

The New Playing Field: The Emerging Carbon Market



W I N S L O W
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Abbreviations

AAU - Assigned Amount Unit

CCX - Chicago Climate Exchange

CDM - Clean Development Mechanism

CER - Certified Emission Reduction

CO₂e- Carbon Dioxide Equivalent

EB – Executive Body

ERU - Emission Reduction Units

ET - Emission Trading

EUA - European Union Allowance

EU ETS - European Union Emissions Trading Scheme

GHG - Greenhouse Gas

ITL - International Transaction Log

Jl - Joint Implementation

NCEP - National Commission on Energy Policy

NGO – Non-Governmental Organization

REC - Renewable Energy Certificates

RGGI - Regional Greenhouse Gas Initiative

RPS – Renewable Portfolio Standard

The rules of the game have changed: grappling with the new reality of climate change restrictions is transforming the way that businesses and governments around the world operate. Compelled by regulations, common sense and their own profit motive, businesses and governments are adapting to the new rules of the carbon-constrained world by modifying their activities and creating new strategies. The rapidly developing world of carbon emissions trading created by this new game is a complicated one, but has great implications for the development of new industries and businesses worldwide.

This paper is based on the assumption that climate change is a real phenomenon that is becoming more easily observed, and will not repeat scientific data supporting the theory of climate change. Whether one agrees with the science supporting climate change or not, some industries are already feeling the burn. According to the world's leading reinsurance company, Munich Re, economic losses from major natural disasters doubled between the 1970s and 1990s, causing actuaries to develop insurance products to mitigate financial risks related to climate change.

But in addition to risks, the global response to climate change is creating new opportunities for creative businesses. The Kyoto Protocol, a United Nations-brokered agreement to combat climate change, for example, has built-in mechanisms that allow countries and firms to trade greenhouse gas emissions, allowing cost-efficient emission reductions and creating a new commodity and trading market. In order to understand these new opportunities, this paper will first summarize the regulatory frameworks and specific mechanisms that have that have created them. Then it will review a number of new and existing industries that can leverage their strengths in new ways to profit from the new regime.

International Movements on the Field

The most important regulatory action related to climate change is the Kyoto Protocol. More than 150 countries have ratified the Protocol, which obligates each signatory industrialized nation to reduce its greenhouse gas (GHG) emissions by at least 5.2% below their 1990 levels by 2012. The Kyoto Protocol, originally signed in 1997, took effect in February 2005 with specific emission reduction obligations for 39 developed countries. Beginning in 2008, and running through 2012, participating countries will need to demonstrate that they have met their stated reduction targets, or risk being out of compliance. Countries will therefore need to set emissions targets for emissions from businesses, including power-generating utilities, in order to achieve their nation-wide reduction targets. While the aim of the Protocol is for each country to reduce its emissions, it also set up several mechanisms for trading carbon emission credits between and within signatory countries, which have created the rules opportunities discussed later in this paper.

The United States and Australia, together representing approximately 22% of GHG emissions, have not ratified the Kyoto agreement, citing the lack of mandatory goals for developing countries and potential negative repercussions for their own economies. As an alternative to the mandatory goals of the Kyoto Protocol, the U.S. propagated the voluntary Asia-Pacific Partnership for Clean Development and Climate, launched in the summer of 2005. It links the U.S., Japan, Australia and the three developing economies of China, India and South Korea in an agreement to develop and transfer clean technologies. However, skeptics criticize the agreement for its lack of binding targets and funding.

Domestic Plays

Fortunately, climate regulations are stirring in the U.S and the question of domestic movement on carbon emissions has progressed from “never” to “when”. At the Federal level, the Senate passed two amendments to the 2005 Energy Bill related to climate change, one recognizing human contribution to greenhouse gas levels in the atmosphere and the need to slow their growth, and the second promoting voluntary clean-energy and carbon-capture technologies. In addition, the National Commission on Energy Policy (NCEP) has proposed mandatory goals with a maximum price for carbon allowances to limit the cost of emission reductions; less ambitious than Kyoto commitments. While the era of a carbon-constrained U.S. seems far off, and another amendment seeking to impose a mandatory limit on GHG emissions failed in the Senate, Senator Jeff Bingaman argued several times in late 2005 that the NCEP plan could be passed before the next presidential election.

