultimately, impaired share price performance

F. Restricted market access to countries/regions with higher air emissions standards

Laggardly carbon intensive firms operating abroad where climate change concerns are high may face competitive disadvantages associated with their inability to make full use of Kyoto Protocol mechanisms (particularly in the developing world) and the higher greenhouse gas emissions profile of their technologies. U.S. companies competing abroad that have not begun to take steps to reduce emissions in domestic operations may find concerns over their ability to do so in new projects.

Opportunities

A. Competitive advantages may be had by being first to market with new high-efficiency and low-emissions technologies

Improving the energy conversion efficiency of fossil fuel and the economic performance of power plants can be enhanced by greater use of new technologies that garner win-win solutions for shareholders and the environment. These technologies include:

- Pulverized coal technologies, which increase efficient conversion rates of fossil fuels and have the potential to increase average power station efficiency from 30 percent to more than 60 percent in the longer term.

- Combined heat and power production that enhances fuel conversion efficiency to up to 90 percent and also reduces greenhouse gas emissions.
- The development and application of technical carbon dioxide removal and sequestration techniques, post-combustion capture of carbon dioxide in flue gas streams.
- Combined cycle gas turbine (CCGT) technology, which allows for higher thermodynamic efficiencies. The efficiency of the best available natural gas fired CCGTs currently being installed is now around 60 percent and has been improving at 1 percent per year in the past decade.
- Integrated Gasification Combined Cycle (IGCC) systems, which utilize the efficiency and low capital cost advantages of a CCGT by first gasifying coal or, preferably, biomass. Commercially available coal- or wood-fired IGCC power stations with efficiencies over 60 percent may be feasible by 2020.

The benefits of these technologies to reducing overall greenhouse gas emissions-intensity was demonstrated by the transition of the electric utility industry in the U.K. to new lower emissions technology in the U.K. The adoption of new technologies and higher efficiency power generation systems resulted in a reduction of carbon emissions of approximately 40 million tons of carbon equivalent over the level emissions would have otherwise been absent these developments.

B. Compelling new growth opportunities for non-fossil fuel technologies and renewables are emerging in both the developed and developing worlds.

Environmental concerns, technological advancement, ongoing structural change in the electricity distribution industry, and broader market liberalization are all contributing to the growth in opportunity for renewables. In general terms, the advantages of wind, geothermal, hydro, photovoltaic, biomass, and such like are by now well-recognized: low cost (in certain situations), modularity, flexibility; lack of need for large capital investments; lack of reliance on volatile fuel prices and, of course, low environmental impact.

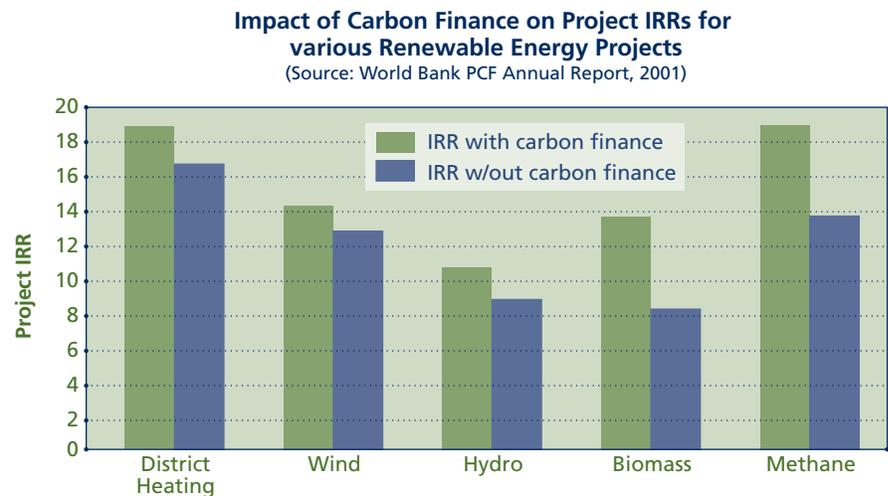
During 2000 and 2001, government intervention in support of renewables, crucial to expeditious commercialization, strengthened considerably. Europe has already surpassed its plans to generate 6 percent of its energy needs from renewables by 2010 – it aims for 50 percent by 2050, corresponding to an investment of \$90–\$135 billion (at an average of \$1–\$1.5m per MW to install). Australia is moving towards 2 percent renewables by 2010, equivalent to approximately A\$6bn.

