



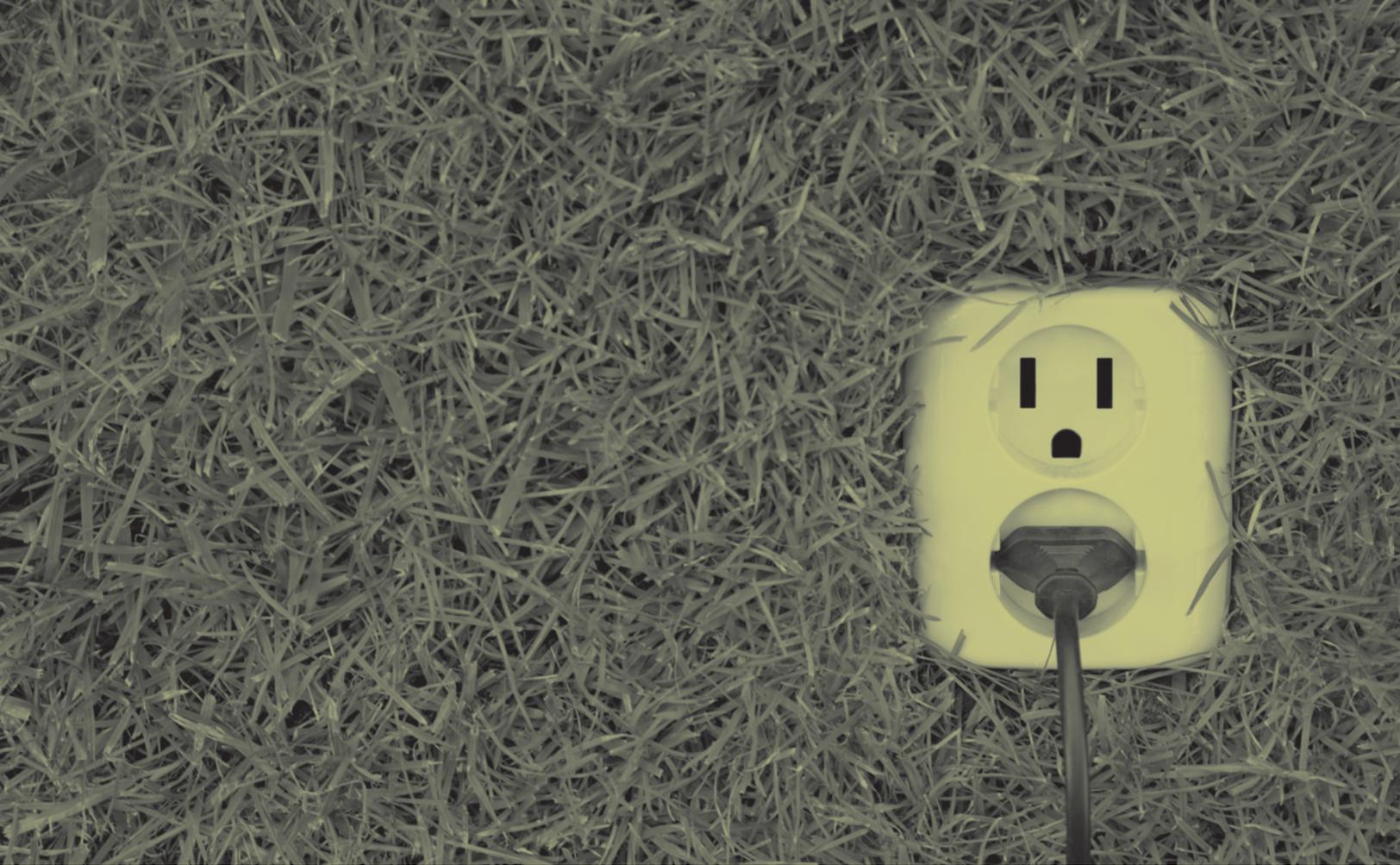
SAMANTHA PUTT DEL PINO

ELIOT METZGER

JOHN LARSEN

SHARPENING THE CUTTING EDGE

Corporate Action for a Strong, Low-Carbon Economy



SHARPENING THE CUTTING EDGE

Corporate Action for a Strong, Low-Carbon Economy

SAMANTHA PUTT DEL PINO

ELIOT METZGER

JOHN LARSEN



WORLD
RESOURCES
INSTITUTE

ACKNOWLEDGMENTS

This publication would not have been possible without valuable contributions of time and insight from a variety of people. We benefited enormously from their feedback and perspectives. We are grateful for the contributions of our reviewers, including Dr. Lawrence P. Carr, Dave Guernsey, Don Harwood, David Refkin, Robyn Roberts and Bella Tonkonogy and WRI colleagues John Finisdore, Polly Ghazi, Alex Perera, Jeff Rodgers and Jacob Werksman. We appreciate the data inputs of Chris Lau and the background research of Jarryd Commerford and Walton Upchurch. We especially appreciate the guidance and support of Liz Cook, Jennifer Layke and Janet Ranganathan.

Stephanie Hanson and Polly Ghazi provided skillful editing and we thank Jennie Hommel, Hyacinth Billings and Angela K. Mitchell for invaluable assistance with process, production and design.

The authors also would like to thank our corporate partners for their productive collaboration and the following companies and organizations for their financial support: Con Edison, Richard and Rhoda Goldman Fund, Kimberly-Clark, Emily Hall Tremaine Foundation, Energy Foundation, Johnson & Johnson, Oak Foundation, Pfizer, Robertson Foundation, Sea Change Foundation, Staples, Turner Foundation, U.K. Global Opportunities Fund, UPS, U.S. Environmental Protection Agency, WestWind Foundation.

HYACINTH BILLINGS
PUBLICATIONS DIRECTOR

ANGELA K. MITCHELL, LIGHTDAUGHTER : DESIGN | INTERACTIVE | PRESS
LAYOUT

Each World Resources Institute report represents a timely, scholarly treatment of a subject of public concern. WRI takes responsibility for choosing the study topics and guaranteeing its authors and researchers freedom of inquiry. It also solicits and responds to the guidance of advisory panels and expert reviewers. Unless otherwise stated, however, all the interpretation and findings set forth in WRI publications are those of the authors.

Copyright © 2009 World Resources Institute

ISBN: 978-1-56973-719-4



TABLE OF CONTENTS

- FOREWORD iv
- EXECUTIVE SUMMARY 1
- INTRODUCTION 3
- GETTING STARTED: LESSONS LEARNED FROM EARLY STEPS TOWARD A LOW-CARBON ECONOMY 5
- CUTTING EDGE ISSUES AND CHALLENGES IDENTIFIED IN 2004 5
 - Verifying and Registering GHG Emissions Data 6
 - Setting and Updating Performance Targets 7
 - Identifying Cost-Effective Emission Reductions 8
 - Managing Internal Communications 10
 - Capturing New Business Opportunities 11
 - Adapting to Market-Based Solutions 11
- SUMMARY OF LESSONS LEARNED 12
- A SHARPER CUTTING EDGE: NEXT STEPS FOR CORPORATE CLIMATE ACTION 13
- SKETCHING OUT A NEW VISION 13
- FROM BEST PRACTICE TO NEXT PRACTICE: KEY QUESTIONS TO CONSIDER 15
- CONCLUSION 18
- NOTES 19
- ABOUT THE AUTHORS 20
- ABOUT WRI 20

FOREWORD

In the last dozen years I have had the chance to work with executives from several Fortune 500 companies to address the business implications of climate change. When we first started out, drawing the links between our warming planet and corporate strategy was a new exercise. The executives were pioneers in recognizing that increasing carbon dioxide and other greenhouse gas (GHG) emissions posed a significant risk, and that actions and products to reduce such emissions would provide competitive advantages.

Our early discussions resulted in a joint action agenda we called *Safe Climate, Sound Business* and helped guide our future work with the private sector to develop climate change solutions. Soon after, we launched the Greenhouse Gas Protocol Initiative with the World Business Council for Sustainable Development (WBCSD) and other key stakeholders to create guidance that today is the international standard for GHG accounting and reporting. We also convened several cross-sector partnership groups to advance the business case for taking action, build markets for clean energy technologies, and develop effective corporate climate change strategies.

Those collaborations taught WRI a lot about the practical challenges associated with measuring, analyzing, and reducing GHG emissions, and I believe our partners gained in-depth knowledge and experience that today is helping to prepare them and the country for the low-carbon economy of tomorrow.

In 2004, WRI reported in *A Climate of Innovation* how our corporate partners had developed best practices to reduce emissions while increasing profits as part of cutting-edge climate strategies. This successor publication reviews how WRI's 60 corporate partners have implemented climate change strategies in key areas, providing insights and lessons to inform next steps for corporate action. Strategies analyzed include setting performance targets, identifying cost-effective emission reductions, implementing best practice GHG data management, and capturing new business opportunities by developing low-carbon products and services.

Drawing on the experiences of real managers taking concrete actions, the report identifies some of the innovative strategies and measures companies must implement to move from the best practice of today to the "next practice" of tomorrow.

Reading this publication, I am struck by how far we have come in a decade...and how far we have yet to go. While companies have taken critical first steps, efforts to date simply do not add up to the set of solutions that will be required to meet the climate challenge. Today scientists are telling us that climate change is happening faster than anticipated and serious impacts are occurring sooner than anticipated. We need to implement technologies and practices to dramatically reduce emissions over the next several years if we are to manage rather than lurch toward the low-carbon economy that inevitably lies ahead.

We need to sharpen the cutting edge, and quickly. Companies must move on to a new generation of corporate leadership on climate change. The time to raise the bar is now.

Jonathan Lash
President
World Resources Institute

EXECUTIVE SUMMARY

The window of opportunity to effectively respond to climate change is now. Leading scientists warn that global greenhouse gas (GHG) emissions must begin to decline in ten years if we are to avoid the worst impacts of climate change. The United States is at a clear decision point. The scale of the climate challenge, paired with the investments needed to respond to a deep global recession, represent a unique opportunity to shift to a low-carbon economy that can provide a stronger, safer and more sustainable future. As users and producers of goods and services, businesses are central to an effective climate change response.

To be successful in a low-carbon future, companies must become expert in today's best practice, emerging innovative practice and tomorrow's "next" practice. This report can help guide corporate actions over the next few years, as companies and policymakers accelerate the pace of responding to climate change. It offers guidance on six key actions:

- **DEVELOP COMPREHENSIVE, STRATEGIC CLIMATE CHANGE METRICS.** Performance targets that go beyond carbon-only measures will be more useful for measuring and managing an effective corporate response to climate change.
- **EXPAND GHG REPORTING.** Companies will need to develop efficient, responsive reporting processes to meet growing demands for climate change risk disclosure (financial and physical) from a variety of stakeholders.
- **REALIGN CLIMATE CHANGE STRATEGIES TO A LOW-CARBON ECONOMY AND A WARMING WORLD.** Strategic partnerships across the value chain will help identify cost-effective GHG emission reductions and minimize exposure to carbon price impacts. Businesses will also need to analyze their entire value chain to assess how they may be exposed to shifting weather patterns and climate risks.
- **ANTICIPATE AND MEET NEW MARKET DEMANDS.** Tomorrow's economy will place new value on goods and services that use energy and natural resources more efficiently and reduce GHG emissions. Companies can capture new business opportunities if they position themselves to supply these new markets.
- **INFORM AND ADVANCE EFFECTIVE CLIMATE POLICY.** Companies will need to be constructive participants in U.S. and international policy dialogues. Corporate insights can help to inform effective climate and energy policies to ensure a safe climate and sound economy.
- **MAKE LONG-TERM INVESTMENT DECISIONS THAT FACTOR IN CLIMATE RISKS.** All corporate investment decisions will need to evaluate climate change risks and whether investments put the company at an advantage or disadvantage in a low-carbon future. Poor investment decisions can lead to significant future costs if they lock in commitments to high-carbon products or strategies.

