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THE NEXT FINANCIAL MARKET

by

Peter Fusaro

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INTERNATIONAL RESEARCH CENTER FOR ENERGY AND ECONOMIC DEVELOPMENT (ICEED)
850 Willowbrook Road
Boulder, Colorado 80302 U.S.A.
Telephone: 303/442-4014
Fax: 303/442-5042
E-mail: iceed@stripe.Colorado.EDU
Website: http://www.iceed.org

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Peter Fusaro*

Introduction

This paper summarizes the ongoing developments of the green trading markets for greenhouse gases (GHGs), renewable energy credits, and the financial value of energy efficiency. It explores what green trading actually is, why green financial indexes are needed for market maturation, and what is on the horizon in the convergence of capital markets and the environment.

The energy business is already globalized and multinational; large energy companies operate in more than 100 countries. This globalized business, coupled with the spread of information across borders through media, such as the Internet and television, have significantly changed public perception about the environment. A new, globally conscious environmentalism has been created over the past decade; as a result, pollution can no longer be exported across borders. Global environmentalism is even more true of GHG emissions that affect the entire planet. With carbon content increasing in the atmosphere at 4 parts per million (ppm) annually, there is justifiable fear that inaction eventually will lead to ecological disaster. This concern has created the potential for emissions trading (including web-based applications).

Past environmental protection in many countries has followed the heavy-handed command and control approach proven to be expensive and cumbersome. More cost-effective market-based incentives using tradable permits have been gathering momentum through the 1990s. The initial successes to date have been the trading of chlorofluorocarbons (CFCs) under the Montreal Protocol of 1987 to save the ozone layer, and the U.S. emissions trading scheme for sulfur dioxide (SO2) for acid rain abatement, which began in 1995. The key to these successes has been the introduction of tradable permits combined with government sanctions for non-compliance and government mandates for carbon.

Kyoto Protocol Sets the Stage

The Kyoto Protocol of December 1997 originally obligated the following GHG reductions over the 1990 period base line: 7 percent in the United States; 6 percent in Japan, Canada; 8 percent in the European Union (EU), Switzerland and most of Central and Eastern Europe. Each

country is setting its own program to deal with emissions reductions. Commitments made by the Annex 1 (economically developed countries) can be fulfilled by the purchase of emissions rights from other countries. In order for this agreement to be implemented, it would need approval by 55 countries accounting for 55 percent of Annex 1. The Kyoto Protocol comes into force 90 days after the date it receives the required number of ratifications. The goal is to activate the agreement during 2003.

Realistically, the Kyoto Protocol is a watered-down treaty that is important directionally but largely irrelevant to arresting GHG emissions. After meetings in Bonn and Marrakech, it was compromised further and is often referred to as "Kyoto Lite." The Kyoto Protocol of 1997 had sought GHG emission reductions from developed countries to 5 percent below their 1990 levels by 2012. The Bonn agreement cuts emissions only 1 to 3 percent. How carbon sinks, such as forests, will be recognized and how credits will be calculated remain unresolved. The lowered emissions goals and lack of U.S. participation (which emits a quarter of GHG) as well as that of developing countries make this modest agreement essentially a cover for lack of real progress on GHG emissions reductions. Even though the treaty is flawed, it is the start of a global emissions trading market.

Moving beyond Kyoto

The private sector will take the lead in the development of emissions trading markets since it has a vested commercial interest in emissions reductions. The responsibility for compliance, however, will rest with government. It is widely believed that markets will form first and that government should not inhibit their growth. However, eventually government mandates will be required to facilitate the development of the global market with verifiable standards.

Because European, Japanese, and U.S.-based companies are moving to develop pilot programs for emissions trading, there exists a first-mover advantage as waiting for regulatory approval may prove more costly in the future. Emissions rights may be traded through bilateral transaction, listing on exchanges, or through brokerage houses.

There are two main systems to create and trade GHG-related tradable commodities: (a) cap and trade and (b) base line and credit. In a cap-and-trade system (i.e., allowance-based trading), the maximum level of emissions released from sources is set by a control authority. This level is considered the cap. Each source receives an emission permit specifying the amount of emissions it can emit. These sources then receive allowances from the control authority that are

rights to emit a certain number of emissions. The allowances are freely tradable and can be sold and bought. At the end of each compliance period, each source must hold a number allowances exactly matching its actual emissions.

Under a *base line-and-credit system* (i.e., credit- or project-based trading), each participant is provided a base line against which its performance is measured. If an action is taken to reduce emissions, the difference between the base line and the actual emissions can be credited and traded. The base line established for crediting purposes can be fixed—based upon an absolute level of emissions—or dynamic—decreasing or increasing over time. The key distinction between the cap-and-trade and the base line-and-credit systems is that in the former, regulated sources' emissions are required to achieve an emission cap, which is a fixed quantity of emission reductions. Such a limit is not imposed by a base line-and-credit system.

