

**Electric Power, Investors,
and Climate Change**
A Call to Action



C E R E S

September 2003

About CERES

CERES is a coalition of investor, environmental, labor and public interest groups working together to increase corporate environmental responsibility worldwide. CERES represents more than \$300 billion in assets. Investor members include state and municipal pension funds, socially-responsible investment firms, religious groups, union funds, and foundations. Since its founding in 1989, CERES has persuaded dozens of companies to endorse the CERES Principles. Most recently, CERES co-founded the Global Reporting Initiative (GRI) with the United Nations Environment Programme. CERES is now bringing together the sustainability and corporate governance movements to improve corporate and public policies on climate change and other social, environmental and governance issues. For more information, visit www.ceres.org.

About This Report

This report will be available in PDF format on the Internet at: <http://www.ceres.org>

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INTRODUCTION

This report summarizes the results of a yearlong CERES Dialogue among experts from the electric power sector, investors, and environmentalists regarding the issue of global climate change. It presents several specific Dialogue recommendations for government and private sector actions that could create the right financial signals for electric companies to take positive action on climate change.

Numerous studies have also shown that climate change could pose significant financial risk to a variety of industry sectors worldwide. Solving this complex problem will require fundamental shifts in the way that the world uses and produces energy, which creates both risks and opportunities for the electric sector.

This report is aimed at alerting the financial community to the challenges of climate change. Findings from the world's leading scientists are driving concern and awareness that climate change is a significant environmental, economic, and governance challenge that must be addressed. Numerous studies have also shown that climate change could pose significant financial risk to a variety of industry sectors worldwide. Solving this complex problem will require fundamental shifts in the way that the world uses and produces energy, which creates both risks and opportunities for the electric sector. Leaders from the investment community should participate in the debate unfolding on this issue, understand its possible financial risks, and take action to protect their assets.

This report is also intended as a guide that can help electric companies and investors begin to chart a course through the uncertainty that lies ahead. Electricity markets are being deregulated in a variety of ways and at an uncertain pace. Financial markets for electric companies face uncertainty as well, mostly due to questions about the pace of future economic growth and its corresponding influence on the national demand for power generation. Portions of the sector have also recently been rocked with scandals, investigations, and large losses, creating uncertainty for all involved. In the environmental arena, the future regulatory landscape is uncertain at best, as policymakers battle over which pollutants to regulate, by how much, and by when.

CERES urges readers to learn from the more than twenty-five experts who contributed to the Dialogue. By following the course laid out in this report, electric companies, their investors, and the public can navigate their way through the sea of uncertainty to a cleaner, more sustainable energy system.

EXECUTIVE SUMMARY

In light of rising concern among electric companies, investors and environmental groups about the risks of climate change, CERES (The Coalition for Environmentally Responsible Economies) launched the Electric Power/Investor Dialogue in 2002 with experts from the power sector, environmental and consumer groups, and the investment community.

Dialogue participants included:

- ▶ Both regulated and deregulated electric companies with commercial interests in electricity generation, transmission, distribution and energy services;
- ▶ Investors representing large pension funds, institutional investors, and socially responsible investment firms; and
- ▶ Environmental and consumer groups with expertise in climate change, clean air and energy policy.

The following organizations participated in the Dialogue and developed this Consensus Statement:

Endorsing Companies and Organizations

| Investor Groups | Power Companies |
|---|-----------------------------------|
| Calvert Group | Calpine |
| Connecticut State Treasurer's Office | Con Edison |
| Innovest Strategic Value Advisors | Keyspan |
| Investor Responsibility Research Center | Northeast Utilities |
| ISIS Asset Management | PG&E Corporation |
| New York City Comptroller's Office | PPL Corporation |
| PAX World Funds | Public Service Enterprise Group |
| The Presbyterian Church USA | Wisconsin Energy |
| Social Investment Forum | |
| Trillium Asset Management | |
| Walden Asset Management | |
| | Environmental and Consumer Groups |
| | Co-op America |
| | Natural Resources Defense Council |
| | Union of Concerned Scientists |
| | World Resources Institute |
| | World Wildlife Fund |

Greenhouse gas emissions, including carbon dioxide emissions, will be regulated in the U.S. The issue is not whether the U.S. government will regulate these emissions, but when and how.

Over the course of a year, the Dialogue has forged agreement on several key findings and developed recommendations for select audiences to encourage more proactive greenhouse gas reductions in the electric sector.

The report includes the final product of the Dialogue – a consensus statement on behalf of all of the participants and their organizations. That statement:

- ▶ Introduces the climate change issue and other challenges facing the electric sector and its investors;
- ▶ Presents nine findings about climate change and the electricity sector; and
- ▶ Recommends that government policymakers, electric companies environmental and consumer groups, and investors undertake four basic strategies to address the climate change issue.

This report also includes background information prepared by CERES on key climate change issues for electric companies and their investors including:

- ▶ ***The environmental reality*** – climate change science, electricity generation and climate-friendly technologies, and the environmental regulatory landscape;
- ▶ ***The market and financial reality*** – Electricity market dynamics and prospects for emissions reductions, financial risks of climate change, and electric sector investors and recent trends.

Summary of Findings

The diverse group of dialogue participants found that:

1. Greenhouse gas emissions, including carbon dioxide emissions, will be regulated in the U.S. The issue is not whether the U.S. government will regulate these emissions, but when and how;
2. Currently, state, regional and international programs are driving action to reduce greenhouse gas emissions;
3. A patchwork of regulations and continued uncertainty over when and how carbon dioxide emissions will be regulated is the least optimal path forward;
4. International regimes to reduce greenhouse gas emissions like the Kyoto Protocol will present both risks and opportunities to U.S. electric companies with operations abroad and could impact their attractiveness to energy sector investors;
5. Coming regulation of greenhouse gas emissions poses financial risks and opportunities for the electric sector, while effects will vary due to factors like a company's fuel mix and market conditions;
6. Voluntary action is complementary to the achievement of mandatory targets and may be effective in reducing emissions in the electricity sector. However, voluntary programs are unlikely to produce large-scale, long-term conversion to low and non-emitting technologies;

7. Today, most mainstream investors do not consider the climate change issue significant enough for them to develop a detailed understanding of it.
8. In the near future, mainstream investors will increasingly focus on climate change business risks in company valuations and investment decision-making.
9. The time is right for corporate management and investors to focus on climate change.

Summary of Recommendations

The group recommends that investors, government policymakers, electric companies, and environmental and consumer groups should:

- ▶ **Actively Engage in the Climate Change Issue** – Senior management and directors of electric companies and investors should enhance their understanding of, and engagement in, the climate change issue.
- ▶ **Quantify and Analyze Climate Change Financial Risk** – Investors and electric companies should work together to build upon existing tools to quantify and assess the financial risks of climate change.
- ▶ **Create a National Climate Change Program** – A climate change program to limit greenhouse gas emissions is required to create certainty for both electric utilities and investors. The federal government should develop a national mandatory program that is market-based to achieve that goal.
- ▶ **Transform the Market for Clean Energy Technologies** – Government must encourage investors, industry leaders and consumers to promote deployment of existing technologies that emit little to no carbon. This strategy should include funding for additional research and development to make existing technologies more competitive and also to develop new technologies.

A climate change program to limit greenhouse gas emissions is required to create certainty for both electric utilities and investors. The federal government should develop a national mandatory program that is market-based to achieve that goal.

CERES ELECTRIC POWER / INVESTOR DIALOGUE

CONSENSUS STATEMENT

All participants in the CERES Electric Power/Investor Dialogue have developed and agreed to the following statement:

Introduction

These recommendations are intended to serve as an alert on climate change to leaders and investors in the electricity industry. Climate change is a serious, long-term environmental and financial threat in need of an early, widespread societal response by businesses, governments, and individual citizens. Addressing it could profoundly change the ways in which we use and produce electricity for many decades to come. Indeed, significant action to mitigate climate change will be necessary in many other sectors of the economy, such as transportation and manufacturing. Because the public and private sectors are becoming more concerned about the impacts of climate change on commercial activity, populations and the environment, the issue presents both risks and opportunities to executives and investors.

Many electric companies in the United States emit significant amounts of greenhouse gases, and believe it is in their shareholders' and the public's interest for them to act now to reduce these emissions. But they confront the problem that financial and electricity markets do not reward, and in some cases punish, proactive efforts that anticipate environmental issues, such as climate change. Because the cost of mitigating greenhouse gas emissions is not a recognized standard business expense across the sector, investments to address climate change are viewed as a cost with a negative impact on the balance sheet. This creates a barrier to proactive efforts and has significant implications; emissions from the U.S. electricity sector are growing and currently contribute 40% of U.S. and 10% of worldwide carbon dioxide emissions, the most prevalent greenhouse gas.

Uncertainty Abounds

The electricity industry and energy investors are also facing a period of uncertainty about the future regulation of greenhouse gases. This uncertainty makes it difficult for all to determine the future price of greenhouse gas emissions or to value the assets that emit them. This situation will continue until the U.S. government clarifies the future path for regulation through either domestic or international action.

Many electric companies in the United States emit significant amounts of greenhouse gases, and believe it is in their shareholders' and the public's interest for them to act now to reduce these emissions.

Even if started today, the transition will take place over a long period of time to enable gradual capital stock turnover and to minimize the costs to affected companies and communities.

Managing the uncertain policy environment on climate change is one of a number of significant environmental challenges facing electric company executives and investors in the next few years as well as the decades to come. Compounding the uncertainties, efforts to combat climate change come on top of a series of other pressing issues facing the U.S. electric industry. They include:

- ▶ Volatility in fuel prices and growing demand for electricity;
- ▶ Dynamic markets and an uncertain future, as approximately half of the states have begun to deregulate their electricity markets;
- ▶ Increased pressure to ensure reliability of electricity supply;
- ▶ Local concerns about power plant sitings and expansions;
- ▶ Highly competitive capital markets;
- ▶ Increasing requirements to reduce emissions of air pollutants; and
- ▶ Introduction of new generation technologies such as fuel cells, biomass, geothermal, solar and wind energy and requirements for their use.

Overcoming Hurdles

Unlike other air emissions of concern, climate change cannot be controlled by currently available "end of pipe" technologies. As such, advanced, highly efficient technologies and low carbon energy sources will have an increasingly important role to play as society reduces greenhouse gas emissions. Further, a price signal for greenhouse gas emissions will likely result in shifts in the value of different forms of energy generation and the potential increase in value of low- and zero-emissions sources and technologies. This will require significant financial and human capital outlays. Even if started today, the transition will take place over a long period of time to enable gradual capital stock turnover and to minimize the costs to affected companies and communities.

Mitigating greenhouse gases will affect each electric company differently due to their specific energy assets, generation mix and market conditions. For example, companies in regulated markets may have the ability to pass the cost of new regulations and some voluntary environmental programs on to consumers. Companies operating in deregulated markets do not have this ability and thus may have more difficulty taking on investments that may negatively impact their balance sheet. Conversely, these deregulated markets can attract investment in newer, more efficient and lower carbon-intensive generation.

Inconsistent economic regulations in the same market also can impact emissions, such as distinct rules for public power companies (e.g. municipal power and rural cooperatives) in certain areas of the country. Further, differing environmental standards such as those based on the age of power plants can create additional challenges.

Despite these hurdles, a growing number of electric companies recognize that climate change is a serious problem and they understand that their sector has a role to play in addressing it, beyond what it is currently doing. By engaging in the issue, they can improve their internal business planning, make better investment decisions with respect to control of other air emissions, perhaps gain competitive advantage and lower the cost of mitigation and investments in new technologies over time.

However, acting before greenhouse gas emissions are regulated has costs that, to some, outweigh the potential benefits. Given the current uncertainty surrounding the timing and structure of regulations, electric companies fear that they might be hurt competitively in the marketplace or lose the confidence of investors.

Presently, the investor community does not widely understand the financial implications of many environmental risks, including global climate change. Climate change is a long-term problem with technical and scientific complexity. Investors are hindered because they lack access to consistent information. Government bodies could do more to ensure that consistent information on climate change risk is provided to investors. For now, however, climate change is especially challenging for the financial community to assess.

The Dialogue

CERES launched the Electric Sector/Investor Dialogue in 2002 with the objective of developing specific recommendations for government and private sector actions that could create the right financial signals for electric companies to take positive action on climate change.