Tax incentives throughout the industrial world are also working in favor of greenhouse gas abatement measures. Japan has embarked on aggressive course of clean energy growth, tax reform and support for the Kyoto Protocol.

The China Daily reports government prioritization of renewable energy resources: projects include 7,000 small hydro stations, more than 12 tidal power stations, a solar program, 15 wind power plants and many home biofuel systems.

The US renewables market is forecast to grow 34 percent by 2020, albeit off a very small base. US state regulations reducing market entry barriers for renewables are steadily being introduced. In 1999, California reported \$400 million in export sales of energy technology and equipment to 29 countries with an additional \$2 billion in expected sales from current projects.

Moreover, the additional returns provided by the sale of emissions credits could improve the financial characteristics of clean energy projects in developing countries and economies in transition. This is illustrated in the chart below, which shows the enhanced returns of projects undertaken by the World Bank's Prototype Carbon Fund over the past year:



The bottom line is that companies will find it harder and harder to be leaders in the new integrated energy business without being leaders in renewable energy forms. Developing the core competencies and strategic vision to adjust a company's portfolio of products and services accordingly should be a key objective of all energy industry executives.

C. Opportunities in demand-side management and broader energy service offerings

Leading energy companies are already refashioning their core business models to benefit from high growth in power generation, distribution and energy management outsourcing. Even companies traditionally not associated with energy and climate change issues such as Texas Instruments are recognizing how their "smart" technologies can contribute to climate protection by facilitating smaller, lighter and more energy-efficient products and industrial processes.

The growing relevance of energy usage to the bottom line across all sectors of the economy is placing new emphasis on energy efficiency and power management. Duke Energy's DukeSolutions unit recently announced a five-year deal with Bank of America Corp. under which it will manage the energy business at 4,800 bank sites, involving about \$110 million in annual energy costs. These are just a few examples of some of the many demand side management opportunities arising in the energy sector for leading companies, and this trend is expected to continue as liberalization of the power markets proceeds both in the U.S. and abroad.

D. Opportunities in power quality management

As industrialized nations become more dependent on information technology, the direct and indirect costs to businesses resulting from power outages are rising dramatically. Thus, a growing number of opportunities are being created for stand-alone distributed energy sources and uninterruptible power supplies (UPS), otherwise known as micropower technology, as alternative off-grid power backup sources. The backup power market alone has been estimated to be around US\$10-20 billion, growing at about 20 percent annually.

Implications for Electric Utility Fiduciaries

1. Climate change demands a Board-level strategic response

Climate change clearly represents a major strategic issue for the electric utilities industry and is of relevance to the long-term evolution of the industry and possibly the survival of individual companies. The formulation of a board-level strategy to manage attendant risks and opportunities should be a top priority for companies in this sector. For board members of electric utilities or power generators, failure to do so could represent a serious breach of fiduciary duty and raise the possibility of future legal liability.

2. Corporate competitiveness may be jeopardized: managing the customer interface will be key

Companies should be concerned to assess their risks not only to regulations requiring greenhouse gas emissions to be reduced, but also changing consumer appetites and preferences, particularly those relating to the penetration of clean energy alternatives. In a deregulated environment, not only might the costs of achieving greenhouse gas emissions reductions be prevented from moving on to the customer, but customers will demand greater environmental performance from their electricity suppliers. In this case, optimizing use of emissions trading, and other efficiency-enhancing technologies may be critical. Companies that fail to adapt to these changing market considerations may experience greater difficulty creating shareholder value and ultimately may place their long-term survival in jeopardy.

3. Company physical assets may also be at risk

Company directors should be concerned to examine their own property exposure and energy usage in order to fully appreciate the range of climate risks to which their companies may be exposed. Firms with assets in the developing world may wish to consider the potential vulnerability of these assets to weather extremes, and the potential for host governments to impose new emissions restrictions at some point in the future.

