Corporate use of carbon prices

Commentary from corporations, investors and thought leaders

June 2014

A white paper from CDP North America

About CDP and CDP Disclosure

CDP, launched in 2000 and formerly known as the Carbon Disclosure Project, administers an annual climate change questionnaire to public companies. The request is made on behalf of CDP's investor signatories, and results are made public online and in annual reports. CDP signatories are banks, investors, wealth advisors, pension funds, and other entities in the financial services sector.

In 2013, 1,000 US companies disclosed through CDP, including 334 companies from the Standard & Poor's 500. Globally, 54% of world market capital now discloses through CDP.

In 2014, CDP is collecting disclosure data on behalf of 767 investor signatories controlling $92 trillion in assets through its climate change program. Investors become signatories to CDP's questionnaires to secure disclosure of environmental data across four separate programs—climate, water, forests, and Carbon Action. The resulting data provides the financial community with information to help drive investment toward a low-carbon and more sustainable economy.

Findings and results of 2014 disclosures will be announced from September 2014.

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Introduction

In December 2013, CDP released a white paper[1] detailing how S&P 500 companies are using internal carbon pricing as a strategic tool in their business planning. The paper generated significant media interest, in large part because the companies that use these prices are typically industrial, manufacturing or fossil fuel companies associated with higher emissions profiles.

This strong interest led to many questions, asked both in the media and directly to CDP, about what carbon prices mean and how they function. Common questions included:

- Why are these companies using a carbon price?
- How are these prices calculated, and how do they function as internal costs?
- Do carbon prices drive strategy and investment?
- What are the implications of the use of these prices for investors, companies and policymakers?

This paper was conceived to provide insight on these and other questions through direct commentary from companies using carbon prices, investors, policy makers, and academics. These various perspectives demonstrate that corporate use of carbon pricing can spur innovation, curtail risk and provide investors with an economic valuation of climate-related risks and opportunities.

Senior leaders of major companies such as AEP, Disney, Microsoft, TD Bank, and Xcel Energy describe in their own words why and how their companies price carbon risk as part of their business strategy. Investors from Generation Asset Management and Pax, as well as former Goldman Sachs Chairman for Investment Strategies Bob Litterman, provide perspective on why properly valuing carbon is increasingly crucial to decision making among asset managers and owners.

The paper also features insights from thought leaders in this space, including former EPA Administrator Christine Todd Whitman and Jason Bordoff, who speak to how an internal price on carbon can encourage investment and grow the US economy. The World Bank goes beyond explaining this subject and issues a call to action for corporations to take leadership in managing climate change by engaging government and civil society and putting a price on carbon.

CDP hopes this paper can help companies identify how calculating and using internal carbon pricing can be a useful and effective tool to future-proof the financial performance of fixed assets.

With the recent EPA announcement on the regulation of existing power plants under section 111(d) of the Clean Air Act, it is clear this is an issue that will continue to rise in prominence in the coming months and years. As that happens, CDP will continue to provide valuable information to investors on how corporations are managing and leading the transition to a low-carbon economy.

CDP hopes this paper can help companies identify how calculating and using an internal carbon price can be a useful and effective tool to future-proof the financial performance of fixed assets.

1. Use of internal carbon proce by companies as incentive and strategic planning tool, CDP North America, December 2013.

American Electric Power

Nick Akins
Chairman, President & Chief Executive Officer

American Electric Power has used a carbon price within its internal planning processes for a number of years. As one of the largest providers of electricity in the United States and a large consumer of fossil fuels, appropriately valuing carbon is an essential part of prudent risk management.

In recognition of this potential risk, we have taken a number of steps to reduce our carbon emissions footprint over the past decade, including deploying energy efficiency programs, purchasing renewable energy and constructing new, highly efficient conventional generating facilities.

> The use of a carbon price favors investment in new zero- or low-carbon generation technologies, as well as gradual divestment (i.e. retirement) of older carbon-intensive generating sources.

Based on these actions and other factors, we have reduced our annual greenhouse gas emissions by 21% since 2005 and 31% since 2000—an exceptional achievement over such a short period of time. Furthermore, during the period of 2003–2010, AEP voluntarily participated in a binding carbon emissions reduction program through the Chicago Climate Exchange. AEP also constructed the world's first fully integrated carbon capture and storage project retrofitted to an existing power plant.

AEP uses a carbon price within its Integrated Resource Planning (IRP) process to appropriately capture the potential future policy and regulatory risk associated with carbon emissions. The IRP process is the fundamental pathway through which we assess and plan for providing reliable electric supply to our customers over a longer-term time horizon. The IRP is a formal process within many of our states, which involves publically disclosing a plan for future operations that is subject to review by regulators and stakeholders. In most cases, it includes a robust stakeholder process to inform the plan's development. AEP's IRP process considers all available resource and market options to achieve the least-cost plan.

The carbon price used within the IRP process is a fundamental input that places a relative value on carbon dioxide emissions from AEP's electric generating facilities and future facilities that may be considered within the planning process. The effects of carbon pricing are further integrated into AEP's forecasts for commodity pricing, including wholesale electricity, natural gas and coal. The use of a carbon price favors investment in new zero- or low-carbon generation technologies, as well as gradual divestment (i.e. retirement) of older carbon-intensive generating sources.