Dialogue participants include:

- ▶ Regulated and deregulated electric companies with commercial interests in electricity generation, transmission, distribution and energy services;
- ▶ Investors representing large pension funds, institutional investors, and socially responsible investment firms; and
- ▶ Environmental and consumer groups with expertise in climate change, clean air and energy policy.

Presently, the investor community does not widely understand the financial implications of many environmental risks, including global climate change.

Investors and corporate managers should take steps to factor climate change risks into their investments.

The following organizations participated in the Dialogue and developed this Consensus Statement:

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| | Environmental and Consumer Groups |
| | Co-op America |
| | Natural Resources Defense Council |
| | Union of Concerned Scientists |
| | World Resources Institute |
| | World Wildlife Fund |

Over the course of a year, the Dialogue has forged agreement on several key findings and developed recommendations for select audiences to encourage more proactive greenhouse gas reduction in the electric sector. This paper represents that consensus.

More detailed recommendations follow, but in general, Dialogue participants agree that:

- ▶ Greenhouse gas emissions will be regulated in the U.S. sometime in the future;
- ▶ The federal government should create a national, mandatory, market-based program to limit greenhouse gas emissions;
- ▶ Greenhouse gas reduction could pose significant financial risks and opportunities for the power sector; and
- ▶ Investors and corporate managers should take steps to factor climate change risks into their investments.

Achievement of the recommendations requires the commitment and input of investors, governments and the electric sector alike. To facilitate action and explore new strategies, the Dialogue participants call for the creation of a multi-stakeholder group to monitor and implement these recommendations.

DIALOGUE FINDINGS

The diverse group of dialogue participants found that:

1. Greenhouse gas emissions, including carbon dioxide emissions, will be regulated in the U.S. sometime in the future. The timing of the regulations and their structure remain uncertain, despite on-going debates at state,

federal and international policymaking forums. The issue is not whether the U.S. government will regulate these emissions, but when and how.

2. Currently, state, regional and international programs are driving action to reduce emissions. Investors too frequently look only at the national policymaking agenda to gauge the relevance of a particular regulatory issue. With climate change especially, state, regional and international efforts are motivating emissions reductions.¹ These initiatives include carbon regulations in Massachusetts and New Hampshire; greenhouse gas reduction programs in California; regional efforts to address climate change in the Northeast and on the U.S. borders with Canada and Mexico; and, internationally, via efforts to ratify and prepare to implement the Kyoto Protocol. While more fragmented and harder to track, these initiatives provide important signals for investors and analysts on the direction of policy and likely leaders in the industry.

3. Continued uncertainty over when and how carbon dioxide emissions will be regulated at the national level is the least optimal path forward. Recent studies have found that, for a majority of electric companies, the most expensive regulatory approach would be to reduce some of the pollutants initially – sulfur dioxide, nitrogen oxide and mercury – and to control carbon dioxide later.² This would call for two distinct compliance strategies with increased costs. For most electric power companies, it may be more cost-effective if standards for all four emissions are established at the same time. Financial markets do not favor uncertainty, and it is impossible for electric companies to accurately value assets when the future price of carbon dioxide emissions is unknown. Regulatory certainty on carbon emissions is needed today to develop informed and cost-effective compliance strategies. Absence of national action compounds the problem by producing an uneven playing field, as states and regions act differently or without coordination to address the problem.

4. International regimes to reduce greenhouse gas emissions like the Kyoto Protocol will present both risks and opportunities to U.S. electric companies with operations abroad and could impact their attractiveness to energy sector investors. Electric companies with assets and business interests outside the U.S. where greenhouse gas emissions are regulated may incur higher costs of compliance or face multiple emissions reduction mandates in the future, which could impact their competitiveness. Further, as investors begin to incorporate climate change into their decision-making, companies with access to market-based compliance mechanisms – like an international cap and trade program³ – may be better able to manage risk and be more attractive to investors.

5. The regulation of greenhouse gas emissions poses financial risks and opportunities for the electric sector, while effects will vary due to factors like a company's fuel mix and market conditions. Electric sector companies cannot be described with a broad brush. Each company operates under dif-

Continued uncertainty over when and how carbon dioxide emissions will be regulated at the national level is the least optimal path forward.

Voluntary action is complementary to the achievement of mandatory targets and can be effective in reducing emissions in the electricity sector. However, voluntary programs are unlikely to produce large-scale, long-term conversion to low and non-emitting technologies.

ferent and dynamic regulatory and market conditions. Companies have varied sensitivities to price and market fluctuations and follow different business strategies based on the type and location of their assets and their specific service areas.

6. Voluntary action is complementary to the achievement of mandatory targets and can be effective in reducing emissions in the electricity sector. However, voluntary programs are unlikely to produce large-scale, long-term conversion to low and non-emitting technologies. The highly competitive nature of the electricity sector and the uncertain business value of greenhouse gas reductions make voluntary efforts a difficult choice for many companies. Since greenhouse gas emissions are not regulated and cost a company nothing, investments to reduce these emissions presently show little return on investment.

7. Today, most mainstream investors do not consider the climate change issue significant enough for them to develop a detailed understanding of it. Even the most informed investors struggle to translate information related to climate change into useable and quantifiable evaluation criteria. Exacerbating the problem is a lack of uniform reporting and disclosure practices among the sector, and differing regulatory and market rules around the country, which makes accurate benchmarking a challenge.

8. In the near future, mainstream investors will increasingly focus on climate change business risks in company valuations and investment decision-making. Today, some investors are beginning to assess financial exposures related to climate change and air pollutant regulation in the electric sector as state and other regulatory initiatives on climate change emerge. Corporate scandals and the recent downturn in the sector should lead to increased scrutiny of the full array of financial risks and business opportunities facing electric sector companies – including environmental exposures resulting from climate change and other environmental issues.

9. The time is right for corporate management and investors to focus on climate change. While the impact of climate change is just one factor that goes into a potential business decision, it could result in shifts within the industry. These shifts include promoting investments in energy efficiency, combined heat and power, developing renewable energy, increased financial incentives for facility efficiency upgrades as well as encouraging research, and investments in lower-emitting technologies. Recent policies put in place by selected companies, like the reinsurance company SwissRe, to include climate change considerations in company valuations is an indicator of an emerging trend.

OVERVIEW OF RECOMMENDATIONS

Participants recommend that public and private entities undertake four basic strategies:

- ▶ **Active Engagement in Climate Change Discussion** – Senior management and directors of electric companies and investment houses should augment their understanding of, and engagement in, the climate change issue.
- ▶ **Climate Change Risk Quantification and Analysis** – Investors and electric companies should work together to build upon existing tools to quantify and assess the financial risks and opportunities of climate change. Even with the substantial uncertainties associated with climate change, it is possible in the short term to compare the impact of a limited number of regulatory scenarios on electric companies. Changes in the electric industry should also be considered as part of these scenarios, especially shifts in the technologies used to produce energy. These analytic tools will improve over time as uncertainties evolve, but to wait for “perfect knowledge” would be a mistake. In turn, widespread usage of analytic tools should continue to be encouraged.
- ▶ **National Climate Change Program** – A climate change program to limit emissions is required to create certainty for both electric utilities and investors. The federal government should develop a national, mandatory, market-based program to achieve that goal.
- ▶ **Transform the Market for Clean Energy Technologies** – Government must encourage investors, industry leaders and consumers to promote deployment of existing technologies that emit little to no carbon. This strategy should include funding for additional research and development to make existing technologies more competitive and also to develop new technologies. All parties must assist in transforming markets for these technologies.

Government must encourage investors, industry leaders and consumers to promote deployment of existing technologies that emit little to no carbon.

The Dialogue targeted its recommendations at four pivotal audiences:

- ▶ Investors, including equity and fixed income analysts, institutional investors, mutual funds, public and private pension funds and rating agencies.
- ▶ Policymakers in state, national, and international government bodies, and local public utility commissions.
- ▶ Electric sector, including companies in the generation, transmission, distribution and energy services industries.
- ▶ Environmental and consumer organizations.

Many of the recommendations require participation across target groups to change current thinking and financial analytical practices. For example, market transformation activities like increasing the deployment of climate-friendly technologies require coordination and action across all of these targeted audiences. Therefore, Dialogue participants call for the creation of a multi-stakeholder group to monitor and implement these recommendations.

Specific Dialogue Recommendations

Government – ideally leading at the federal level and following at the state level – should establish the appropriate environmental standards that give companies certain targets and the flexibility to meet them cost-effectively, given their specific market conditions.

Investors

Investors have a vital role to play in shifting thinking within corporate structures to value greenhouse gas mitigation. Through the development of new quantitative tools, requesting disclosure of greenhouse gas emission risks, and education, companies will respond and emissions will decrease over time. Investors have a wide reach, impacting not only power generators, but also the clients and suppliers throughout the product life cycle of energy. Investors should:

- ▶ Ask companies and portfolio managers about climate change exposures, and their plans for addressing them.
- ▶ Support the development of quantitative analysis and benchmarking that demonstrate relative performance on climate change management. This would help to identify the leaders and the laggards within the industry.
- ▶ Educate other investors and colleagues in the financial community on climate change risks. Socially responsible investors (SRIs) should lead this effort through participation in various investor forums.
- ▶ Encourage proactive corporate climate change policy positions. This includes pollution prevention, emissions reductions and support of investments in energy efficiency, renewables and emerging climate-friendly technologies.
- ▶ Promote initiatives like the Carbon Disclosure Project and the WRI/WBCSD Greenhouse Gas Protocol that provide direction to companies and standardized reporting formats for disclosure to investors.

Government

The primary role of government bodies is to set clear rules for how the electricity market will operate and the framework under which the electric sector will address environmental issues. Government – ideally leading at the federal level and following at the state level – should establish the appropriate environmental standards that give companies certain targets and the flexibility to meet them cost-effectively, given their specific market conditions. National governments should:

- ▶ Support voluntary initiatives as a complement to mandatory programs. Voluntary efforts complement mandatory programs by providing vehicles to recognize innovation, promote learning and encourage bold action beyond regulatory requirements.
- ▶ Develop national policies to reduce greenhouse gas emissions. The sooner the obligations under regulatory programs are known, the more effectively businesses and investors can respond and factor emissions issues into their planning. These should include:
 - A climate change program to limit greenhouse gas emissions to create certainty for both electric power companies and investors, through a national, mandatory program that is market-based.

- Similar programs to limit emissions in other large emitting sectors, including transportation and manufacturing should be developed, and trading should be allowed among them.
 - A national renewable energy standard requiring an increasing amount of electricity produced from renewable resources such as biomass, geothermal, solar, and wind. This standard should encourage a national definition of qualifying renewable energy technologies to promote effective renewable energy credit trading.
- ▶ Protect and recognize early actors in the design of regulatory programs by granting credit for early action through tradable credits taken in advance of the compliance deadlines for regulatory or legislative requirements.
 - ▶ Upgrade and expand efficiency standards for electricity-consuming equipment, such as appliances, heating, ventilation and cooling systems, and industrial motors.

Governments can be instrumental in providing incentives to reduce greenhouse gas emissions through the regulation of electricity markets. National and state electricity regulators should:

- ▶ Adopt market design rules and policies that:
 - Facilitate grid interconnection;
 - Reward climate-friendly technologies;
 - Enact funding mechanisms for any activity that avoids, reduces, or sequesters greenhouse gas emissions, including energy efficiency, investment in climate-friendly technologies, conservation, sequestration, and renewable energy; and
 - Level the playing field between regulated and deregulated companies with regard to greenhouse gas emissions reductions.
- ▶ Adopt new rules to assist Public Utility Commissions (PUCs) to address the costs of greenhouse gas emissions. PUCs should require companies to provide information on exposures to potential regulation of greenhouse gases and call for increased investments in renewable energy and demand side management. Their efforts should focus on incentive programs that reduce greenhouse gas emissions, such as Renewable Portfolio Standards and Public Benefits Funds.

National and state governments also have tax, budget and purchasing tools that can help steer markets toward investments in technologies that emit fewer greenhouse gases, and may provide other benefits. National and state government budgets should:

- ▶ Adopt tax incentives for renewable energy and energy efficient technologies.
- ▶ Adopt tax benefits for capital stock turnover such as modifications to asset and investment depreciation schedules.
- ▶ Require energy efficiency improvements in government buildings and government agencies.
- ▶ Adopt minimum purchase requirements for renewable energy.