As the federal government procrastinates on enacting binding reductions, however, state and local governments have begun to take matters into their own hands, taking bold initiatives to reduce carbon dioxide emissions by installing a cap-and-trade system and renewable energy quotas. Some examples of these programs are listed in Text Box I.

Box I

Examples of Local initiatives.

- Seven states agreed under the Regional Greenhouse Gas Initiative (RGGI) in December 2005 to stabilize emissions from power plants at their current level between 2009 and 2015, cut them by 10% between 2015 and 2020 and install a capped-price trading system. Several other states and Canadian provinces, as well as the District of Columbia, are observers in the process.
- Coastal western states have developed the West Coast Governors’ Global Warming Initiative to reduce GHG emissions through a variety of multi-state partnerships
- Twenty-one U.S. states and Washington D.C. have adopted renewable portfolio standards that require certain percentage of electricity produced from renewable sources by a certain date. Six states allow the trading of renewable energy credits (REC) to meet compliance targets. REC trading in four other states and the District of Columbia will begin by 2007.
- More than 190 mayors of U.S. cities have signed the Climate Protection Agreement promoted by Seattle Mayor Greg Nickel, with the aim of reducing GHG emissions 7% below 1990 levels by 2012.

Rules of the Game

The prime goal of the Kyoto Protocol is to reduce global warming resulting from climate change by limiting greenhouse gas emissions. GHGs are typically referred to simply as carbon as shorthand for carbon dioxide, the most prevalent GHG. They are global pollutants: regardless of whether a ton of carbon dioxide is emitted in France or China, it will have the same effect as it is transported through the atmosphere—unlike air pollutants, such as nitrogen and sulfur oxides, which have more localized effects. Recognizing this, the Kyoto Protocol includes three flexibility mechanisms that provide countries alternate ways to meet portions of their binding commitments:

- Joint Implementation (JI) –allows developed countries to invest in emission reduction projects in other developed countries to earn emission reduction units (ERUs)
- Clean Development Mechanism (CDM) –allows developed countries to invest in emission reduction projects in developing countries to earn Certified Emission Reductions (CERs)
- Emission Trading (ET) – allows developed countries to trade the rights to emit a certain amount of greenhouse gases, measured in Assigned Amount Units (AAUs)

These programs allow cooperation between countries to help all to meet their individual goals under the common framework. They allow emissions reductions to be taken at the most cost effective location. This may mean, for example, that it is more effective for a British company to pay for less expensive reductions in China rather than paying for them at home. Under the Clean Development Mechanism, the British company is then able to count earned CERs from projects in China toward its own emissions goal. In addition, CDM projects allow technology transfer to the developing nations and help them bypass GHG-emitting technologies that the developed nations are dependent on as their infrastructures develop.

The three flexibility mechanisms described above, as well as various regional initiatives, have created an array of types of carbon credits to be traded and counted towards commitments. Table I summarizes the types of carbon credits created by these programs and the European regional trading system described below. All of these credits are measured in units of carbon dioxide equivalent tons (CO₂e). There are six GHGs included in the protocol that each have different capacity to heat the atmosphere, and units of CO₂e allow organizations to calculate their emissions of all GHGs in terms of the equivalent amount of the most prevalent, CO₂. And although the three programs use different units of credits (ERUs, CERs and AAUs), companies and countries can use a combination of all three to reach their commitments. They will be able to meet these targets through a combination of reduced emissions from their own activities and a mix of carbon credits from Joint Implementation and Clean Development Mechanism projects as well as purchased carbon credits.

Table I

Types and characteristics of carbon and alternative energy credits					
Emission Reduction Units (ERU)	Joint Implementation (JI)	The UN, after implementation of an emission reduction project	Developed country in another developed country.	Available for trading in 2008	2008-2012
Certified Emission Reduction (CER)	Clean Development Mechanism (CDM)	The UN, after implementation of an emission reduction project	Developed country in a developing country	Currently restricted, broadly available in mid-2007	2005-2012
Assigned Amount Unit (AAU)	Emission Trading (ET)	Limited issuance by national governments	Companies and governments in developed countries	Available for trading in 2008	2008-2012
European Union Allowance (EUA)	European Union Emission Trading Scheme (EU ETS)	Limited issuance by national governments	Companies and governments in the EU	Currently available	2005-2007

Executive bodies chartered by the UN will oversee both CDM and JI projects. These bodies will have the authority to approve and register projects under these two mechanisms in order to create the desired carbon credits. A key criteria for qualification of a CDM project, and presumably a JI project as that system is developed, is it must meet an “additionality requirement” which the International Emissions Trading Association describes as when “the calculated reductions in emissions are additional to any that would have occurred in the absence of the project activity.” For example, this will mean that installing a renewable energy system where there was no energy generation before would not generate CERs, while replacing a fossil fuel system with a renewable one would.