Companies that are successful in these areas will help to set the new benchmark for corporate leadership in a low-carbon future.

The World Resources Institute has been working with the private sector for more than a decade on developing responses to climate change. Many of our corporate partners are building a solid foundation for long-term action. This has taken time, resources and commitment. Key challenges remain, however.

This report assesses how companies have fared in addressing the “cutting-edge issues” identified in our 2004 report *A Climate of Innovation* (below). The experiences of our corporate partners illustrate important progress and barriers.

- **VERIFYING AND REGISTERING DATA.** GHG registry programs have grown over the last few years with companies seizing the opportunity to verify and register their emissions. Many companies that are not participating still are undergoing the process of third-party verification of data. For most companies, however, data management can be a time-consuming challenge.
- **SETTING AND UPDATING PERFORMANCE TARGETS.** Setting GHG emission reduction targets has become a fairly common practice among major corporations. GHG targets alone, however, do not fully communicate corporate commitments to action nor do they necessarily focus investments on the critical changes necessary to prepare companies for a low-carbon future.
- **IDENTIFYING COST-EFFECTIVE EMISSION REDUCTIONS.** New financing models are helping to accelerate clean technology investments, and a growing number of companies are also engaging in emerging supply chain management activities. Fuller engagement of senior financial executives remains a key barrier to increased deployment of low-carbon projects.
- **MANAGING INTERNAL COMMUNICATIONS.** Simple, clear messaging and engagement of a wide range of employees has proved to be a successful strategy for involving the broader company in climate commitments. Cutting through the barrage of corporate information targeted at employees and successfully diffusing climate change knowledge remains a challenge.

- **CAPTURING NEW BUSINESS OPPORTUNITIES.** Companies that have explored opportunities to supply low-carbon goods and services have been able to demonstrate financial success in these new markets. Advancing these opportunities will require new business models, increased investment, and policy frameworks that value and reward action to reduce GHG emissions.
- **ADAPTING TO MARKET-BASED SOLUTIONS.** Policy action to address climate change is likely to include market-based mechanisms, such as a cap-and-trade program or a carbon tax that attaches a cost to GHG emissions. Many companies are preparing for climate policy by engaging in stakeholder processes and building an expert base of policy knowledge. Other companies, however, are relying on limited sources of information or remain unengaged, and risk being unprepared for future climate regulations. Overall, the dynamic policy environment is difficult to navigate, and uncertainties continue to prevent effective long-term corporate planning and investment.

Moving forward, a complex set of transformations will be required to dramatically increase the efficiency of energy use, rapidly accelerate clean energy technology deployment, bridge the technology gap between today's practices and tomorrow's clean energy economy, and maximize the efficiency of the transportation system. Each of these transformations represents business risk and opportunity. However, while many companies recognize climate change is a business issue, corporate climate change goals and implementation strategies are not yet sufficient for achieving the scale of necessary GHG emission reductions. We need to forge a new definition of corporate leadership to build on the progress made to date and to adequately meet the scale and urgency of the climate challenge.



INTRODUCTION

The pace of policy action on climate change in the United States accelerated significantly in early 2009. Within a few weeks of taking office, the Obama Administration worked with the U.S. Congress to advance federal funding for more than \$70 billion in “green” projects and initiatives and signaled intentions to implement a cap-and-trade program for greenhouse gases (GHGs) by 2012.¹ For business, these developments are clear indications that the prospect of national climate legislation is no longer speculation and that the transition to a low-carbon future is poised to begin.

Business interests – both risks and opportunities – are directly tied to climate change. There is a compelling business case for aggressive action to minimize climate risks with a transition to a low-carbon future (see Box 1).² With strong policy signals and broader support for spurring investment in energy efficiency and renewable energy projects, the time is ripe for a step-change in corporate action on climate change.

Since 2000, the World Resources Institute (WRI) has worked closely with companies to implement the *Safe Climate, Sound Business* agenda and advance corporate action to address climate change. WRI and partners have developed tools and strategies to support a transition to a low-carbon economy. With a group of more than 60 corporate partners, we have explored the risks, barriers, and opportunities for business success in a low-carbon economy (see Box 2). We have worked with corporate energy

BOX 1 BUSINESS RISKS FROM CLIMATE CHANGE

PHYSICAL RISKS

Damage to property, assets and distribution networks; reduced availability of natural resources, such as water and timber, for products and services.

SECURITY RISKS

Increased competition for dwindling natural resources can spark conflict or other security risks in some parts of the world, leading to global instability and supply chain disruptions.

FINANCIAL RISKS

Increased insurance premiums in vulnerable regions (e.g. coastal areas), loss of revenue from reduced demand for carbon-intensive products, higher operating costs for fossil-intensive industries, and reduced or lost revenue in markets affected by physical impacts of climate change.

COMPETITIVENESS RISKS

Changing dynamics relating to business operations and demands for products and services in a low-carbon world. Forward-thinking companies that anticipate and prepare for these changes will have a competitive edge in a low-carbon economy.

REPUTATIONAL RISKS

Loss of brand value amid an increasing number of shareholder resolutions and greater competition for climate-conscious consumer markets. Companies risk being considered part of the problem if they have not been able to demonstrate that they are part of the solution.

managers, facilities directors, and sustainability staff implementing climate change and energy goals.

In 2004, WRI published *A Climate of Innovation*, which highlighted emerging business strategies to reduce greenhouse gases.³ It also offered a list of forward-looking issues and challenges that business would confront over the next several years: verifying and registering data; setting and updating performance targets; managing internal communications; capturing new business opportunities; identifying cost-effective GHG reductions; and adapting to market-based solutions.

The next section of this report reviews recent corporate action in each of these cutting-edge issue areas. It provides several “In Practice” examples from WRI’s corporate partners. Experience to date provides important insights about opportunities and challenges in implementing corporate climate change strategy as standard business practice. For example, despite the economic slowdown, corporate energy efficiency and clean energy projects remain a priority. Many companies report that they are planning

to either invest in the same number of projects in the coming year, or are planning to invest in more.⁴ This is especially true of energy efficiency projects, which suggests that the tightening of budgets has improved the attractiveness of these low-risk investments. It also suggests that companies view their low-carbon strategies as long-term options irrespective of the financial environment.

These insights and lessons can help inform the next steps for corporate climate action, which is the focus of the final section of this report. Although many companies have taken valuable first steps, recent analyses suggest the current corporate approach is not sufficient to achieve necessary GHG emission reductions by 2050.⁵ As the pace of climate change (and policy action to reduce GHGs) accelerates, companies that seek to thrive in a carbon-constrained environment will need to develop new, innovative approaches that meet tomorrow’s low-carbon business imperatives. This report concludes with a brief discussion of challenges on the horizon and offers questions for companies to consider as they progress along the path to a low-carbon future.

BOX 2 WRI’S CLIMATE AND BUSINESS ENGAGEMENT PROJECTS

For ten years, WRI has engaged more than 60 companies through the U.S. Climate Business Group (Climate Northeast, Climate Midwest, and Climate Southeast*), the Green Power Market Development Group and the California Affiliates program. We have designed our projects to achieve two primary goals: (1) Build a business constituency that is more informed on climate and energy policy; and (2) Accelerate corporate deployment of renewable energy.

These partnerships have advanced strategies for companies to thrive in a carbon-constrained economy. Peer-to-peer learning and collaborative engagement has helped partners develop innovative approaches to emissions management, develop and market climate-friendly products and services, and broaden their understanding of policy and market developments. Partners include:

Acuity Brands	Dupont Company	JPMorgan Chase & Co.	Rayonier
Alcoa Inc.	Eastman Kodak Company	Kimberly-Clark	Related
Advanced Micro Devices (AMD)	eBay	Lenovo	Staples
Apple	FedEx Corporation	Levi-Strauss & Co.	Starbucks Coffee Company
Archer Daniels Midland Company	General Electric Company	Michelin North America Inc.	Time Inc.
Baker & McKenzie	General Motors	MWW	TOTO USA
Baxter International	Georgia-Pacific	NatureWorks	Toyota Motor Sales, USA
Bristol-Myers Squibb	Google	Neenah Paper	United Airlines
BT Americas	Great River Energy	News Corporation	United Parcel Service (UPS)
Caterpillar	Hewlett-Packard	NewPage Corporation	United Technologies Corporation (UTC)
Cisco Systems	IBM	Northeast Utilities Systems	Wal-Mart Stores
Citi	Intel Corporation	OfficeMax	Wells Fargo
The Coca-Cola Company	Interface	Pactiv Corporation	Xcel Energy
Con Edison	Intuit	Pitney Bowes	
Delta Airlines	Johnson Controls Inc.	Pfizer	
The Dow Chemical Company	Johnson & Johnson	PPG Industries	

For more information, visit www.climate-northeast.org, www.climate-midwest.org, www.climate-southeast.org, www.thegreenpowergroup.org.

* WRI co-convenes its Climate Southeast workgroup with Southface Energy Institute. www.southface.org.

** Some of these companies provide financial support to WRI’s climate program in the form of technical fees for project activities. Some are funders of other programs within WRI. A full accounting of WRI’s funding sources can be found in our annual report, available online at www.wri.org.

Greenhouse gas . n. a gas, such as carbon dioxide, that contributes to the greenhouse effect by absorbing infrared radiation.

GETTING STARTED

LESSONS LEARNED FROM EARLY STEPS TOWARD A LOW-CARBON ECONOMY

In the five years following the release of *Climate of Innovation* (see Box 3) there has been a dramatic expansion in the number of companies that recognize that climate change is an issue for their business.⁶ In assessing progress to date, it is useful to review what we identified as “cutting edge” in 2004.

CUTTING-EDGE ISSUES AND CHALLENGES IDENTIFIED IN 2004

- **VERIFYING AND REGISTERING DATA.** As third party verification and registration programs emerge, companies will need to advance best practice GHG data management.
- **SETTING AND UPDATING PERFORMANCE TARGETS.** Redesigning targets to remain relevant in changing regulatory and market environments.
- **IDENTIFYING COST-EFFECTIVE GHG REDUCTIONS.** New internal management systems and tools to identify the cost-effective emission reduction projects, allocate capital, and accurately quantify and capture the resulting reductions.
- **MANAGING INTERNAL COMMUNICATIONS.** Assigning a team or individual to coordinate internal communications on climate change strategy across multiple departments.
- **CAPTURING NEW BUSINESS OPPORTUNITIES.** Incentives and funds to develop the low-carbon products and services likely to grow in demand.

