

Industrial Energy Efficiency as a Risk Management Strategy

*Cullen Naumoff and Anna Monis Shipley,
American Council for an Energy-Efficient Economy*

ABSTRACT

Energy efficiency is an effective strategy to minimize a company's *overall enterprise risk*. It can be utilized as an element of a risk management portfolio or as a lone strategy. Due to its common sense approach, even companies without financial energy managers can implement energy efficiency technologies relatively effectively and inexpensively. Operational risks mitigated by energy efficiency include both short-term benefits in acquiring best price guarantees but also long-term risks in market direction. Furthermore, minimized risk in energy markets through energy efficiency gives companies a competitive edge. Energy efficiency as a risk management strategy is a reliable source of continual minimization of enterprise risk and improved bottom line.

Introduction

Industry utilizes risk management as a tool in efforts to maximize the bottom line. Industry embraced risk management strategies in the 1960s and since then it has become a key component of a comprehensive business strategy. Peter Fusaro, author of *Energy Risk Management*, explains, "The risk management process reduces financial exposure associated with price volatility by substituting a transaction made now for one that would be made at a later date." (Fusaro 1998). Risk management aids companies in minimizing operational surprises or losses. Traditional strategies to combat against unwanted exposure in this market include hedging and long-term futures contracts. In recent decades, energy has become a greater risk to profitability due to the volatility that exists in the oil and natural gas markets. Therefore, companies now consider energy as an element of their risk management portfolios. The following explores the topic of considering energy efficiency as a risk management tool in reducing exposure to the volatility of the energy market.

Energy efficiency has traditionally been embraced at plant level. Techniques are utilized to reduce a specific plant's energy consumption or new energy-efficient technologies are installed. However, energy efficiency can be effective as a corporate strategy as well. Plant-level interactions with energy efficiency yield immediate gains, while energy efficiency as part of the corporate agenda delivers long-term benefits. Energy efficiency employed at the corporate level as a risk management strategy provides leadership for the rest of the company to follow suit. Donald Wulfinghoff, a Maryland-based consultant, notes, "Effective management of energy costs cannot occur until the top executive takes personal control of them." (Muson 2006). Energy efficiency has the opportunity to reduce exposure to market volatility through reducing energy expenditures, reducing energy's fraction of operating costs, and increasing overall awareness of company energy use (Elliott 2006).

What Role Does Energy Efficiency Play in Risk and Risk Management?

Securing reliable, low-cost, long-term energy sources in the current volatile market has become a pressing issue for most companies. As a result of the volatility in the energy markets, it is increasingly expensive (if not impossible) to lock in energy prices for the future (Wellington and Sauer 2005). “*Annualized price volatility for crude oil is twenty-five percent per year. For natural gas, it is forty percent, the highest of any commodity.*” (Fusaro 1998). Thus, the importance of managing energy in terms of enterprise risk is imperative. Market volatility can greatly increase a company’s strategic and financial risk. In recent decades, energy has also been seen as a growing environmental issue. Companies who are perceived as large energy consumers will also have to fend off public reputation risk. “The companies that have potential for creating significant value are those that have the most strategic options available to embrace a low-carbon world.” (Goldman Sachs 2005). Energy is a common element in *supply risk*, *productivity risk*, and *technical risk* and therefore is an important risk management strategy in managing costs and productivity (Garforth 2006).

Definition of Enterprise Risks

1. **Strategic risk** is the current and prospective impact on earnings or capital arising from adverse business decisions, improper implementation of decisions, or lack of responsiveness to industry changes. This risk is a function of the compatibility of an organization’s strategic goals, the business strategies developed to achieve those goals, the resources deployed against these goals, and the quality of implementation.
http://www.bankersonline.com/tools/riskmgt_strategicrisk.doc
2. **Financial risk** is often defined as the unexpected variability or volatility of returns, and thus includes both potential worse than expected as well as better than expected returns. Furthermore, the risk indicates that a company or project may not have adequate cash flow to meet financial obligations.
http://en.wikipedia.org/wiki/Financial_risk
3. **Reputation risk** is the current and prospective impact on earnings and capital arising from negative public opinion. This affects the institution’s ability to establish new relationships or services or continue servicing existing relationships. This risk may expose the institution to litigation, financial loss, or a decline in its customer base. Reputation risk exposure is present throughout the organization and includes the responsibility to exercise an abundance of caution in dealing with its customers and the community.
http://www.bankersonline.com/tools/riskmgt_reputationrisk.doc