The Kyoto Protocol envisioned three international mechanisms to enable Annex 1 states to reduce emissions and reach targets in the 2008-2012 span; emissions trading (described above), joint implementation (JI), and the clean development mechanism (CDM).

JI enables Annex 1 governments (investor country) to invest in emission-reduction projects in other Annex 1 states (host country) and use these emission reduction units (ERUs*)* to comply with commitments under the Kyoto Protocol. Such a transaction increases the number of assigned amount units (AAUs) in the investor nation and reduces the AAUs in the host state. ERUs are effective in 2008 to 2012, but some forward trades have already taken place in anticipation that the transacted reductions will be approved as ERUs under forthcoming JI guidelines. Private-sector entities can participate in the generation of ERUs but need government approval to do a specific JI project. Emission reductions generated through carbon sequestration, e.g., forestry projects, in Annex 1 countries are called removal units (RMUs). They also are effective from 2008 to 2012.

Through *CDM*, an Annex 1 government can invest in an emission-reduction project in a non-Annex 1 country (developing nations, like China, India, and Brazil) and use the generated emissions called certified emission reductions (CERs) to comply with commitments under the Kyoto Protocol. As the transfer of CERs to the investor country increases its AAUs and allows this state more pollution credits without decreasing the AAUs of another nation, CDM trades are rigorously supervised by a U.N. body.

All three mechanisms are currently being used. Bilateral trade between countries is thought the most effective means to trade

emissions initially. The emissions unit to be traded is 1 ton of carbon dioxide (CO_2) equivalent for the six GHGs. Nitrous oxides (NO_X) and methane (CH_4) emissions, two other greenhouse gases, are difficult to quantify in many countries. The United States, which already established an over-the-counter (OTC) market for NO_X emissions in 1999 as well as CO_2 emissions, also has completed cross-border trades with Canada.

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 thought that actions taken today will most likely be grandfathered into the future revised treaty. Kyoto was meant to be flexible and allow market-based solutions to trading GHGs as a carbon-reduction strategy and as a means to spread energy efficient technologies for industry. Governments also expect industry to make the largest GHG reductions, and this expectation falls heavily on oil and gas companies, electric and gas utilities, manufacturers, and automakers.

It has been estimated that Japan will have the highest cost of compliance in an emissions trading market at more than $500 per ton of carbon. These are very onerous costs to industry and should accelerate the adoption of a domestic Japanese emissions trading scheme. The Japanese have been very active in this arena; such a scheme is now under way.

The Danish and U.K. emission trading systems, which are national cap-and-trade plans, feature emission allowances. However, to date these emission allowances have not been exchangeable. In addition to emission allowances in the United Kingdom, credits generated from U.K.-based emission-offset projects can be used by participants of the emission-trading system to reach compliance.

The EU emission-trading arrangement to start in 2005 also will be a cap-and-trade system with tradable emission allowances and will include participation by the 10 members of Central and Eastern Europe. Under discussion is a parallel EU base line-and-credit method for project-based emission-reduction credits. Canada, Japan, and South Korea have plans to set up emission-trading systems that will feature emission allowances. Japan launched a pilot emission-trading system in 2002, and Korea is planning to introduce several single-sector markets for trading GHG emissions, culminating in a single integrated market by 2012.

The creation of a marketplace for emissions trading should motivate firms with surplus emissions rights to supply them to the market. In effect, there are merits to move forward early despite the risk of

uncertainty on future rules. It seems evident that industry-driven schemes may be grandfathered in the future as the rules are more clearly defined. Thus, industry can create its own domestic and international portfolio of emissions allowances or credits; by acting early it will probably be less costly than in the future. Using GHG emissions allowances now is a form of insurance for industry participants. Moreover, emissions trading results in significant environmental gains at reduced compliance costs and promotes the introduction of more benign environmental technologies.

