CHAPTER 1

Green Trading: Convergence of the Capital Markets and the Environment

By Peter C. Fusaro

The energy and agricultural industries—the world's leading emissions polluters—will be the leading suppliers of environmental solutions, because it is good business. Today, these industries are at a turning point on global warming as carbon intensity continues to grow while time to stabilize carbon dioxide and other greenhouse gas (GHG) emissions is limited. This issue goes far beyond the pitifully weak and flawed Kyoto Protocol on which many in the European Union (EU) and Asia have focused their efforts during the past decade. Time is *not* on our side.

The United States accounts for 25 percent of global GHG emissions. In order to meet growing electricity demand, this country (like the developing nations) is now moving to more coal-fired capacity with greater GHG emissions and other forms of pollution. At the same time, the U.S. government will never accept the Kyoto Protocol. So, rather than concentrating on the controversial issues of this treaty, it is now more important to focus on what can be done and how it can be accomplished. Trading and the markets offer a solution and a way forward.

The energy industry particularly has the financial strength, intellectual capital, and global presence to provide these solutions. BP and Shell have already taken the lead, but others are not far behind. ChevronTexaco has developed GHG software that it is sharing with the world (see chapter 10). Suncor, the Canadian tar sands producer, is now the biggest wind developer in Canada as it uses renewable energy as carbon offsets.

The carbon footprint of the majors can be found everywhere in oil and gas production, refining, and transportation around the world. As these companies continue to expand their involvement in the power industry, they will need to adopt solutions that include the use of more efficient,

environmentally benign technology as well as basic changes in standard industry practices.

Another sector under the spotlight is electric utilities, which arguably has borne the brunt of responsibility in most GHG discussions. While some in this industry have been proactive in beginning remediation steps (noticeably, coal-burning AEP), many others are grappling with how to develop a GHG strategy.

MOVING BEYOND KYOTO

Since the private sector has a vested commercial interest in emissions reduction, it will take the lead on the development of emissions trading markets. Compliance responsibility, however, will rest with government. Prevalent is the strong belief that markets will form first and that government should not inhibit their growth.

European, Japanese, and U.S.-based companies are now moving ahead to develop both trading programs and pilot projects since a first-mover advantage exists, and waiting for regulatory approval may prove more costly in the future. Emissions rights may be traded through bilateral transactions or brokerage houses or by listing on exchanges.

The Kyoto Protocol envisions three international mechanisms that would enable Annex 1 countries to reach emissions-reduction targets beginning in 2008 through 2012. These mechanisms are emissions trading, joint implementation (JI), and the clean development mechanism (CDM), with all three modes currently being used.

Bilateral trade between countries is generally regarded as the most effective means to initially trade emissions. The emissions unit to be traded is 1 ton of carbon-dioxide equivalent (CO_2eq) for the 6 greenhouse gases.[1] Among these greenhouse gases, NOx and CH_4 (methane) emissions can be more difficult to quantify in many countries. The U.S. has already established an over-the-counter (OTC) market for NOx and has traded CO_2 emissions. In addition, efforts are underway to develop protocols for non-Kyoto CO_2 trades to be factored into a global trading market.

Since trading mechanisms will be part of any long-term approach to limiting GHG emissions, the emissions market is going forward on many fronts without Kyoto approval or U.S. participation in Kyoto. It is anticipated that actions taken today will most likely be grandfathered into a future revised treaty. Kyoto was meant to be flexible, allowing market-based solutions to trading GHG as a carbon-reduction strategy and as a means to

facilitate the spread of energy-efficient technologies for industry. Further, since governments expect industry to make the largest GHG reductions, the obligation for progress falls heavily on the oil industry, electric and gas utilities, manufacturing, and automakers.

A RISING CORPORATE FINANCIAL ISSUE

Environmental issues are now becoming corporate financial issues. Greater financial disclosure of corporate environmental risks (including risks due to climate change) has raised the issue of the environment as a corporate fiduciary responsibility. Increasingly, the environmental and financial performances of companies are intertwined. This impacts automobile manufacturers, electricity utilities, hydrocarbon groups, banks, and insurance companies. Moreover, it is rising as a Sarbanes-Oxley issue as well, which means that environmental financial risks will now have to be disclosed on the company balance sheet.