Energy efficiency can effectively mitigate the three types of enterprise risk. Strategic risk involves reacting to market needs. This type of risk requires companies, large or small, to have a vision of the future direction of the market and its requirements. In today’s world, carbon emissions are a real threat and thus a global carbon cap-and-trade system is a coming reality. Energy efficiency can be a valuable tool in reducing greenhouse gases and thus can play a role in reducing this strategic risk. Furthermore, companies who drag their feet in this arena will certainly lose competitive edge. Energy efficiency is a key component of any well-rounded business energy strategy.

Financial risk can be effectively mitigated through energy efficiency. In this scenario, companies are strategizing against market volatility. As a risk management approach, energy efficiency is instrumental in lowering a company’s demand for oil or natural gas. Energy efficiency technologies and best practices are an effective, yet relatively inexpensive approach to

reducing dependency on fossil fuels. As a direct result of reduced demand, a company's exposure to market volatility is also reduced as their fossil fuel consumption wanes. Thus, energy efficiency proves to be an effective management tool to mitigate financial risk.

Finally, energy efficiency also acts as a player in mitigating reputation risk. Reputation risk has become increasingly more imperative in today's world. Consumers are progressively more concerned with global climate change and the United States' endless energy consumption. Becoming "green" has become all the rage. Companies who refuse to embrace environment-friendly business practices will not only suffer when federal regulations are created but also en route as they suffer consumer and shareholder backlash for failing to meet green standards. Energy efficiency, however, can be utilized as risk strategy to improve reputation. Energy efficiency is looked upon positively, as consumers and shareholders alike consider it an initiative to decrease energy consumption. Energy efficiency will mitigate unwanted consumer and shareholder environmental dissatisfaction. Energy efficiency is an effective business tool that is a key player in any risk management portfolio. It not only provides a stable and reliable source of energy reduction, but it also aids in mitigating risk that is not directly financially related.

Corporate Paradigms

According to Howard Muson, energy use is often a company's third or fourth largest cost. As such a huge investment, corporate leadership should be very interested in strategies invested to manage this ever-variable cost. Embracing energy efficiency at the corporate level can result in a multitude of benefits. A corporate approach solidifies a company's commitment to reduced energy consumption. Furthermore, by including a broad spectrum of individuals on the risk management team, this delegates responsibility throughout several departments to effectively institutionalize responsible energy use. This approach yields a long-term investment in managing energy as opposed to short-term hedge funds or even contracts. While even these strategies vary in time, energy efficiency provides a stable tool in risk management.

Michael S. Pappas, Senior Vice President of Modular Process Control, maintains, "The important paradigm shift that a manufacturing company has to make, at least initially, is to treat energy efficiency as a management issue, not an engineering issue." (Muson 2006). Creating a sense of energy cost accountability is pivotal in providing a focused incentive to responsible energy use. As volatility is increasingly an issue of concern, companies are forced to think creatively to continue operation at baseline costs. Energy efficiency provides a stable tool to reduce a company's energy demand, but additionally offers a strategy to mitigate passing on the higher price to the customer. In a high competition market, this is key to survival.

Companies regard government regulation as imminent (Hoffman 2006). Adopting energy efficiency as a risk management strategy provides a proactive approach to doing business. The long-term outlook shows the imperative nature of acting before government regulations are implemented. In this manner, regulations are a surprise element in doing business. Finally, energy efficiency as a corporate goal will lead to an overall reduction in greenhouse gas emissions. This sole element will give companies an edge as the global climate change debate continues and the United States begins to form its approach to the issue.

Energy can no longer be dumped into corporate's environmental bag. While reduced energy consumption does have positive environmental impacts, this perspective is continually overlooked in many companies. "Traditionally, the environmental agenda was dismissed as fluff by many corporate leaders, who when asked about the subject would direct inquires to their

managers of public affairs.” (Russell 2003). In addition, energy can no longer be regarded as a mere operational parameter, but must be understood as a business strategy (Garforth 2006). The mindset still exists in many companies that energy is just another element of doing business, when in reality, energy represents one of the highest controllable costs in a facility. Moving energy from the environmental and operational arenas into a component of business strategy is the first step in responsible energy management. “What perhaps has not been appreciated as much, is how complacency about energy use increases a company’s vulnerability in volatile energy markets.” (Muson 2006). Energy is a raw material that must be measured, quantified, and utilized from a bottom line perspective.