4. Utilities will also face risks from concerned investors and insurance providers

Fiduciaries may also need to connect with the insurance and banking constituencies to ensure that the cost of capital is not driven up unexpectedly or unfairly due to finance sector concerns over climate-related risks. Likewise, outreach to the asset management community may become important to allay potential fears over impairment of equity valuations stemming from climate change risks. Here, the strategic positioning of management may be critical in demonstrating adequate risk management provisions have in fact been taken.

5. Clean power presents compelling business opportunities which should be examined carefully

Finally, institutional investors and corporate directors should examine the potential opportunities that may be available within the burgeoning renewables and clean power sectors, and assess the extent to which the interests of shareholders are being served by current strategies on this issue.

5. CONCLUSIONS AND IMPLICATIONS FOR CORPORATE DIRECTORS AND INSTITUTIONAL INVESTORS

It should be clear from the foregoing that climate change has become a major risk management challenge for U.S. fiduciaries. Company directors and institutional investors alike face a growing financial and legal risk that climate change will adversely affect the value of the assets for which they have fiduciary responsibility.

While climate change is an extraordinarily complex issue, this report's message to U.S. corporate directors and institutional investors is straightforward:

- **Climate change is occurring at a rate that creates the very real risk of disastrous financial and competitive consequences** for the U.S. business and investment communities. What is more, sudden, unpredictable, and dramatic climate changes could well occur once certain unknown thresholds are breached.
- At the level of individual companies, broader investment portfolios, and even entire economies, **the adverse impacts of climate change could be severe or even catastrophic.**
- Political momentum is growing rapidly at global, regional, and national levels for **early and decisive action to reduce greenhouse gas emissions.** Several jurisdictions have already implemented new regulatory and tax measures to encourage substantial reductions in greenhouse gas emissions, and U.S. firms operating in these markets have no choice but to comply.
- **A number of powerful forces are converging to advance climate change on to the agenda of the 21st century prudent fiduciary:** new awareness that the "off balance sheet" environmental and social impacts of industrial corporations have tangible financial consequences for shareholders and investors; a broadening of what is legally required of "the prudent fiduciary" to include addressing environmental and social issues; and increasingly strident demands for greater transparency and accountability from both corporate boards and institutional investors.
- **Failure to assess the risks of climate change** for one's company or investment portfolio would not only be imprudent, it **could represent a significant breach of fiduciary responsibility, and carry potentially serious legal liabilities.**
- The economics of climate change mitigation are such that **early, precautionary actions are likely to be decisively more cost effective than remedial ones.** The costs and risks of inaction on climate change will almost certainly exceed the costs of early mitigation measures by a considerable margin.

- At both company and economy-wide levels, the right blend of policies and actions, if skillfully introduced, can not only substantially reduce the costs of climate change itself and climate change mitigation measures, but can **frequently produce a net economic benefit**.

In view of this, what can and should company directors and institutional investors actually do in the face of the risks of climate change? The following recommendations outline some of the critical action items for corporate directors and institutional investors seeking to discharge their fiduciary duties in a prudent and responsible manner.

Corporate Directors

Both by law and by convention, company directors have a very clear set of duties. The most important of these are: to set and monitor overall company strategy and direction; to select, compensate, monitor, and evaluate the CEO; to protect the long-term assets of the shareholders; and to ensure the integrity and clarity of the company's reporting to key stakeholders.

In light of these duties, company directors should:

- ❑ **1. Ensure that the company has sufficient expertise to make informed and responsible decisions regarding climate change.**

New conditions have arisen in the twenty-first century that are very different from those in which most corporate directors have professional experience. This means that most board members and company executives are under-informed and under-prepared for these new challenges. Board members should commit to ensuring that both the board itself and senior management have access to and use the necessary specialized expertise to make informed decisions in this area.

- ❑ **2. Insist that company executives undertake a thorough assessment of the company's current and probable risk exposure to the financial and competitive consequences of climate change.**

As a first step, this will involve measuring the company's greenhouse gas emissions throughout its entire value chain. The best available reporting framework with which to do this is the Greenhouse Gas Reporting Protocol. The Protocol was jointly convened by the World Resources Institute and the World Business Council for Sustainable Development, and is included in the comprehensive Global Reporting Initiative (GRI) Guidelines.³

- ❑ **3. Insist that company executives have also thoroughly examined the opportunities which climate change may also present for new or expanded business activity and/or cost reduction.**

Climate change is not only about risk; it is also about opportunities. A few leading multinationals have already shown impressive results cutting greenhouse gas emissions significantly at no net cost whatsoever.