Automakers are becoming concerned about carbon-dioxide emissions per vehicle, and utilities now pay more attention to cutting their GHG emissions as part of their overall air emissions reductions. Oil and gas companies are increasingly concerned about emissions as production, refining, transportation, and distribution liabilities. Banks' share valuations could fall if these financial institutions lack adequate carbon risk management strategies. Insurance and re-insurance companies are now at the forefront of confronting such financial hazards as catastrophic crop failures and epidemics of infectious disease due to climate change. These new financial liabilities for insurance and re-insurance companies could prompt them to drop coverage for certain companies, which will prompt change and market creation.

Environmentally-related corporate financial issues are now mobilizing shareholders to voice their concerns at annual meetings of the large oil companies, for instance. These shareholders cite studies such as those conducted by Innovest (the so-called "green Moody's") to show that companies perceived to be more environmentally aware are in fact more financially successful. Indeed, as corporations begin to analyse financial risks, they also realize that this global issue requires action. While the good deeds of BP, Shell, DuPont, Trans-Alta, and AEP are important, it is now time for the new wave of corporate engagement. Already, projects and trades have begun, much institutional money has flowed into project-based reductions, and green trading is now underway. For this second wave of corporate engage-

ment, companies need the greenhouse-gas business case for taking action *now* and require the confidence that there will be no later penalty for such actions.

ENTER AGRICULTURE

The agricultural sector is beginning to realize the market potential and financial benefits of renewable energy—not just in the form of rents from siting large wind towers but from the more important self-generation of electricity with wind and biomass from agricultural wastes. The utilization of plant and animal farm waste can produce additional cash crops to be "harvested" and commercialized for their environmental attributes. The energy and agricultural sectors can join forces to develop new energy supplies while reducing externalities and creating new American industries that can be exported throughout the world.

Together, energy and agriculture are the world's largest businesses. Notably, they have also the most deeply liquid commodity markets. This liquidity provides excellent conditions for the financial engineering of environmental financial products that could capitalize on and grow cross-commodity arbitrage opportunities—not only for energy and agricultural commodities but also for GHG emissions reduction, renewable energy, and energy efficiency. The inflexion point for this sea change is during the next two years.

PROJECT FINANCE IMPLICATIONS

Another emerging financial trend that may hold the key to GHG emissions liquidity is the structured finance market, i.e., "Green Finance." A fuel-type shift to greener and cleaner fuels such as natural gas (in preference to coal or oil) is becoming embedded in the fabric of new power-station project financing. Since these plants have a useful life of 30 to 40 years, they will bring a stream of emissions credits that can be banked or used upfront, thus unlocking another avenue for market evolution. This type of thinking is just beginning to take hold at investment and commercial banks in New York, London, and Tokyo.

Moreover, it can be envisioned that an environmental checklist is emerging in the green or environmental finance arena—yet another way in which financial engineering can bring about market development and liquidity. There is no time to fight past demons. Forward-thinking and global-

ly based energy participants should embrace the inevitability that international policy on GHG is being set by both media and public perceptions. In this context, the rational response by enlightened industry participants is to develop and support market-based solutions to global pollution.

In an imperfect world, this is the reality. In order to reduce or offset CO_2 emissions, emissions trading will act as a catalyst of change in the transition of world economies toward renewables and accelerated transfer of more efficient, greener technologies.

Ironically, the global market that now seems best positioned for trading is the renewable energy credit (REC) market. Renewable energy has undergone a quantum technology shift in terms of increased efficiency and lower costs, and there are only a few financial players focusing on the new factors that drive this market. Once again, government mandates (called *Renewal Portfolio Standards* in the U.S.) are driving market maturation. In the physical market, wind and solar power are posting global growth of 40 and 30 percent per annum respectively, with costs for wind power now competitive with gas and coal. In addition, tax subsidies for waste-to-energy and biomass power generation will move the equation further forward.

Looking at a small installed base of renewable power generation today misses the fact that the ramping up of this technology is global. These power stations are also getting bigger with wind turbines of 5.5 MW, and 300 to 400 MW wind farms on multiple sites are being developed. More important, they have created another fungible commodity market that can be traded across borders as the credits are measured in megawatt hours. Such green power initiatives will create a highly fungible market for RECs.