The federal government should develop a national renewable energy standard requiring an increasing amount of electricity produced from renewable resources such as biomass, geothermal, solar, and wind. This standard should encourage a national definition of qualifying renewable energy technologies to promote effective renewable energy credit trading.

- ▶ Fund research, development and deployment of low-emitting, non-emitting and mitigation technologies, like a hydrogen infrastructure, renewables, integrated gasification combined cycle, and carbon sequestration technologies.

The national government through the Securities and Exchange Commission (SEC) can help investors understand the implications of climate change for the electricity sector. While mandatory programs to reduce greenhouse gas emissions are under development, the SEC should:

The SEC should work with investors and the electric sector to develop a protocol for disclosing the financial risks associated with climate change and future regulation of greenhouse gases.

- ▶ Work with investors and the electric sector to develop a protocol for disclosing the financial risks associated with climate change and future regulation of greenhouse gases. A multi-stakeholder process should be created to develop the protocol, involving investors, electric companies, government officials, and environmental and consumer organizations.
- ▶ Once uniform methodologies are developed, require electric companies to disclose the financial risks that relate to climate change. Under current SEC rules, companies are required to disclose material environmental liabilities of which they are aware.⁴

Electric Sector

Electric companies should “lead by example” by taking proactive steps and demonstrating best practices for greenhouse gas mitigation to investors and policymakers. Examples include participation in pilot trading programs and voluntary emission reduction commitments.⁵ However, given the lack of price signals for greenhouse gas emissions, they will be limited in their ability to move too far ahead of their competitors. Individual electric companies should:

- ▶ Consider the climate change issue at the Board of Directors level by evaluating climate change-related costs and opportunities in capital stock decisions. This could be achieved by incorporating greenhouse gas emissions issues into capital planning, mergers and acquisitions activity and business strategies. Such action might lead to:
 - Retirement/repowering of capital stock;
 - Investments in clean energy and climate-friendly technologies, including renewable energy, integrated gasification combined cycle, carbon sequestration, demand-side management and efficiency improvements; and
 - New research and development initiatives.
- ▶ Work with investors, government bodies and other stakeholders to develop uniform methodologies and reporting formats for greenhouse gas emissions and the corresponding financial risks related to climate change.
- ▶ For companies that serve retail customers, offer options for exceeding minimum standards of energy efficiency and renewable energy.

Environmental and Consumer Groups

Environmental and consumer groups serve as catalysts for action at the grassroots and policymaking levels. In order to change market conditions, public support is essential. Environmental and consumer groups provide a needed organizing structure and knowledge base to educate and disseminate information to a wide range of stakeholders. They should:

- ▶ Promote clean energy technologies to consumers, government, investors and generators.
- ▶ Educate the investment community on climate change risks and costs.
- ▶ Urge corporate board approval of proactive climate change policy positions.
- ▶ Establish pilot programs that create and test markets and price signals for greenhouse gas emissions reductions.
- ▶ Work to develop consistent messages among environmental and consumer groups on climate change mitigation and policies.

ENDORISING COMPANIES AND ORGANIZATIONS

Investor Groups

Calvert Group (www.calvertgroup.com) has been a leader in the Socially Responsible Investing field for more than two decades and is recognized as a well established leader in fixed-income investing. With the broadest array of SRI mutual funds across equity, bond and money market portfolios, Calvert manages approximately \$8.5 billion in assets in 27 screened and non-screened portfolios. Calvert believes that investing in companies that are committed to meeting the challenges of the future with an expanded view of corporate responsibility is more than just a matter of “doing the right thing” – it also makes good business sense.

The Connecticut State Treasurer (www.state.ct.us/ott) oversees a wide variety of activities, and is responsible for the prudent management of state funds. As principal fiduciary for six State pension and eight State trust funds, the Treasurer is responsible for prudently managing the assets for approximately 160,000 teachers, state, and municipal employees who are pension plan participants and beneficiaries as well as academic programs, grants, and initiatives throughout the state.

Innovest Strategic Value Advisors (www.innovestgroup.com) is an internationally recognized investment research and advisory firm specializing in analyzing companies' performance on environmental, social, and strategic governance issues, with a focus on their impact on competitiveness, profitability, and share price performance. Innovest provides clients with industry, company and specialized reports, asset management sub-advisory services, and custom research, consulting and portfolio analysis. Founded in 1995 with the mission of identifying non-traditional sources of risk and value potential for investors, the firm currently has over US \$1 billion under direct sub-advisory mandates.

Investor Responsibility Research Center (www.irrc.org), founded in 1972, is the world's leading source of impartial, independent research on corporate governance, proxy voting and corporate responsibility issues. Its mission is to provide the highest quality research on companies and shareholders worldwide. IRRC provides research, software products and consulting services to over 500 subscribers and clients representing institutional investors, corporations, law firms and other organizations. IRRC offers guidance on proxy voting as well as company profile information for portfolio screening and other purposes.

ISIS Asset Management plc (www.isisam.com) is one of the United Kingdom's largest active investment managers with approximately \$96 billion under management (as of 30 April 2003). Along with conducting rigor-

ous financial analysis, ISIS evaluates companies' corporate governance, social and environmental risks and opportunities and encourages the companies it owns to improve policies, performance and transparency in these areas.

New York City Comptroller's Office (www.comptroller.nyc.gov) has the mission of ensuring the city's financial health by advising the Mayor, the City Council, and the public of the City's financial condition. The Comptroller, an independently elected official and the Chief Financial Officer of the City, also makes recommendations on City programs and operations, fiscal policies, and financial transactions. In addition, the Comptroller manages over \$69 billion in pension funds, performs budgetary analysis, audits city agencies, registers proposed contracts, oversees budget authorization, determines credit needs, terms and conditions, prepares warrants for payment and issues and sells City obligations.

PAX World Funds (www.paxworld.com), a socially responsible mutual fund company, has offered investors the opportunity to achieve "performance with principles" for over 30 years. Established in 1971, Pax World Balanced Fund was the first mutual fund to adopt comprehensive social and environmental screens. The Pax World Funds invest in companies producing products and services that improve the quality of life, while avoiding companies involved in weapons production or the alcohol, tobacco and gambling industries. In addition, Pax World offers the Pax World Growth Fund, Pax World High Yield Fund, the only socially responsible high-yield bond fund, and the Pax World Money Market Fund.

The Presbyterian Church USA (www.pcusa.org) is a major Protestant denomination of nearly three million members and approximately 11,000 churches with numerous programs to improve the quality of life and social responsibility of people in the world. The Church seeks to mobilize the human and financial resources of the church to respond with compassion and justice in local communities, in the nation, and throughout the world.

The Social Investment Forum (www.socialinvest.org) is a national nonprofit membership association dedicated to promoting the concept and practice of Socially Responsible Investing. The Forum is made up of over 500 financial professionals and institutions. The Forum has five major areas of activity: Networking and Continuing Education, Research, Direct Member Services & Information, Industry Growth and Client Services, and Industry Advocacy.

Trillium Asset Management Corporation (www.trilliuminvest.com) has been the leader in socially responsible investing for over 20 years, guided by a belief that active investing can offer good returns to the investor, while also promoting social and economic justice. Trillium is an independent employee-owned firm, dedicated to professional, high quality, individualized service for valued clients. Their mission is to help clients meet their financial

goals and have a positive impact on society. Trillium Asset Management manages investment portfolios for a broad array of individuals and institutions.

Walden Asset Management (www.waldenassetmgmt.com) has provided socially responsive investment services to individuals and institutions since 1975. With approximately \$1 billion in socially screened assets under management, Walden provides an array of domestic social investment services. Walden, a division of United States Trust Company of Boston, strives to serve all aspects of their clients' unique investment needs, including portfolio management, social research, shareholder advocacy, community development investing and account custody.

Power Companies

Calpine Corporation (www.calpine.com), one of North America's leading power companies, is committed to fulfilling the continuing need for clean, efficient, reliable electricity in an environmentally responsible manner. Calpine has transformed from one of the nation's leading developers of power plants to a major power-plant operator and provider of services, focused on providing customers with high-value products and services to meet their unique energy requirements. Calpine has 83 energy centers in 23 states in the U.S., as well as in Canada and the United Kingdom, with a capacity of more than 19,400 megawatts. Calpine uses two types of fuel - natural gas and geothermal steam - to produce energy-efficient electricity in ways that dramatically decrease environmental impact.

Con Edison (www.coned.com) For more than 175 years, Con Edison has been supplying the energy that powers New York. Consolidated Edison Company of New York (Con Edison), a regulated utility, provides electric service in most of New York City and Westchester County. They provide natural gas service in Manhattan, the Bronx, and parts of Queens and Westchester. Con Edison also owns and operates the world's largest steam system, providing steam service in most of Manhattan. Con Edison is a subsidiary of Consolidated Edison, Inc., one of the nation's largest investor-owned energy companies with approximately \$8 billion in annual revenues and approximately \$18 billion in assets.

KeySpan (www.keysenergy.com), formed in 1998, is the largest distributor of natural gas in the Northeast, with 2.5 million gas customers and more than 12,000 employees. KeySpan is also the largest investor-owned electric generator in New York State and operates Long Island Power Authority's electric system serving 1.1 million customers. KeySpan also has strategic investments in natural gas exploration, production, pipeline transportation, distribution and storage, Canadian gas-processing and fiber-optic cable. Through 2002, KeySpan has lowered its power plant CO₂ emissions by 14% below 1990 levels.

Northeast Utilities (www.nu.com) is a Fortune 500 diversified energy company located in Connecticut with operations throughout the Northeast. Through its competitive and regulated subsidiaries, NU provides Energy for a Changing World, with a full range of energy products and services to millions of residential and business customers from Maine to Maryland. From delivering electricity and natural gas, to marketing energy commodities, to operating and maintaining power plant facilities, NU is committed to safety, reliability and expanding consumers' energy options.

PG&E Corporation (www.pgecorp.com) is an energy-based holding company headquartered in San Francisco. It is the parent company of Pacific Gas and Electric Company and PG&E National Energy Group. Pacific Gas and Electric Company is one of the largest combination natural gas and electric utilities in the United States. Based in San Francisco, the utility serves 13 million people throughout a 70,000-square-mile service area in Northern and Central California. PG&E Corporation's National Energy Group focuses on power generation and natural gas transmission.

PPL Corporation (www.pplweb.com), headquartered in Allentown, Pa., controls about 11,500 megawatts of generating capacity in the United States, sells energy in key U.S. markets and delivers electricity to customers in Pennsylvania, the United Kingdom and Latin America. PPL's four principal business subsidiaries are PPL Generation, PPL EnergyPlus, PPL Global and PPL Electric Utilities.

Public Service Enterprise Group (www.pseg.com) is a diversified energy company headquartered in Newark, N.J. PSEG subsidiaries include: PSE&G, New Jersey's oldest and largest combined public gas and electric utility; PSEG Power, a major regional independent power producer; and, PSEG Holdings which includes other unregulated energy businesses. PSEG was founded in 1903 and is celebrating its 100th anniversary this year.

Wisconsin Energy Corporation (www.wisconsinenergy.com), headquartered in Milwaukee, Wis., is an \$8.4 billion holding company with a diversified portfolio of subsidiaries engaged in electric generation; electric, gas, steam and water distribution; pump manufacturing and other non-utility businesses. The corporation's utility subsidiaries serve more than one million electric and 950,000 natural gas customers in Wisconsin and Michigan's Upper Peninsula. Its non-utility subsidiaries include energy services and development, pump manufacturing, waste-to-energy and real estate businesses.

Environmental Organizations

Co-op America (www.coopamerica.org) is the national nonprofit consumer, business and investor organization working to harness economic power to create a socially just and environmentally sustainable society. Co-op America provides resources to consumers and business to help choose sustainable consumption practices; shift their purchasing and investing to socially and environmentally responsible companies; and use their power as consumers, investors and businesses to encourage America to change the way we do business to one that respects people and the planet.