The U.S. Emissions Trading Experience

Although many countries continue to propose emissions trading schemes in the form of green certificates, the United States is the only country to develop a successful emissions trading market; it has worked well for the past eight years. As initially proposed by the Environmental Defense Fund to the first Bush administration for the trading of SO_2 credits, the emissions trading market has surpassed what its architects envisioned. The U.S. Environmental Protection Agency (EPA) runs an emissions auction supervised by the Chicago Board of Trade, a regulated commodities exchange. Under Phase I, which began on January 1, 1995, the 110 highest emitting utility plants were mandated to reduce their annual SO_2 emissions by 3.5 million tons. This process was extended to NO_X in 1999. The OTC forward markets can trade these vintaged credits through the year 2030. Several OTC energy brokers are involved, including Evolution Markets, Natsource, Prebon, and Cantor Fitzgerald, resulting in over 1 million trades per year. The market is liquid and has created emissions credits that are a fungible financial product. It also has saved $1 billion annually over command-and-control strategies. Under Phase II, which began January 1, 2000, a more stringent standard calling for an additional annual reduction of 5 million tons of SO_2 was required; the program has been expanded since then to another 700 U.S. utility plants.

The current Bush administration has proposed even more stringent standards for sulfur dixoide under its Clear Skies initiative. Under the SO_2 program, utilities are given one allowance for each metric ton of sulfur dixoide emitted. The 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. To buy allowances, other utilities must reduce their emissions below their limits. These emissions allowances are fully marketable once they are allocated through an auction of the Environmental Protection Agency. Therefore, allowances can

be bought, sold, and banked. The allowances are allocated in phases; later phases tighten the limits on previously impacted sources of pollution and also are 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 do not comply with the law. This system has an allowance trading system. All transfers are recorded and posted on the Internet. Serial numbers allow the tracking of each allowance's trading history and an inventory for all accounts is provided. The most interesting phenomenon from this market-based approach has been that from 1995 through 1999 the market not only met its required emissions reduction targets but was 30 percent under compliance—exceeding expectations by lowering emissions below the announced targets because some companies demonstrated unexpected behavior such as banking rather than selling emissions credits.

This is not a "soft" issue; the importance of climate change as a financial risk is now being acknowledged by Wall Street and the City of London. Corporate boards are increasingly concerned as shareholders question their environmental practices. In fact, according to Innovest Strategic Value Advisors (the Green Moody's), the environmental performance and financial performance of companies are increasingly intertwined. This directly impacts auto manufacturers, electric utilities, oil and gas companies, banks, and insurance firms. Automakers are concerned about carbon dioxide emissions per vehicle produced and sold. Electric utilities give attention to reducing their GHG emissions as part of their air emissions reductions. Oil and gas companies are growing concerned about emissions as production, refining, transportation, and distribution liabilities. Bank share valuations could fall if they do not have adequate carbon risk-management strategies.

In fact, a "carbon" beta has been created as the metric for a firm's risk exposure that implies a threat to future shareholder value. While companies and industry sectors may vary widely on their degree of risk exposure, managing carbon risk will be a leading consequence of climate change. Financial institutions are vulnerable to this change as market capitalization could be impacted negatively. The point is that climate-driven risks will continue to grow; there is global momentum for improved disclosure on corporate risk. First movers may be rewarded rather than penalized for being active. Much of their emissions reductions will come through cost-effective risk management solutions such as emissions trading. Companies have the choice of paying less now for action or more later as a financial penalty.

Corporate Responses to Kyoto

The Kyoto Protocol will have limited market success in its present form without the participation of the United States. Moreover, the present form of Kyoto has significantly lowered goals. GHG reduction will take decades to achieve rather than the goal of 2012 envisioned. In effect, Kyoto is a very modest effort to contain emissions—only a first step, but a positive one.

The need to create market liquidity is the primary challenge for achieving success in CO_2 emissions trading. With electric load growth and economic activity increasing each year, there is a need to create incentives for new technologies to penetrate new, liberalized markets. One obstacle to change has been the fossil-fuel subsidies in many countries that send the wrong economic signals. Effective incentives must have the flexibility to develop market-based solutions and should not be overly onerous.

Many private companies are moving forward under their own initiatives. In effect, they are creating a global emissions portfolio that will develop provided energy firms can assume the risk. The BP and Shell internal emissions trading systems are leading the way for energy companies to reduce GHG emissions, and this year (2003) have been externalized into a carbon business. To aggregate reductions from all business units, BP began a program in January 2000 that has 150 of its units operating in more than 100 countries in a cap-and-trade scheme to reduce its GHG emissions. Both CO_2 and methane are traded in the BP system. At the end of 2000, BP had traded 2.7 million tons of CO_2 at an average price of $7.60.

Shell pledged to reduce its GHG emissions by 10 percent by 2002 compared to the 1990 base-line levels. Shell's upstream oil and downstream refining and chemicals businesses are trading emissions. It is estimated that the value of Shell's carbon reductions range from $5 to $40 per ton. The program is reconciled internally on a yearly basis. Both Shell and BP have extended their programs externally because they have developed expertise and success in emission trading.