- **ADAPTING TO MARKET-BASED SOLUTIONS.** Continuous assessment of the internal cost of GHG emission reductions for market-based regulatory climate policy; constructive, mutually beneficial engagement between companies and policy makers.

By working with WRI’s network of corporate partners, we have observed various business strategies that address these challenges. Several companies have succeeded in minimizing climate risks and capitalizing on new opportunities. Experience to date has also highlighted common obstacles and barriers. The following review of how these companies have addressed the cutting-edge issues identified in our 2004 *Climate of Innovation* report highlight near-term challenges, opportunities and lessons for long-term business success in a low-carbon economy.

BOX 3 A CLIMATE OF INNOVATION

In 2004, WRI released *A Climate of Innovation: Northeast Business Action to Reduce Greenhouse Gases*. The report provides a review of the activities of WRI’s Climate Northeast business partnership, a group of large corporations based in the northeast United States that works together and with WRI to explore private-sector action on climate change. At the time of the report, Climate Northeast project partners were: Bristol-Myers Squibb, Citigroup, Consolidated Edison of New York, Eastman Kodak Company, General Electric, Johnson & Johnson, Northeast Utilities Services Company, Pfizer, and Staples.

<http://www.wri.org/publication/climate-of-innovation>

VERIFYING AND REGISTERING GHG EMISSIONS DATA

ACTION AND EXPERIENCE

The need for a reliable GHG emissions inventory and the value of an effective GHG emissions data collection system will continue to increase as companies comply with mandatory government reporting requirements⁷ or respond to investor requests for climate risk disclosure. Third-party verification services and voluntary GHG registries have become relatively common over the last few years.⁸ In March 2009, the U.S. Environmental Protection Agency (EPA) issued a draft rule for mandatory GHG reporting in the United States, beginning with 2010 data. A final rule is expected by the end of 2009.⁹ Under the proposed rule, facilities that annually emit 25,000 metric tons or more of GHGs would be required to submit reports to the EPA each year.¹⁰

- Few partner companies were participating in registry programs in 2004. Today more than one-third of WRI's 60 partners are registered in one or more of these programs. Some partners are motivated to participate because of an expectation that such registries will provide them experience with (and may transition into) future GHG regulatory frameworks. Others value the transparent public platform and validation for their emissions inventory, which gives them credibility with various stakeholders. Still others seek to demonstrate verifiable early action in the event that future legislation takes this into account.
- Of those corporate partners not participating in GHG registries, several are pursuing third-party verification outside of a registry framework. Others have decided the added value of participation is not worth the investment or have opted to wait for GHG

regulations. Still others are exploring registry options or working to perfect internal systems to accurately and efficiently measure GHG emissions.

LESSONS LEARNED

Successes

- Companies are gaining valuable experience verifying and registering emissions data, which will be useful for complying with future mandatory reporting requirements.
- There are abundant opportunities for corporate GHG data verification, which can help validate corporate progress towards public GHG reduction targets and provide credible information for investors and other stakeholders interested in a company's efforts to mitigate climate risks.
- Many GHG emission registries require third-party verification. Verification standards have been widely adopted¹¹ and are seen as credible.

Challenges

- Not all companies have established the internal systems needed to verify and register GHG inventories and efficient data management continues to be a difficult process to perfect. Ensuring data accuracy and completeness across multiple facilities and companies is a challenge. In addition, some reporting programs require base year adjustments under certain circumstances.¹² A base year is the year against which emissions performance is measured. In some cases, this can require significant work to track and manage, a particular challenge in dynamic companies that undertake frequent acquisitions and divestitures (see box on GE's experience).

IN PRACTICE: GE'S APPROACH TO GHG DATA MANAGEMENT

GE is a global, infrastructure, finance and media company based in Connecticut, with customers in more than 100 countries and territories. The company established 2004 as its base year to track progress towards its GHG reduction goals, but the base year figure is far from static. Each year, GE adds or subtracts approximately 50 facilities from its portfolio. These changes must be reflected in the base year emissions if the company is to accurately assess whether it is successfully reducing GHG emissions.

To meet this accounting challenge, the company first has to determine what changes require a base year adjustment. Following guidance from The Greenhouse Gas Protocol: Corporate Accounting and Reporting Standard (www.ghgprotocol.org/standards/corporate-standard -- see Appendix E), GE annually adjusts its base year total to include 2004 emissions from facilities acquired, and exclude emissions from facilities divested. GE makes similar changes to current and previous years, integrating full year historic emissions (rather than prorated figures) for these facilities, regardless of whether acquisitions or divestitures occur mid-year.

Efficiently managing this process is a separate challenge. Early on, the company circulated email surveys to gather information about which facilities needed to be added or subtracted from the inventory. GE digitized its inventory process, replacing the slow and cumbersome survey with a module within GenSuite®, a proprietary, customized electronic environmental management system. GenSuite® is GE's standard environment, health and safety (EHS) tool used at 2,000 GE sites by more than 66,000 users. The GHG inventory module automates GHG calculations from energy use data inputs and analyzes trends among different business units, facility types, and countries. This allows GE to streamline the data gathering process and incorporate it into standard GE EHS reporting requirements. After completing final quality assurance procedures, GE can review changes to its portfolio and update its 2004 base year as necessary to accurately assess and report annual progress towards its GHG reduction goals.

Adapted from *Accounting for Change: Best practice in updating corporate GHG inventories at dynamic companies*. Climate Northeast case study. April 2009. www.climatenortheast.org.

SETTING AND UPDATING PERFORMANCE TARGETS

ACTION AND EXPERIENCE

Establishing a GHG emission reduction target and publicly reporting on performance has become a common way for companies to manage and communicate progress in addressing climate change. Defining targets, however, has proven quite complicated. Some companies strategize internally to assess emission reduction opportunities and determine achievable goals. Others consult with external experts to set targets.¹³ Companies have now become quite experienced with this aspect of GHG management. Almost 60 percent of WRI's corporate partners have established public GHG emission reduction targets. About the same number of Global 500 companies have set GHG emission reduction targets.¹⁴

- Some companies have updated from intensity to absolute targets,¹⁵ which are generally easier to understand and communicate.¹⁶ When Pfizer achieved its intensity target to reduce global GHG emissions by 43 percent per million dollars of revenue from 2000 to 2007, it established a new absolute target to reduce total global emissions by 20 percent from 2007 to 2012.¹⁷
- Some companies are setting energy savings or renewable energy targets in addition to GHG reduction targets for a broader communication of the company's strategy:
 - ▶ PPG Industries' target is to reduce its total energy intensity 25 percent from 2006 to 2016 and its total global GHG emissions 10 percent from 2006 to 2011.¹⁸
 - ▶ Johnson & Johnson has paired its target to reduce GHG emissions 7 percent below 1990 levels by 2010 with a formal climate-friendly energy policy that promotes: energy efficiency; co-generation; on-site deployment of renewable energy; renewable electricity purchasing; and carbon trading and sequestration.¹⁹
 - ▶ The Coca-Cola Company has established targets that reflect different conditions and opportunities for reductions across its global reach. It has committed to stabilizing emissions in its manufacturing operations in emerging economies and reducing emissions by 5 percent in its manufacturing operations in developed countries. Both are 2015 targets compared to a 2004 baseline.²⁰
 - ▶ GE has set multi-faceted performance targets. Under the umbrella of its ecomagination initiative, the company has established a "1-30-30 plan." This calls for the company to reduce its absolute emissions by 1 percent from 2004 levels by 2012, reduce GHG intensity by 30 percent by 2008 and improve energy efficiency by 30 percent by 2012. The company has further committed to an annual revenue goal of \$25 billion from ecomagination products in 2010; will double investment in research and development (R&D) for clean technologies from \$700 million in 2005 to \$1.5 billion in 2010; reduce water use by 20 percent by 2012 and publicly report on its progress.²¹
 - ▶ DuPont has set "marketplace goals" that call for the company to, by 2015, double investment to \$640 million in R&D programs that provide environmental benefits for customers,

grow annual revenues by at least \$2 billion from products that create energy efficiency or significant GHG reductions for customers, and nearly double revenue from non-depletable resources to at least \$8 billion.²²

LESSONS LEARNED

Successes

- The numerous examples of GHG reduction targets and clean energy goals illustrates that companies understand that setting targets and communicating them publicly is an expected and necessary step to demonstrate climate responsibility to stakeholders.
- Some companies are transitioning to absolute GHG targets, developing multi-faceted goals (GE and Coca-Cola), revenue-based targets (GE and DuPont) and clearly defining the methods for meeting targets (PPG Industries and Johnson & Johnson).

Challenges

- Numbers can be misleading and targets do not by themselves indicate a company's level of effort. For example, GE's absolute reduction goal is only 1 percent. Without efforts in place to reduce emissions, however, the company projects that it would otherwise increase emissions by 30 percent over the target's timeframe.²³ Companies that have already achieved emission reductions may also sometimes set seemingly low targets, reflecting that further action is more difficult to achieve. Identifying metrics to track intensity targets is difficult.
- Targets alone do not communicate the extent to which companies are reducing their long-term exposure to climate risks. For example, a company that has an aggressive target but is meeting much of it through external mechanisms (such as purchasing offsets) has likely not reduced its climate risk exposure. In contrast, a company with a seemingly less stringent target may be more effectively minimizing risks by meeting its commitment with investments that maximize the energy efficiency of its own operations and increase the level of renewable energy in its energy portfolio.
- During a target period, some companies may undergo structural changes through mergers and acquisitions. This can make tracking progress toward the target challenging as new emissions data from the merged or acquired company are integrated into the corporate inventory. This usually requires a recalculation of the base year emissions inventory, which can involve tracking down historical emissions or energy data. Such mergers and acquisitions can make meeting a company's established target challenging, especially if the newly acquired company is carbon-intensive. The transition will also likely require additional training for new staff to bring them up-to-speed on reporting requirements.
- Companies or organizations that set aggressive targets or that have already captured the "low-hanging fruit" in terms of emission reductions will usually need to rely on external mechanisms such as offsets to reach the established target. This represents a two-fold challenge. First, the voluntary offset market is currently unregulated and numerous offset standards exist. Second, offsets do not alter business practices in terms of reducing exposure to climate risk (see box on WRI's experience).

IN PRACTICE: WALKING THE TALK – WRI'S EXPERIENCES MEETING ITS CLIMATE COMMITMENT

In 2000, WRI committed to reduce its carbon dioxide emissions to “net” zero and to report on its progress regularly. The organization publishes its inventory annually on its website^a and follows the GHG Protocol's *Corporate Accounting and Reporting Standard*.

WRI occupies leased office space which has been built out to maximize opportunities to improve energy efficiency and minimize environmental impacts.^b The office is located in close proximity to mass transit options and bicycle storage and shower facilities are available to staff. Video-conferencing equipment is installed in the organization's main conference room and “green” electricity has been purchased through renewable energy certificates (RECs). Through these initiatives, WRI has been able to record some success in managing its emissions. The organization, however, faces two key challenges. First, like many businesses, WRI continues to grow and thus its emissions, especially transportation-related emissions, are expected to increase. Second, many of the low-hanging fruit such as energy efficiency improvements have already been captured, leaving business travel emissions which are harder to reduce as its major emissions source.