The Natural Resources Defense Council (www.nrdc.org) is a national, nonprofit organization of scientists, lawyers and environmental specialists dedicated to protecting public health and the environment. Founded in 1970, NRDC has more than 550,000 members nationwide, served from offices in New York, Washington, Los Angeles and San Francisco.

The Union of Concerned Scientists (www.ucsusa.org) is a nonprofit partnership of scientists and citizens combining rigorous scientific analysis, innovative policy development and effective citizen advocacy to achieve practical solutions to the world's most pressing global security and environmental problems. UCS is based in Cambridge, Massachusetts, with offices in Berkeley, California, and Washington, D.C.

World Resources Institute (www.wri.org) is an environmental research and policy organization that creates solutions to protect the planet and improve people's lives. WRI is an independent, non-partisan organization that works closely with governments, the private sector, and civil society groups in more than 100 countries around the world.

World Wildlife Fund (www.wwfus.org), known worldwide by its panda logo, leads international efforts to protect endangered species and their habitats and to conserve the diversity of life on Earth. Now in its fourth decade, WWF works in more than 100 countries around the globe.

THE ENVIRONMENTAL REALITY: PART I

Understanding Climate Change: A Look at the Science

Climate change is one of the most significant environmental challenges facing the world today, and governments, business, and citizens are beginning to take actions to reduce the emissions that cause climate change. Over the course of the 21st century, solving climate change will require fundamental shifts in how the world uses and produces energy that are at least as great as the changes in our energy system since Thomas Edison first invented the light bulb.

When greenhouse gases are released into the atmosphere, the sun's rays become trapped and subsequently cause a warming effect on the earth's surface. The Intergovernmental Panel on Climate Change (IPCC), the leading international scientific body that assesses climate change, has found that based on current emissions forecasts the planet will experience warming of approximately 2.5 to 10.5 degrees Fahrenheit by 2100.⁶ This warming trend could significantly impact the Earth's climate system as well as ecological, economic and social systems. It will also cause severe droughts and floods, sea level rise, loss of ice cover and the spread of disease to populations around the globe.

In the United States (U.S.), the National Academy of Sciences (NAS) and the government's 2002 status report to the United Nations on U.S. efforts to address climate change warn that climate change could result in similar effects, including degrading agricultural lands and ecosystems, changing hydrological cycles and sea level rise. Such changes will alter the economy and the natural environment in profound ways.

The Evolution of Climate Science

The science associated with global climate change is complex and constantly evolving. Scientists are extremely confident about some aspects of climate change, while other aspects of the problem remain less certain.

To assist policymakers, the IPCC was established in 1988 to assess the scientific, technical and socio-economic information relevant to understand the causes and risks of climate change. The IPCC is an intergovernmental organization with participation from all regions of the world, with a balance between developed and developing country experts. It assesses peer-reviewed scientific analysis and informs policy deliberations on the pace, impacts and technological solutions to climate change. Since its creation, it has released three assessment reports that lay the overall framework for understanding and addressing climate change today. Its Third Assessment Report, released in 2001, provides the most comprehensive analysis of the scientific evidence, and the threats that climate change poses to human populations and the environment. The report's findings were extremely

Climate change is caused by a warming of the earth's surface due to the increased concentration of greenhouse gases in the atmosphere. Greenhouse gases include carbon dioxide (CO₂), which is emitted through deforestation and the burning of fossil fuels; methane (CH₄), which results from livestock, landfills and the natural gas combustion process; and hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), nitrous oxide (N₂O), and sulfur hexafluoride (SF₆) that are released during certain industrial processes.

Key Findings of the Intergovernmental Panel on Climate Change: Third Assessment Report

The IPCC's Third Assessment Report provided stronger evidence of human-induced climate change than its previous reports and forecasted dangerous consequences from unmitigated greenhouse gas emissions.

Climate Science⁷

- ▶ There is new and stronger evidence that the warming observed in the last 50 years is attributable to human activities.
- ▶ Emissions of greenhouse gases and aerosols due to human activities continue to alter the atmosphere in ways that are expected to impact the climate.
- ▶ Global average temperature and sea level are projected to rise under all IPCC scenarios.
- ▶ Globally, it is very likely that the 1990s were the warmest decade and that 1998 was the warmest year, in the instrumental record, since 1861.
- ▶ Emissions of CO₂ due to fossil fuel burning are virtually certain to be the dominant influence on the trends in atmospheric concentrations of CO₂ in the 21st century.

Climate Change Impacts⁸

- ▶ Glaciers are projected to continue their widespread retreat during the 21st century.
- ▶ Globally averaged annual precipitation is projected to increase during the 21st century. Regionally, increases and decreases are projected of typically 5 percent to 20 percent.
- ▶ The global mean sea level is projected to rise by 0.09 to 0.88 meters between the years 1990 and 2100, with significant regional variations.
- ▶ Human health threats will increase, including the spread of infectious diseases. Impacts will be felt particularly in lower income populations, predominantly within tropical and subtropical countries.
- ▶ Ecological productivity and biodiversity will be altered, with an increased risk of extinction of some vulnerable species.
- ▶ Water shortages will be exacerbated in many water-scarce areas of the world.
- ▶ The aggregated market sector effects, measured as changes in gross domestic product (GDP), are estimated to be negative for many developing countries and are estimated to be mixed for developed countries for up to a few degrees Centigrade of warming and negative for warming beyond a few degrees.
- ▶ Populations that inhabit small islands and/or low-lying coastal areas are at particular risk of severe social and economic effects from sea-level rise and storm surges.

Climate Change Mitigation⁹

- ▶ Lower emissions scenarios require different patterns of energy resource development.
- ▶ Significant technical progress relevant to greenhouse gas emissions reduction has been made since the IPCC's second report in 1995 and has been faster than anticipated.
- ▶ Forests, agricultural lands, and other terrestrial ecosystems offer significant carbon mitigation potential. Conservation and sequestration of carbon, although not necessarily permanent, may allow time for other options to be developed and implemented.
- ▶ The effectiveness of climate change mitigation can be enhanced when climate policies are integrated with the non-climate objectives. Broad transition strategies are needed to achieve the long-term social and technological changes required by both sustainable development and climate change mitigation.

consequential, as it found stronger evidence for human-induced climate change as well as the potential adverse impacts on populations should concentrations of greenhouse gases continue to rise.

In response to this report and growing public concern about climate change in the U.S., the Bush Administration asked the NAS to assess the current state of climate science. The NAS supported the IPCC’s view that climate change is real and that human activity has been, and continues to be, a contributing factor.¹⁰ Additionally, the Bush administration released its own review in the Climate Action Report 2002, the third in a series of reports to the United Nations on the progress of climate actions and research in the U.S. It similarly concludes that climate change is mostly caused by human actions and it details specific and far-reaching effects of climate change on the American environment. In particular, it concludes that climate change could disrupt hydrological systems, such as water supplies fed by snow, increase heat waves, and adversely damage ecosystems, coastal areas, and regions with permafrost.¹¹

These findings have fueled the commitment of a growing number of policy-makers, companies and public citizens in the U.S. to mitigate climate change with the aim of averting its negative impacts. Part of the challenge will be to encourage greenhouse gas emission reductions from the largest emitting sectors of the economy. The electric sector represents a significant portion of U.S. emissions, along with transportation, industrial and residential sectors.

Climate change could disrupt hydrological systems, such as water supplies fed by snow, increase heat waves, and adversely damage ecosystems, coastal areas, and regions with permafrost.

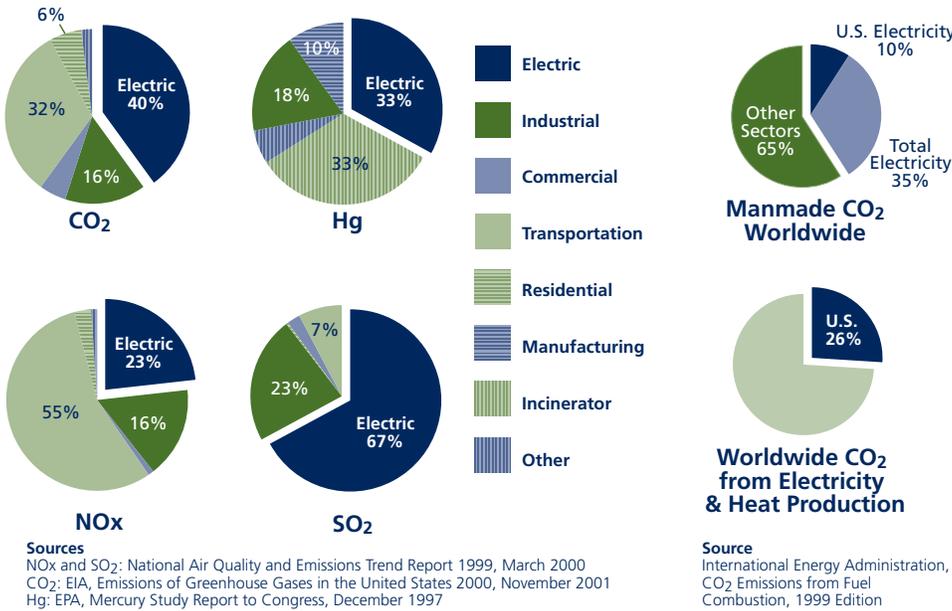


CHART 1: U.S. EMISSIONS BY SECTOR

THE ENVIRONMENTAL REALITY: PART II

The Regulatory Landscape for the Electricity Sector

As the source of significant emissions, generators of electricity in the U.S. are subject to significant environmental regulation, especially for air pollution. The regulatory landscape for the electric industry is both complex and uncertain.

Managing this complex combination of clean air and energy regulation will be a substantial strategic challenge for many electric power companies.

In the next decade and beyond, the Environmental Protection Agency (EPA) and the states will apply a complex array of new Clean Air Act regulations to the sector. It is not clear what EPA may require, or if Congress or the courts may amend it. It is also not clear when CO₂ or other air pollutants will be regulated and to what degree. In addition, state governments are beginning to introduce requirements for electric companies to purchase increasing amounts of renewable energy from sources such as wind and solar. Congress is considering a similar proposal at the national level. Managing this complex combination of clean air and energy regulation will be a substantial strategic challenge for many electric power companies.

The likely implementation of the Kyoto Protocol may also affect some electric companies who own or operate generation plants outside the borders of the U.S. Its emission reduction requirements and other provisions will be significant for many facilities.

Pollutants of Concern

The clean air requirements facing the electricity industry stem from its large contribution to major air quality problems in the U.S. Much public and regulatory attention has focused on emissions of oxides of nitrogen (NO_x), sulfur dioxide (SO₂), and, more recently mercury (Hg). Emissions of these pollutants are currently regulated under the Clean Air Act, and contribute to:

- ▶ Acid deposition (NO_x, SO₂)
- ▶ Fine particulates (NO_x, SO₂)
- ▶ Mercury deposition (Hg)
- ▶ Nitrogen deposition (NO_x)
- ▶ Ozone smog (NO_x)
- ▶ Regional Haze (NO_x, SO₂)

Increased scientific and public concern regarding climate change has drawn considerable attention to the possibility of regulating emissions of CO₂, the largest contributor to the problem.

The U.S. electric industry remains a major source of each of these air pollutants. According to the most recent figures from EPA, power plants account for:

- ▶ 23 percent of nitrogen oxides
- ▶ 67 percent of sulfur dioxide
- ▶ 33 percent of mercury, and
- ▶ 40 percent of carbon dioxide.

The U.S. electric industry is responsible for 26 percent of worldwide CO₂ from electricity and heat production, and almost 10 percent of total worldwide manmade CO₂ emissions.¹² Coal-fired power plants are also the largest source of mercury air emissions.¹³

Current Clean Air Regulatory Path

The electricity sector is already subject to critical air quality requirements, and these are expected to change and increase in the coming years as the EPA moves forward to address ozone smog, fine particulates, acid rain, regional haze and toxic air pollution associated with mercury. It is often hard to predict the precise path for regulations at the EPA. EPA's rules are often subject to legal challenge, as well as to political pressures from all sides.

The EPA is currently working on developing and implementing four packages of rules that will each have a significant impact on the electric industry.