Multinational companies should be encouraged to trade their emissions permits internally between countries in which they operate as a means to accelerate technology transfer and reduce GHG emissions. In essence, we need to create global emission permit allocations and essentially have a market-based solution for global pollution.

Creating the Global CO_2 Emissions Portfolio

The goal is a gradual reduction in emissions driven by measurable targets using market-based incentives and to encourage better

technologies, better fuel choices and better results and accelerated technology transfer. The targets can include outright purchase of emissions reductions. Multinational companies in North America, Europe, and Asia are creating emissions-reducing schemes that can be transferred to their affiliates in developing countries.

Any market needs trading liquidity in order to ensure fungibility. Presently, the CO_2 emissions trading market has completed only 100+ trades, including one North American/Europe carbon trade, one European/Australian trade, several Japanese/Australian trades, and two in California, but this market is accelerating. Another factor that influences trading is caps. As the GHG emissions market is in its infancy, trading caps can either be adopted by government or left open-ended for the markets to develop.

Exchanges getting into the act include the Sydney Futures Exchange, the International Petroleum Exchange, the Paris Bourse/ UNIPEDE, and the Chicago Climate Exchange. The volume of GHG trades increased significantly over the past two years (2000-2002). Approximately 40 million tons of CO_2 equivalent were traded between 2001 and June 2002, compared to 55 million tons transacted between 1996 and 2001—nearly doubling total market volume.

Green Finance

The key breakthrough for carbon dioxide trading will be the use of the project finance mechanism to create CDM credits. In this way, a stream of emissions credits for 30 to 40 years (the life of the project) can be banked up front. Investment and commercial banks later can create an environment checklist so that further streams of credits can be created. Eventually, the creation of a global CO_2 market to be traded on the Internet will accelerate trading, cross borders, and bring the most players to the global marketplace. "Green finance" is thus born as the solution for global pollution and greenhouse gas mitigation strategies through the use of financial engineering at its best. Financial institutions are just starting to understand their emerging environmental liabilities and the value of environmental credits in project finance.

Financial Institutions, Trading Houses, and the Public Sector

Some banks and trading houses already are engaging in buying emission reductions from projects or acquiring non-project-related emission allowances. This is being done in order to use these emission reductions in new products they want to offer to their customers or to earn a profit by selling these environmental certificates to other

buyers at a later stage. Several examples from industry illustrate the success of this approach to emissions reductions. Mitsubishi Corporation purchased GHG emission reductions from JI and CDM projects in order to sell them to power companies and steelmakers that need to cut CO_2 emissions. Mitsubishi aims to make a profit from the difference between purchase and sales price by holding on to credits. For example, Mitsubishi bought 2.8 million tons of CO_2 from a run-of-river hydropower plant in Chile to be generated from 2004 to 2012 for a price of U.S. $3.50 per ton of CO_2. Sumitomo, a Japanese trading house, announced in 1999 that it would help United Energy Systems in Russia invest in 28 gas-fired power stations to replace coal-fired plants and thus acquire annually 10 million tons CO_2. Swiss Re is taking initiatives to acquire emission reductions by investing in GHG offset projects as part of their asset management practices. Swiss Re is aiming to use such credits to offer new insurance products and services to its customers.

A number of governments have established schemes to purchase emission reductions using public funds. Such initiatives often run parallel to cooperation or economic aid programs of these countries. The Dutch government is organizing regular tenders to purchase emission reductions from projects using the JI and CDM mechanisms and has purchased emission reductions from biomass, hydropower, wind, and cogeneration projects in Romania, Slovakia, the Czech Republic, Hungary, and Poland. Other Western European governments are currently exploring similar schemes to acquire Kyoto-compliant emission reductions from projects in transition and developing countries. Emission reductions or emission allowances that are backed by a government scheme and that have clear ownership have the highest value in the market.

How Buyers and Sellers Interact in the Market

Emission reductions can be generated in a specific project or pool of projects using base line-and-credit mechanisms like JI or CDM. Companies can purchase emission reductions as an output or product of a project by signing carbon purchase contracts with the owner of the emission reductions. Because electricity is an output of a clean energy project, emission reductions similarly can be an output of a clean energy project. The emission-reduction purchase agreement is handled like any other contract, i.e., through a power purchase agreement. Buyers can pool together and invest in "pure carbon" funds where a professional fund manager completes an emission-reduction purchase agreement (ERPA) with project entities on behalf of the

investors, who only get a carbon return on their investment and no financial return. Another way to participate is as an equity investor in a project company that receives—in addition to a specified financial return—an amount of emission reductions potentially generated by the project.