❑ **4. Require that the company benchmark itself against its industry competitors, as well as against best practice from other industry sectors.**

This will not only give the board and senior executives a much clearer idea of the company's relative risk exposure, but could also be a source of concrete ideas about effective new initiatives.

❑ **5. Develop, announce, and implement an explicit strategy on climate change that it is integrated into the company's overall business strategy.**

This could mean anything from including "cost of carbon" calculation scenarios when examining potential projects to creating long-term strategies for changing the company's portfolio of businesses to remain competitive in the coming transition to a carbon-constrained business environment.

❑ **6. Link executive compensation to the company's performance on climate change objectives.**

Risk exposures, and therefore specific responses and quantitative performance targets, will vary with each company. What is important is that the targets exist, that they are both ambitious and realistic, and that executives' compensation is tied in part to their success in meeting or exceeding those targets.

❑ **7. Explore new strategic alliances and business arrangements.**

This could take many forms, from choosing new, less carbon-intensive suppliers, to new collaborations with NGOs, to investing in new carbon-mitigation technologies.

❑ **8. Ensure that the company develops and follows best practice standards for disclosing its climate change exposures to investors and to other external and internal stakeholders.**

Institutional shareholders and the company's other key stakeholders reward companies for candor, transparency, and genuine efforts to improve their environmental performance, and will assume the worst when little or no information is forthcoming. The Global Reporting Initiative, recently launched as an international standard setting body, provides a comprehensive and widely accepted format for communicating with stakeholders on climate change and other social/environmental performance issues.

❑ **9. Create formal lines of accountability.**

Establish formal, board-level accountability mechanisms to monitor and report on the company's progress in addressing climate-driven business risks and opportunities, and to ensure that any necessary remedial actions are taken promptly.

Institutional Investors

Institutional investors in the United States have a legal duty to act prudently and solely in their beneficiaries' best interests. Embedded climate risk is a serious long-term threat to the preservation of investment value. For fiduciaries to fulfill their duties under these conditions they must:

❑ ***1. Seek expert advice on climate risk.***

Very few investment managers and securities analysts have the specialized skills or experience necessary to quantify companies' exposure to climate risks. There are, however, a growing number of world-class authorities with expertise in the technical, policy, and financial aspects of climate change mitigation. Institutional fiduciaries would be derelict in their responsibilities if they failed to utilize those resources where necessary.

❑ ***2. Undertake a portfolio-wide assessment of risk exposures.***

Climate risk varies widely among industry sectors. Even within the same sector the risk can vary by as much as sixty times.⁴ As fiduciaries of other people's money, institutional investors must understand and control their relative level of risk exposure. Over time, this should become part of investment managers' overall risk management processes.

❑ ***3. Incorporate climate change considerations into overall investment strategies.***

Pension fund trustees need to state their policy toward embedded climate risk in their statement of investment principles. Mutual fund portfolio managers must incorporate climate risk into their assessments of individual companies, industry sectors, and entire investment portfolios.

❑ ***4. Request – and if necessary, demand – greater disclosure of climate risks by companies wishing to be considered as investment candidates.***

Clearly, investors cannot factor climate risk into their decision-making processes if they lack basic information on company-specific risk levels. In some European countries, such disclosure is now being mandated by legislation or demanded by the largest institutional investors.

❑ ***5. Encourage best practice among their portfolio companies.***

As owners of the firms in which they hold shares, institutional investors and/or their outside fund managers must encourage the senior executives of their portfolio companies to pursue best practice in climate change risk management. Such encouragement will most likely need to be both through private discussions and public support for shareholder resolutions. Institutional investors can also join their peers in informal alliances such as the CERES Sustainable Governance Project or the U.K.-based Carbon Disclosure Project that encourage companies to make their risk exposures and performance more transparent to investors and other stakeholders.