First, EPA has recently created a new ambient standard¹⁴ for fine particles (those smaller than 2.5 microns), and changed its ozone standard from a one hour standard to an eight-hour standard. Under the Clean Air Act, states must develop specific State Implementation Plans (SIPs) by December 2007 to bring areas into compliance by December 2009. The plans will likely require new controls at power plants beginning shortly thereafter, and continuing through 2021.

Extensions of this deadline are allowed only if EPA rigorously demonstrates that pollution control measures to meet the health standards on time are not available or feasible, and no such demonstrations have been made.

Second, under the previous standard for ozone smog, EPA has taken two closely coordinated actions that will likely lead to major reductions in NO_x emissions from power plants in the eastern U.S. in the next few years. First, EPA found that NO_x emissions from 19 states¹⁵ and the District of Columbia are causing violations of the standard for ozone in downwind states, and initiated the "NO_x SIP Call Rule" requiring emission reductions in those upwind states. In addition, EPA promulgated the Section 126 Rule to reduce

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While there are differences among the proposals and uncertainty about the pace of congressional action, it is clear that the electric industry faces significant air pollution controls in the next 10 to 15 years under the current Clean Air Act or one that Congress revises.

transport of NO_x into downwind states. The rule will reduce emissions of NO_x by approximately 510,000 tons from 2007 levels at 392 large electric generating units and large industrial boilers and turbines in 12 states¹⁶ and the District of Columbia. All of the facilities affected by the Section 126 Rule are located in states that are also covered by the NO_x SIP Call. States and facilities must comply by May 2004 (except in Georgia and Missouri, where the deadline is May 1, 2005).¹⁷

Third, in June 1999, EPA proposed new "regional haze" rules to improve visibility at 156 national parks and wilderness areas across the country. The rules require states to make reasonable progress towards meeting natural background conditions in 60 years. States must implement a long-term strategy to reduce emissions with that goal in mind, and update it regularly. States must particularly examine whether older power plants and other facilities should install the best available retrofit technology. These plans are due no later than December 2008. While it is unclear at this point what states might specifically require of power plants, some controls on nitrogen oxides and sulfur dioxide may occur as a result. The first deadline for controls under this plan will occur in 10 to 15 years.¹⁸

Fourth, in December 2000, EPA announced it would regulate mercury emissions from coal- and oil-fired power plants. EPA will propose regulations in mid-December 2003 and final regulations by December 2004. Sources would need to comply with the new standard within three years of the final rule. While the level of controls that EPA might require for mercury emissions from power plants is uncertain, EPA has required other similar sources of mercury emissions to be reduced between 50-90 percent. EPA has said that control technologies are available that would eliminate most of the mercury emissions from these power plants "at a cost far lower than 1 percent of utility industry revenues."¹⁹

Future Federal Clean Air Regulatory Path

Congress is considering proposals to revise the current clean air regulatory path. Thus, leaders in the electricity industry, investors, and others are confronted with significant uncertainty about the future. It is not clear that Congress will act or when, nor what course they will chart.

Three significant plans have emerged:

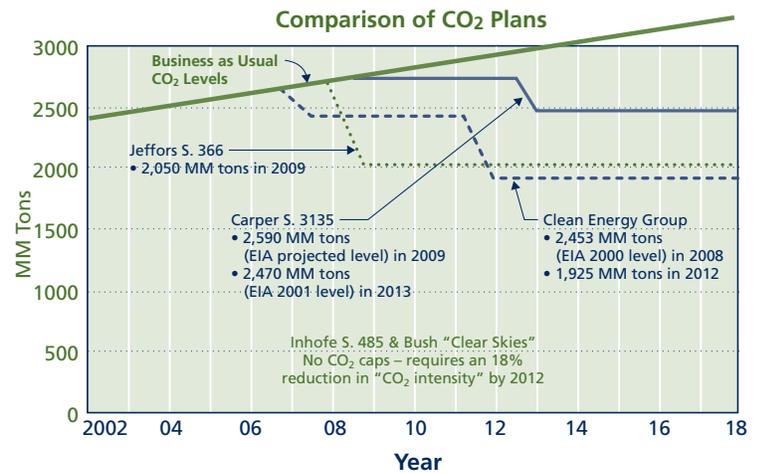
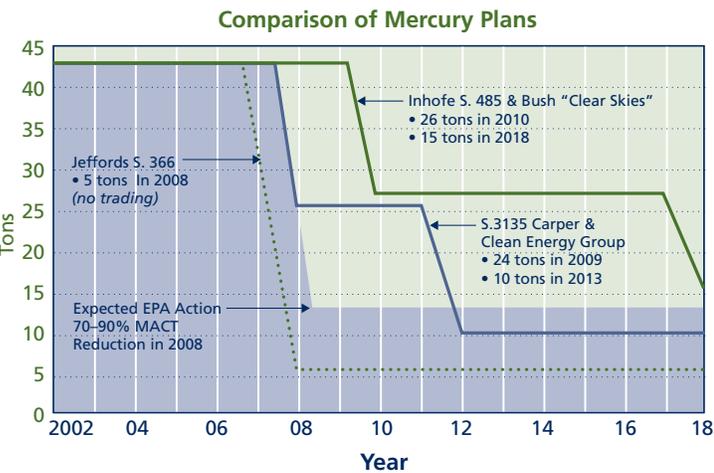
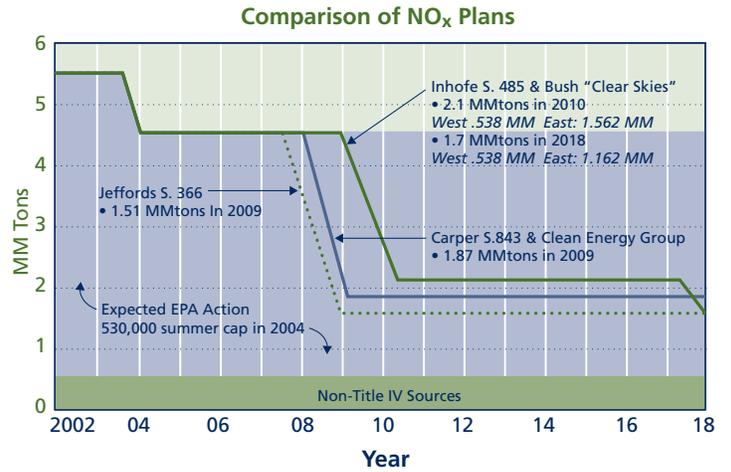
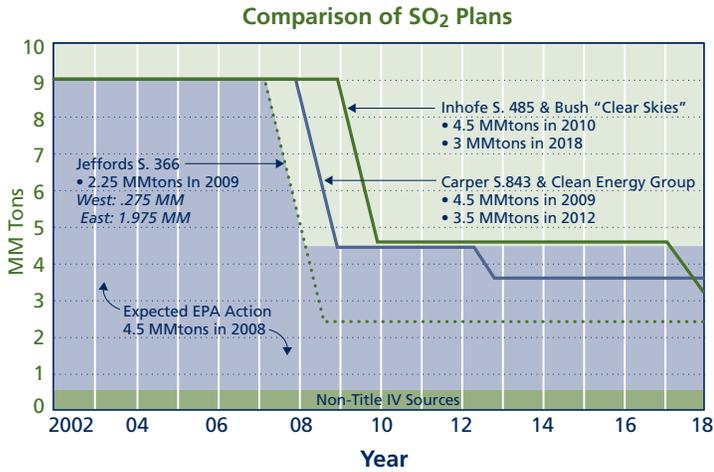
- ▶ The Bush Administration's Clear Skies Initiative
- ▶ The Clean Power Act, S. 366, authored by Senator James Jeffords (I-VT) and others
- ▶ The Integrated Air Quality Planning Act proposal of the Clean Energy Group, a coalition of electric generating and distribution companies

Each of the proposals is similar in that they establish national limits or "caps" on emissions of NO_x, SO₂, and mercury from the electricity industry.

In essence, all the plans envision using national caps on key pollutants to push emission reductions that will achieve many, if not all, of the clean air requirements that are currently envisioned, but do so in a more rational and less confusing way.

Both the Jeffords legislation and the Clean Energy Group proposal also establish a cap for CO₂ emissions, while the Bush Administration's proposal does not. This has already been and will continue to be an extremely contentious issue. Several key Senators who support the Bush proposal, including the Chairman of the Senate Environment Committee, have said that the legislation in the Senate will likely include a requirement to reduce CO₂ emissions.

The proposals differ in the level of required reductions, and the deadline. (See Chart 2 below) The proposals also differ in the extent to which they grant electric companies flexibility to conduct emissions trading for mercury and in meeting the Clean Air Act's current requirements.



Updated May, 2003. Source: Keeler, Jeff. Energy & Environmental Strategies. For more information, please contact jeffkeeler@solsticeenergy.com

Chart 2: Comparison of Several Multipollutant Proposals

While there are differences among the proposals and uncertainty about the pace of congressional action, it is clear that the electric industry faces significant air pollution controls in the next 10 to 15 years under the current Clean Air Act or one that Congress revises.

State Action on Air Pollutants

State governments are important partners in the national effort to reduce air pollution, as they are responsible for developing plans to meet national ambient air quality standards. In recent years, states have also begun to push ahead of the national government in requiring electric generators to reduce their emissions, especially of CO₂. Massachusetts and New Hampshire have recently adopted new requirements to reduce CO₂ and other air pollutants. It is possible that other states may also move forward with similar actions.

Regional efforts are also being developed. In August 2001, the six New England Governors and Eastern Canadian Premiers announced a comprehensive Climate Change Action Plan. The plan calls for multiple goals for the region to reduce greenhouse gas emissions and expand clean energy markets. Of particular relevance is the plan's goal to mirror United Nations Framework Convention on Climate Change objectives in conjunction with regional short- mid- and long-term objectives.

Short-term Goal: Reduce regional greenhouse gas emissions to 1990 emissions by 2010.

Mid-term Goal: Reduce regional greenhouse gas emissions by at least 10 percent below 1990 emissions by 2020, and establish an interactive five-year process, commencing in 2005, to adjust the goals if necessary and set future emissions reduction goals.

Long-term Goal: Reduce regional greenhouse gas emissions sufficiently to eliminate any dangerous threat to the climate; current science suggests this will require reductions of 75 to 85 percent below current levels.

A key element of the plan is a regional inventory protocol and emissions registry and trading scheme, which will likely be compatible with other plans under development in the Northeast U.S.

The Kyoto Protocol

Some U.S. electric companies also own generation facilities in countries, which, unlike the U.S, have ratified or approved the Kyoto Protocol. Electric facilities operating in countries that are subject to the Protocol's emission targets, such as members of the European Union, Canada, and Japan, will likely face emission reduction requirements at some level during 2008–2012. In developing countries, certain clean energy generating facilities may qual-

State Actions to Reduce Greenhouse Gas Emissions

The following states have taken steps to address climate change through different types of greenhouse gas programs. These initiatives are possible models for national approaches.

California

In 2002, California adopted a law regulating the greenhouse gas emissions from automobiles, including SUVs and light-duty trucks. The law requires the state's Air Resources Board to adopt regulations that would achieve "the maximum feasible reduction" in emissions of greenhouse gases, including CO₂. The regulations are expected to be completed by 2005 and would take effect in either 2006 or 2009.

California also adopted a 20 percent Renewable Portfolio Standard (RPS) that requires renewable energy generation to double in the state by 2017.

Massachusetts

Massachusetts adopted a multipollutant program mandating reductions of NO_x, SO₂, CO₂ and mercury emissions from certain power plants in the state. Under the law, power plants must reduce or offset average CO₂ emissions by 10 percent by 2006 and 2008.

Oregon

In 1997, Oregon adopted House Bill 3283, requiring new sources of large CO₂ emitters to offset a significant portion of their emissions. Under the law, new generating plants must meet a standard of 0.675 lbs. of CO₂/kWh and non-generating facilities must meet a rate of 0.504 lbs. per horsepower hour. Compliance can be met through efficiency, cogeneration, offsets or a fee of \$0.85 per ton of carbon. However, the standard cannot add more than 1.8 percent to the cost of a new plant or facility.

New Hampshire

In May 2002, New Hampshire adopted the Clean Power Act, which mandates that the state's three power plants reduce CO₂ emissions by 3 percent to 1990 levels by 2007, with future requirements to lower them an additional 7 percent over the next decade. Emissions trading is allowed under the program to assist with compliance. The law was structured to serve as a model for other state and federal multipollutant programs. The power plants subject to the emission reduction targets must submit a compliance plan to the state by July 2003.