AEP's current carbon price reflects an expected market value for carbon emissions predicated upon either legislation or regulatory action requiring carbon emissions reductions in the early part of the next decade. At this point in time, the most likely avenue for carbon regulation directly affecting AEP's operations appears to be the US EPA's carbon emission standards under section 111(d) of the Clean Air Act. These regulations, released on June 2, 2014, may prompt a review of our carbon pricing assumptions due to the greater clarity around regulatory expectations.

Given the scope of AEP's operations, it comes as no surprise to investors that carbon is priced within AEP's planning process. This process will continue as long as the regulatory and financial risk remains. Our responsibility is to provide safe, reliable and affordable electricity to our customers in an environmentally responsible way and to ensure our investors receive a fair return. To meet these obligations, the use of an appropriate carbon price helps ensure that our capital investments are prudent and not at risk of becoming stranded.

AEP AMERICAN® ELECTRIC POWER

Bob Litterman

Chairman, Risk Committee, Kepos Capital; Former Chairman, Quantitative Investment Strategies, Goldman Sachs Asset Management

Science has clearly demonstrated that climate change is happening and is creating significant risk. Just last month, for example, a panel of climate scientists convened by the American Academy for the Advancement of Science published a report titled "What We Know," in which they wrote, "human-caused climate change is happening, we face risks of abrupt, unpredictable and potentially irreversible changes, with highly damaging impacts, and responding now will lower the risk and cost of taking action."

Pricing this risk appropriately is an obvious and urgent necessary step. Many governments around the globe, including the United States, however, have refused to create appropriate incentives to conserve on the production of greenhouse gas emissions. In fact, in much of the world there are very significant subsidies to the production and consumption of fossil fuels, and these subsidies are much larger in aggregate than the small incentives that do exist in some locations to reduce emissions.

Corporations in much of the world face an uncertain political environment in which there are no existing incentives to conserve on emissions, but in which such incentives are expected to be instituted at some point in the future. In this uncertain environment, corporations are forced to make assumptions about future emissions pricing in order to make decisions about which long-lived capital investments make sense. Moreover, the valuations of certain highly polluting assets, such as coal, will be negatively impacted by increased expectations of such incentives. Such assets are often referred to as stranded assets.

These assumptions about future incentives reflect not only expectations of when emissions pricing will start, if it is not yet in place, but also about the path of emissions prices over time. These incentives to reduce emissions are the only effective brake the world has. The appropriate time path of these incentives recognizes the uncertainty of climate change and therefore attempts to build in a margin of safety. In a rational world, such incentives would be created immediately, would be instituted across the entire global economy and would penalize emissions at a level economists refer to as the social cost of carbon, which the US government currently estimates to be around $37 per metric ton of carbon. The social cost of carbon is the best estimate of the externality created by emissions—the expected present value of the uncertain future damages they might cause.

Corporations typically report expectations that emissions incentives will begin soon, but will start at a level well below the social cost of carbon. They are then expected to increase slowly over time. Such expectations are based primarily on the assumption that political friction will prevent rational policy from being implemented for many decades.

There is, of course, an obvious risk in such expectations. The purpose of creating incentives to reduce emissions is to manage climate risk. Risk management policies are always an urgent priority and should never be implemented slowly. This is particularly true about climate risk, in which the uncertainty about potentially catastrophic impacts in the distant future is quite significant. Moreover, the expectation of an irrational delay in creating appropriate incentives creates its own perverse incentives for economic agents to speed up the use of stranded assets before the incentives are put in place. Of course there is no excuse for a government knowing of the risk to postpone a risk management incentive in order to allow owners of these assets to extract value before the risks are officially recognized. The creation of appropriate incentives to reduce emissions does not destroy the value of stranded assets; rather it causes the actual lower value to be recognized.

For investors, the immediate risk is that society, recognizing how irrational and risky such delay is, will move more quickly than is generally expected to eliminate the political frictions and to put those appropriate incentives in place. If so, then the artificially high valuations of stranded assets will fall to the level that appropriately and rationally reflects the damages that their emissions may create. Owning stranded assets at current valuations is a bet that rational incentives will not be put in place for a long time to come. Investors can best identify such overvalued assets by comparing the path of corporate emissions price expectations with their own view. The ability to make that comparison is the reason many investors are looking for transparency in corporate emissions pricing assumptions.

Columbia University

Jason Bordoff, Professor of Professional Practice in International and Public Affairs; Founding Director, Center on Global Energy Policy

> Greenhouse gas emissions are present in almost all areas of modern economic activity. The breadth of the problem demands a market-based approach.

While there are many reasons why companies would begin to account for an internal carbon price now, as indicated by CDP's December 2013 report, it should send a strong signal to policy makers that despite the divisive political debate around climate change, many in corporate America are preparing for some form of nationwide carbon pricing.

This should be viewed as good news. The necessity to counter the global increase in greenhouse gas emissions is only growing. Action will need to be taken at a national level, and the sooner it occurs, the lower the cost. Carbon pricing is the best option on the table to ensure the solution addresses our two major policy concerns, environmental protection and economic growth, in the most balanced way possible.

Greenhouse gas emissions are present in almost all areas of modern economic activity. The breadth of the problem demands a market-based approach. Whether through a tax, a cap and trade program, or some form of equivalent program, carbon pricing initiatives press industries to find the most economic and efficient way to cut the emissions associated with their business. It spurs innovation, as companies strive to find solutions that reduce the financial impact on their bottom lines, and, by extension, their consumers' bottom lines as well.