❑ **6. Explore the commercial potential of new, “climate-friendly” investment products.**

Some innovative asset managers have recently created new mutual funds whose stock selection is oriented towards companies with superior strategic positioning and lower risk regarding climate change. These funds have already demonstrated both marketing and financial performance benefits.⁵

❑ **7. Channel more investment capital into “clean energy” opportunities.**

In addition to the large multinational companies which are the primary focus of the mutual funds described above, there are many promising investment opportunities among smaller companies which are developing and *commercializing new clean energy technologies* such as fuel cells, microturbines, and solar power. Most major institutions are already investing more heavily in unlisted, privately held companies in general anyway; all that would be required is a greater willingness to examine the growing opportunities specific to climate-friendly technologies. These companies are making a very direct contribution to minimizing the adverse effects of climate change, and the economic prospects of the best of them are attractive indeed.

❑ **8. Promote the universal adoption of the Greenhouse Gas Reporting Protocol recommended in the Global Reporting Initiative’s reporting guidelines.**

The more that greenhouse gas reporting can be done using a *common, standardized format*, the easier it will be for institutional investors and other stakeholders to assess and compare company performance, and to encourage both top performers and laggards to move to a higher performance level.

❑ **9. Support collective industry initiatives promoting a lower-carbon economy.**

While institutional investors have considerable power and influence over company performance as individual actors, that influence can be increased many times through *collective industry action*. A number of fora already exist to do precisely this, including CERES, the Council of Institutional Investors, the Global Reporting Initiative, the International Corporate Governance Network, and the United Nations Environment Programme’s Finance Initiative, among others. In addition, investors can and should make their views known to both national governments and key multinational institutions such as the World Bank and its sister institutions.

ENDNOTES

- 1 U.S. Federal Reserve System, *Flow of Funds Accounts of the United States: Annual Flows and Outstandings*. Washington, D.C. General Printing Office, 1999.
- 2 Union of Concerned Scientists, *Energy Security: Solutions to Protect America's Power Supply and Reduce Oil Dependence*, UCS Publications, 2002; National Academy of Sciences, *Abrupt Climate Change: Inevitable Surprises*, March 2002.
- 3 For additional information on greenhouse gas emissions and the Greenhouse Gas Protocol Initiative, see www.ghgprotocol.org; for more information on the Global Reporting Initiative, see www.globalreporting.org
- 4 Innovest Strategic Value Advisors, *The Electric Utilities Report*, April 2002.
- 5 One recent example is U.S. fund management firm T. Rowe Price's "Clean Future Fund", which attracted a remarkably strong level of customer demand, and which has also out-performed its financial benchmark substantially.
- 6 Intergovernmental Panel on Climate Change (IPCC), *Third Assessment Report*, 2001.
- 7 U.S. National Academy of Sciences, *Abrupt Climate Change: Inevitable Surprises*, March 2002.
- 8 U.S. Department of Energy, *U.S. Insurance Industry Perspectives on Global Climate Change*, February 2001.
- 9 Presentation made by Thomas Loster, Munich Re, to the UNEP Finance Initiatives roundtable at the seventh session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, Marrakech, November, 2001.
- 10 See U.S. Department of Energy, *U.S. Insurance Industry Perspectives on Global Climate Change*, February 2001.
- 11 See, for example, the proceedings of the Swiss Re meeting on the Business Risks of Greenhouse Gas Emissions and Climate Change, Center for Global Dialogue, October 2001.
- 12 See, for example, the discussion of the economics of climate change in the IPCC Third Assessment Report, 2001.
- 13 "Kyoto Implementation Still Not Certain", <http://www.edie.net/news/US/28032002.cfm>
- 14 For more information on the Kyoto Protocol, see the United Nations Framework Convention on Climate Change website (www.unfccc.int).
- 15 Additional information on these organizations's climate change positions can be found on their respective websites.
- 16 Munich Re Geoscience Unit, UNEP "Our Planet" magazine, February 2001.
- 17 Innovest Strategic Value Advisors, *Carbon Finance Benchmarking of the U.S. Electric Utilities Industry*, June 2001.
- 18 CERES, Natural Resources Defense Council, and Public Service Enterprise Group, *Benchmarking Air Emissions of the 100 Largest Generation Owners in the U.S. – 2000*. March 2002. A copy of the report is available at www.ceres.org.