Wisconsin

The Wisconsin Public Service Commission, when evaluating new sources of power generation, runs a scenario that monetizes the cost of CO₂ emissions.

ify for credits under the Protocol's Clean Development Mechanism. These credits may make these facilities more attractive financially.

As of March 2003, 106 countries had ratified or approved the treaty. The treaty will take effect when it is approved by the Russian Federation, which the government has announced it intends to do.

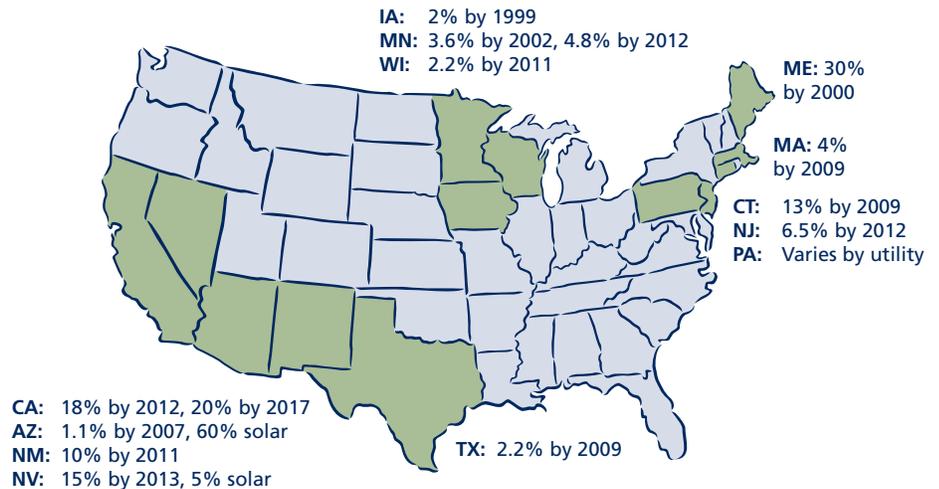
New state requirements will lead to the development of 12,400 megawatts (MW) of new renewable power by 2012 – an increase of more than 90 percent over total U.S. production from renewables in 1997.

Renewable Electricity Standards

There is also a growing movement by states to enact laws that require electric companies to purchase an increasing amount of energy from renewable energy sources, such as biomass, geothermal, solar and wind. These renewable electricity standards add to the momentum of states acting to reduce carbon emissions, but also add to the complexity and uncertainty of managing energy and environmental requirements in the electricity field. Thirteen states have now adopted these "Renewable Electricity Standards," including Arizona, California, Connecticut, Iowa, Maine, Massachusetts, Minnesota, New Mexico, Nevada, New Jersey, Pennsylvania, Texas and Wisconsin. Governor Pataki (R-NY) has recently announced his intention to create a similar standard for New York, and other states are actively considering it.

These state actions are motivated by a wide variety of concerns. Benefits of increased renewable energy include diversification of state fuel supplies.

Renewable Energy Standards



13 States

IL, HI and MN also have non-binding renewable goals.

Source: Union of Concerned Scientists

CHART 3: Status of State Renewable Electricity Standards

This will ensure greater competition as a way of protecting consumers from price increases for fossil fuels such as coal and natural gas, without air pollution. Renewable electricity standards also help to create new economic development through local renewable energy industry providers.

Current renewable energy production for electricity is quite small – approximately 2 percent of all production. But these new state requirements will lead to the development of 12,400 megawatts (MW) of new renewable power by 2012 – an increase of more than 90 percent over total U.S. production from renewables in 1997 (this excludes electricity produced from hydroelectric facilities).²⁰

Congress is also considering proposals to implement a similar requirement at the national level. In 2002, the Senate adopted a proposal that would have required utilities to purchase 10 percent of electricity from renewable energy by the year 2020, but the legislation was never completed. It is expected that Congress will reconsider the issue in 2003 - 2004 as it drafts energy legislation.

THE ENVIRONMENTAL REALITY: PART III

U.S. Electricity Generation and Climate-Friendly Technologies

Reducing greenhouse gas emissions from the electricity sector is fundamentally different than reducing emissions of other air pollutants. Electric generators can reduce pollutants such as NO_x or SO₂ by installing pollution control devices, such as scrubbers, on the waste stream. For CO₂, technologies have been demonstrated, but they are not yet commercially viable. Thus, the fuel used to produce the electricity and the efficiency of the electricity system are the critical factors in creating or reducing emissions. At the moment, electric companies have three basic options for reducing emissions:

- ▶ Increasing production from less emitting or zero-emitting fuel sources
- ▶ Improving the efficiency of power generation
- ▶ Improving the efficiency of electricity use

In addition, companies may offset their emissions through carbon storage, also known as sequestration.

Electricity Production Today

Today, over 70 percent of U.S. electricity generation is produced from the burning of fossil fuels, with about 52 percent coming from coal. Nuclear energy makes up about 20 percent, hydroelectric power makes up about 7 percent and other renewable energy sources like solar, geothermal, wind and biomass make up about 2 percent of current generation.

Coal produces the greatest amount of CO₂ for each unit of electricity produced, as well as significant amounts of NO_x, SO₂, and mercury. Natural gas produces about 65 percent less CO₂ emissions, and virtually no emissions of SO₂ and mercury. Most existing power plants typically convert 30 to 35 percent of the energy contained in the coal into electricity. Modern natural gas plants convert more than 50 percent of the natural

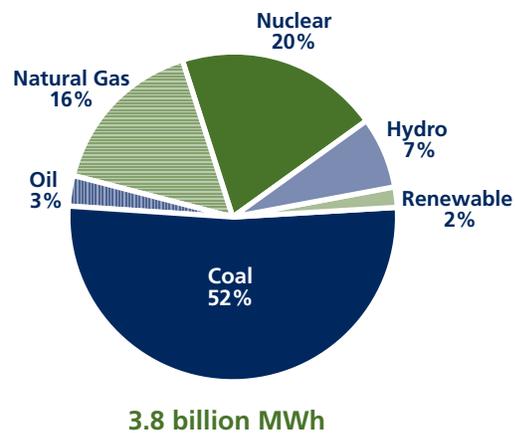


CHART 4: U.S. Electricity Generation Fuel Mix

gas into electricity – making these new plants cleaner burning and more energy efficient.

Electricity produced from nuclear power and hydroelectricity creates no greenhouse gas emissions, but each has significant other environmental and social concerns. Renewable energy from sustainably managed biomass, geothermal, solar, and wind create no greenhouse gas emissions, nor significant other environmental problems. But they are not deployed widely due to cost, resource availability and energy infrastructure constraints. However, wind energy is now economically competitive in certain locations and is the fastest growing source of energy in the world. Also, solar energy, while not yet competitive in many applications, continues to come down in cost and holds promise for the future. Further, advanced fossil fuel technologies, such as combined cycle natural gas, combined heat and power and integrated coal gasification combined cycle (IGCC), can produce electricity with only a small fraction of the emissions of traditional fossil generation and are viewed as the next generation of fossil technologies.

Wind energy is now economically competitive in certain locations and is the fastest growing source of energy in the world.

Energy Generation Technologies²¹

To generate electricity, electric companies use a range of technologies with different emissions profiles. Due to the long capital life of energy investments, a transition to climate-friendly energy technologies is expected over a long time horizon. Certain energy generation technologies like Integrated Gasification Coal Combined Cycle, Combined Heat and Power and Combined Cycle Natural Gas offer significant efficiency gains over conventional generation methods.

Pulverized coal – Pulverized coal is the dominant technology for coal-fired generation in the U.S. Coal is milled into powdered form in pulverizers and combusted in a chamber. The hot gases and heat create steam, which is used to activate a turbine to produce electricity. It accounts for over 50 percent of electricity generation in the U.S.

Fluidized-Bed Combustion – Similar to pulverized coal technology, but allows coal to burn more efficiently by mixing pulverized coal with limestone (or other sorbents).

Integrated Gasification Combined Cycle – This is the next generation of coal-based energy production. Coal is gasified and then used to fire a gas turbine. Rather than being wasted, the exhaust from the gas turbine is then used to create steam that is fed into a steam turbine, creating a second source of power. Gases containing carbon can be separated and potentially sequestered into the ground, offering the possibility of reducing greenhouse gas emissions as well as creating more efficient coal-fired generation. However, presently the cost of gasification-based energy is considerably more than pulverized coal generation.²²

Natural Gas Turbines – Gas turbines produce energy by combusting fuel and air to produce high temperature, high pressure gas that turns a turbine to produce energy. According to the U.S. Department of Energy, 900 of the next 1,000 plants to be built in the U.S. will likely use natural gas turbines. Natural gas is a cleaner burning fuel than coal and results in about 65 percent lower CO₂ emissions. With the ability to optimize energy generation by feeding hot exhaust into a steam turbine, combined cycle natural gas power plants can operate at about 50 percent efficiency, contributing further greenhouse gas emission benefits. When heat is recovered these same plants can reach 90 percent efficiency.

Nuclear Energy – Nuclear reactors split atoms of uranium to generate heat to produce steam used for energy generation. Nuclear energy poses environmental tradeoffs. Nothing is combusted in nuclear reactors, so they do not produce air pollution. However, the spent fuel and other material from the reactor are radioactive and therefore must be carefully handled and safely stored for extremely long periods of time to avoid environmental harm.

Hydroelectric power – Generally, water from a reservoir or river is used to spin blades of a turbine to produce energy. Hydroelectric power produces no greenhouse gas emissions, but faces other environmental challenges like degrading fish habitats and other ecosystems.

Fuel Cells – Unlike most other electricity generating technologies, fuel cells generate energy by chemical reaction, not combustion. Operating in a similar fashion to battery generated power, fuel cells consist of two electrodes placed around an electrolyte. Oxygen passes over one electrode and hydrogen over the other to produce energy, water and heat. A consistent source of hydrogen is required to power a fuel cell. A "fuel reformer" can use hydrogen from any hydrocarbon fuel (i.e., natural gas, methanol or gasoline) to power the chemical reaction. However, with other sources of hydrogen, fuel cells can provide zero emissions energy, as the only byproduct of their use is water. But if hydrogen is supplied via a fuel reformer powered by coal or natural gas for example, CO₂ emissions from its use will be similar to that of a combined-cycle natural gas plant.

Wind Energy – Wind turbines employ propeller-like blades to catch the wind's energy and spin a turbine to produce electricity. When adequate winds are available, wind energy is one of the most cost-effective sources of renewable energy, with no greenhouse gas emissions. Some early wind farms resulted in high bird mortality, but these issues have been largely resolved through improved technology and preferential siting. However, some communities have resisted wind farms due to aesthetic impacts.

Solar Energy – Photovoltaic cells and concentrated solar power systems use the sun's heat and light to produce energy. Solar power contributes no greenhouse gas emissions, but is currently more expensive than con

ventional energy generation technologies at non-peak times and subject to resource availability.

Biomass – Organic material is combusted to produce energy. There are several different technologies used for converting biomass into electricity, including direct combustion, co-firing, landfill methane capture, gasification, pyrolysis and anaerobic digestion. Biomass is a renewable energy source, but depending on the conversion method, it can emit greenhouse gases and have other adverse environmental impacts.

Geothermal – Steam is produced from reservoirs of hot water below the earth's surface. Geothermal technologies produce energy without emissions. However, its usage is limited to locations where the resource is available. Most geothermal reservoirs in the U.S. are located in the western states, Alaska and Hawaii.

Energy Efficiency

Energy efficiency reduces emissions by slowing demand for electricity or reducing fuel consumption in generation. This can be achieved at the plant when energy is generated (supply-side) or at the end-user where electricity is consumed (demand-side). A range of technologies from combined cycle generation to building materials like insulation and energy efficient windows, appliances, lighting and office equipment can reduce the amount of energy used, thus reducing emissions.

Energy Efficient Technologies

The following list provides examples of energy efficiency technologies that are available today and that can contribute to greenhouse gas emission reductions. Countless arrays of technologies are available to address specific energy efficiency opportunities.