Approaches and Strategies to Managing Energy Risk

Industrial companies are concerned with the severe volatility that exists in the oil and natural gas markets, as it has an effect on their respective budgets. Energy price volatility may take away a company’s ability to dedicate funds to capital and productivity improvements. Different-sized companies manage this volatility with different methods at various levels. Unfortunately, there is not a cookie cutter approach that will effectively suit all types and sizes of industry. Clearly, large companies are at an advantage in terms of the resources they can dedicate to their energy and risk management team. Nonetheless, various methods are still applicable to all corporations. Energy efficiency is a universal approach that will have the same result, on different scales, throughout all of industry.

Hedge funds tend to be the most popular strategy in the effort to reduce exposure to market price volatility. Regardless of company size, most have been forced to learn basic hedging strategies in effort to manage market volatility. Businesses must have some idea of how much energy they plan on consuming based on historical records. In addition, access to market forecasts is pivotal to hedge at the appropriate time. Finally, the company must target the risk appetite (the amount of risk they are willing to undertake) and factor the implications of additional tools they plan in utilizing to minimize exposure (Jackson 2006). Hedging involves complicated interactions from all facets of a company’s operation. Ultimately, even making an informed hedge does not always guarantee the most effective reduction in risk.

Large companies typically enjoy greater success in employing hedge funds. However, as mentioned previously, this is mainly due to the greater number of expert resources they can dedicate to the process. For example, Alcoa has an entire department dedicated solely to hedging and market strategies. They cooperate closely with (1) engineers who provide energy consumption data, (2) schedulers who predict how much energy the plant will require in upcoming months, and (3) the corporate board who determines the amount of risk Alcoa is willing to undertake. This collaboration aids Alcoa in hedging an appropriate amount of energy at a relatively affordable price. Small companies lack this type of inner communication and funds to dedicate to decisions of energy management. Typically they are fully engaged with items that are perceived as more critical to the bottom line.

Additional favored approaches include long-term and futures contracts, arbitrage, and even investment in renewable energy. However, contracts are beginning to become obsolete due to the severe variance in the market making contracts impossible to create. In addition, many corporate boards are limiting contracts to a relatively short period of time. Arbitrage also represents a risky venture and is rather atypical in today’s market conditions. Renewables are a growing trend in the effort to mitigate oil and gas prices. Unfortunately, access to renewables

sources vary regionally and thus make these sources an unlikely consistent risk management tool. Companies who utilize a combination of these financial tools typically experience an effective mitigating system.

A risk portfolio approach offers the ideal strategy. However, for many small and medium-sized companies this is not an option. Energy efficiency, which fills an important gap in these cases, is a relatively straight-forward and inexpensive method that still has much potential in small and medium-sized industry (Shipley and Elliott 2006). Using energy efficiency, these companies are able to reduce their energy demand, and accordingly reduce their exposure to the volatile oil and gas market. “Since the oil futures market has effectively created a world price for oil, there is no price advantage to simply increasing domestic production. Rather, reducing consumption and developing alternatives such as renewables and biofuels are the most effective solutions.” (Friend 2005). This is an uncomplicated strategy that does not require expert financial advisors, but gives small and medium-sized industry an opportunity to begin to manage their energy. Moreover, energy efficiency also offers large industry an additional risk portfolio member. Energy efficiency in a large manufacturing company will reduce overall demand, which results in a reduced overall investment required in energy.

Corporate Case Studies

The following case studies chronicle three companies and their approaches to energy consumption and strategies to avoid becoming a victim of today’s volatile energy markets.

Alcoa

Alcoa is the world’s leader in aluminum smelting capacity and the world’s second largest producer of aluminum (Alcoa 2006). Energy represents a significant portion of the company’s total operating costs. According to Jay Rateau, an energy purchaser at the company, Alcoa currently operates on natural gas, oil, and electricity. As energy is essential to the business, it has been forced to take initiative in the energy arena, otherwise its operating costs would have skyrocketed. It has developed an energy strategy that includes three pillars: conservation, physical use, and financial concerns. Alcoa aims to use only what is necessary for operation. Its necessary fuels are then purchased with the aid of an entire strategizing department. Clearly, energy is a key component in their risk management plan.