THE EMERGING FINANCIAL MARKET

Energy trading began in 1978 with the first oil futures contract on the New York Mercantile Exchange (NYMEX). During the 1980s and 1990s, the International Petroleum Exchange (IPE) and NYMEX successfully launched futures contracts for oil and gas. These successful futures exchanges survived the Enron et al. energy-trading debacles of recent years and demonstrated their capable financial performance. Today, oil companies and financial houses provide the necessary trading liquidity through market-making on both the established government-regulated futures exchanges and off-exchange energy derivatives markets, which can clear on the futures exchanges. These companies know how to manage their financial energy risks and have the risk-management skills that will be deployed increasing-

ly in the emerging global environmental markets. Financial risk will be managed on established energy futures exchanges because trading debacles have taught the energy markets that financial performance is fundamentally important. While OTC brokers (such as Natsource, Evolution Markets, and CO_2e) broker bilateral trades, market-making is what is lacking from the environmental financial markets. However, in order to make a market, principals are needed.

The principals for environmental financial market-making will be the investment banks, multinational oil and gas companies, and agribusiness. They have the global presence, balance sheet, and the exposures to take action and to put their financial wherewithal behind this market as they have done for oil and gas trading. They also have the financial balance sheet to perform.

Environmental financial products for sulfur dioxide (SO_2) and nitrous oxides (NOx) have been successful in controlling U.S. pollution since 1995. A $6 billion environmental market today may seem pale in comparison with a $2 trillion energy derivatives market, but the growth trajectory suggests that today's green trading markets should be compared with 1978's oil markets. However, this time around, maturation will be global and simultaneous as carbon-trading regimes take root in the EU, Asia, Australia, and North America. While thus far, trades for carbon dioxide have numbered only in the hundreds—with a notional value of about $500 million—estimates suggest that a $3 trillion commodity market may emerge over the next 20 years. The dollar value of this market is enticing, but the reality is that the global energy industry will be one of the primary suppliers of liquidity to this market, followed by the agricultural industry, since both industries are already active in commodity trading.

Green trading encompasses the convergence of the capital markets and the environmental markets; it includes not only trading in GHG emissions reduction but also renewable energy and the financial value of energy efficiency. Further, there are natural cross-commodity arbitrage opportunities since oil, gas, coal, and power, like weather derivatives, have environmental dimensions. Today, cross-border trades of carbon dioxide have been conducted between the U.S. and Canada, Canada and Germany, Germany and Australia, and Australia and Japan. Developing countries will be fully engaged in this financial market as sellers of GHG credits and allowances, using its mechanisms to provide liquidity for needed technology transfer.

Green trading provides a market-driven solution to reduce pollution, but government sanctions are needed to put the rules in place. The U.S. SO_2

program is a "cap-and-trade" plan with a 35-year life that requires the retirement of pollution credits from 1995 though 2030. A GHG regime will require a 100-year life and should be put into place now, not in 15 years. Governments must also deal with the cross-border components of trading, and rules need to be harmonized. As in the overall environmental financial market, liquidity providers in the green-trading markets will include energy companies, banks, agricultural producers, insurance and reinsurance industry, and investment banks.

U.S. EMISSIONS TRADING EXPERIENCE

Although many countries continue to propose various types of emissions-trading initiatives, the reality is that only the U.S. has the track record of a successful emissions-trading market which has worked well over the past 10 years. As initially proposed by the Environmental Defense Fund (a U.S. environmental organization now called Environmental Defense) to the first Bush administration for the trading of sulfur dioxide (SO_2) credits, the emissions-trading market has been successful even beyond what its architects envisioned.