Initially, only organizations that file as a participant in a particular CDM project’s registration papers will be eligible to own and use CERs created by that project. Project participants can include the project’s developer as well as one or more companies that are interested in using the CERs generated from the project to meet their commitments. However, CERs cannot be traded broadly until the installation of the International Transaction Log (ITL) in mid 2007, which will allow transfer of CERs from sellers’ account at the CDM registry to the buyer’s account at its respected national registry. This will enable broad trading of CERs by any organization worldwide, regardless of whether a buyer was part of the project registration.

Trading of ERUs generated by Joint Implementation projects will be similar to trading of CDM-generated CERs. However, ERUs will not be available to be traded widely until the commitment period begins in 2008, according to the Protocol. Similarly, the emissions trading scheme of the Kyoto Protocol itself, separate from the EU’s pilot system described below, will also begin in 2008, and AAU credits will be able to be traded widely among organizations and countries. Credits from all three mechanisms will be available by 2008, when nations, and companies within nations, are required to be in compliance with their emission reduction targets.

Anticipating the 2008 beginning of the Protocol's commitment period, the European Union initiated the EU Emission Trading Scheme (ETS) as a pilot stage of the Kyoto implementation, running from January 1, 2005 through December 31, 2007. Each country within the EU has a designated emission reductions target for industrial sectors within their country. According to each country's national allocation plan, each company in these sectors was issued credits, called European Union Allowances (EUAs) worth 95% of their targeted emission levels, creating a demand for EUA credits. Companies can then buy or sell their credits on exchanges to supplement their emission reductions programs, creating the first market for carbon credits. Any organization, even outside of the EU, can buy EUAs and apply them towards commitments, resell them or remove them from the market to force extra reduction. EUAs are currently traded on six exchanges in Europe with two more joining the ranks soon, and they are also traded directly through agencies that arrange deals. These markets are acting as a pilot of the Emissions Trading mechanism of AAUs under the Kyoto Protocol, and EUA trading will end when AAU trading begins in the commitment period in 2008. Companies registered as part of a CDM project can apply use CERs toward ETS commitments or, after 2007, trade the credits to other companies to meet their own commitments.

At the first Meeting of the Parties to the Kyoto Protocol, convened in December 2005, participants agreed to continue the discussion on the future of the Kyoto mechanisms, although no specific terms and conditions of the CDM and JI mechanisms beyond 2012 were defined. While some fear that lack of clarity beyond 2012 may inhibit CDM project development, EU's environment commissioner Stavros Dimas stated that ensuring the continuation of the negotiations "is giving the Protocol a future. It reassures developing countries that the transfer of clean technologies will continue. It also reassures business that investment in clean technologies will remain worthwhile, and it gives researchers a sense that the demand for new low-carbon technologies will continue to rise."