-
- 19 See, for example, Innovest Strategic Value Advisors, *Electric Utilities Industry Sector Report*, 2002.
- 20 J.P. Hawley and A.T. Williams, *The Rise of Fiduciary Capitalism*, (Philadelphia: University of Pennsylvania Press, 2000).
- 21 Robert A. G. Monks, *The New Global Investors: How Shareholders Can Unlock Sustainable Prosperity Worldwide* (2001 – full text available on-line at www.ragm.com)
- 22 Deutsche Bank, 'Greenhouse Gas Trading Warms Up', *Euromoney.com*, January 2002
- 23 See, for example, Bank Sarasin, *Sustainable Investments: an Analysis of Returns in Relation to Environmental and Social Criteria*, 1999, and *Environmental Shareholder Value*, 1998; World Business Council for Sustainable Development, *Environmental Performance and Shareholder Value*, 1997, and *Financing Change*, 1996; European Federation of Financial Analysts, *Eco-Efficiency and Financial Analysis: The Financial Analysts View*, 1996; ICF Kaiser, *Does Improving a Firm's Environmental Management System and Environmental Performance Result in a Higher Stock Price?* 1996; and Center for the Study of Financial Innovation, *Measuring Environmental Risk*, 1994. "Eco-efficiency" can be defined briefly as the capacity to create greater shareholder value with lower levels of resource inputs and environmental risk than one's corporate competitors.
- 24 Lynn Cowan, "More Shareholders Taking Companies to Task Over Global Warming," *Wall Street Journal Online*, March 27, 2002; Interfaith Center on Corporate Responsibility, *Proxy Resolutions Book*, January 2002.
- 25 Robert Monks, "Shareholder Requests Change in ExxonMobil Governance in Order to Prevent Further Loss of Value," press release, December 18, 2001; see www.ragm.com for more information on Monks' campaign with Exxon.
- 26 Eileen Claussen, "State and Corporate Action on Climate Change: Multiple Benefits from Multiple Approaches", speech to the National Governors Association Workshop, February 28, 2002.
- 27 One of this report's principal authors at Innovest Strategic Value Advisors appeared before the Committee in March 2002 to give testimony on this matter.
- 28 See, for example, U.S. Energy Information Agency, *Analysis of the Impacts of an Early Start for the Kyoto Protocol*, July 1999; and Terry Barker and Paul Ekins, *How high are the costs of Kyoto for the US economy?* Tyndall Centre Working Paper 4, July 2001.
- 29 There are also indications that some sources of greenhouse gas emissions can be limited at no or negative net cost, for example through correcting market imperfections, including ancillary benefits and efficient tax revenue recycling. The IPCC estimates that up to 1.3 and 2.5 Gt of carbon equivalent emissions reductions – current global emissions total roughly 8 Gt C - could be realized by 2010 and 2020, respectively, through measures that confer direct net economic benefits through reduced energy usage.
- 30 L.H. Goulder, *Confronting the Adverse Industry Impacts of CO2 Abatement Policies: What Does It Cost?* Resources For The Future, Climate Issues Brief No. 23, September 2000.
- 31 Union of Concerned Scientists, *Energy Security: Solutions to Protect America's Power Supply and Reduce Oil Dependence*, UCS Publications, 2002.