To ensure that its emissions balance equals zero each year, the organization must procure offsets. For a number of years, WRI purchased offsets through the voluntary offset market. This is an unregulated market and several standards for measuring offset quality exist, such as the Voluntary Carbon Standard^c, the Gold Standard^d and Green-e Climate^e. This makes navigating the market and ensuring offset quality a challenge, even for an organization that has a sophisticated understanding of the market.

In 2008, WRI elected to procure offsets from a compliance market because policy structures improve the certainty about the emission reductions realized. The organization purchased Clean Development Mechanism (CDM) credits from two projects, one in India and one in China through EcoSecurities. Although CDM credits have been criticized,^f WRI felt offsets from a compliance market offer the best available solution.

Moving forward, WRI plans to regularly evaluate its approach to GHG management. The CDM credits we purchased were 3 to 4 times more expensive than the average cost of voluntary offsets which creates a financial challenge. Also, the purchase of offsets is not moving business practice at WRI toward low-carbon activities. The organization now needs to develop a strategy that balances its need to undertake carbon intensive activities – such as frequent trips to other countries and regions in pursuit of our mission – with the necessity of curtailing emissions and managing the financial implications of our strategy. WRI will continue to publicly report on its progress as its approach evolves.

a www.wri.org/project/wri-co2-commitment

b WRI's expanded office achieved LEED-CI Gold Certification from the U.S. Green Building Council.

c www.v-c-s.org

d www.cdmgoldstandard.org

e www.green-e.org/getcert_ghg.shtml

f *State of the CDM 2008: Facilitating a Smooth Transition into a Mature Environmental Financing Mechanism*. International Emissions Trading Association. 2008.

IDENTIFYING COST-EFFECTIVE EMISSION REDUCTIONS

ACTION AND EXPERIENCE

Innovative approaches to financing, along with broader assessments of cost effective emission reduction opportunities, can facilitate deployment of low-carbon projects that, like any other investment opportunity, can meet the company's internal rate of return (IRR) criteria. Some companies also are finding that life-cycle analyses, supply chain engagement, or road testing emerging technologies can reveal new opportunities for significant emission reductions.

- Johnson & Johnson found that targets and good ideas alone were not enough to drive the company's emissions down at a pace that would enable them to meet their 2010 goal to reduce emissions 7 percent below 1990 levels. To overcome this, the company established an annual budget of up to \$40 million for capital investments in low-carbon projects. Projects that do not meet the company's established IRR but that can offer significant GHG reductions or climate benefits such as improved building performance can access these funds. This allows climate-friendly projects to move forward without having to compete for funding with non-climate related priorities.²⁴ The process of accessing these funds has now become routine for managers in Johnson & Johnson's business units. As of 2007, the company had allocated

approximately \$100 million in capital relief funds,²⁵ including 10 solar photovoltaic (PV) arrays installed at its U.S. facilities for total capacity of 4.1 megawatts of solar power, ranking them as one of the largest corporate users of solar PV.²⁶ The company's low-carbon projects achieve an average IRR of 16.3 percent.²⁷ In many companies, the capital allocation process is not as streamlined and projects can get held up in multiple departments, including finance, facilities, environment, health and safety, energy, corporate responsibility, procurement and sometimes several others.²⁸

- Staples wanted to install solar PV systems on its roofs but found the upfront capital costs prohibitive. Instead, the company partnered with SunEdison, pioneer of the “solar services” model through which SunEdison arranges for the financing, design, equipment supply and construction of the solar PV arrays. Staples “hosts” the solar equipment on its rooftop but does not own it, thus avoiding up-front capital expenses.²⁹ In 2008, 75 percent of commercial PV installations utilized this type of third-party financing.³⁰ Across the U.S., solar PV projects are the most prevalent in those states that have supported solar power development through incentives and clean energy goals.³¹
- TOTO, the world's largest plumbing manufacturer, is working to minimize exposure to GHG regulations by evaluating total life-

cycle emissions associated with its products to identify emission reduction opportunities and measure success. The company requires that all new product lines demonstrate a lower “carbon footprint” than the products they replace. The company has also shifted some of its manufacturing facilities closer to key markets in part to reduce transportation fuel demands and associated costs and emissions. Advances in GHG accounting (see Box 4) are creating additional guidance for this emerging area of risk assessment and opportunity.

- In 2006, Time Inc., the world’s largest magazine publisher, announced a GHG reduction target for its paper suppliers – an early example of a company moving to leverage impact along its supply chain. Time asked the paper suppliers to reduce GHG emissions 20 percent from a 2004 base year by 2012. Suppliers that already had achieved reductions prior to 2004 had the option to reduce GHG emissions 25 percent from a 2000 base year or 30 percent from a 1996 base year by 2012.³²
- UPS actively seeks out opportunities to test and deploy new technologies which can help the company to identify those that will help it to reduce fuel costs and emissions (see box on UPS’ experience).

LESSONS LEARNED

Successes

- Dedicated financing through a specific capital budgeting process can help prioritize cost effective GHG reduction investments in

low-risk clean energy and efficiency projects that meet established IRR requirements.

- New financing models for clean energy, and partnerships with suppliers or customers, can lead to additional cost-effective GHG reduction opportunities.
- Quantifying emissions in value chains beyond “in-house” operations can reveal new emission reduction opportunities upstream (among key suppliers or resource extraction) or downstream (from customer use and disposal).
- Proactively testing new technologies can help inform research and development (R&D) priorities and identify specific technologies that will reduce energy and emissions.

Challenges

- Only a select few companies like Johnson & Johnson have ensured sufficient allocation of capital to low-carbon projects.
- Complex decision-making processes can impede swift deployment of funding and projects. Many companies report that accounting and finance departments often are the least engaged in designing and implementing corporate climate change strategies.³³
- Wider market penetration requires policies – including a price on carbon³⁴ – and incentives to help overcome obstacles, such as cost and technical barriers, like system integration.
- Collaborative approaches to R&D could help bring more new low-carbon technologies to market.³⁵

IN PRACTICE: UPS’ EXPERIENCE ROLLING OUT CLEAN ENERGY TECHNOLOGY

UPS, a global package delivery and logistics company, has been in business for more than 100 years, operates a ground fleet of nearly 100,000 vehicles, and is taking a proactive approach to integrating new clean technologies that improve efficiency and reduce greenhouse gases.

UPS captures energy and efficiency savings with advanced logistics tools and fleet management technologies. The company is replacing older vehicles with models that allow them to road-test new alternative fuel vehicle (AFV) technologies. Intensive maintenance procedures, using automotive information systems and preventative maintenance checks to optimize maintenance schedules, keep vehicles in top operating condition. UPS has installed an advanced package routing system to manage delivery of nearly 16 million deliveries each day, saving three million gallons of gasoline and 32,000 metric tons of CO₂ in 2007. Other network and vehicle management efforts are reducing energy and emissions by using new applications for global positioning systems (GPS), package labels, and air route planning (UPS is the 8th largest airline in the world). Among the technology tools the company is exploring is telematics, which UPS tested on 334 delivery trucks in 2007. The technology monitors engine performance to track rapid acceleration or braking, idling, or excessive speeds, all of which reduce vehicle fuel efficiency. It also provides engine diagnostics enabling conditional maintenance for optimum performance. Onboard GPS capabilities allow route planning analysis to reduce vehicle miles traveled. UPS now has the telematics hardware installed on over one third (22,000) of its U.S. package car fleet and 50 percent of those vehicles are commissioned (fully functional). Also all new package cars at UPS will come with the telematics technology installed.

UPS explores the potential of new low-carbon technologies literally as the rubber hits the road—in what the company calls its “rolling laboratory” approach. UPS identifies, tests, and deploys these technologies by taking advantage of partnership opportunities to share the financial responsibility and minimize risks. For example, UPS partnered with Eaton Corporation, the U.S. Environmental Protection Agency (EPA), the U.S. Army, and Navistar International, to test EPA’s patented hybrid hydraulic technology – high efficiency diesel vehicles equipped with hydraulic propulsion that can store energy and enhance fuel efficiency. The 18-month test demonstrated dramatic fuel savings and emission reductions. UPS announced that it would deploy seven hybrid-hydraulic vehicles in 2009 and 2010, expecting 35-45 percent fuel efficiency gains and 30 percent lower CO₂ emissions with the new technology. The more pilot tests, the more experience UPS gains with cutting edge technology. The company is able to evaluate which network tools or vehicles offer the best energy and emission benefits. This translates to more efficiency gains and wider adoption of low-carbon vehicles, allowing UPS to reduce energy use and emissions while continuing to grow its business. Ultimately, UPS’ proactive approach to clean technology demonstration and deployment puts the company in a position to meet challenges such as rising fuel prices and carbon regulations.

UPS has also leveraged its expertise in efficient transport logistics to generate revenues. UPS has created a business, UPS Logistics Technologies, to sell advanced fleet network management tools to other companies. This leads not only to higher revenues, but broader energy and emission reductions. Approximately 140,000 other vehicles are using the technology, which reduces approximately 1.3 million metric tons of CO₂ annually.

BOX 4 OVERVIEW OF GHG PROTOCOL

Ten years ago, WRI partnered with the World Business Council for Sustainable Development (WBCSD) to develop standard corporate accounting and reporting guidelines for greenhouse gas emissions. A multi-stakeholder process led to the publication of *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* in 2001. Today, it is used by hundreds of companies around the world and serves as the foundation for all major GHG measurement and management programs.

The GHG Protocol Initiative is now working in concert with private sector partners, policymakers, NGOs, academics and other experts to develop two new accounting standards for product and supply chain emissions – one for product-level reporting and one for corporate-level reporting. The resulting standards will be a valuable step forward, enabling companies to better understand their comprehensive GHG emissions profile and inform strategies that focus on opportunities for cost-effective emission reductions across their product value chains. For more information, visit www.ghgprotocol.org.

MANAGING INTERNAL COMMUNICATIONS

ACTION AND EXPERIENCE

Implementing corporate climate change strategies requires a broad set of communications across business units and among different levels of staff to generate buy-in and new ideas for addressing climate change, communicate data needs, and drive behavioral changes among staff – a difficult but critical component to accomplishing GHG reduction goals. Specific details of a successful climate change communications strategy can be quite complex and vary from company to company. Internal engagement strategies confront challenges relating to corporate culture, company size, and staff expertise.