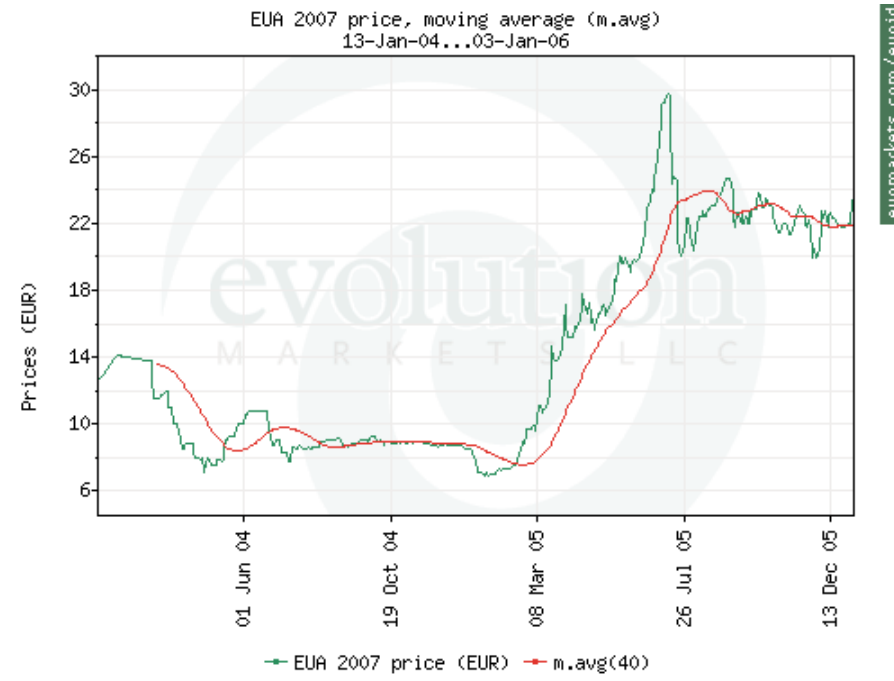
(Most) Valuable Credits

With the implementation of the EU's Emission Trading Scheme and the Kyoto Protocol, carbon dioxide, once thought of merely as an inert gas, became a commodity. The two types of carbon credits currently available –CERs from Clean Development Mechanism projects and EUAs allotted by the ETS–have different conditions that affect their price. For instance, prices can vary depending on the date of delivery of the credit, the type of project underlying the credit, country risk or other factors.

The value of CERs is dependent on the specific project, and terms of CER trades can vary. According to Point Carbon, an Oslo based consultancy, CERs from projects that are in the early stages of development and have not yet been registered with the CDM's governing body, cost around \$6-\$12 per ton CO₂e. CERs from mature projects, where a seller or a financial intermediary can guarantee timely delivery in the future, cost \$15-\$21 per ton. This difference represents the uncertainty about whether the project will run as planned, whether the specified number of credits will actually be generated and whether those credits will be accepted by the UN. At the same time, immediately available EUAs issued by national authorities have traded as high as €30 (\$36) (see Chart 1 for historic EUA prices). If a company relies on cheap CERs for achieving its emission reductions target and the anticipated CERs are not delivered on time, the company will

be fined €40 (approximately \$48) per ton of non compliance through 2007 and €100 (\$120) per ton during the Kyoto compliance period 2008-2012.

Chart I
Price and volume of European Union Allowances traded with issuance date in 2005



Source: Evolution Markets

Although the carbon credit market is still small, it is growing fast. According to Point Carbon, the value of 2005 EUAs traded on exchanges and over the counter grew from negligible amounts in 2002 to €3.6 million in 2003, €83 million in 2004 and €5.4 billion (\$6.6 billion) in 2005. There is an even larger potential market for emission reduction credits as the CDM and JI mechanisms mature. According to a United Nations Environment Programme tally released in mid-January 2006, 68 CDM projects are already registered and expected to generate approximately 30 million CERs each year. The same report also listed 589 projects in the CDM pipeline, slated to deliver 116 million CERs per year; and 97 in the JI pipeline for 10.8 million ERUs annually.

The market for these credits is expected to be huge. The price of an EUA credit for delivery in 2006 ended 2005 at €21.65; the value of CERs and ERUs in the pipeline at half that price would be over €1.37 billion annually, or approximately \$1.66 billion. This value will continue to increase as the number of CDM and JI projects in the pipeline grow. Additionally, if the United States accepted a national cap-and-trade program, it could spawn a trading market with an annual value ranging from \$41 billion to \$77 billion, according to a report by the Pew Center on Global Climate Change.

US on the Sidelines

Ironically, the market-based approach to reducing emissions was pioneered in the U.S., which is not participating in pioneering the new carbon credit market. This approach was developed in the 1980s, as several states announced specific limits on sulfur dioxide and nitrogen oxide emissions to combat acid rain. This prompted Congress to create a federal mandate to trade sulfur dioxide and nitrogen oxide emission credits in 1990, as part of the amendments to the Clean Air Act. Emissions of those pollutants have fallen sharply and robust trading markets have been developed in the years since, successfully demonstrating the feasibility of a cap-and-trade mechanism to control emissions of a pollutant.