The failure of Congress to pass laws to reduce greenhouse gas emissions in a meaningful way increases the economic repercussions of climate change, raising the costs of future environmental endeavors as well as the risk of weather-related disasters, including droughts and floods.

There are success stories that show cap-and-trade systems can be effective. The Clean Air Act Amendments of 1990, signed into law by President George H.W. Bush, enacted limits on the amount of SO_2, the precursor to acid rain, that could be emitted by the country's coal-fired power plants. A robust trading program in SO_2 permits emerged as a result, slashing SO_2 emissions while providing cost savings on the order of $1 billion annually compared to what it would have cost under a command-and-control regulatory approach. The program also produced health benefits estimated between $50 and $100 billion per year.

Since cap-and-trade legislation failed in Congress, there have been calls to create carbon pricing in the form of a tax. Whether this will lead to meaningful legislative change seems unlikely at this point. All indications are that it will remain very difficult to find a majority in Congress to push through a carbon pricing solution to one of the greatest problems facing our country. That companies are already preparing for carbon pricing, however, shows they understand some form of policy response to the growing threat of climate change is likely to come at some point.

COLUMBIA | SIPA
Center on Global Energy Policy

Exelon Corporation

Christopher D. Gould, Senior Vice President, Corporation Strategy and Chief Sustainability Officer

As the nation's leading competitive energy provider, Exelon continually conducts near- and long-term modeling to best determine and inform our daily market positions, near-term portfolio management and decision making around investment and development.

We identify and regularly review key market drivers, including potential regulatory or policy influences such as a price on carbon, and use them in our ongoing analysis to capture a range of plausible future outcomes and develop our overall strategy. Because we focus on the three attributes of sustainable energy—clean, reliable and affordable—potential regulation of carbon is one of many considerations in our planning models, and results are weighed with other issues that may impact market conditions.

One way Exelon has used a price on carbon to develop a supply curve that ranked GHG abatement measures based on the price of carbon needed to support the economic viability of the options. This approach included both demand side and supply-side alternatives (e.g., energy efficiency, increasing nuclear capacity and renewables), and helped inform the Exelon 2020 strategy and goal to abate 17.5 million tonnes of GHG emissions annually by 2020. This approach supported prioritization of investments that ultimately led Exelon to achieve its goal in 2013.

Investors should value market forecasting expertise that focuses on ensuring short-term market performance while also being forward-thinking and seeking to ensure valid strategic direction under emerging market forces like climate change This balance of short- and long-term considerations is essential for ensuring corporate success, but also for meaningful integration of these issues into how corporations operate. As a result of our careful consideration of existing and potential market drivers across the energy value chain, Exelon has positioned itself as the leading US competitive energy provider, with one of the cleanest and lowest-cost power generation fleets and one of the largest retail customer bases in the United States.

Exelon has a solid platform for pursuing its continued commitment to sustainable growth and competitive markets, helping drive customer choice, innovation and efficiency in a carbon constrained economy.

Exelon has consistently supported market-based solutions as the most effective way to drive national carbon emission reductions. In light of EPA's proposed carbon regulations under Clean Air Act Section 111(d) for existing power plants, Exelon supports compliance solutions that treat all carbon-free resources equally, regardless of age or technology, and provide flexibility for states to adopt strategies that allow cost-effective solutions for consumers. Meaningful and verifiable reduction standards implemented in a market-based fashion will further enable corporations to factor carbon emissions into their strategic business planning and drive investments in technologies that will reduce greenhouse gas emissions.

> One way Exelon has used a price on carbon to develop a supply curve that ranked GHG abatement measures based on the price of carbon needed to support the economic viability of options.

Exelon

Generation Investment Management

Tammie Arnold
Global Head of Client Relations

The investment dynamics related to carbon (CO_2) emissions are complex and multifaceted, driven by continuing changes in regulation, market forces, consumer and societal pressures, and environmental litigation. Successfully navigating the changing landscape requires a thoughtful framework for risk analysis and management by companies and investors alike.

The framework should be one that incorporates downside risk analysis across asset classes (fixed income, equity, real assets, etc), as well as analysis of the substantial upside related to innovation and new technologies that enable more effective use of natural resources. Importantly, a robust framework should also consider the risks related to time horizon analysis, such as the compression of cycles of change seen in recent years as a result of the rapid development and adoption of disruptive technologies.

> A methodical approach to incorporating meaningful carbon pricing scenarios into valuation and analysis will help investors to consistently identify and evaluate risks and opportunities dispassionately, through an economic/financial lens.

As the various forces that could impair carbon-intensive asset valuations come to bear, investors with robust frameworks for incorporating CO_2 risk (e.g. a material price on carbon) into valuations will be better positioned to succeed. A methodical approach to incorporating meaningful carbon pricing scenarios into valuation and analysis will help investors to consistently identify and evaluate risks and opportunities dispassionately, through an economic/financial lens. Most importantly, carbon risk is no longer a left tail risk, but the lack of action could lead to a disorderly unwinding of exposure and more serious downside outcomes. However, the market has visibility into increasing vulnerability of carbon-intensive assets, and investors have ample time to thoughtfully adjust their capital allocation accordingly. In terms of engagement, investors can ask management and boards questions such as:

How does your CAPEX strategy map with the transition to a low carbon economy?