Basically, during March of each year, the U.S. Environmental Protection Agency (EPA) runs an emissions auction supervised by the Chicago Board of Trade. Under Phase I (which began on January 1, 1995), the 110 highest emitting utility plants were mandated to reduce their annual sulfur dioxide emissions by 3.5 million tons. This process began in 1995 for sulfur dioxide and was extended to nitrous oxides (NOx) in 1999. The OTC forward markets trade these vintaged credits through the year 2030. (Vintages are credits available for sale each year until they expire.) Several OTC energy brokers (including Evolution Markets, Natsource, Prebon, and Cantor Fitzgerald) are involved in brokering these credits, and over one million trades per year occur. Thus, the market is liquid and has created emissions credits that are a fungible financial product. It has also saved $1 billion per year over command-and-control strategies of the past. Under Phase II (which began on January 1, 2000), a more stringent standard called for an additional annual reduction of 5 million tons of sulfur dioxide, and the program was expanded to another 700 utility plants throughout the U.S. Today, that financial market is indicating SO_2 prices of over $500 per ton, which creates financial incentives to reduce pollution.

Under the SO_2 program, utilities are given flexibility on how they meet the mandated targets, and can switch to fuels with lower sulfur content,

install pollution control equipment, or buy allowances in order to comply with the law. The utilities are given one allowance for each metric ton of sulfur dioxide emitted. These emissions allowances are fully marketable once they are allocated through an EPA auction, and can be bought, sold, and banked. In order to sell allowances, utilities must reduce their emissions below their emissions limit. All transfers are recorded in the allowance trading system and posted on the Internet. Serial numbers allow the tracking of each allowance's trading history, and an inventory for all accounts is available.

The allowances are allocated in phases. The later phases tighten the limits on previously impacted sources of pollution and are also imposed on smaller, cleaner units. Compliance is assured through continuous emissions monitoring at plants and regular reports to the EPA. Fines are assessed if companies don't comply with the law. Learning from this successful experience, mandatory standards will also be needed for CO_2 reductions as the value of voluntary compliance has been currently valued at less than $1 dollar per metric ton.

THE NEED FOR PRICE INDICES

Markets in environmental financial derivatives are positioned for rapid growth due to political initiatives and business opportunities, but these markets will reach their full potential only if based on reliable indices widely accepted by the trading community. To focus solely on GHG emissions misses the opportunity to capture the benefits of other energy/environmental market-based solutions to global pollution such as renewable energy credits or energy efficiency (negawatt) trading. Therefore, in order to maximize the business opportunity for an established exchange, several environmental financial products for various geographic markets must be traded using regional environmental indices as the underlying benchmarks. The composite of these financial indices will contribute to a global index as well. The need is to establish exchange-traded derivatives products for sulfur dioxide (SO_2), nitrous oxides (NOx), carbon dioxide (CO_2), renewable energy credits (RECs), negawatts (energy efficiency), mercury, and other environmental verticals, with the first step being the creation of several tradable indices in North America, Europe, and Asia.

Since government mandates are the primary market driver for environmental financial products, the scope of activity has been limited to a small number of players. Due to the lack of mandatory compliance for carbon

reductions, there are still more sellers than buyers. Nonetheless, the growth of emissions trading and profit opportunities are attracting a new generation of traders in the market. Commodity traders from the world's largest banks and financial institutions are responding to these opportunities by opening trading operations on both sides of the Atlantic.

One inhibiting factor to market development is the lack of reliable and liquid financial indices, which has muted efforts to create a liquid market. The current trading environment is handicapped by the operational complexity of having adequate allowance inventory on hand to complete a trade, which limits access only to those with ample allowances or those that can borrow allowances. Furthermore, the process of transferring allowances from one party to another can take weeks, limiting traders' ability to enter or exit the market with ease. An index would remove this impediment by allowing more trade structures and by turning the environmental market into a cash-settled operation with the added benefit of improving cap-and-trade policy. Consequently, this would attract more players into the market. With the September 2004 launch of a clean technology index at the American Stock Exchange, it is not too farfetched to expect the appearance of a variety of environmental indices in the not-too-distant future. Because of the potential for improving regulatory policy, we would expect close cooperation between government regulatory agencies and any exchange seeking to use the indices as underlying benchmarks for trading financial products.