Energy Efficient Power Generation

- ▶ **Combined Heat and Power (CHP)** – CHP or cogeneration can provide a highly efficient method of generating electricity and heat at the point of use. By combining the electrical and thermal energy generation in one process, CHP systems can achieve overall efficiencies of 50 to 70 percent as compared with an average 33 percent efficiency for simple electric generation. When considering both thermal and electrical processes together, CHP requires at least 35 percent less fuel than power generated from the grid and steam generated from a boiler.²³

Demand Side Efficiency Technologies

- ▶ **Insulation Improves Heating and Cooling Efficiency** – Heating and cooling accounts for 50 to 70 percent of the energy used in the average American home. Insulating ceilings, walls, and floors in homes and buildings decreases heat flow and reduces the amount of energy needed for temperature control. Insulation products installed

in U.S. buildings save consumers about 12 quadrillion Btu annually or about 42 percent of the energy that would have been consumed with no insulation in place. Twelve quadrillion Btu is almost 15 percent of the total national energy used; it is enough energy to supply the total energy requirements of Florida for four years.²⁴

- ▶ **Energy Efficient Lighting/Compact Fluorescent Lamps** – Lighting accounts for 20 to 25 percent of all electricity consumed in the U.S. In a typical residential or commercial lighting installation, 50 percent or more of the energy is wasted by obsolete equipment, inadequate maintenance, or inefficient use. Compact fluorescent lamps (CFLs) represent a significant lighting advance. They combine the efficiency of fluorescent lighting with the convenience and popularity of incandescent fixtures (the most commonly used lighting source). CFLs can replace incandescents that are roughly three to four times their wattage, saving up to 75 percent of the initial lighting energy. Although CFLs cost more than comparable incandescent bulbs, they last 10 to 15 times as long. Installing lighting controls like timers and occupancy sensors can further maximize lighting efficiency.²⁵
- ▶ **Energy Efficient Air Conditioning** – Household and commercial air conditioning technologies have improved dramatically over the past two decades. Today's best air conditioners use 30 to 50 percent less energy to produce the same amount of cooling as air conditioners made in the mid 1970s. Using an air conditioner with a Seasonal Energy Efficiency Ratio (SEER) of 13 or higher (10 SEER is the standard) and a Energy Efficiency Ratio of (EER) 11 will result in energy savings of up to 25 percent from conventional air conditioners.²⁶

Carbon Sequestration

Storing or sequestering carbon biologically in trees and soils or geologically in underground formations may offset emissions from power generation, and some electric companies have experimented with such programs. Sequestration has been a controversial area, in part because it only temporarily offsets emissions, rather than actually reducing them.

Biological sequestration typically involves planting trees or enhancing carbon retention of soils. This storage is usually temporary, as it last only as long as the tree. Some have argued for limiting biological sequestration because it permits the release of carbon contained in fossil fuels buried underground for thousands of years, and replaces it with temporary storage of carbon for an average of a hundred years. Further, in some instances, carbon leakage can occur. Leakage happens when carbon sequestered on one site results in carbon release on another.

Depending on the activity, however, biological sequestration may also have valuable environmental and social co-benefits such as bio-diversity enhancement, wetland restoration and sustainable land management. Additionally, while sequestration may take several years to produce carbon benefits, it is often less expensive than emission reduction measures.

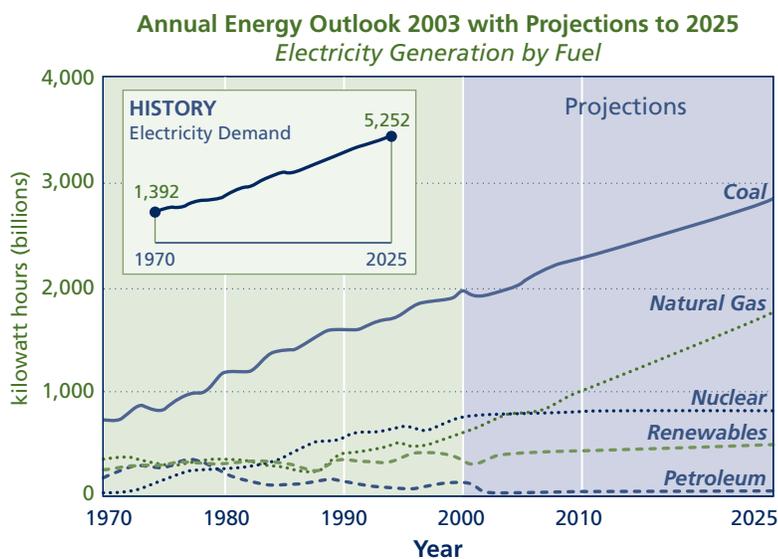
Geologic sequestration involves capturing the CO₂ from the fuel or its emissions, and then storing it in underground geologic formations. This has the potential to store massive amounts of CO₂ and is the focus of large-scale public and private research and development initiatives. Researchers and companies interested in using this technology seek data on the stability of CO₂ storage in particular. Further, the infrastructure needed to facilitate geologic sequestration is costly. Therefore, geologic sequestration is seen as a longer-term offset strategy.

These issues, weak regulatory signals for carbon benefits, and the lack of clear carbon measurement and accounting procedures prevent significant sequestration investments. While methodologies to measure and account for different types of sequestration activities are evolving, investments have been modest compared to the amount of emissions released each year. Difficulties in establishing accounting methods for sequestration are due in part to the scientific and technical nature of these activities and the view that sequestration is less transparent and more subject to leakage than emission reduction activities.

Future Energy Production

According to the U.S. Department of Energy's Energy Information Agency (EIA), energy demand is expected to increase steadily over the next several decades. Without significant changes, fossil fuels are expected to continue to dominate the generation mix. In the absence of regulatory and market signals, greenhouse gas emissions will continue to rise along with energy demand, even though climate-friendly technologies and practices are available today to reduce emissions.

While methodologies to measure and account for different types of sequestration activities are evolving, investments have been modest compared to the amount of emissions released each year.



Source: Energy Information Administration (EIA), Form EIA-860B, "Annual Electric Generator Report—Nonutility"; EIA, Annual Energy Review 2001, DOE/EIA-0384 (2001) (Washington, DC, November 2002); and Edison Electric Institute. Projections: Table A8

CHART 6: EIA Generation Forecast Chart

THE MARKET AND FINANCIAL REALITY: PART I

Electricity Market Dynamics and Prospects for Emission Reduction

Understanding the electricity sector today is crucial to reducing greenhouse gas emissions in the future. Powerful forces are at work, largely fueled by deregulation of electricity markets. These changes have created electric companies that are diverse and, in many cases, very different from the traditional vertically integrated, regulated electric utility. Many electric companies are reassessing their business strategies and planning for more dynamic operating conditions ahead.

The extent to which an electric company operates in regulated or deregulated markets has a great deal to do with its business strategy and how it will address forward-looking environmental challenges like climate change.

Today's Changing Electricity Market

The electricity market in the U.S. is multi-layered and undergoing dramatic changes. Over 70 percent of electric companies are investor-owned, while 14 percent are government-owned and 11 percent are cooperatively owned.²⁷ What was once a highly regulated, vertically integrated system is shifting to competitive markets where deregulated companies compete to provide wholesale and, in a few cases, retail electricity.²⁸ Further, while some electric power companies follow the traditional model of providing customers with energy generation, transmission and distribution services, others, encouraged by competition, are opting to specialize their product offerings.

Approximately half of the states in the U.S. have moved to some form of competitive markets. Additionally, the Federal Energy Regulatory Commission (FERC) is in the process of advancing competitive wholesale markets through the Standard Market Design rulemaking process. Its prospects are uncertain, as some in Congress have indicated strong opposition. This current transition creates further uncertainty in electricity markets.

The extent to which an electric company operates in regulated or deregulated markets has a great deal to do with its business strategy and how it will address forward-looking environmental challenges like climate change. Generally, in regulated markets, ratepayers bear significant business and environmental risks, and in deregulated markets, shareholders take on more of these risks. Companies operating in deregulated electricity markets need to ensure that costs of complying with environmental rules such as greenhouse gas or CO₂ regulation can be included in the price for electricity in the markets they service. In these deregulated markets, a company would be at a competitive disadvantage if it operates with limits on air pollutants and its competitor does not. However, these same deregulated markets often attract investment in newer, more efficient and less carbon-intensive generation. This can result in displacement of older, more costly and higher emitting power.

In regulated markets, companies negotiate their profits with regulators and have sought and received approval from Public Utility Commissions to increase rates to pay for compliance costs. They are likely to do the same with greenhouse gas regulation.

The Move Toward Competitive Electricity Markets

Wholesale competition expanded considerably in 1996 when the Federal Energy Regulatory Commission (FERC) promulgated Order 888, requiring all public utilities owning or controlling interstate transmission facilities to offer non-discriminatory transmission service. This opened the door to electricity commodity trading. Today, 50 percent of all electricity sales to ultimate customers come from wholesale transactions.

In addition, since about 1995, there has been significant activity in state legislatures and at utility commissions to examine activities designed to promote competition at the retail level (i.e., to provide electricity consumers the ability to choose their electricity supplier) that would complement the wholesale competition promoted by FERC. As of February 2002, legislation or regulatory orders had been passed in 16 states and the District of Columbia to promote retail competition. However, after the electricity supply problems in California in 2000, California suspended retail competition and a number of other states passed laws or issued orders to delay implementing retail competition.

Recent Trends in the Electric Industry

With the spread of deregulation, electric companies were free to move away from traditional company models and experiment with new ventures. This led to the creation of energy trading businesses, merchant players and new interest in international power development, in addition to some non-energy related investments. Companies took very specific paths based on their operating markets, asset portfolio and desire for risk. With the economy booming and investor confidence high, the boldest of these firms transformed the electricity industry into what was viewed widely as a highly innovative and fast growing sector.

By 2000, the electric sector looked dramatically different than it did just ten years before. Some regions of the country continued to remain dominated by the standard, vertically integrated utility companies, while others developed a variety of competitive structures. Likewise, different businesses pursued vastly different strategies in response to these often mixed and inconsistent market signals.

A large-scale restructuring of energy companies is still underway. Today, the sector is made up of vastly different types of companies, operating under different market conditions. Business models are distinct and shaped in large measure by their existing asset base and market conditions. Recently, some companies have faced financial difficulties related to their merchant and trading business.

These changes and difficulties in the electricity industry have raised investor concern. But, as the financial state of the sector evens out, investors will increasingly look to regulatory risks, like climate change, that could negatively impact their investments. Further, a bright spot of these events is a new openness among investors to consider climate change risks in the future.

As the financial state of the sector evens out, investors will increasingly look to regulatory risks, like climate change, that could negatively impact their investments.

THE MARKET AND FINANCIAL REALITY: PART II

Climate Change and the Financial Risks for Electric Companies

A number of recent studies have pointed to the growing financial risks for the climate change issue for all firms, and especially for electric companies. The CERES report, *Value at Risk*,²⁹ identified key factors that are converging to push company directors, executives, and institutional investors to consider climate change as a serious financial risk. These factors include:

- ▶ Stronger scientific consensus that
 - Emissions and concentrations of climate change gases are rising rapidly and will continue to do so,
 - Human activity is to blame,
 - Effects are occurring now and will worsen substantially over the next century
- ▶ Greater public understanding and concern about the problem
- ▶ Increasing government action to limit greenhouse gases
- ▶ Increasing understanding of the fundamental change that addressing climate change will mean for the way the world uses and produces energy
- ▶ Increasing concern about the financial risks and opportunities of this change
- ▶ Greater investor concern driven by corporate governance failures

Several studies have specifically examined the risks and opportunities in the electricity sector. These studies have examined the financial risks associated with regulation of greenhouse gas emissions and corresponding devaluation of high-emitting assets. Some analysts have also identified positive opportunities for firms with a proactive environmental management strategy for problems such as climate change. These opportunities include:

- ▶ Competitive advantage in new clean electricity markets
- ▶ Enhanced public image and improved relationships with customers and regulators
- ▶ Improved employee morale and understanding of how to address climate change

Key Findings of Financial Risk of Climate Change for Electric Companies

Analysis of the financial risk of climate change for electric power companies must make assumptions about the likely course of climate policy in the U.S. or elsewhere in the world. As such, this analysis provides an indicator of risk, rather than a precise estimate of the direct financial effects on a particular company. Among the key findings from analysis performed so far:

- ▶ The effect of regulation of CO₂ and other air pollutants varies widely among electric generators.
- ▶ A company's generating assets, installed technologies, fuel mix and market position will shape specific impacts and risks.
- ▶ The design of the regulatory policy and the extent to which the firm operates in regulated or deregulated electricity markets also affect specific impacts and risks for individual companies.
- ▶ Under a modest regulatory scenario, many U.S. electric companies face a carbon exposure of between 5 and 10 percent of market capitalization. Under a Kyoto regulatory scenario, many U.S. electric companies face a carbon exposure of between 10 and 35 percent of market capitalization.³⁰
- ▶ The financial impacts of air quality and climate change regulations are material. If proposed legislation is enacted, more than half of the companies included in a recent study will face compliance costs of 10 percent of their total year 2000 revenues (net present value). Under certain scenarios, two companies could face compliance costs more than 50 percent of 2000 revenues.³¹
- ▶ A strategy to control three air pollutants now, coupled with CO₂ emissions cuts at a later date, is the most expensive compliance scenario for most companies.³²

Electric companies that take positive and proactive measures to address environmental issues can also capture significant benefits for shareholders. According to a recent study, electric power companies with above average environmental management earned 30 percent greater total shareholder return over three years than below average companies over three years. Innovative companies will seize new clean energy technology markets. Proactive environmental management also enhances reputation with consumers and especially with regulators – an important group for this industry.