Are your business model and R&D strategy sufficiently positioned to capture value in a move away from fossil fuels?

How exposed is your long-lived fixed asset base to carbon asset risk?

The transition to a low-carbon economy will unlock an era of innovation presenting investors with opportunities to capture value as energy infrastructure and fossil-fuel dependent industries undergo unprecedented transformational change. This next chapter of capitalism will usher in resource and design innovations across industries. Changes in transport (e.g. electric vehicles and fleet logistics), energy generation (e.g. solar and wind) and water consumption (e.g. desalination and irrigation), to name a few, indicate that successful businesses will be ones that adapt their operating model to the emerging opportunities of a carbon-constrained economy. Companies that remain entrenched in outdated business practices and blind to the realities of the transition to a low-carbon economy will face increased risk of stranding, making their assets less productive and their stocks and bonds less desirable.

Furthermore, the momentum behind voluntary sustainability disclosure should serve as a signal to policymakers that even incumbents in carbon-intensive industries acknowledge the direction of investment capital. The time for including climate risk into business and investing decisions has never been more important. Incorporating a meaningful price on carbon into valuation frameworks not only helps investors and companies avoid misallocating capital and potentially owning assets that will be impaired in the transition to a low-carbon economy (whether CO_2 emissions are priced directly or indirectly); but, critically, it also illuminates emerging investment opportunities as creative solutions develop.

generation

Governor Christine Todd Whitman

Former EPA Administrator, Co-chair of the Clean and Safe Energy (CASEnergy) Coalition and President of the Whitman Strategy Group

> Those companies that incorporate a price on carbon when looking at their capital expenditures often find that the inclusion of this price changes the return profiles of their investments over the life of the assets.

Every day there is an increasing recognition of the dangers and challenges caused by climate change. As a former Administrator of the EPA and Governor and resident of a coastal state, I understand these challenges deeply. But, addressing climate change also presents us with opportunities to embrace new solutions as we build a cleaner energy portfolio.

Despite the attention given to political intransigence and hotly debated disagreements in Washington and at the United Nations, there is positive movement in addressing climate change. The global public is not willing to wait for stars to align in their governments or intergovernmental organizations; people are not only demanding action, they are acting. That is why it should not be surprising that companies, organizations and cities around the world are moving to measure, disclose, price, and reduce their carbon footprints.

What is interesting and important about the inclusion of internal carbon prices by so many companies is that this trend is changing the economics of doing business. Those companies that incorporate a price on carbon when looking at their capital expenditures often find that the inclusion of this price changes the return profiles of their investments over the life of the assets. The fact that they do this is prudent planning as a cost of carbon (or some other regulatory measure to reduce carbon emissions) could well be mandatory within the life of assets that can be as much as 30 years. When companies look at the world through this practical lens, they suddenly find that alternatives such as wind, solar, hydropower, geothermal and nuclear energy all become more attractive.

Cities, communities and corporations do not have the luxury to put off action any longer. They are on the front lines of climate change, day in and day out. All options for mitigating climate change are being brought to the table and weighed equally. That means solar, wind, hydropower, geothermal and nuclear energy all have a place in our energy portfolio.

In my work as co-chair of the Clean and Safe Energy Coalition, I have sought to drive an informed dialogue around all our energy choices—including highlighting the climate change and clean-air benefits nuclear energy brings to our portfolio. We're working to dispel old notions of nuclear energy and raise awareness of the many benefits it brings to communities across America, particularly when it comes to addressing climate change.

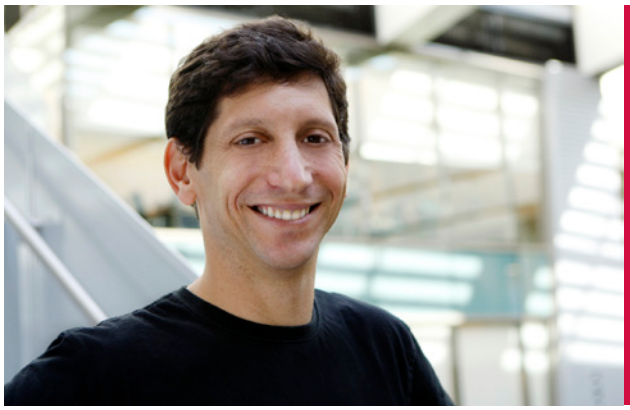
Nuclear energy already represents nearly two-thirds of America's emissions-free electricity, and it is the only source of carbon-free baseload electricity. That makes it a natural complement to other carbon-free, but intermittent, sources like wind and solar.

As cities, communities, and companies continue to take action on climate change, they will continue to put pressure on governments to come together and tackle what is becoming the defining struggle of our generation. Taking steps to measure, disclose, and then act on reducing carbon emissions—that's our commitment to a cleaner-energy future.

CASEnergy Coalition
CLEAN AND SAFE ENERGY

Microsoft Corporation

Rob Bernard
Chief Environmental Strategist



> By applying a financial cost to the carbon impact of our operations, it provides justification to prioritize efficiency—and therefore cost reductions—across the organization.

At Microsoft, we believe that we have a responsibility to address the environmental impact of the growing energy demands from our operations, services and devices. At the same time, we have an opportunity to demonstrate how the use of our technology can help accelerate the transition to a low-carbon economy.