NEED FOR NEW AND CONSISTENT METRICS

Many countries have renewable energy, energy efficiency, and GHG programs. Since most programs today are and have been independently developed, there needs to be some coordination to provide consistency. Consistent methodologies for measuring emissions—including GHG, renewable energy, and energy efficiency efforts—would facilitate project investment. Consistency would facilitate development of project templates, thereby reducing costs and allowing rapid dissemination of the lessons from early projects. National and international markets for GHG credit trading would offer the liquidity necessary to return value to projects and thereby, encourage financing. To function efficiently, such markets require assurance of integrity—clear definitions, avoidance of double counting, verification, and liquidity. At this point in market development, it is critical to foster some consensus around the development of

common metrics for the private sector and policy makers to assess opportunities at the regional, national, and international levels. GHG registries managed by a third-party, non-governmental entity could serve as a model at a state or federal level (such as in California and most EU countries, respectively).

Today's one-off market is composed of many companies not acting on what will ultimately help them financially. A few innovators are proactive. The reality is that environmental damage is emerging as a financial liability for multinational corporations globally. These liabilities are the market drivers for change. As the dynamic models have yet to be built, the quantification of these risks will keep analysts and mathematicians busy for many years.

Software products for both quantifying forward prices for CO_2 and RECs will be very valuable to a host of users. Demand for such software products has been stimulated by the January 2005 launch of the EU Emissions Trading Scheme (ETS) as well as increased price volatility in the U.S. SO_2 markets due to increased oil price volatility and higher prices, which has lead to a knock-on effect on SO_2 markets.

2005: A BREAKTHROUGH YEAR

The year 2005 could be the breakthrough year for this emerging financial market. Besides the vaunted EU ETS, there is significant movement at the state level in the U.S. More than nine states are collaborating in the Regional Greenhouse Gas Initiative (www.rggi.org) to form a cap-and-trade market in the Northeast, which will be in harmony with Canadian provincial governments' requirements in eastern Canada. This initiative also has an agreement to work with the California Climate Action Registry (www.climateregistry.org) to have conforming standards. In 2005, these developments would set in place rules to begin cross-state GHG trading in the U.S. Moreover, after the 2004 presidential election, the federal government probably will seek standardization to ensure harmony between the U.S. energy industry and others as well as overseas administrations because U.S. corporations need this certainty for investment planning. Japan is not far behind as it undertakes mock trading of carbon with over 40 industrials.

There will be two stages in the development of the international carbon market. Now, in stage one, carbon credits are being created. Trading covers many years because, thus far, there has not been an allocation of sufficient

units to have a spot market and because the units are project-based reductions. Capital is required, and forward commitment for carbon-dioxide reductions cannot be banked at the present time. If the World Bank were buying a 10-year stream of reductions, a bank loan would usually be available to implement the project.

Consequently, trades are still done in large-volume structured deals. Nevertheless, early speculative trading and some risk hedging have begun. Alongside this emergence, there is a transformation in how climate change liabilities are handled within some energy companies and energy end-user groups. As major corporations begin to treat the GHG issue as a financial matter, responsibility is passing from environmental professionals to risk managers. In this, the early stages of the market, carbon finance is playing a bigger role and, over the next years, a liquid spot market will develop.

Green trading markets are now at a turning point. The existing market is characterized by opaque prices, little trading, few participants, poor liquidity, tremendous inefficiency, and wide arbitrage opportunities—factors that brokers now love; these attributes are familiar because they occur in every new market during its market maturation process. Having seen the emergence and maturation of oil, gas, power, weather, and coal as fungible commodity trading markets, the environment is now well positioned to be the next financial commodity trading market.

Uniquely, the carbon market will develop simultaneously throughout the world—something that has never occurred in other markets. The second stage of carbon market development will be toward a mature and liquid market and, over the next 10 years, there will be linked markets followed by indexed markets. We shall see spot trading, high volumes, advanced brokerage similar to the power and gas markets, and a growth in carbon finance.

Moreover, another unique aspect of this market is that it will be a government-mandated market despite advocates of voluntary trading in the U.S. Arguably, the U.S. created the carbon template: The trading regime of the sulfur dioxide (SO_2) allowance market (which began in 1995), as described earlier in this chapter, has vintage credits to the year 2030 while a true carbon regime will have a span of 50 to 100 years. This is envisioned after 2012 for the Kyoto Protocol, and work at the governmental level has begun to create the longer-term market.