While there is no currently federal mandate to restrict and trade carbon emissions in the U.S., several groups are getting ready for when there is. The Chicago Climate Exchange (CCX) is anticipating eventual greenhouse gas regulations in the U.S. and seeking to prove that a market-based GHG emission reduction program is viable in the U.S., as well as to develop domestic expertise in GHG emissions trading. The forty members of the CCX, including businesses, non-governmental organizations, universities and municipalities, made voluntary, legally binding commitments to reduce their emissions of greenhouse gases by four percent below the average of their 1998-2001 baseline by 2006, the last year of the pilot program. Unfortunately, the CCX lacks liquidity, which means that few credits are generated and sold on that platform. A U.S. contract for the right to emit one metric ton of CO₂ costs approximately \$2, while on the regulations-driven European market, a similar allowance traded at approximately \$26 in mid-December 2005. There are also some over-the-counter trades, where emission market brokers help suppliers and consumers of carbon credits arrange trades, regardless of whether they are CCX members. Nevertheless, the overall number and volume of credits traded in the U.S. remains low.

However, 21 states have Renewable Portfolio Standards (RPS), which mandate that certain utilities within the state generate a certain minimum amount of their electricity from renewable sources. This has created intra and interstate markets, but no national markets. Generation of renewable energy results in the creation of Renewable Energy Certificates (RECs), which represent the environmental attributes of displacing fossil fuel generation. RECs can be purchased to meet RPS commitments in the ten states that have already implemented a trading system. RECs for different technologies vary in price depending upon their emissions, location and period of generation. Electricity generated from alternative energy sources is sold into the main power lines. This electricity can be sold as renewable energy inclusive of its environmental attributes, or the electricity can be sold as standard “brown” power and the RECs sold to a different buyer. RECs in compliance markets are generally certified by state agencies while RECs in the voluntary market can be certified by the nonprofit organization Green-e. Certified brokers and retailers can then sell RECs to voluntary buyers like corporations, universities, individuals or utilities and to compliance buyers like utilities or cooperatives that need to comply with their state’s RPS. One REC is equal to one megawatt hour of electricity production, and RECs are usually quoted in vintages by year of generation. The older a REC is, the less valuable it becomes.

The REC market is similar to the carbon market, as both are aiming to reduce the emission of GHGs. The regulatory basis of RPS in several U.S. states also resembles the obligations of the Kyoto signatories. Similar to varying CER prices, the price of RECs varies significantly between voluntary markets and states with enforced compliance markets, and by type of energy (solar, wind, landfill gas, etc.) underlying the REC. For example, according to November 2005 data from Evolution Markets, an environmental and energy brokerage firm, wind RECs can cost \$3-\$5/MWh on the voluntary market but up to \$53/MWh on the Massachusetts compliance market; solar RECs cost \$25-\$50/MWh on voluntary market and \$225-\$250/MWh in New Jersey's compliance market. Solar RECs are more expensive for several reasons: they reflect the higher cost of building a solar facility than a wind facility and the existence of a solar quota in several states' renewable portfolio standards, as well as the public perception that solar energy is "greener" than wind power because of issues such as wildlife impact. Proactive American companies can buy RECs on the voluntary market to offset negative environmental impacts of their electricity consumption and improve their corporate image, as Whole Foods Markets and FedEx Kinko's recently did. Utilities in states with an active compliance market have to either install new renewable capacity or buy RECs to comply the RPS requirements.

Because the U.S. has no national GHG target, there is only a negligible carbon market. But when the carbon regime becomes a reality in the United States, carbon credits are expected to considerably increase in price. However, companies in unregulated markets in the U.S. have been reluctant to buy credits now or reduce their current emissions, because of the fear that these actions will not be counted when regulations are set in the future. This concern is valid if the baseline for emission reductions is set at current levels of emissions, as it has been for the Northeastern states' RGGI. Conversely, if the baseline for emission reductions is several years back, like the Kyoto Protocol's 1990 baseline, worries about accounting of emission reductions will be less founded.

A New Playbook

The fight to reduce the impact of GHG emissions on the environment and economy is creating new markets, new products and new opportunities. This changing landscape is creating new, and sometimes surprising, niches for existing industries as well as giving rise to new ones. The creation of carbon credits as a new commodity, as well as the markets for trading them, allows for the invention of new business models. For example, a producer of energy generation technology can now also sell carbon credit generation technology. A company that sells energy efficient appliances now has an extra incentive sell energy use reduction. Entrepreneurs will have opportunities to create new products, services and markets. The following section highlights some industries that we believe stand to potentially benefit from the new carbon constrained world.