A carbon fee model[1] is an excellent way to provide both the financial framework and the formal discipline to drive efficiency projects. By applying a financial cost to the carbon impact of our operations, it provides justification to prioritize efficiency—and therefore cost reductions—across the organization. It encourages everyone to get involved and has opened the door to conversations that weren't occurring otherwise by making everyone accountable for lowering the company's environmental footprint.

We've found over time that the more we can integrate sustainability goals across the business, the better position we are in to respond to changing economic, social and environmental conditions. Our carbon fee model supports a culture of innovation and efficiency at Microsoft. We are promoting the efficient use of resources and purchasing green power, and we hope to set an example by driving accountability through our internal carbon pricing and carbon fee model.

The fees collected from the carbon fee support important projects—from internal efficiency measures to renewable energy projects like the 110 megawatt Keechi wind project[2] in Texas. In addition, we invest in carbon offset projects such as biodiversity in Madagascar and Indonesia[3] and efficient cook stove projects in Mongolia.[4] These projects are not only offsetting GHG emissions, but they are also advancing global citizenship by improving health, protecting ecosystems and providing income and employment to local communities.

Realistically, it would not be possible for us to adopt this model if it did not benefit the overall productivity and profitability of our company. The growth of our business must also incorporate the greater needs of society. Increasing our efficiency and performance in a resource-constrained world across all of our operations is an important part of our efforts to be a better, more socially minded corporate citizen.

The world around us is changing, and as everyone has seen in the news, difficulties like extreme weather and droughts, severe pollution in cities and other environmental challenges continue to impact the world significantly. This is increasingly becoming a challenge for society, which makes it a bigger and bigger challenge not only for Microsoft, but also for our customers and partners. We have an amazing opportunity in front of us to tap into the culture of innovation and the power of cloud computing, devices and our partner ecosystem to enable a transition to a new way of thinking and interacting with our planet's resources.

Environmental sustainability is an important focus across our organization. Ultimately, we believe that making a commitment to becoming carbon neutral and implementing a carbon fee will continue to be good for both the environment and our business.

Microsoft

1. Microsoft carbon fee model.
2. "Microsoft Signing Long-Term Deal to Buy Wind Energy in Texas," Microsoft Green Blog, November 4, 2013.
3. "A Look Inside: Microsoft's Impact on Biodiversity through Offset Investments," Microsoft Green Blog, February 12, 2014.
4. "Microsoft's Carbon Offset Strategy: Making a Difference One Project at a Time," Microsoft Green Blog, September 3, 2013.

Pax World Funds

Julie Fox Gorte, Ph.D.
Senior Vice President for Sustainable Investing

In order to avoid catastrophic climate change—which means keeping future global warming below 2°C—we need to cut human-caused emissions of greenhouse gases (GHG) by 80% below 1990 levels by 2050.

Moreover, current global emissions are over 60% higher now than they were in 1990, making the challenge even more daunting. The penalty for not doing so will be increasingly torrential rainfall, persistent drought and rising sea levels.

Some companies are proactively working to slay the climate risk vampire, or at least weaken it, by using internal carbon prices. All of the 29 US companies that reported using carbon prices to CDP are leaders in addressing climate AND have done a commendable thing. A positive carbon price means that markets are reducing emissions below what they would otherwise have been. Pricing carbon emissions means that capital expenditures must incorporate the cost of carbon emissions in the planning process, and that tends to weed out projects that involve heavy emissions.

Similarly, a high carbon price will cut emissions more, and faster, than a low one. What carbon price would achieve the 80% reduction we need? Several studies have estimated that the European Union Emissions Trading System (EUETS), the world's largest and best established carbon market, has reduced emissions by around 2–8% since 2005 as part of the beginning of the first phase of the EUETS. That is a rate of reduction of less than 1% per year, and the prices that achieved it ranged from €30/tonne to about €3/tonne, but the lower figure reflects the impact of a global recession, when slowing economic activity has a tendency to cut emissions anyway.

Of the 29 US companies that reported establishing carbon prices, 11 said what those prices were, and they range from $6/ton to $60/ton (which comes out to $5.44 to $54.4/tonne). The low number comes from Microsoft, and the high one from Exxon-Mobil. It's impossible to know what true reductions will be at either company, but it is probably safe to assume that Exxon's price will cut emissions more than Microsoft's will. Will either be sufficient? It's impossible to know.

It is also important to know, especially for investors. Asset managers are always seeking out better-managed companies to invest in, and good management is about anticipating all significant risks, not just things that affect the balance sheet in the next quarter. Companies that use internal carbon prices are signaling investors that they are aware of the risks posed by climate change, both to society and to their own companies. Investors are increasingly aware of so-called black swan risks, or the risks of statistically unlikely but deeply damaging events, and the warmer the globe is, the more likely it is that the largest emitters of greenhouse gases will face reputational risks, not to mention physical risks to their own bricks and mortar from increasingly severe weather and rising seas. Companies with internal carbon prices are assuring investors that they do know the migration patterns of at least this specific black swan.

> Asset managers are always seeking out better-managed companies to invest in, and good management is about anticipating all significant risks, not just things that affect the balance sheet in the next quarter.