This new marketplace would motivate firms with surplus emissions rights to trade or supply those rights to the market. Despite the risk of

uncertainty on future rules, there are advantages in early action. The argument today is that to do it early will probably be less costly than in the future. Accumulating GHG emissions allowances now is a form of insurance for industry participants. Moreover, emissions trading delivers significant environmental benefits from reduced compliance costs as well as promotes environmental technologies. As rules become more clearly defined, industry-driven schemes will probably play key roles and be grandfathered into future regimes. Thus, industry can create its own domestic and international portfolio of emissions allowances or credits.

Emissions trading schemes have various characteristics similar to the dual process of electric power industry liberalization in many countries. Since the power industry contributes substantially to GHG emissions, the intersection of emissions trading and electric power deregulation will provide impetus to move the process forward.

THE FUTURE ROLE OF EXCHANGES

Almost all environmental financial contracts, such as those in SO_2 or CO_2, are traded on the OTC markets. Therefore, there is an opportunity for exchanges such as the IPE, NYMEX, and the Chicago Board of Trade to offer OTC clearing, which would effectively make these quasi-futures contracts under government oversight and help make them more acceptable to risk managers. The IPE recognized this opportunity last April and has linked its platform to the Chicago Climate Exchange in order to trade emissions in the EU.

In Japan, both the Tokyo Commodities Exchange and Tokyo Stock Exchange are considering launching carbon derivatives contracts. Presently, the ground rules in Japan are in a state of flux between a cap-and-trade market and a baseline market. A movement is also emerging to create the next trading regime beyond 2012 and for the Kyoto Protocol to include developing giants such as China, India, and Indonesia.

In launching a voluntary carbon exchange in September of 2003, the Chicago Climate Exchange or CCX (www.chicagoclimateexchange.com) is following another route to GHG market maturation. This voluntary carbon exchange is mostly U.S.- and Canada-centric, with a current roster of more than 60 members. As the first exchange to be launched at a time of changing U.S. attitudes on global warming, it serves as a precursor to other North American exchanges that are likely to enter this emerging market space. As the next step, CCX has partnered with the IPE to launch the

European Climate Exchange in time for the EU ETS in January 2005.

There is competition to create global environmental exchanges. In actuality, the exchanges need not be mutually exclusive as today's Internet technology facilitates borderless trading. In effect, we can have world GHG trade through the Internet. Because exchanges can be established quickly on the Internet, many believe that Internet-based emissions trading would be a desirable development. Such trading would have low costs of operation and allow immediate disclosure for market players. The concept behind the allowances was to foster the implementation of demand-side efficiencies or use of renewable energy. These concepts are tailored to the developing CO_2 market development and the use of the Internet as the means to implement change.

CREATING THE GLOBAL CO_2 EMISSIONS PORTFOLIO

The goal is a gradual reduction in emissions driven by measurable targets using market-based incentives that can include outright purchase of emissions reductions. The aim is to encourage better technologies, fuel choices, and results, and accelerated technology transfer. Already, multinational companies in North America, Europe, and Asia are developing emissions reducing initiatives that can be transferred to their affiliates in developing countries. In coming years, global environmental corporate portfolios will be managed with stringent profit and loss targets for company business units and will need fungible markets with price certainty in order to benchmark their financial performance.

Any market needs trading liquidity in order to ensure fungibility. So far, the CO_2 emissions trading market has completed about 200 trades, and its development is dependent on the resolution of many factors, not the least being caps. Since this market is in its infancy, trading caps can either be adopted by government or left open-ended for the markets to decide.

FUTURE MARKET DEVELOPMENTS

Green trading promises to be a $3 trillion commodity market involving major energy company participation. It will have cross-commodity arbitrage opportunities with oil, gas, power, and coal futures contracts as well as OTC contracts. It will create new project development in the renewable-energy and energy-efficiency sectors that will trade their environmental attributes. The global dimension of all these implications cannot be under-

stated: Green trading will be the first truly global commodity market since the development of the oil market, and the coming years will see an acceleration of this market's maturation.

Peter C. Fusaro, *founder* and *chairman* of Global Change Associates, an international energy and environmental consulting firm, can be reached at **T**: (212) 316-0223 and **E**: peterfusaro@global-change.com.

[1] The six greenhouse gases addressed by the Kyoto Protocol are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_20), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).