- Companies have found that establishing teams with a diverse set of perspectives and multiple areas of expertise can be a valuable approach to managing climate change strategies.³⁶ Alcoa has a climate change team that spans global operations and engages senior level leadership in operations, government affairs, technology, communications, and finance. The team oversees global and U.S. policy teams that communicate directly with regional teams and operating locations.³⁷ PPG Industries formed an Energy Security and Climate Change steering committee to develop and implement its corporate strategy. Sub-committees focus on specific issues like energy security; global climate change domestic advocacy; energy and greenhouse gas emissions; markets, products and services; and communications.³⁸
- For some companies, “employees” may refer to several thousand individuals, across dozens of countries, speaking different languages, and all with different levels of familiarity or interest in climate change. Employees are often bombarded with corporate messaging on a variety of topics from charity drives to health awareness, benefits changes and safety inspections. To deal with such challenges, the Coca-Cola Company developed a series of logos to visually depict environmental priorities: energy and climate protection, sustainable packaging, and global water stewardship. The logos provide a simple way to communicate the company’s environmental focus regardless of language differences among employees. The company also established a corporate motto – *grow the business, not the carbon* – as part of their climate change communications. This standard messaging helps to communicate the company’s system-wide commitment to reducing emissions.³⁹
- Some companies that have been forced to shed employees as a result of the ongoing financial crisis have downsized staff with decades of experience managing climate change issues. In those cases where companies have not successfully diffused climate change understanding throughout their operations and management, these staffing cuts can be significant setbacks for corporate climate strategy. The same is true of staff turnover. Some companies can experience a slow down in the implementation or advancement of their climate change strategies as staff retire and new employees must come up to speed.

LESSONS LEARNED

Successes

- Cross-functional workgroups can facilitate broad participation, input, and buy-in to a company’s climate strategy.
- Clear and simple messaging can help reach a broader number of employees.
- Support at the CEO level helps to focus employee attention on the company’s goals.
- Providing incentives and recognition to employees can help elevate awareness of corporate efforts.

Challenges

- Engaging employees remains an elusive goal for most companies. It is difficult for climate change messaging to distinguish itself within a barrage of information.
- Corporate executives – and their employees – do not have the luxury of a singular focus on climate change. Competing priorities can diminish the relative importance of climate change on corporate agendas.
- Staff losses can drain a critical brain trust that could impact successful implementation of climate strategies and risk losing ground to competitors.

CAPTURING NEW BUSINESS OPPORTUNITIES

ACTION AND EXPERIENCE

New markets emerging in anticipation of GHG regulations (establishing a price on carbon) will make low-carbon products and services increasingly financially attractive. This presents new opportunities for providers of these products and services to capture these new markets.

- GE has become well-known for its *ecomagination* campaign which seeks to position the company to capture these new markets by setting targets to increase investment in R&D for cleaner technologies and to grow revenues from *ecomagination* products such as wind and gas turbines, efficient home appliances, aircraft engines and hybrid locomotives.⁴⁰ The initiative, launched in 2005, has seen continued growth in revenues despite the present economic slowdown. Revenues reached \$17 billion in 2008, up 20 percent from 2007, prompting CEO Jeff Immelt to note “a green lining among the current economic stormclouds...strengthening GE’s competitive position and the advantage GE offers to its customers.”⁴¹
- Caterpillar’s remanufacturing division (CAT Reman) captures value by revitalizing machines and equipment that otherwise would be scrapped. Caterpillar tracks its customers and products, gathering retired parts and machines that undergo a proprietary process to harvest the useful parts of retired machinery for use in renewed “CAT Certified Rebuild” products that sell for approximately half the cost of a comparable model from raw materials. Caterpillar estimates that remanufactured products can require up to 80 percent less energy, 90 percent less water, 99 percent less material and emit 50 percent fewer GHG emissions than products manufactured from virgin materials.⁴²
- Johnson Controls is positioning itself as a solutions provider for both buildings and transportation in anticipation of growth markets for low-carbon goods and services. The company’s “Building Efficiency” business provides energy-efficiency building-related products and services, earning nearly \$4 billion in net sales in 2008 – up nearly 10 percent from 2007. The company’s automotive business units are working to provide the products needed for GHG reductions in the transportation sector, such as advanced battery technologies.

LESSONS LEARNED

Successes

- New markets for low-carbon goods and services can prove profitable even in today’s fiscally constrained environment with low oil prices.
- Action today can position a company to take advantage of increasing market demands for products and technologies needed to reduce global emissions.

Challenges

- Low-carbon business models will not be able to capture the full value of goods and services until there is a regulatory price on GHG emissions.
- Additional innovative business models are needed to create solutions to rapidly expand the availability and affordability of low-carbon goods and services.

ADAPTING TO MARKET-BASED SOLUTIONS

ACTION AND EXPERIENCE

Since 2004, several state and regional GHG reduction programs have taken shape. Each has sought to create a market-based system to limit and reduce emissions through a cap-and-trade mechanism. In 2009, the Regional Greenhouse Gas Initiative (RGGI) in the Northeast became the first mandatory GHG emissions reduction program in the United States. Though mandatory reductions in the near-term are modest, businesses in the region are now officially operating under carbon-constrained conditions.

- Amid rapid policy developments, companies face an increasing need to track legislative action that will have direct or indirect impacts on their business. It is not always feasible to keep pace with fast-moving policy dialogues. Several companies receive regular updates via industry trade groups or other outlets. Most WRI partners also actively seek out additional information from other sources with various perspectives to get additional insight on policy options and developments.
- Ongoing debates about climate policy are presenting more opportunities for policymakers and stakeholders, including businesses, to engage collaboratively to explore optimum solutions. Several partner companies have seized the opportunity to provide input and perspectives on various climate policy proposals. Nearly half of WRI partners have participated in stakeholder commissions or partnerships engaged in climate policy discussions (see Table 1).
- Businesses are also playing an increasingly important role in national climate policy. Companies have partnered with other stakeholders to provide input to the design of federal policy. Coalitions like the U.S. Climate Action Partnership (USCAP) and Business for Innovative Climate & Energy Policy (BICEP) have already played influential roles in advancing policy action and informing legislation. The Waxman-Markey Climate Discussion Draft released in early 2009 contained many of the policy recommendations outlined by USCAP.

TABLE 1 NUMBER OF WRI PARTNERS FORMALLY ENGAGED IN CLIMATE POLICY PROCESSES

FEDERAL ^a	REGIONAL ^b	STATE
10	7	19

^a Includes Business for Innovative Climate and Energy Policy (BICEP, www.ceres.org/BICEP) and U.S. Climate Action Partnership (USCAP, www.us-cap.org)

^b Includes Midwestern Greenhouse Gas Reduction Accord (MGGRA, www.midwesternaccord.org), Regional Greenhouse Gas Initiative (RGGI, www.rggi.org) and the Western Climate Initiative (WCI, www.westernclimateinitiative.org)

LESSONS LEARNED

Successes

- Other policy information resources (such as specialized news update services, consultants and NGO partners) can supplement or balance trade association resources.
- Engagement in stakeholder processes helps to establish expert internal knowledge that can feed directly into corporate business decisions.
- Companies that partner with other stakeholders also inform policy makers of specific ideas on an optimal policy path forward.
- Businesses can also inform NGOs' policy positions in terms of what policy design is likely to work most effectively in driving GHG reductions.

Challenges

- Navigating the fast-changing and often complex policy landscape can be a major challenge for companies. Companies must track climate policy activity at the state, regional, national and international levels and understand the drivers, stakeholders and impacts of each.
- Companies getting information from a single source are likely missing out on other important perspectives and insights about the opportunities or challenges created by various policy options.
- Companies that are not engaged, or are not playing constructive roles, risk losing the credibility to inform climate policy action.

SUMMARY OF LESSONS LEARNED

WRI's corporate partners have achieved successes in pursuit of their corporate climate change strategies. Many are now experienced in GHG data management, target-setting, verification and reporting. Companies have demonstrated innovative approaches to clean technology deployment and many are actively engaged in the climate policy process. It is clear that implementing these strategies is a task that requires support across the company as well as significant time and resources. As momentum builds for U.S. climate policy and pressure increases for U.S. engagement in international climate policy, the need for businesses to advance innovative solutions to the climate challenge will accelerate. Even while some key challenges remain to achieving today's level of best practice across a wide spectrum of companies, we will need to forge a new definition of corporate leadership to build on the progress made to date and to adequately meet the scale and urgency of the climate challenge.



A SHARPER CUTTING EDGE NEXT STEPS FOR CORPORATE CLIMATE ACTION

SKETCHING OUT A NEW VISION

Consensus is growing that the world must undergo a dramatic shift away from fossil fuels. Studies show that in order to avoid the most dangerous atmospheric concentrations of GHGs and their associated impacts, global emissions must peak within the next ten years and then begin to decline.⁴⁹ For the United States to avoid the most serious consequences of climate change, it must achieve an 80 percent reduction below 1990 levels by 2050 and work with other countries to achieve global reductions.⁵⁰ As of 2007, U.S. emissions were 17.1 percent higher than 1990 levels.⁵¹ Significant changes to business-as-usual must occur to realize the necessary scale of reductions. Both capital and clean technology will have to be mobilized in radically new and innovative ways.⁵² A complex set of transformations will be required to revolutionize the way that energy is produced, delivered and used:

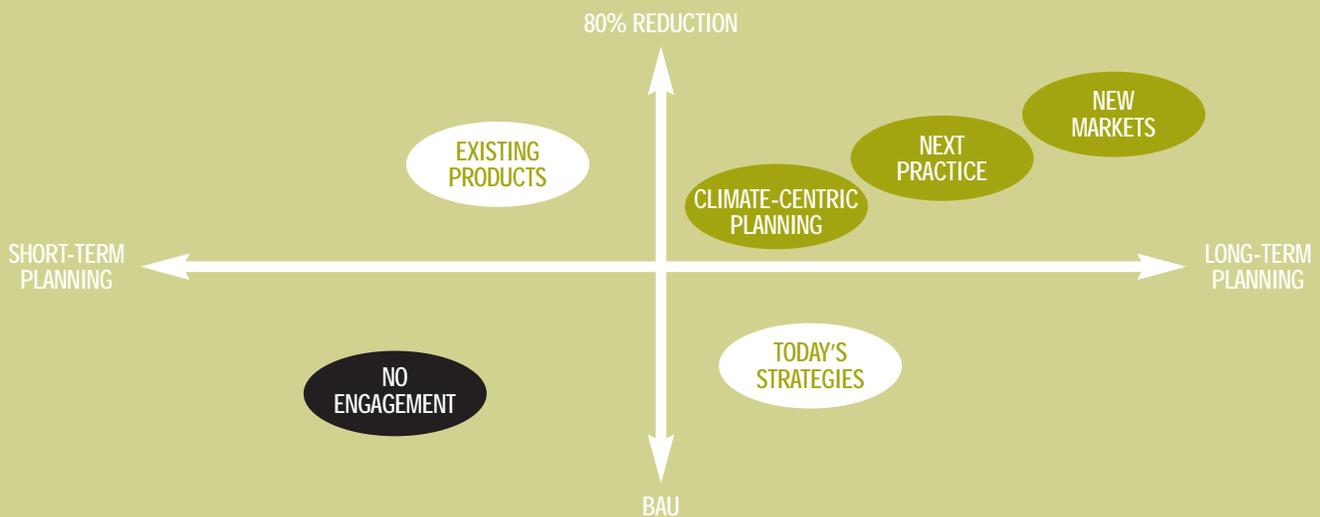
- **DRAMATICALLY INCREASE THE EFFICIENT USE OF ELECTRICITY.** The most cost-effective way to reduce emissions from the electricity sector in the near term is to provide and use power more efficiently. This will require infrastructure upgrades to improve the nation's electricity transmission system as well as greater investment in, and deployment of, energy-efficient technologies and new business models to deploy them.
- **RAPIDLY SCALE UP CLEAN ENERGY TECHNOLOGIES.** In the United States, more than 75 percent of energy is derived from fossil fuels.⁵³ Massive deployment of clean energy will require:
 - ▶ investment in smart grid infrastructure⁵⁴ that will not only improve the efficiency of power delivery but also allow more effective integration of distributed generation systems such as solar photovoltaic (PV) arrays and wind turbines.
 - ▶ development of storage technologies that can mitigate the intermittent nature of many renewable forms of energy.
 - ▶ regulatory frameworks that provide renewables and other low-carbon technologies with a level playing field compared to fossil fuel or other forms of GHG intensive technology.
 - ▶ approaches to clean technology deployment that factor in a portfolio of solutions such as optimal deployment of demand-side management, smart-grid and regionally-appropriate applications of combinations of renewable resources.
- **BRIDGE THE TECHNOLOGY GAP BETWEEN TODAY'S BUSINESS-AS-USUAL AND TOMORROW'S CLEAN ENERGY ECONOMY.** The economic potential of renewable energy and energy efficiency may not be sufficient over the mid-term to prevent the most serious impacts of climate change.⁵⁵ Capturing and storing carbon dioxide from power plants and other large industrial point sources is likely to have a critical role to play in stabilizing GHG emissions.⁵⁶