From a risk perspective, Alcoa approaches the purchase of oil and natural gas with similar strategies. It uses a portfolio approach to ensure best price scenarios. Alcoa engages in contracts with the producing market to purchase both oil and gas. Typically, contracts are purchased through the bank who acts as a third party. Alcoa is then required to pay the bank settlement payments. Purchasing from the index with the use of hedges is also a popular tool. Cap, collar, and ceiling mechanisms are devices used within Alcoa’s hedging strategies. A cap gives customers the right to purchase fuel oil at a ceiling price when the market price is higher and at the market price when it is lower. Caps are most beneficial to customers who wish to limit their exposure to high prices, but take full advantage of lower prices when the fuel oil market declines. A collar likewise gives customers the right to purchase fuel oil at a ceiling price when the market is higher and at the market price when it is lower, but with a lower limit of the floor price. This allows customers to limit exposure to upward price movements at a lower cost than a cap.

In effort to purchase natural gas, Alcoa will also approach the wholesale market at various stages of production to acquire the best price. Negotiations with the distributor are typical, despite the battle that ensues over entity of value. All contracts made directly with the producer are typically indexed with Henry Hub (the wholesale natural gas hub in Louisiana that is typically referenced as the base wholesale natural gas price) and fixed floating swaps are common tools in these interactions. Finally, Alcoa mitigates the variability needed by production with field and market zone storage. This allows Alcoa to over- or under-buy and store the gas at the producers' end for a reasonable fee.

Energy efficiency has also been an active player in Alcoa's energy strategy. In 1999, Alcoa began a partnership with the U.S. Department of Energy (DOE) to identify opportunities for reducing energy consumption at its aluminum processing facilities. Since then, Alcoa has identified up to \$60 million in savings and reduced its operating costs by more than \$15 million (U.S. Department of Energy 2006). Alcoa has embraced energy efficiency as a strategy to reduce its energy consumption across the board. Furthermore, 20% of the efficiency opportunities can achieve savings through "no-cost" projects while the remaining 80% require two-year paybacks or less. Similarly, these projects have resulted in a reduction in Alcoa's greenhouse gases. Just under 450,000 metric tons of greenhouse gases were eliminated last year due to energy efficiency projects. These results are a huge player in mitigating reputation risk. Alcoa's corporate commitment states, "The company wide philosophy.... boosts Alcoa's image locally, regionally, and globally." (US Department of Energy 2006). Energy efficiency has reduced Alcoa's exposure to the volatility of the market and has been a big player in minimizing the overall risk.

Alcoa has become a global leader in energy management and this has transpired as a successful risk management plan that represents a successful approach to volatility mitigation. Alcoa has not only strategized well, but it also has the resources and capability to appropriately manage these concerns. An entire department is dedicated to gathering relative energy consumption data, watching the markets, and making appropriate moves. The more energy efficiency opportunities that are taken advantage of, the less energy this department must worry about purchasing. The large manufacturing company is fortunate to enjoy this type of dedication on all business fronts.

DuPont

DuPont is "a dynamic science company committed to creating sustainable solutions to improve life everywhere." It has committed to sustainable growth—in other words, continual increase in the value of its products while reducing its overall environmental footprint. Although its total energy costs represent just 10% of its operating costs, it has realized risk benefits with an energy management plan. In 1999, DuPont adopted a Corporate Energy Management (CEM) strategy based on Six Sigma projects. "Fuel price spikes and constant volatility underscored the need to take more coordinated action. In addition, new concerns emerged regarding potential environmental regulation." (Russell 2005). Energy efficiency played an important role in the CEM approach that led to reducing annual energy use to 6% below 1990 levels.

Is it really worth the worry for companies like DuPont whose relatively small total energy consumption won't sink them in costs?

For the majority of companies, energy is one of many inputs that enable the creation of products. Energy expenses generally represent less than five percent of total operating costs, although energy tends to be a much higher percentage of controllable costs. Regardless of the percentage expenditure, a breach in fuel or power supplies can nonetheless stop production, which greatly impacts business performance through wasted raw material, idle resources, and lost revenue. While a company's ability to control the availability and cost of energy may be limited, its ability to plan for and manage potential effects is much greater.