- 32 IPCC *Third Assessment Report*, September 2001
- 33 National Academy of Sciences, *Climate Change Science: An Analysis of Some Key Questions*, National Academy Press (report available at: <http://www.nap.edu/catalog/10139.html>).
- 34 IPCC *Third Assessment Report*, September 2001; Information also based on "IPCC and Its Findings" in CERES, NRDC and PSEG report, *Benchmarking Air Emissions of the 100 Largest Electric Generation Owners in the U.S.-2000*, March 2002 (available at www.ceres.org).
- 35 Ibid.
- 36 IPCC, *Climate Change 2001: Synthesis Report*, 2001.
- 37 "Kyoto Implementation Still Not Certain", <http://www.edie.net/news/US/28032002.cfm>
- 38 For more information on the Kyoto Protocol, see the United Nations Framework Convention on Climate Change website (www.unfccc.int).
- 39 Leonie Haimson's analysis of Kyoto Protocol ratification, <http://www.gristmagazine.com/heatbeat/thisjustin030802.asp/>.
- 40 See the UNFCCC website for more information (<http://unfccc.int/resource/con-vc/p.html>).
- 41 David Buchan, "Emissions Trading," *Financial Times*, April 11, 2002. Found at <http://globalarchive.ft.com/>.
- 42 Ibid.
- 43 IPCC *Special Report on Emissions Scenarios and Third Assessment Report*, September 2001.
- 44 See, for example, T.F. Homer-Dixon, *Environment, Scarcity and Violence*, Princeton University Press, 1999; K. Topfer, UNEP Helmsman Addresses Environmental Challenges, *Environmental Science and Technology*, 33 (1), pp. 18-23, 1999.
- 45 US Energy Information Administration, *Reference Scenario 2000*.
- 46 J.P. Hawley and A.T. Williams, *The Rise of the Fiduciary Capitalism*, 2000.
- 47 Source: Greenwich Associates, March 2002
- 48 Robert A. G. Monks and Nell Minow, eds. *Corporate Governance Second Edition* (Cambridge: Blackwell Publishers, 2001).
- 49 Joann S. Lublin, "Proxy Voting Is a Fiduciary Duty, SEC Chief Says in Letter to Group," *Wall Street Journal*, March 21, 2002.
- 50 IRRS and SIF Press Release, March 27, 2002. The IRRS/SIF study is available at www.shareholderaction.org and www.irrc.org.
- 51 Ibid.
- 52 Ibid.
- 53 Virginia L. Gibson, Bonnie K. Levitt, and Karine H. Cargo. *Overview of Social Investments and Fiduciary Responsibility of County Employee Retirement System Board Members in California*. Baker & McKenzie (2000).
- 54 Richard H. Koppes and Maureen L. Reilly, "An Ounce of Prevention: Meeting the Fiduciary Duty to Monitor an Index Fund through Relationship Investing," in *The Journal of Corporation Law*, University of Iowa, Spring edition (1995); Douglas Cogan, "Tobacco Divestment and Fiduciary Responsibility, A Legal

- and Financial Analysis," *Investor Responsibility Research Center*, January 2000;
Lewis D. Solomon and Karen Coe, "The Legal Aspects of Social Investing by
Non-Profits," *Journal of Investing*, Winter 1997.
- 55 See Matthew J. Kiernan, "Eco-Value, Sustainability and Shareholder Value",
Environmental Quality Management, Summer 2001.
- 56 "Research shows efficiency of eco-efficiency," *Environmental Finance*,
June 2001.
- 57 *BNA Daily Reporter*, February 25, 2002.
- 58 Analysis published in Innovest's Alternative Energy Technologies and the
"New Energy Economy" research briefing, Fall 2001.
- 59 See company website at www.visionquest.com
- 60 See Innovest's *Global Metals and Mining Report*, August 2001.
- 61 *Ibid.*
- 62 See Innovest's *Global Telecommunications Industry Report*, April 2001.
- 63 Pew Center on Global Climate Change, *Corporate Greenhouse Gas Reduction
Targets* (2001). See: www.pewclimate.org
- 64 Mark Mansley and Andrew Dlugolecki, *Climate Change – A Risk Management
Challenge for Institutional Investors* published by Universities Superannuation
Scheme, London, 2001.
- 65 U.S. EPA, *Key Source Category Analysis for the Inventory of US Greenhouse
Gas Emissions and Sinks* (1990-1999), September 2001.
- 66 Innovest Strategic Value Advisors, *The Auto Report*, 2000.
- 67 Association of American Railroads, *The Rail Transportation of Coal*, January
2000.
- 68 For details of the Clear Skies Initiative, see [www.whitehouse.gov/news/
releases/2002/02/20020214.html/](http://www.whitehouse.gov/news/releases/2002/02/20020214.html/).
- 69 See, for example, Airtrends Special Supplement on the Clear Skies Initiative,
published by Natsource LLP, February 2002.
- 70 U.S. Energy Information Administration, *International Energy Outlook*, 2001.
- 71 International Aluminum Institute, *Responding to Climate Change*, 2000.
- 72 Mike Tidwell, "Glaciers are Melting, Islands are Drowning, Wildlife is
Vanishing", *Washington Post*, September 9, 2001.; See also Reuters, "Study:
Global Warming Hits Species All Over World," March 28, 2002
([http://www.nytimes.com/reuters/world/international-environment-
warming.html](http://www.nytimes.com/reuters/world/international-environment-warming.html)).
- 73 *Cornell Hotel and Restaurant Administration Quarterly*, April 1, 2001.
- 74 "UK Tourism: Open for Business," *Financial Times*, June 30, 2001.
- 75 World Business Council on Sustainable Development (WBCSD), *Industry, Fresh
Water and Sustainable Development*, April 1998.
- 76 Environment News Service (ENS), March 13, 2001, <http://ens-news.com>.
- 77 See, for example, IPCC *Technical Summary: Climate Change 2001, Impacts,
Adaptation and Vulnerability*, Report of Working Group II of the IPCC.
- 78 WBCSD, *Industry, Fresh Water and Sustainable Development*, April 1998.
- 79 From IPCC *Technical Summary: Impacts, Adaptation, and Vulnerability*, 2001