Leadership is ephemeral. To stay leaders, companies will need to start setting carbon prices that will reduce emissions in chunks rather than increments. That, in turn, means keeping accurate records on what reductions are achieved by the prices they have imposed, and adjusting those prices to achieve a rate of reduction that is consistent with what we need. In a world with a rapidly changing climate, leadership is a little like the way the Red Queen described traveling in ***Through the Looking Glass:*** "Now here, you see, it takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!"

1 CDP, "Use of internal carbon price by companies as incentive and strategic planning tool," December 2013.

2 Richard G. Newell, William A Pizer and Daniel Raimi, "Carbon Market Lessons and Global Policy Outlook," Science, Vol. 343, 21 March 2014.

3 See, for example, Lucas Merrill Brown, Alex Hanafi and Annie Petsonk, "The EU Emissions Trading System: Results and Lessons Learned," Environmental Defense Fund, 2012; Ralf Martin, Mirabelle Muüls and Ulrich Wagner, "An Evidence Review of the EU Emissions Trading system, Focussing on Effectiveness of the System in Driving Industrial Abatement," UK Department of Energy & Climate Change, July 10, 2012; and Tim Liang, Misato Sato, Michael Grubb and Claudia Comberti, "Assessing the effectiveness of the EU Emissions Trading System," Centre for Climate Change Economics and Policy Working Paper No. 126, Grantham Research Institute on Climate Change and the Environment Working paper No. 106, January 2013.

4 As of 2/28/14, Microsoft Inc. represented 1.2% of total assets of Pax World Balanced Fund, 2.0% of Pax World Growth Fund, 1.2% of Pax World Global Women's Equality Fund, 0.2% of ESG Managers Growth and Income fund, 0.2% of ESG Managers Balanced Fund, 0.1% of ESG Managers Income Fund, and 0.2% of ESG Managers Growth Fund. No Pax World Funds owned any shares of Exxon Mobil. Holdings are subject to change.

Stanford University

Stephen Comello and Stefan Reichelstein, Graduate School of Business and the Steyer-Taylor Center for Energy Policy and Finance


Stephen Comello


Stefan Reichelstein

> For proposed new capital investments, such as an oil extraction facility or a refinery, a $40 charge per metric ton of carbon dioxide is levied on all anticipated direct emissions that are attributable directly to the project's operations.

A case study in internal carbon pricing: Royal Dutch Shell

Like other major oil companies, Shell has imposed an internal charge on its own CO_2 emissions for several years. From publicly available reports and direct conversations with managers at Shell, we gather that this multinational company has adopted the following corporate policy: for proposed new capital investments, such as an oil extraction facility or a refinery, a $40 charge per metric ton (tonne) of carbon dioxide is levied on all anticipated direct emissions that are attributable directly to the project's operations.

As a consequence, proposed investments will meet the usual financial criteria in the capital budgeting process only if the projected cash flows do so subject to a $40/tonne tax that would hypothetically be paid to an outside party in connection with the project in question.

Our conversations with managers at Shell indicate that the company has adopted this form of shadow pricing in order to mitigate the financial risk associated with long-term investments in operating assets. To the extent Shell anticipates that substantial carbon prices will be imposed in future years around the world, the policy becomes a mechanism for curtailing investments at risk of "stranding" assets. At the same time, the policy is intended to incentivize business units to structure their operations so as to reduce emissions up to a marginal cost of $40/tonne of CO_2.

As a general rule, the $40/tonne charge is applied uniformly—that is, regardless of the business unit proposing a project or the location of the assets to be deployed. One exception to this rule pertains to projects proposed in jurisdictions with carbon pricing regimes already in place, e.g., refineries in California are obligated parties and therefore must obtain emission permits at a current price of $14/tonne. In that case the internal price of $40/tonne would be adjusted by the expected actual CO_2 charges so as to avoid "double-taxation."

It was emphasized that Shell imposes the internal carbon price as an "investment screening device" at the project selection stage. In particular, the $40/tonne charge is not applied in measuring the subsequent operating profits of the business units. This raises a broader issue that should be of interest to future field research. Imposing an internal carbon price only as an "investment screening device" could lead to a mismatch between investment planning and control. For projects with a long, useful life, it is unavoidable that actual cash returns will differ from forecasted returns. This, in turn, may create incentives for managers to engage in "creative optimism" when they present their original project cash flow forecasts. As a general management principle, it is therefore considered essential to have ex-post measures of performance that are consistent with the initial capital budgeting process. Yet such an alignment becomes difficult if the $40/tonne per charge is applied at the planning stage, without follow-through in the actual measure of profit received. Management at Shell points out that the company has an extensive set of checks and balances to prevent any "gaming" in the capital budgeting process. The empirical question then becomes whether such checks can be effective in a global and diversified company which otherwise relies on the principle of decentralized decision making.

STANFORD BUSINESS GRADUATE SCHOOL OF

TD Bank Group

Karen Clarke-Whistler[1]
Chief Environment Officer

> We use a carbon price to engage our more than 85,000 employees in our carbon-neutral initiative and make it a factor in just about everything we do.

In 2010, TD Bank Group (TD) became the first North America–based carbon-neutral bank, just one part of our commitment to environmental leadership. Our approach to achieving carbon neutrality has three elements: reducing our energy use, greening our energy supply and investing in innovative renewable energy credits (RECs) and carbon offsets—at least 50% of which have a social benefit.