Source: Alliance to Save Energy (2003), pg. 2.

The year 2004 marked DuPont's big push in energy efficiency according to William Bailey, Principal Consultant in Energy Engineering at the company. It pushed through energy efficiency projects as part of the CEM Six Sigma approach. DuPont used energy efficiency as a means to reach its 2010 goals of returning energy consumption to 1990 levels. Bailey noted that in the 2004–2005 time span, DuPont experienced a 3.5% to 4% reduction in total energy consumption. This has had an obvious effect on DuPont's energy demand.

DuPont's energy management approach has yielded successful results due to the corporate approach that has entwined the entire company in the philosophy and unexpected multifaceted benefits of energy efficiency. Bailey describes the three parties involved with CEM as Senior Management, Plant Engineers, and Central Technology, who provides second-party assessments. Each group has a different incentive for employing energy efficiency, but all share common ground in working toward the bottom line—reducing energy consumption.

Energy efficiency as part of CEM has three main purposes, according to Bailey. These include mitigating the volatility of the energy market, increasing the rate of return to shareholders, and improving environmental responsibility. The goals play roles in mitigating risk in financial, *strategic*, and reputation risk, respectively. Thus, energy efficiency has become an essential element in DuPont's risk management portfolio. Furthermore, it should be noted that DuPont's success is largely due to corporate's role in committing to reducing energy consumption. It has embraced energy efficiency as a business strategy, which has led to not only financial savings and less market exposure, but also to unprecedented reduction in greenhouse gases. DuPont continues to please both the business and environmental communities.

Metal Castings Technologies, Inc.

Metal Casting Technologies, Inc., located in New Hampshire, is a General Motors Corporation and Hitchiner Manufacturing Co, Inc. joint venture research and development company. This small company focuses on generating new near-net-shape casting technology (Metal Casting Technology 2000). Although a much smaller corporation than Alcoa and DuPont, it too is concerned about the future of energy, especially in the business in which it is involved. Despite not having the same resource capability to devote to the subject, Paul Mikkala, president of the company, has taken it upon himself to change the face of his company in light of growing energy concerns. Metal Castings Technologies, Inc. will lead the way for future casting companies to follow in responsible energy consumption.

It must be noted that Mikkala's lead is a rarity in today's casting business. Raymond Monroe, executive vice president of the Steel Founders' Society of America, explains that since 2004 the casting business has had a boom in business and experienced situations of shortage in capacity. The current situation lacks incentive for these companies to be concerned about energy management. He continues, "Small companies have greater things to consider than energy when this cost can realistically be passed on to the customer." Small companies like those Monroe advises are unable to dedicate resources solely to methods like Six Sigma or energy management. In recent years with the casting industry's drastic increase in production, due to the constant business and lack of competition, it is feasible for these companies to implement an energy surcharge to stabilize a rise in energy operational costs. Monroe questions, "What is the incentive in their situation?"

Mikkala, however, has found an incentive for Metal Casting Technologies, Inc., and the operation is currently under a visionary transformation to reduce energy consumption by 75%. Mikkala is well aware of the volatility that exists in the oil and natural gas markets and the burden it places on operations. He says, "We are at the mercy of the pipeline and suppliers." His company does not have the resources to dedicate to financial market strategies that would decrease the market risk. Mikkala contemplated using biomass as an additional energy resource, but quickly calculated that the return on investment would not be high enough to sustain the company. Eventually, the sagacious president decided to reinvent the current process and replace old machines with new energy-efficient technologies. Although this required a large investment in capital funding, Mikkala saw this as the future of the casting business. The casting industry's large energy demand has the potential to be an influential element in profitability. Paul Mikkala and Metal Casting Technologies, Inc. have taken pro-active action with energy efficiency in mitigating this potentially high risk situation.

Summary and Conclusions

Energy efficiency plays an essential role in minimizing risk in any risk management strategy, regardless of the size of a company. Admittedly, implementation and portfolios will vary in these companies but benefits are universal. In any situation, energy efficiency is an important component in mitigating financial risk. In today's volatile oil and natural gas market, reduction in energy consumption through energy efficiency provides a reliable source to continually reduce exposure to the market's instability. Large and small companies alike benefit from a lessened interaction with unpredictable energy prices. Furthermore, in large corporations with access to risk management departments, energy efficiency provides an added opportunity to minimize the need for third-party market players.