- **MAXIMIZE EFFICIENCIES AND DEPLOY CLEAN TECHNOLOGIES IN TRANSPORTATION SYSTEMS.** A combination of low-carbon fuels, fewer vehicle miles traveled – including smarter land use planning, widely deployed mass transit systems and greater use of intermodal strategies (such as freight to rail), and advanced vehicle technologies – will be required to manage emissions in the transportation sector.

Each of these transformations also represents business risks and opportunities. Many companies have begun to recognize that climate

change is a business issue and are assessing their risk. Corporate climate change goals and implementation strategies, however, are not aligned with the scale of required reductions. An analysis by The Carbon Trust and McKinsey & Co., for instance, showed that current efforts do not chart a path to a low-carbon future, but instead set us on a trajectory to increase emissions to levels deemed “catastrophic” by scientists.⁵⁷ (That study analyzed the likely emissions trajectory based on actions to date across several industrial sectors and the assumptions of industry analysts and experts on expected climate change-driven investments and actions).⁵⁸

FIGURE 1 ILLUSTRATIVE SNAPSHOT OF CORPORATE ACTION ON CLIMATE CHANGE



Key: BLACK indicates companies that are unengaged through choice or lack of understanding that the climate change problem exists.
 WHITE indicates where most companies that are taking action are today.
 GREEN indicates the quadrant that companies will need to be in moving forward.

Figure 1 is an illustrative snapshot of where companies are today and where they need to go.

- **Lower-left quadrant.** These companies are not engaged in climate change planning. They are not assessing their risk and are not participating in climate change policy discussions.
- **Top-left quadrant.** These companies recognize that GHG emission reductions are required and are providing existing products, generally to a niche market, to solve the problem. These companies have recognized the business opportunity created by climate change but have not yet innovated the types of products and services that will help lead to a rapid transition to a low-carbon economy.
- **Bottom-right quadrant.** These companies have begun to make long-term climate change plans, for example by setting emission reduction goals. Many of the strategies being employed, however, will not ultimately transform the company to one that is adjusted to a low-carbon world.

- **Top-right quadrant.** Companies that can successfully integrate climate-centric planning into every aspect of their business, leapfrog from best practice to “next practice”⁵⁹ and understand (and eventually capture) the new markets that are created by climate change will be best positioned to demonstrate what corporate leadership looks like in a low-carbon future. While some companies are experimenting in this space, “next practice” is by nature immature. Once companies begin to adopt “next practice” activities, the activities become improved best practice.⁶⁰ Moving to a low-carbon future will require that the types of activities illustrated in this quadrant become business-as-usual.

Companies that will survive and thrive are those that quickly realign their corporate infrastructure to the expectation of a low-carbon economy and those that provide the low-carbon goods, technologies and services to fill the new market. There are several questions for companies to consider as they evaluate how to evolve from best practice to “next practice.”

FROM BEST PRACTICE TO NEXT PRACTICE: KEY QUESTIONS TO CONSIDER

ARE GHG-ONLY TARGETS ENOUGH?

Companies may be well served by establishing a “dashboard” with multiple metrics that track performance beyond GHG-only priorities. This can help focus corporate attention on a wide range of interlinked variables that together can provide a more comprehensive view of the company’s contribution to moving the economy in a low-carbon direction. For example, in addition to standard GHG reduction targets, next generation targets may focus on the inter-connection between GHG performance and a company’s financial health, or for measuring employee awareness and understanding of climate change, or on how a company has managed other natural resources that have climate change implications (for example water, which has significant impacts on energy use and vice versa).⁶¹ Companies could benefit from metrics that track exposure to fossil fuel price volatility in their energy contracts or how their climate change commitments engage and retain talent.

HOW WILL DATA MANAGEMENT BE EXPANDED TO ACCURATELY CAPTURE SUPPLY CHAIN OPPORTUNITIES?

As companies exhaust emission reduction opportunities within their operations and as more and more activities (and associated emissions) are outsourced, strategic partnerships across the supply chain will become more important to advancing emission reduction strategies and managing costs (see Box 5). Currently most voluntary and mandatory programs focus on those emissions that are owned or controlled by the reporting company.⁶² The *GHG Protocol Corporate Accounting and Reporting Standard* provides a clear and widely recognized methodology for gathering the necessary data for these emissions.⁶³ Looking forward, it will be necessary to manage data across a wide variety of business partnerships so that emission reduction opportunities across the supply chain can be properly evaluated and measured.⁶⁴

WHAT DOES THE NEXT GENERATION OF GHG REPORTING LOOK LIKE?

As climate regulations come into force, some companies will be required to move toward compliance reporting. In the meantime, increasing numbers of companies voluntarily and publicly report their GHG emissions data. In 2008, the Carbon Disclosure Project reported that 1,550 responses had been submitted to its annual survey, a response rate of 55 percent.⁶⁵ Moving forward, requirements for reporting of emissions data and risk exposure is likely to expand. For example, in 2008, the Attorney General of New York announced that Dynegy Inc., a national energy company, would be required – as part of a mutually agreed settlement – to provide relevant information to investors about the company’s climate risk as part of its annual filing to the Securities and Exchange Commission.⁶⁶ More recently, the National Association of Insurance Commissioners (NAIC) moved to require insurance companies to disclose the financial risks they face from climate change and the steps being taken to respond to those risks.⁶⁷ Such actions indicate a growing desire for greater disclosure of the financial risks of climate change.

WHAT TYPES OF GHG REDUCTION STRATEGIES HELP TO REALIGN COMPANIES WITH A LOW-CARBON ECONOMY?

Companies will need to evaluate their strategies for reaching their climate change targets. A focus on strategies that ultimately decarbonize business practice should be paramount. Companies should prioritize opportunities in their own operations, networks and value chains that help prepare them for a low-carbon economy, rather than exclusively depending on external mechanisms (such as carbon offsets or renewable energy certificates). A company seeking to minimize climate risks will be better served by upgrading its corporate fleet to high-efficiency vehicles, improving the efficiency of its network infrastructure or installing low-carbon technologies instead of prioritizing investment in more passive, external strategies.

BOX 5 RATTLING SUPPLY CHAINS

As global forces like changing demographics, growing environmental pressures, environmental regulation, and climate change interact to alter the future landscape of markets and industries, business leaders have recognized the need to understand their nature and magnitude. For large companies with global dimensions, this need for understanding is not limited to their direct operations but instead may rest primarily in their supply chains.

To illustrate the financial relevance of environmental issues, the World Resources Institute (WRI) and A.T. Kearney, Inc., collaborated to develop a future scenario of major environmental trends, including the physical impacts on the environment and the public policy response. The potential implications for a basket of commodity prices for energy and agricultural commodities were then determined, as well as the effects of those prices on the earnings of a representative set of companies in the fast-moving consumer goods (FMCG) sector.

The scenario – dubbed Ecoflation – shows a future in which policies and constraints on natural resources force firms to add to the cost of doing business the environmental costs previously borne by society. While this concept inevitably increases costs in the near term, technological advances, efficiency gains, and reallocation of resources should ultimately lower costs to firms while reducing natural resource-related risks over the longer term.

The report recommends that companies address emerging risks to their supply chains by understanding environmental impacts and dependencies; taking inventory of current environmental initiatives through the value chain; ranking environmental issues and opportunities; and embedding sustainability principles into an action plan.

Adapting to environmental pressures will require not only preferential sourcing but also product innovation and restructured value chains.

Rattling Supply Chains. A.T. Kearney, World Resources Institute. 2008. <http://www.wri.org/publication/rattling-supply-chains>

WHAT TYPES OF ADAPTATION STRATEGIES POSITION COMPANIES TO SURVIVE WITH CLIMATE CHANGE IMPACTS?

According to the Intergovernmental Panel on Climate Change (IPCC), some warming of the climate is unavoidable due to past emissions of GHGs. As a result, strategies to adapt to the impacts of climate change will be required even with strong mitigation efforts.⁶⁸ Businesses will need to analyze their entire value chain, including potential impacts on customers, suppliers, and the communities in which they operate to assess how they may be exposed to shifting weather patterns and climate risks.⁶⁹ For example, Entergy is an electric power production and distributing company on the U.S. Gulf Coast. Its location makes the company's service territory and assets vulnerable to flooding and hurricanes. Entergy's power plants, facilities, transmission and distribution systems, customers and employees all could be at risk from the physical impacts of climate change. Hurricanes Katrina and Rita cost the company \$1.5 billion.⁷⁰ Developing strategies to adapt to climate change could help companies generate ideas for new products or services.

WHO WILL SUPPLY TOMORROW'S MARKETS?

Corporate climate strategies will not succeed if they rely only on consumers to "do the right thing." Some climate-conscious consumers will buy low-carbon products or make behavioral adjustments, such as turning down their home thermostat a degree or two to save energy. These actions are important, but they alone will not achieve the reductions needed at the pace required. Companies must drive consumer preferences by advancing mass market, low-carbon products and services. They must attract consumers based on cost and performance, in addition to being a "green" or "responsible" product. In 2008, Wal-Mart exceeded its one-year goal of selling 100 million affordable compact fluorescent lamps (CFLs) by 37 million.⁷¹ The company now sells its own house brand CFL product. As energy costs rise, companies can differentiate themselves by providing those products that have the product design attributes that are attractive to consumers while also meeting growing needs for improved efficiency.

Companies can also take advantage of new markets that will emerge in a low-carbon future. Project Better Place, founded in 2007, is capturing a new plug-in electric vehicle trend in the auto industry to develop a new business model that generates revenue by charging drivers for access to an infrastructure network of renewably powered recharging stations and battery exchange locations.⁷² Australia, Canada, Denmark and Israel, as well as California and Hawaii have committed to developing electric car networks in partnership with Project Better Place.⁷³

WILL CORPORATE POLICY ENGAGEMENT SUPPORT A POLICY ENVIRONMENT FOR A LOW-CARBON FUTURE?