How does our internal carbon pricing work? We calculate the cost of the RECs and carbon offsets on an annual basis and charge them back to our business groups based on the relative contribution of those groups to our overall carbon emissions. Our internal price on carbon is about $10 per tonne of CO_2e.

Having an internal price on carbon aligns with our approach of embedding the environment across our business. We use a carbon price to engage our more than 85,000 employees in our carbon neutral initiative and make it a factor in just about everything we do.

Being carbon neutral and having an internal price on carbon has quite literally transformed the bank. Take our facilities: for every tonne of emissions we can't eliminate through energy reduction, we have to invest real dollars to buy and develop offsets and RECs or purchase greener—and generally more expensive—energy. The potential for avoided costs AND increased environmental benefits is a business driver. We now approach the design and operation of all our facilities through a "green" lens. This has led to development of net zero energy branches; design standards for new stores that are 45% more energy efficient; solar installations on 100 facilities; a LEED platinum energy-efficient data center; and retrofitting of existing facilities. Our total GHG emissions from energy have decreased 11% from 2008, despite having a 23% growth in the space we occupy and almost doubling our revenue.

We've been able to leverage these valuable insights gained from our own facilities to create a range of low-carbon financial products and services for our customers. These offerings include financing for residential renewables and energy efficiency projects, insurance for hybrid and electric vehicles, $3 billion in financing to companies with low-carbon operations, and a very successful $500 million green bond—the first to be issued by a commercial bank in Canada. From 2006 to 2013, our investment in the low-carbon economy was more than $6 billion.

There's an old saying, "You can't go wrong by doing right" and that has proven particularly true when it comes to our carbon neutral commitment—it is something that resonates with our employees, our customers and our investors.

1 With support from Monica Sood, Chartered Professional Accountant, TD Environment

The Walt Disney Company

Beth Stevens, Ph.D., Senior Vice President, Corporate Citizenship, Environment and Conservation

> We have proven that putting a price on carbon isn't bad for business by making positive strides toward ambitious environmental goals, while simultaneously delivering three consecutive years of record financial performance.

From Disney's earliest days, we have believed that our concern for kids and families must extend beyond their entertainment to the world in which they live. Our actions as a company must meet the standard set by the stories we tell. Disney has filled this role through the responsible actions we've taken as a company, including our efforts to use our resources wisely and conserve nature as we operate and grow.

Central to our environmental stewardship efforts is our ambitious goal of achieving zero net greenhouse gas emissions. We believe that the private sector plays a significant role in advancing energy efficiency and that an internal price on carbon is an important tool.

Disney has found that by attaching a financial value to carbon, our businesses have an incentive to reduce their greenhouse gas emissions and to think creatively about new approaches and technology that will help reduce their carbon footprint. We have proven that putting a price on carbon isn't bad for business by making positive strides toward ambitious environmental goals, while simultaneously delivering three consecutive years of record financial performance.

Pricing carbon has engaged our businesses to assess the impact of their operations and evaluate where they can make improvements to reduce their emissions. Since our program requires each business segment to contribute an allocated fee based on their annual greenhouse gas emissions, their emissions directly impact their bottom line. We have also built this into our capital planning process, so that our businesses have to take the carbon fee into account when planning new capital projects.

The Disney Climate Solutions Fund (DCSF) was created to offset what we can't reduce. It is made possible because we have a price on carbon; fees from the carbon price flow directly into DCSF. Through DCSF, we purchase high-quality forest carbon credits to offset the emissions we haven't yet found a way to reduce. These projects not only help us meet our goal but provide many additional benefits besides carbon sequestration, such as conserving regions with high ecological and biodiversity value and protecting critical habitat and areas with valuable ecosystem services. Since 2009, Disney has invested $48 million in forest conservation, improved forest management and reforestation projects around the world.

Putting a price on carbon has proven to be an effective tool in stimulating emissions reductions, including maximizing energy efficiency and seeking low carbon alternatives. Investing in forest carbon projects enables us to address our remaining emissions now, while continuing to seek innovative ways to further reduce our emissions in the future.

Disney

The World Bank

Rachel Kyte, World Bank Group Vice President and Special Envoy for Climate Change

A dangerously warming planet is far more than an environmental challenge—it is a fundamental threat to efforts to end poverty and threatens to put prosperity out of reach for millions of people.

As we move to an era of growth through climate action, reports from the Intergovernmental Panel on Climate Change confirm that a robust price on carbon has never been more important. A strong price signal, especially in major economies, will establish the right incentives and direct financial flows toward efficient, resilient investments.

Pricing carbon is inevitable. A growing number of countries, provinces and cities are designing solutions. Over 40 national and 20 sub-national jurisdictions have already adopted emissions trading or carbon taxes or plan to launch them. Together, these countries and regions account for more than 22 percent of global emissions. Many more are developing policy packages that will price carbon.

Key in this is the message from businesses that they want certainty going forward and that pricing carbon will be a factor. Businesses see that carbon pricing is the most efficient and cost-effective means of tackling the emissions challenge. But if they want to maintain growth in a climate-impacted world, companies cannot wait for governments to act.