Energy Related Technologies

The challenge of combating the increase of GHGs in the atmosphere will involve new ways of thinking about energy production and use. As companies and nations are required to limit their GHG emissions, they will increasingly need to turn to technologies that allow them to create and use energy while lowering emissions. Replacing the status quo with any of the following technologies could reduce emissions and potentially create carbon credits available for trading, while companies in these industries also

stand to benefit from increased sales, as their products enable others to reduce their own emissions.

Alternative Energy

The producers of the equipment used to generate renewable energy stand to gain a major boost from the implementation of both Renewable Portfolio Standards in the U.S. as well as any carbon constraining regulations such as the Kyoto Protocol. This group includes alternative energy types—solar panel and wind turbine manufacturers, geothermal system and small-scale hydroelectric system developers. In addition to these more traditional alternative energy technologies are also emerging alternative technologies: burning biomass for energy, a process which may be considered to be carbon neutral depending on the fuel; harnessing wave power to generate electricity; burning methane captured from decaying landfills or produced by anaerobic digesters; and using hydrogen to run fuel cells. There are also controversial energy sources that do not cause GHG emissions but may be undesirable for other reasons—nuclear and large-scale hydroelectric power.

Energy Conserving Technologies

The flip side of producing GHG-free power is not producing power at all. While the obvious path to energy conservation is to do with less electricity—such as turning off lights or computers—energy conservation technologies can also allow the same amount of electricity to do more “electrifying.” For example, high temperature superconducting wires allow electricity to be transported more efficiently, reducing the amount of energy lost in transmission and therefore the amount of energy that needs to be generated. Many “clean coal” technologies improve the efficiency of burning coal while reducing pollutant emissions, reducing the amount of coal that needs to be burned. Technologies that allow more efficient end-use of electricity will also benefit, such as ones that substantially reduce the amount of power wasted by appliances in stand-by mode, which consumes a surprising amount of energy. Another example technology is the use of LEDs, which are more efficient than incandescent or halogen lights, to provide lighting.

GHG Capture Technologies

Another emerging area of technologies does not seek to limit the amount of carbon dioxide or other GHGs created in energy generation, but seeks to prevent them from reaching the atmosphere. For example, anaerobic digesters can convert decaying organic waste from agricultural waste into biogas to produce electricity from gas that otherwise would have been vented. Similarly, methane, a powerful GHG, can be captured for energy production from decaying garbage in landfills or from oilfields where it is released as a byproduct.

A more controversial aspect of this field is the idea of capturing carbon dioxide and storing it somewhere, referred to as carbon sequestration. This idea has piqued the interest of electric utilities, such as American Electric Power and Southern Company, who have partnered with the U.S. Department of Energy in a project to build the world’s first zero-emissions coal fired power plant within the next decade. This technology would allow utilities to continue producing energy from fossil fuels while meeting GHG emission limitations. Potential techniques to store the sequestered carbon could include injection into spent oil and gas reservoirs, injection into deep ocean waters or using ecosystems, such as forests, to uptake and store carbon. While carbon sequestration is still a rela-

tively untested theory, it holds great promise as a means to reduce the concentration of carbon dioxide in the atmosphere.

Kyoto Mechanisms Operations

As the previous sections of this paper described, the Kyoto Protocol set up several flexibility mechanisms to ensure that carbon emissions reduction occur in an economically effective manner. The overseeing of these mechanisms, as well as developing projects to create and trade the carbon credits, will require entirely new industries.

Project Designers

Project designers can organize, plan, arrange, finance and sometimes implement projects to create carbon credits, currently under the Clean Development Mechanism and Joint Implementation projects beginning in 2008. For example, AgCert was founded to develop a standardized process for producing greenhouse gas (GHG) emission reductions from intensive livestock farms. AgCert has a number of operational projects as well as forward contracts with customers for several million CERs. Another organization, EcoSecurities, has built a large portfolio of carbon credits (CERs and ERUs) working with a wide spectrum of project types to reduce greenhouse emissions. EcoSecurities also provides expert advisory services to corporations, governments and NGOs on how to benefit from emerging emission markets and manage carbon risk. Other similar organizations include Econergy Brazil, Ecoinvest, and PricewaterhouseCoopers.