Although there are plenty of examples of companies deploying low-carbon technologies, these examples are a trickle of what is technically feasible.⁷⁴ The right policy framework that provides economic incentives for producers and purchasers could open the floodgates. Corporate insights on persistent barriers to greater deployment can help inform effective policy measures, including the implementing rules that will support clean technology investment and deployment in the United States and across the globe.

As providers of low-carbon technologies to the global marketplace, U.S. businesses can provide a constructive voice at the international level as well. As emerging economies continue to rapidly industrialize, it is becoming more and more urgent that this growth be fueled by clean and efficient technologies. This is a clear new market opportunity for private sector innovators and suppliers of these technologies. It is in the best interest of the business community to help advance a viable international framework to facilitate international trade, technology transfer, and capacity building in clean technology development and deployment so that a viable, long-term market can be established.

WHERE ARE THE CARBON RISKS THAT NEED TO BE FACTORED INTO LONG-TERM BUSINESS DECISIONS?

Meeting the climate change challenge requires long-term strategic investments today. It is critical, particularly in a financially-constrained business environment, that money is spent wisely with the long-term outlook in mind. Companies increasingly must assess all major investments to determine whether they add to, or reduce, climate risk. As a result, it will become more important than ever to more fully engage Chief Financial Officers and other high-level risk officers in developing corporate climate change strategies. There are several examples of how companies can be put at a disadvantage by long-term investments made today that are not aligned with tomorrow's low-carbon future:

- **NEW FOSSIL FUEL POWER PLANTS.** Fossil fuel resources were a cost-competitive option in yesterday's economy, but in a carbon-constrained economy they are a business risk. Electric power plants are long-term investments and if they rely on carbon-intensive fuels they are potentially long-term liabilities. More importantly, the liability risks extend beyond electric utilities to the customers they serve. Businesses located in regions with a heavy dependence on coal will be put at a financial disadvantage by the higher costs of fossil fuels if alternative options are not developed and deployed as older units are retired.

Clean or renewable resources are available for power development across the country.⁷⁵ Some utility-scale renewable power projects are already in the works. PG&E, for example, has signed an agreement with Solel to purchase output from a 553 MW solar plant planned for operation in 2011. When constructed, the plant will utilize 1.2 million mirrors over 9 square miles of the Mojave Desert in California, and 317 miles of vacuum tubing to capture the sun's heat.⁷⁶ Meeting growing power demands, however, will also require mass deployment of distributed generation systems. In many areas, single-source renewable energy will be insufficient. A regionally specific strategy will be required to take advantage of all locally available resources. For example, in some areas, it may be possible to reduce electricity demand through demand-side management and to meet the remaining power demand through a combination of renewable resources such as wind power at night (when the wind is generally stronger) and solar power during the day.

- **COMMERCIAL BUILDINGS AND INDUSTRIAL FACILITIES.** Most near- to mid-term GHG reduction potential from the building sector is expected to come from existing buildings.⁷⁷ More than half of today's buildings are expected to still be in use in 2050⁷⁸ so business practices and policies that promote improved energy efficiency in buildings will be required. For example, re-commissioning buildings can result in energy savings of between 5 and 15 percent.⁷⁹ Today, however, even in states with up-to-date commercial energy codes, such standards apply only to new commercial construction while approximately 70 percent of existing commercial buildings were constructed before 1990.⁸⁰

Companies that choose to build "traditional" facilities today may face higher costs in the long-term as they have to retrofit and upgrade their buildings to achieve energy and cost savings that they could have been accruing from the outset. Buildings account for more than 15 percent of global GHG emissions and are responsible for more electricity consumption than any other sector.⁸¹ They also can have a lifespan of several decades. Investment dollars spent today to construct new energy-efficient facilities with integrated low-carbon power sources can save companies in the long-term through lower energy costs and reduced risks associated with energy price fluctuations or energy shortages. Indeed, "green" or high-performance commercial buildings have proliferated in the United States over the last ten years, but they represent just a fraction of total building stock.⁸²

There is growing research into net zero energy buildings.⁸³ According to the Department of Energy, these buildings generate as much energy as they consume through a combination of maximized energy efficiency and on-site power generation from renewable resources.⁸⁴ Several major companies such as United Technologies Corporation, Dupont and LaFarge have partnered with the World Business Council for Sustainable Development to develop a roadmap to put the building sector on the path to achieving zero net energy buildings for all new construction by 2050.⁸⁵ Similarly, hundreds of building sector professionals (architects, designers, engineers, planners and consultants) have signed up to the Architecture 2030 Challenge which calls for all new buildings and major renovations to operate on 100 percent clean energy by 2030.⁸⁶

To fully realize GHG reduction potential in the building sector will require a coordinated approach that factors in technical and policy solutions for new and existing buildings, recognizing the contributions of engineering, design, building operation, smart-growth concepts and the myriad decision-makers in the industry, including building designers, owners, operators and tenants.⁸⁷

- **PRODUCT DEVELOPMENT CHOICES.** Although low-carbon products exist today, they are a marginal category of products relative to the entire economy's product offerings. Companies that develop carbon-intensive products today may be at a disadvantage over the long term. A price on carbon can drive up the cost of using GHG-intensive products and consumer preferences will consequently align to a "green" economy. For example, tomorrow's passenger cars must be fundamentally different from today's models.⁸⁸ Vehicles that require high-emitting fossil fuels will become less and less attractive to both individual and commercial cost-conscious customers. Several auto manufacturers, including Tesla Motors, Th!nk, Toyota, Chevrolet, Renault-Nissan and Volkswagen either already have plug-in electric vehicles in the marketplace or are developing them.⁸⁹ Israel is developing the world's first infrastructure network that will allow it to deploy plug-in electric vehicles nationwide.⁹⁰ Vehicle manufacturers that continue to focus on inefficient vehicle models will lose market share to competitors that have recognized, and responded to, the transition to a low-carbon economy.

CONCLUSION

It remains to be seen which business models will survive the migration to a low-carbon future. Companies must become expert in today's best practice, emerging best practice and tomorrow's "next practice."

Whether or not companies can make the transition will depend not just on getting the regulatory frameworks right to spur business action and innovation, but also on choosing the right metrics for measuring business leadership. Corporate climate change action, viewed through the lens of corporate social responsibility, has brought business to where it is today – a considerable achievement that now needs to be built upon to achieve a low-carbon future. Looking forward, business action on climate change will need to be viewed in more strictly business terms, with climate change considerations systematically woven into every near-, mid-, and long-term business decision and investment. Companies must focus on reducing exposure to the physical and cost implications of GHG emissions, adapting business models to thrive in the next economy, and fostering far-reaching innovation to lead the economy toward a low-carbon future. The strength of tomorrow's economy will depend on whether businesses can foster next practices to achieve the next generation of best practice, and the extent to which policy frameworks can help enable and reward that behavior.

BEST PRACTICE TODAY

- Verifying and registering GHG emissions data.
- Setting and updating GHG performance targets.
- Assessing and mitigating exposure to physical and regulatory risks of climate change.
- Identifying cost-effective GHG reductions.
- Managing internal communications
- Adapting to market-based solutions.

EMERGING BEST PRACTICE

- Developing comprehensive, strategic climate change metrics such as setting revenue-based targets to capture new business opportunities to supply the clean energy economy.
- Continuing to innovate in GHG measurement, management and reporting to respond to growing demands for climate risk disclosure.
- Realigning climate strategies to a low-carbon economy by assessing climate change risk in the supply chain; engaging supply chain partners to reduce or eliminate risk; providing information to customers on GHG impact of products.
- Constructively engaging in U.S. and international climate policy dialogues.

"NEXT PRACTICE"

- Implementing adaptation strategies in concert with mitigation opportunities. Contributing to adaptation funds to help the poor adapt to climate change impacts.
- Anticipating and meeting new market demands by developing products and services that use energy and natural resources more efficiently and help reduce vulnerability to climate change.
- Factoring climate risk into long-term business decisions and investments.
- Realigning business models to a low-carbon economy.
- Completing the transition to clean energy sources.