Many companies are already working within a carbon-pricing system and are developing expertise in managing their emissions. The leaders are also incorporating greenhouse gas reduction targets in their business planning and are disclosing climate risk to investors. Major companies worldwide have publicly announced greenhouse gas reduction goals that are leading them to accelerate their investment in energy efficiency, new business models and new businesses. They are also pricing carbon internally. More than 100 companies publicly disclosed to CDP in 2013 that they already utilize carbon pricing as a tool to "future proof" their business models—managing risks and opportunities to current operations and future profitability.

There is also a growing body of evidence that corporate disclosure on climate change correlates well with strong financial performance. In a recent study, CDP found that industry leadership on climate disclosure is linked to higher performance on three key financial metrics that reflect overall corporate quality: return on equity (+5.2% p.a. between top 20% companies and bottom 20% companies), cash flow stability (+18.1% p.a.) and dividend growth (+1.6% p.a.). CDP's work is important. Getting the word out is critical to help a race to the top iterate with public policy change.

Momentum is growing. Countries and companies are preparing for a world with an increasing cost of carbon and the cost-effective solutions needed at scale. There are trade-offs. Invest now, reap reward later. New, cleaner jobs are emerging, reflecting a transition from brown jobs. But transition and trade-offs can be managed, as they have with every other revolution. Corporate leadership, as CDP reveals, is managing that process, not trying to turn back the tide.

As part of the global effort to mobilize ambitious action and political will to complement and support a meaningful global climate agreement in 2015, United Nations Secretary-General Ban Ki-moon has invited heads of state and government, along with business, finance, civil society, and local leaders, to a Climate Summit in New York on September 23, 2014. The Summit aims to catalyze action that will shift the world to a low-carbon, resilient economy.

> Pricing carbon is inevitable. A growing number of countries, provinces and cities are designing solutions.

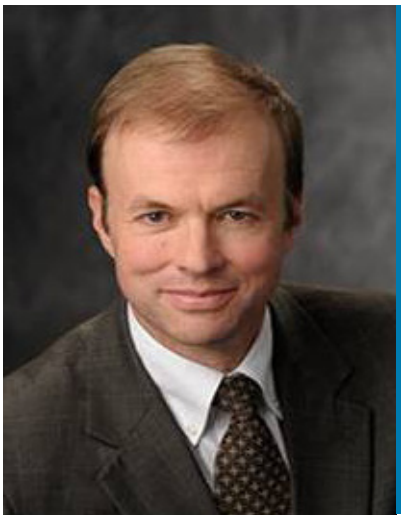
Support for policies that lead to a price on carbon will be important common ground among government, civil society and the business community.

Please join us by bringing your company into this leadership club on carbon. Put a price on it. Urge government action in support. Your family, your employees, and your shareholders will thank you.

WORLD BANK GROUP

Xcel Energy

Frank P. Prager
Vice President, Policy & Strategy



> Regardless of policy outcomes, we have plans in place to reduce carbon emissions by 31% by 2020, while keeping our prices competitive and reducing carbon policy risks faced by the company and its customers.

Electric utilities are the most capital-intensive businesses in the US, and we evaluate our long-term investments across a range of future scenarios. Therefore, Xcel Energy and other utilities use carbon proxy pricing to plan for potential future carbon policy outcomes.

In fact, carbon regulation in the US power sector has already begun with Environmental Protection Agency (EPA) regulations covering new plants, while President Obama has also directed the EPA to develop existing source regulations. Most utilities today are focused on EPA's regulated pathway, rather than congressionally legislated carbon policy, to forecast the future of carbon policy.

In the states where Xcel Energy operates, public utility commissions (PUCs) oversee our major generation and other investment planning activities. Many of these PUCs have directed us to use carbon proxy pricing for planning purposes. Under the regulatory planning process, utilities and other stakeholders propose price levels, timing and escalation of carbon proxy prices. Xcel Energy bases our proposed carbon proxy prices on a periodic survey of third-party market forecasting consultants. The PUC usually determines the final carbon proxy price forecast, and often requires our planning to include forecasts both with and without assumed carbon proxy prices.

Today, the US power sector continues to face some uncertainties about the timing, stringency and form of carbon regulation. In fact, the EPA's rules may not require the states to place any price on carbon emissions. While we regard carbon regulation as probable, carbon markets and prices are less certain, so we view carbon proxy pricing as one useful tool among others to plan for carbon regulation. We have implemented other planning measures, such as requiring carbon capture and sequestration on new forecasted coal plants. We do this to model the direct requirements of current regulations, not to anticipate a carbon price. Over the next two years, we will learn more about the EPA's plans to regulate existing plants, and we may adapt our risk management tools accordingly. All that said, Xcel Energy continues to believe that in the long term, some type of carbon market or pricing mechanism may arise either through EPA regulations or as a reaction to them, and we continue to use carbon proxy pricing along with other carbon policy forecasting techniques.

Given the uncertainty in US carbon policy, PUCs, utilities and investors favor planning outcomes that are robust across a range of carbon policy outcomes. For instance, we have scheduled certain coal plant retirements that were economic with and without carbon policy assumptions, and we have also made economic wind and solar purchase decisions not reliant on carbon policy. These decisions do not rely on a carbon price, but they do reduce carbon emissions and risk. Regardless of policy outcomes, we have plans in place to reduce carbon emissions by 31% by 2020, while keeping our prices competitive and reducing carbon policy risks faced by the company and its customers.

Xcel Energy®
RESPONSIBLE BY NATURE®

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