Credit Traders

Credit trading firms arrange the transfer of renewable energy and carbon credits under the Kyoto flexibility mechanisms and local, regional and national initiatives. For example, New York-based Evolution Markets and Natsource Asset Management are both brokers of renewable energy, including RECs, power purchase agreements, and GHG credits. Both of these firms also offer consultancy services, helping clients develop strategies to meet their voluntary and binding commitments.

Carbon Funds

Carbon funds invest contributions made by companies and governments in projects designed to produce emission reductions. Contributors in funds receive a pro rata share of CERs. The aim of these funds is either to help a company or a country achieve compliance with its Kyoto commitments, or to accumulate carbon credits and resell them later. Examples include the eight World Bank Carbon Funds, Netherlands EBRD Carbon Fund, Natsource GHG Credit Accreditation Pool, EcoSecurities and Standardbank Managed Fund, Danish Carbon Facility, European Carbon Fund and several others. We believe the array of carbon funds in the carbon market is starting to perform a function similar to that of mutual funds on the stock market, with companies and governments as investors. According to World Bank, the value of carbon funds worldwide has increased from approximately \$275 million in January 2004 to about \$3 billion in November 2005.

Affiliated Industries

The industries listed above have a fairly transparent link to GHG emissions regulations. However, some surprising industries are also viewing the new rules as new opportunities.

Insurance

Insurance companies can provide services to ensure emission reduction purchase agreements against not delivering the agreed amount of carbon credits. Ben Lashkari, senior

vice president of environmental and commodity markets at Swiss Re, told Point Carbon in December that the development of hedging instruments for the rapidly growing JI/CDM market is a new and important business field for the company. Insurers can also provide services for renewables projects, such as Swiss Re underwriting a wind farm off the Welsh coast. As more renewable energy sources become larger and more costly, the demand for insurance products is expected to increase.

Litigation As climate change gains acceptance as a scientific theory, it is spurring litigation over its causes and effects. Freshfields Bruckhaus Deringer, a London-based law firm, hopes to cash in on the wave of climate-change litigation actions "There's going to be a whole host of (climate-change) actions ...we might look to do that kind of thing " said Freshfields lawyer Paul Watchman at the October 2005 launch of a report on environmental, social and governance issues and investing, written by Freshfields for the UN Environment Programme's Finance Initiative. A precedent might be set by New York and 8 other states who filed a lawsuit in July 2004 against five of America's largest power companies demanding they cut their emissions by 3% a year over 10 years. The Inuit people have also lodged a petition to the Inter-American Commission on Human Rights for the dangerous impact of climate change, as reported by Reuters.

Finance We believe the involvement of financial firms will be crucial as many of these new industries develop. Paul Dawson of Barclay's Capital described three roles that financial intermediaries will play: providing a "route to market" for both carbon credits and credit seekers; market development and risk management; and financing emission reduction projects. Global finance firm Goldman Sachs has stated that it seeks business opportunities in trading carbon credits, water rights and other environmentally related commodities; investment in renewable energy projects and technologies; and financing for the commercialization of environmentally friendly technologies.

Consultancy The developing nature of the carbon markets makes them attractive to consultants. Consultancy firms such as Point Carbon are providing groundwork as the carbon markets develop and research such as used in writing this paper. Consultants, including divisions of other firms such as the credit transaction firms, assist clients in assessing the economic risks imposed by climate change policy and developing strategies to manage risk and capture opportunities. They can also help clients structure emission reductions projects and estimate the value of emissions assets or develop components of their renewable energy certificate (REC) strategies

End Game The days of unrestricted greenhouse gas emissions have ended and the era of carbon con- striction has begun. All companies will be affected by restrictions, whether via their own activities or the energy they purchase. The suite of regulations, such as the Kyoto Protocol, that are enforcing these restrictions, will be burdensome to some companies; however, those regulations also represent tremendous opportunity.

Some existing companies may find new demand for their products. Some will find that their strengths allow them to create new opportunities. Some companies will develop

new business models to meet the needs of companies and countries as they strive to meet their obligations. And many new companies will grow to form and serve the developing carbon markets.

The Kyoto era will mean a new set of rules for many companies around the world, and will create new products, services and markets. While many are understandably fearful, forward thinkers and entrepreneurs around the world are realizing the opportunities that this new game will provide, and are starting to write a new playbook.

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