- 80 FT.com, April 27, 2001.
- 81 See, for example, *World Energy*, Volume 4 No.1 (2001).
- 82 US Energy Information Administration, *Carbon Dioxide Emissions from the Generation of Electric Power in the United States*, July 2000.
- 83 Center for a Sustainable Economy, *Good Business: A Market Analysis of Energy Efficiency Policy*, 2002.
- 84 Innovest Strategic Value Advisors, *Carbon Finance Benchmarking of the U.S. Electric Utilities Industry*, June 2001.
- 85 Innovest Strategic Value Advisors, *Electric Utilities Industry Sector Report*, 2000.
- 86 Presented as part of the UNEP Finance Initiatives climate change working group workshop on risks and opportunities for the financial services industry, Rio de Janeiro, Brazil March 14, 2002.
- 87 For the Greenhouse Gas Protocol Initiative, see www.ghgprotocol.org; for the Global Reporting Initiative, see www.globalreporting.org
- 88 Innovest Strategic Value Advisors, *The Electric Utilities Report*, April 2002.
- 89 One recent example is U.S. fund management firm T. Rowe Price's "Clean Future Fund", which attracted a remarkably strong level of customer demand, and which has also out-performed its financial benchmark substantially.

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Innovest Strategic Value Advisors is an internationally recognized investment research and advisory firm specializing in analyzing companies' environmental and social performance and their impact on competitiveness, profitability, and share price performance. Innovest's chairman Jim Martin was Chief Investment Officer for one of the largest pension funds in the United States (TIAA-CREF) for over fifteen years.

Founded in 1998, with the mission of identifying non-traditional sources of risk and value potential for investors, the firm provides company and industry research to institutional investors and to Fortune Global 500 companies. Its institutional clients have included CalPERS and ABP, two of the largest pension funds in the world. Innovest also provides custom portfolio analysis and research to leading fund managers including Schroders, State Street Global Advisors, and Societe Generale. In addition to its pure research activities, Innovest has co-designed and provides research support to investment funds worth over \$US 1 billion. Its partners in this work include ABN-AMRO, Mellon Capital, Brown Brothers Harriman, T. Rowe Price, and Credit Lyonnais.

One special area of focus for Innovest's research is climate change and its potential impact on shareholder value. The firm has completed research in this area for corporate, institutional, and civil society clients in the U.S., Europe, and Australia, and is currently completing a major climate change research project for the UN Environment Programs' Finance Initiative.

Innovest is headquartered in New York, with major offices in Toronto and London. For more information, visit www.innovestgroup.com

ABOUT CERES

CERES is a coalition of 85 investor, environmental, labor and public interest groups working together to increase corporate environmental responsibility worldwide. Investor members represent more than \$300 billion in assets. Since its founding in 1989, CERES has persuaded dozens of companies to endorse the CERES Principles. Most recently, CERES convened and led the Global Reporting Initiative (GRI) with the United Nations Environment Programme. The new CERES Sustainable Governance Project is bringing together the sustainability and corporate governance movements to improve corporate policies on climate change and other social, environmental and governance issues. For more information, visit www.ceres.org

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