Shareholder concern and interest in climate change has increased over the past decade. Much of that concern is currently directed at encouraging electric companies to disclose the financial risks associated with climate change, and especially the risks associated with future regulation of CO₂.³³

In 2003, shareholder proposals at electric companies received record high amounts of support, including, 27 percent at AEP (the highest vote ever for a global warming resolution at an electric power generator); 24 percent at

TXU; and 23 percent at Southern Company. In addition, shareholder proposals in other sectors received similarly high levels of support, including 32 percent at ChevronTexaco (more than triple the support of the last global warming-related resolution at ChevronTexaco, which received 9.6 percent in 2001); 23 percent at GE; and 22 percent at ExxonMobil (the highest vote ever for a climate change resolution at ExxonMobil).

THE MARKET AND FINANCIAL REALITY: PART III

Electric Sector Investors and Climate Change

A Look at Today's Electric Sector Investors

Investors in the electricity sector and the other key players that influence and affect them are even more diverse than electric companies. These investors have differing investment goals and time horizons. The electricity sector itself depends on a mix of equity and debt to acquire the capital to finance its work, and equity and debt holders have different goals and objectives.

Among the key investment players in the electricity sector are:

- ▶ Public and private pension funds with a long-term objective of funding worker retirement
- ▶ Mutual funds that pool investments from many smaller investors
- ▶ Ratings agencies that assess the financial health of electric companies and rate their bonds
- ▶ Socially responsible investment firms (SRIs) that often support specific investor objectives such as avoiding investments in nuclear power
- ▶ Insurance companies that manage large investment portfolios and insure electric companies in a variety of ways
- ▶ Accounting firms that provide audit and accounting services to electric companies
- ▶ Investment banks that both assist electric companies by developing debt and equity financing and also sell them to investors
- ▶ Banks that provide financing for projects or other credit lines for electric companies
- ▶ Government bodies such as the Securities and Exchange Commission (SEC) that regulate the investment industry

While some of these investors, such as pension funds and bondholders, have a long-term investment perspective, compensation systems in the investment world are usually designed to reward short-term performance. Each segment of the industry has distinct variables that are factored into investment decisions, which indicate their openness to incorporating climate change risks into their evaluation methods.

Debt Lenders and Climate Change

The bulk of investment in the investor-owned electric sector is in the form of long-term debt. It is used to cover capital expenses for individual companies. Investment is also received through equity capital markets with the sale of stocks. In 1999, about 55 percent of investment in the sector was capitalized through long-term debt, with the remainder largely in stocks or other forms of retained capital.³⁴ At the end of 2002, long term debt increased to about 60 percent.

Institutional investors, including mutual funds, pension funds, insurance companies and commercial banks, are the primary lenders of debt for the sector. They tend to take a mid-to long-range view on an investment and focus primarily on whether a company will be able to meet its obligations on its loans. Strong corporate credit ratings and company stability are key factors for their investments.

Because of the relatively long duration and specific focus of the investment, debt lenders may be more likely to direct attention to environmental risks, like climate change. Climate change could potentially impact long-term investments as governments adopt limits on greenhouse gases that might create new clean energy markets or lower the value of existing assets. Under a modest regulatory scenario, many U.S. electric utilities face a carbon exposure of between 5 and 10 percent of market capitalization. Under a Kyoto regulatory scenario, many U.S. electric companies face a carbon exposure of between 10 and 35 percent of market capitalization.³⁵ Presently, however, in the current investment climate, the most pressing concerns for debt lenders are the financial survivability and basic fundamentals of specific companies.

Equity Investors and Climate Change

Equity investment in the sector is made up of institutional investors, SRIs, and, more recently, speculative players like private equity and hedge funds.³⁶ Equity investors in traditional regulated utilities have often sought stable investments with high dividends, while equity owners of deregulated companies may be pursuing higher risk investments with the possibility of greater rates of return. Short-term earnings are key indicators of performance and many equity investors have not focused extensively on environmental risks or climate change. More recently, some new entrants to these markets have exhibited a less short-term outlook, which may change their view on environmental risk.

Socially Responsible Investors and Climate Change

With the rise of SRIs, environmental risks are being granted a higher degree of attention in investment decision-making. SRIs currently make up a relatively small, but growing segment of investment in the sector. Some socially responsible investment firms specifically do not invest in electric companies

that operate nuclear power plants, and this may limit the role that they play in the electricity sector to some degree. Due to growing public concern about climate change and the potential for new regulations to reduce greenhouse gas emissions, SRI funds have increased the profile of climate change related factors in valuations. SRIs employ a variety of tools for assessing climate change-related risks. They range from screens for low-emissions energy generation to requesting information on corporate-wide emissions and management plans. SRIs are also active supporters of shareholder resolutions encouraging proactive management on climate change.

Building Protocols for Corporate Climate Change Management and Disclosure

The Carbon Disclosure Project

The Carbon Disclosure Project (CDP) is a collaboration of 35 major institutional investors that represent more than \$4 trillion in assets. In 2002, the CDP sent a greenhouse gas questionnaire to the 500 largest companies in the world asking for the disclosure of investment-relevant information concerning their greenhouse gas emissions. In February 2003, the CDP released the findings of the questionnaire. They found that while 80 percent of respondents acknowledged the importance of climate change as a financial risk, only 35 to 40 percent were actually taking action to address the risks and opportunities. The full report, Executive Summary and responses are available at www.cdproject.net.

The World Resources Institute and World Business Council for Sustainable Development Greenhouse Gas Protocol

The WRI/WBCSD Greenhouse Gas Protocol (GHG Protocol) is a broad international coalition of businesses, non-governmental organizations, government and inter-governmental organizations. Launched in 1998, the objective of the initiative is to develop internationally accepted accounting and reporting standards for greenhouse gas emissions to be used by companies and other organizations. The GHG Protocol also provides practical guidelines to help companies manage their greenhouse gas emissions. Presently, the GHG Protocol consists of: 1) Corporate GHG Accounting and Reporting; and 2) Project GHG Accounting and Reporting. For more information, please see www.ghgprotocol.org.

Global Reporting Initiative

The Global Reporting Initiative (GRI) is a multi-stakeholder process and independent institution whose mission is to develop and disseminate globally applicable Sustainability Reporting Guidelines. These Guidelines are for voluntary use by organizations for reporting on the economic, environmental, and social dimensions of their activities, products, and services. The GRI incorporates the active participation of representatives from business, accountancy, investment, environmental, human rights, research and labor organizations from around the world. Started in 1997 by the Coalition for Environmentally Responsible Economies (CERES), the GRI became independent in 2002, and is an official collaborating center of the United Nations Environment Program (UNEP) and works in cooperation with UN Secretary-General Kofi Annan's Global Compact. More information on GRI can be found at <http://www.globalreporting.org/index.asp>

Electric Industry Investment Trends

Recently, the electric sector and its investors have faced extremely difficult times. In the last two years, ratings agencies have downgraded many electric companies, and investors have become concerned that companies may not have the financial liquidity to pay their debts. These downgrades have increased the cost of capital. According to a recent report from the rating agency Standard & Poor's, current financial problems for electric companies stem from investments outside of traditional regulatory utilities – merchant plants, trading, and international power production. These investments were usually financed with bank debt, which is less stable than equity. Access to capital markets is now constrained due to investor skepticism over:

- ▶ Accounting practices and disclosure issues
- ▶ The plethora of federal and state investigations into both electricity market and accounting issues
- ▶ Failing confidence in future financial performance³⁷

Analysts expect this capital crunch to continue. With more than \$25 billion on bond debt coming due in 2003, one leading credit agency has predicted that 40 percent of the utility-holding companies and half of the merchant electricity generators that it rates face possible ratings downgrades.³⁸

Prior to the economic boom and wave of deregulation in the 1990s, the electric sector was viewed as a stable and modest growth sector by investors. Traditional financing for the sector provided investors with consistent dividends and moderate, but steady, earnings. However, deregulation opened up new possibilities for returns from the sector. Many electric companies moved into new business ventures, like combined heat and power, distributed generation, energy trading, merchant energy sales and overseas power development. Some companies diversified their businesses further, going beyond energy into the telecommunications and IT industries. More sophisticated financial accounting and financial transactions followed, largely as a result of electricity trading. Equity investors in particular were attracted to these innovations and the potential for sharp growth over a relatively short time horizon. Rating agencies and debt lenders similarly looked favorably on these new ventures, providing companies with high credit ratings and large loans.

The enthusiasm for the sector waned in the aftermath of the Enron bankruptcy and with revelations about false energy trading transactions. These events sharply discredited energy trading businesses in investors' eyes. Downturns in the economy and the corresponding weak demand for electricity compounded troubles. Some companies that had developed merchant energy plants suffered further blows, as it became clear that additional energy generation would not be needed in the near future in some regions of the U.S. This changed the dynamics in terms of raising capital for new plants. In the current energy market, most new generation is

financed if it has long-term contracts, usually from a regulated utility, and few merchant plants are under development. Today, much of the industry remains in a transition period, with waves of re-organization, asset sales, restructuring of debt and growing use of long-term contracts.

Climate change will affect the financial markets for the sector in the future, especially as investors focus more closely on the range of environmental risks and opportunities of particular investments.

ENDNOTES

1. Cities in the U.S. are also taking steps to encourage greenhouse gas reduction through initiatives like the Cities for Climate Protection program. Please see www.iclei.org for more information.
2. Please see Environmental Protection Agency; *Fact Sheet: Analysis of Emissions Reductions Options for the Electric Power Industry Report*. Washington, DC: 1999. Accessed via the Internet on April 26, 2003 at <http://www.epa.gov/capi/multipol/mercfact.htm>, and Robert Repetto and James Henderson. *Environmental Exposures in the U.S. Electric Utility Industry*. Yale School of Forestry and Environmental Studies. New Haven, Connecticut: 2003.
3. A cap and trade program sets a mandatory limit on emissions and permits regulated entities to meet their reduction requirements through emissions trading. The U.S. Acid Rain program is an example of such an approach.
4. The SEC currently requires companies to disclose “material events and uncertainties known to management that would cause reported financial information not to be necessarily indicative of future operating results or future financial condition.” (Item 303, Regulation 17CFR229, 303) In practice, this usually results in disclosure of liabilities such as toxic waste, but not risks associated with climate change.
5. Examples of programs that encourage voluntary emission reductions include the Environmental Protection Agency’s Climate Leaders, the Chicago Climate Exchange, Environmental Defense’s Partnership for Climate Action, and the World Wildlife Fund’s Climate Savers program.
6. Houghton, J. T., Y. Ding, D. J. Griggs, M. Noguer, P.J. van der Linden, and D. Xiaosu, eds. (2001). *Climate Change 2001: The Scientific Basis. Contribution of the Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change*; Cambridge University Press, Cambridge, United Kingdom.
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