Additionally, federal industry-wide carbon regulation is imminent in the relatively near future (Friend 2005). Energy efficiency in small and large companies can provide low cost/no cost options to reducing their carbon emissions. "They [companies who engage now with carbon related risks] will develop a competitive advantage in managing climate-related costs and risk, exploiting new business opportunities created by restraints on greenhouse gases, and creating good will among stakeholders." (Friend 2005). The market will soon call for reduced emissions, namely in the form of a carbon cap-and-trade system. Energy efficiency provides a sustainable strategy to reduce emissions and therefore minimize this strategic risk. Moreover, this technique shows insight into the future outlook of markets and guarantees a long-term strategic approach.

The public is becoming increasingly aware of the consequences of irresponsible human interaction with the environment. Historically, industry has played a large role in this destruction. As trends in environmental consciousness continue to climb, industry will no longer be able to continue operation as is currently routine. Many companies, including those described above, are taking steps to rethink industry. Energy efficiency is an essential player in this transformation. As a relative inexpensive investment, energy efficiency can lead a company's environmental responsibility efforts. Furthermore, this strategy is a key component in reducing a company's reputation risk. Small or large, reputation is a pivotal element in profitability, and energy efficiency can provide a means to ensuring a positive perspective in the eyes of consumers.

Energy efficiency is an effective strategy to minimize a company's *overall enterprise risk*. It can be utilized as an element of a risk management portfolio or as a lone strategy. Due to its common sense approach, even companies without financial energy managers can implement energy efficiency technologies relatively effectively and inexpensively. Operational risks mitigated by energy efficiency include both short-term benefits in acquiring best price guarantees but also long-term risks in market direction. Furthermore, minimized risk in energy markets through energy efficiency gives companies a competitive edge. Energy efficiency as a risk management strategy is a reliable source of continual minimization of enterprise risk and improved bottom line.

References

Alcoa. 2006. *About Alcoa*. http://www.alcoa.com/global/en/about_alcoa/overview.asp.

Alliance to Save Energy. 2003. *Strategic Industrial Energy Efficiency: Reduce Expenses, Build Revenues, and Control Risk*. Washington, D.C.: Alliance to Save Energy.

Elliott, Neal. 2006. *America's Energy Straitjacket*. Washington D.C.: American Council for an Energy-Efficient Economy.

Friend, Gil. 2005. *Risk, Fiduciary Responsibility and 'Regulatory Insulation.'* Saratoga Springs, N.Y.: Corporate Strategies Today.

Fusaro, Peter C. 1998. *Energy Risk Management: Hedging Strategies and Instruments for the International Energy Markets*. New York, N.Y.: McGraw-Hill Companies, Inc.

Garforth, Peter (Garforth International LLC). 2006. Personal Communication. November 15.

Goldman Sachs. 2005. *2005 Sustainable Investing Report*. New York, N.Y.: Goldman Sachs.

Hoffman, Andrew. 2006. *Getting Ahead of the Curve: Corporate Strategies That Address Climate Change*. Arlington, Va.: Pew Center on Global Climate Change.

Jackson, Sydney (PA Consulting Group). 2006. Personal Communication. November 16.

Metal Casting Technology, Inc. 2000. <http://www.hitchiner.com/HIMCO/MCT.html>.

- Muson, Howard. 2006. *Stopping the Profit Drain from Higher Energy Costs*. New York, N. Y.: The Conference Board.
- Russell, Christopher. 2003. *Strategic Industrial Energy Efficiency*. Washington, D.C.: Alliance to Save Energy.
- . 2005. *Margins for Profit, Not Error: Corporate Energy Management at Dupont*. http://www.ase.org/uploaded_files/industrial/DuPont%20Case%20v08.pdf. Washington, D.C.: Alliance to Save Energy.
- Shipley, Anna and Neal Elliott. 2006. *Ripe for the Picking: Have We Exhausted the Low-Hanging Fruit in the Industrial Sector?* Washington, D.C.: American Council for an Energy-Efficient Economy.
- U.S. Department of Energy. 2006. *Case Studies*. http://www1.eere.energy.gov/industry/bestpractices/case_studies.html
- Wellington, Fred and Amanda Sauer. 2005. *Framing Climate Risk in Portfolio Management*. Washington D.C.: World Resources Institute.