GREENHOUSE GASES

NOTES

- Includes funding for high-performance buildings, transit systems, smart grid infrastructure, weatherization programs, energy efficiency, and renewable energy. See: www.recovery.gov. In a proposed budget, the Obama Administration incorporated assumptions for future revenue generated by a cap-and-trade system for greenhouse gases. See: <http://www.whitehouse.gov/omb/budget/>.
- Competitive Advantage on a Warming Planet*. J. Lash, Wellington, F., Harvard Business Review, 2007.
- See "Looking Ahead: Cutting-Edge Issues and Challenges for Corporations" in *A Climate of Innovation: Northeast Business Action to Reduce Greenhouse Gas Emissions*. A. Aulisi, Layke, J., Putt del Pino, S. WRI, 2004.
- Results of late 2008 WRI-Climate Group survey of corporate partners designed to understand the relative importance of financial and non-financial criteria for investing in low-carbon technology projects.
- Climate Change – A Business Revolution? How tackling climate change could create or destroy company Value*. The Carbon Trust, 2008.
- In 2003, approximately 200 Fortune 500 companies responded to an annual survey from the Carbon Disclosure Project. By 2008 more than 380 were responding to the survey and 74 percent of those had developed targets for reducing GHG emissions. Carbon Disclosure Project. *CDP Global 500 Report 2008 and CDP 1 Report 2003*. Retrieved 20 October 2008: <http://www.cdproject.net/cdp-reports.asp>
- Ten Northeast states already regulate GHGs from electric power plants and those companies and utilities that are regulated must report their emissions data. www.rggi.org.
- The U.S. Department of Energy established a voluntary reporting registry under section 1605b of the 1992 Energy Policy Act. It does not require third-party verification of reported emissions data. More recently, several additional voluntary and mandatory GHG reporting platforms have emerged, which do require third-party verification: California Air Resources Board (CARB); California Climate Action Registry (CCAR); Chicago Climate Exchange (CCX); The Climate Registry (TCR); European Union Emissions Trading Scheme (EU ETS).
- <http://www.epa.gov/climatechange/emissions/ghgrulemaking.html>. Viewed on March 23, 2009.
- Ibid.
- For example ISO standards 14064-3, 14065 and 14066. The Climate Registry's General Verification Protocol is consistent with ISO 14064-3 and its approach to accreditation of verifiers is in line with ISO 14065.
- The GHG Protocol *Corporate Accounting and Reporting Standard* which underpins many reporting programs requires a base year adjustment when structural changes are made to the company, for example through mergers, acquisitions and divestitures. Adjustments are also made when errors are discovered or when a change in calculation methodology or improvements in the accuracy of emission factors or activity data would result in a significant impact on the base year emissions data. www.ghgprotocol.org.
- The U.S. Environmental Protection Agency's Climate Leaders program and World Wildlife Fund's Climate Savers program help their members to define emission reduction targets.
- 383 Global 500 companies responded to the Carbon Disclosure Project's 2008 survey. Of those, 74 percent had set GHG emission reduction targets, representing 57 percent of all Global 500 companies. *CDP Global 500 Report 2008*. Retrieved 9 April 2009: <http://www.cdproject.net/cdp-reports.asp>
- Intensity targets tie reductions to another metric, for example, reducing emissions by 10 percent per unit of product manufactured. Absolute targets do not take factors such as business growth or decline into account, e.g. reducing total emissions by 10 percent below an established base year.
- A Climate of Innovation: Northeast Business Action to Reduce Greenhouse Gases*. A. Aulisi, Layke, J., Putt del Pino, S. World Resources Institute, 2004.
- U.S. Environmental Protection Agency, Climate Leaders Program. www.epa.gov/climateleaders.
- www.ppg.com. Viewed March 28, 2009.
- www.jnj.com/connect/caring/environment-protection. Viewed March 18, 2009.
- www.worldwildlife.org/climate/climatesavers2.html. Viewed March 18, 2009.
- www.ecomagination.com. Viewed on March 18, 2009.
- http://www2.dupont.com/Sustainability/en_US/Marketplace_Goals/index.html. Viewed on April 9, 2009.
- www.ecomagination.com. Viewed on March 18, 2009.
- A Capital Idea: Realizing GHG Returns and Johnson & Johnson*, Climate Northeast case study. World Resources Institute, 2008.
- Ibid.
- Johnson & Johnson, 2007 Sustainability Report.
- Ibid.
- Results of late 2008 WRI-Climate Group survey of corporate partners designed to understand the relative importance of financial and non-financial criteria for investing in low-carbon technology projects.
- The Solar Services Model: An Innovative Approach to On-site Solar Photovoltaics*. Green Power Market Development Group case study. World Resources Institute, 2005
- Solar Power Services. Guice, Jon. February 2008. Greentech Media.
- Most installed solar PV capacity is in CA, NJ, CO, NV, HI, NY, AZ, CT, OR and NC. *US Solar Industry Year in Review 2008*. Solar Energy Industry Association. www.seia.org/galleries/pdf/2008_year_in_review-small.pdf. Viewed April 6, 2009. These states have either Renewable Portfolio Standards with solar or distributed generation provisions or net metering programs. www.dsireusa.org. Viewed April 6, 2009.
- Time Inc. 2007-2008 Sustainability Report.
- Getting Ahead of the Curve: Corporate Strategies that Address Climate Change*, A. Hoffman, University of Michigan. Pew Center on Global Climate Change, 2006.
- Many climate policy proposals focus on market-based options that place a cost on GHG emissions, commonly referred to as a carbon price. The goal is to discourage emissions by placing a cost on releasing GHGs to the atmosphere and making it expensive to emit large amounts of GHGs. *The Bottom Line on Climate Policy Terminology*. Compiled by Eliot Metzger. World Resources Institute, 2008.
- Carbon Lock-In: Barriers to Deploying Climate Change Mitigation Technologies*. M. Brown, Chandler, J., Lapsa, M.V., Sovacool, B. Oak Ridge National Laboratory, 2007.
- Getting Ahead of the Curve: Corporate Strategies that Address Climate Change*, A. Hoffman, University of Michigan. Pew Center on Global Climate Change, 2006.
- Ibid.
- http://corporateportal.ppg.com/PPG/ecologicalsolutions/20_energy/. Viewed on March 6, 2009.
- www.worldwildlife.org/climate/climatesavers2.html. Viewed on March 18, 2009.
- www.ecomagination.com
- GE Press Release. "GE's 2008 Ecomagination Revenues to Rise 21 Percent, Cross \$17 Billion." Retrieved 7 November 2008: <http://ge.ecomagination.com/site/#press/2008revenue-rise>.
- Caterpillar. 2007. "Endless: 2006 Sustainability Report." Available online: http://www.cat.com/cda/files/457948/7/YECX1230_2006_Caterpillar_Sustainability_Report_100.pdf
- The Bottom Line on Cap-and-Trade*. Compiled by E. Metzger. World Resources Institute, 2008.
- For example, through WRI's *Bottom Line on Climate Policy* series. <http://www.wri.org/publication/bottom-line-series>.
- Some WRI partners participate in multiple climate policy dialogues.
- 25 companies and 5 environmental groups, including WRI, are members of USCAP. www.us-cap.org, viewed on March 23, 2009.
- Convened by CERES, 8 companies are members of BICEP. www.ceres.org/BICEP, viewed on March 23, 2009.
- http://www.us-cap.org/pdf/USCAP_Statement-on-Waxman-MarkleyDiscussion.pdf, viewed on April 7, 2009.
- IPCC, 2007: Technical Summary. In: *Climate Change 2007: Mitigation*. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Barker T., I. Bashmakov, L. Bernstein, J. E. Bogner, P. R. Bosch, R. Dave, O. R. Davidson, B. S. Fisher, S. Gupta, K. Halsnæs, G.J. Heij, S. Kahn Ribeiro, S. Kobayashi, M. D. Levine, D. L. Martino, O. Masera, B. Metz, L. A. Meyer, G.-J. Nabuurs, A. Najam, N. Nakicenovic, H.-H. Rogner, J. Roy, J. Sathaye, R. Schock, P. Shukla, R. E. H. Sims, P. Smith, D. A. Tirpak, D. Urge-Vorsatz, D. Zhou, [B. Metz, O. R. Davidson, P. R. Bosch, R. Dave, L. A. Meyer (eds)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- Fourth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC, 2007.
- Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007*. U.S. Environmental Protection Agency, 2009. <http://www.epa.gov/climatechange/emissions/downloads/09/07ES.pdf>
- Leveling the Carbon Playing Field*. T. Houser, Bradley, R. et al. Peterson Institute for International Economics and World Resources Institute, 2008.
- U.S. Energy Information Administration, *Annual Energy Review 2007*. Report no. DOE/EIA-0384(2007).
- A smart grid would use technologies and tools to significantly improve the efficiency and reliability of the electric grid. *The Smart Grid: An Introduction*. Prepared for the U.S. Department of Energy by Litos Strategic Communication. [http://www.oe.energy.gov/DocumentsandMedia/DOE_SG_Book_Single_Pages\(1\).pdf](http://www.oe.energy.gov/DocumentsandMedia/DOE_SG_Book_Single_Pages(1).pdf).
- Opportunities and Challenges for Carbon Capture and Sequestration*. Logan, J., Venezia, J., Larsen, K. World Resources Institute, 2007.
- Ibid.
- Climate Change – A Business Revolution? How tackling climate change could create or destroy company Value*. The Carbon Trust, 2008.
- Ibid.
- "Next practice" is a term coined by business management guru and WRI board member, C.K. Prahalad.
- "Focus on next practices, not on best practices." CNBC-TV18 interview with C.K. Prahalad, May 19, 2008. <http://www.moneycontrol.com/india/news/management/focusnext-practices-notbest-practices-ck-prahalad/13/17/338643>.
- Water and Watts*. E. Metzger et al. World Resources Institute, Southeast Energy Efficiency Alliance, Southface Energy Institute. April 2009.
- Referred to as Scope 1, direct emissions in the GHG Protocol *Corporate Accounting and Reporting Standard*.
- 57 percent of Global 500 companies responding to the Carbon Disclosure Project's 2008 survey use the WRI/WBCSD GHG Protocol. *CDP 2008 Quick Facts*. <http://www.cdproject.net/reports.asp>. Viewed on April 9, 2009.
- The GHG Protocol Initiative is currently developing product and supply chain standards. www.ghgprotocol.org.
- www.cdproject.net. Viewed on March 24, 2009.
- http://www.oag.state.ny.us/media_center/2008/oct/oct23a_08.html. Viewed on March 24, 2009.
- http://www.naic.org/Releases/2009_docs/climate_change_risk_disclosure_adopted.htm. Viewed on March 24, 2009.
- IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 7-22.
- Adapting to Climate Change: A Business Approach*. Pew Center on Global Climate Change.
- Ibid.
- www.walmart.com/sustainability/. Viewed February 14, 2009.
- www.betterplace.com. Viewed February 13, 2009.
- Ibid.
- Stabilization Wedges: Solving the Climate Problem for the next 50 Years with Current Technologies*. Pacala, S., Socolow, R. Science 305.2004: 968-972.
- According to the National Renewable Energy Laboratory "almost every area of the country can take advantage of renewable energy technologies, but some technologies are better suited for particular areas than others." <http://www.nrel.gov/rredc/>
- PG&E Corporate Responsibility Report, 2007.
- Towards a Climate-Friendly Built Environment*. M. Brown, Southworth, F., Stovall, T. Oak Ridge National Laboratory. Prepared for the Pew Center on Global Climate Change, 2005.
- Reducing Carbon Dioxide Emissions through Improved Energy Efficiency in Buildings*. Loper et al. Alliance to Save Energy, 2008. http://www.climateactionproject.com/docs/PCAP_Buildings_Report_5-8-082.pdf.
- U.S. Department of Energy, ENERGY STAR program. http://www.energystar.gov/ia/business/BJM_recommissioning.pdf
- Energy Information Administration. 2008. "Commercial Buildings Energy Consumption Survey." Available online: www.eia.doe.gov/emeu/cbecs/.
- Navigating the Numbers: Greenhouse Gas Data and International Climate Policy*. K. Baumert, Herzog, T., Pershing, J. World Resources Institute, 2005
- By 2010, approximately 10 percent of commercial construction starts are expected to be green. *Green Building Smart Market Report*, McGraw Hill, 2006
- For example, the U.S. Department of Energy's Building Technologies Program.
- U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy.
- World Business Council for Sustainable Development, Energy Efficiency in Buildings program.
- www.architecture2030.org, viewed February 13, 2009.
- Towards a Climate-Friendly Built Environment*. M. Brown, Southworth, F., Stovall, T. Oak Ridge National Laboratory. Prepared for the Pew Center on Global Climate Change, 2005.
- Competitive Advantage on a Warming Planet*. J. Lash, Wellington, F. Harvard Business Review, 2007.
- Smart Garage Charette Pre-Read, v2.0. Rocky Mountain Institute. October 2008.
- www.betterplace.com. Viewed February 13, 2009.

ABOUT THE AUTHORS

Samantha Putt del Pino is director of WRI's U.S. Climate Business Group.

Eliot Metzger is an Associate in WRI's Climate and Energy program.

John Larsen is a Senior Associate in WRI's Climate and Energy program.

ABOUT WRI

The World Resources Institute is an environmental think tank that goes beyond research to create practical ways to protect the Earth and improve people's lives. Our mission is to move human society to live in ways that protect Earth's environment for current and future generations.

Our programs meet global challenges by using knowledge to catalyze public and private action:

- To reverse damage to ecosystems. We protect the capacity of ecosystems to sustain life and prosperity.
- To expand participation in environmental decisions. We collaborate with partners worldwide to increase people's access to information and influence over decisions about natural resources.
- To avert dangerous climate change. We promote public and private action to ensure a safe climate and sound world economy.
- To increase prosperity while improving the environment. We challenge the private sector to grow by improving environmental and community well-being.

In all of our policy research and work with institutions, WRI tries to build bridges between ideas and actions, meshing the insights of scientific research, economic and institutional analyses, and practical experiences with the need for open and participatory decision-making.



WORLD
RESOURCES
INSTITUTE

10 G Street, NE
Suite 800
Washington, DC 20002
www.wri.org

ISBN: 978-1-56973-719-4