Another means is to purchase emission allowances from a government or company that has been allocated a certain amount of emission allowances (emission rights), either through an international framework like the Kyoto Protocol or through a national or regional cap-and-trade mechanism like the U.K. emission-trading system or the mechanism planned by the European Union. As happens typically, potential sellers are firms with a demonstrable emission reductions potential that can be achieved at lower costs compared to other companies. Project entities, which generate emission reductions from a project in excess of a specific target or in addition to a specific base line or business-as-usual scenario, can sell the emission reductions on the market. Examples of sellers of emission reduction follow.

1. The energy sector, that is, owners of energy generation, distribution, and transmission, include owners of renewable energy projects; heat and electricity producers that do a fuel-switch project from coal to natural gas or natural gas to biomass or from a heat only to a combined heat-and-power generation; electricity transmission and distribution companies improving transmission and distribution efficiencies; energy-intensive industries that produce their own energy, e.g., cement manufacturers using alternative fuels as tires, rubber pallets, and recycled oils; oil companies reducing gas flaring in oil exploration; and gas distribution companies reducing leakages along pipelines.

2. Owners of demand-side energy efficient equipment in industrial, municipal, and residential sectors, including industries improving the use of energy in their own operations; energy-servicing companies that finance, own, and operate energy efficient equipment for different industrial customers; municipalities using demand-side energy efficient devices in public buildings and street lighting.[1]

3. Waste management companies, including firms capturing methane from landfills and using methane in electricity production, and water companies, capturing methane in wastewater treatment plants and using it for electricity generation.

Other industries that can produce emission reductions are those active in the agriculture and forestry sectors, cement producers, and pulp and paper manufacturers.

Selling Emission Reductions

There are two main ways to sell emission reductions depending on whether the reductions have been generated under a cap-and-trade or in a base line-and-credit scheme. Selling emission reduction under a cap-and-trade scheme is straightforward. A company whose emissions have been capped needs to get its emissions monitored every year through an independent verification body designated by control authorities. To comply, a firm's emissions have to match the number of emission allowances allocated to the company by the authorities.

The monetization of emission reductions under a base line-and-credit mechanism is more onerous. Project owners need to follow a number of procedures during preparation and implementation of the project. The rules for a CDM undertaking are more stringent than for a JI project due to a precaution not to inflate the total number of allowances available to Kyoto Protocol participants. In some JI transactions, the monetization procedure is more streamlined if the host country has established advanced inventory, registry, and monitoring institutions. Nations that do not participate in the Kyoto Protocol may establish their own procedures for monetizing emission reductions. Many of the early U.S. and Canadian trades have traded only verified emission reductions, whose ownership is largely uncertain. There also exist more complex monetizing structures where international emission trading and JI mechanisms can be mixed.

The Need for Standardized Transactions in Liquid Markets

In more liquid markets with more standardized commodities, buyers and sellers might look toward Internet-based platforms or exchanges to buy and sell their emission reductions. The Chicago Climate Exchange (CCX) has 14 companies committed so far and intends to create a set of common standards to facilitate the operation of a pilot voluntary market in GHG in North America. CCX is the first voluntary pilot program in the United States for trading of GHGs. The program groups 17 U.S., Canadian, and Mexican electricity companies and six major industry representatives from the cement, automobile, chemical, and waste sectors as well as municipalities and international GHG offset providers. Participation will be voluntary but firms will be monitored for compliance. The first phase is expected to start in 2003 and would include commitments and trading by participants in the United States, Canada, and Mexico and, from 2006 onward, potentially will include further international linkages. The NASDAQ, as a provider of financial regulatory services, is working with the CCX to assist in the development of registration, market oversight, and

compliance procedures for members of the CCX as well as auditing of the emission base lines, annual true-up and offset verification, and certification procedure.

Euronext, which was created in 2001 by the merger of the exchanges in Amsterdam, Brussels, and Paris, provided an Internet-exchange platform for electricity and CO_2 futures trading simulations under the aegis of Eurelectric, which is an association of European electricity producers. Euronext is planning to become the first fully integrated, cross-border European market for equities, bonds, derivatives, and commodities.

What Is Green Trading?

The green market for trading credit and allowances encompasses much more than just emissions trading. The August 2002 environmental summit in Johannesburg, South Africa, demonstrated the potential growth and application of green markets world-wide for both developed and developing countries. It is not the over-hyped weather and bandwidth trading markets of recent years but the "real" next commodity market that will bring global environmental remediation to very real problems. It will be reminiscent of the world oil markets as carbon is a fungible cross-border commodity.

Green trading markets are a good alternative for facilitating change. The reality is that any solution to arresting GHG emissions will take decades to complete—something that was envisioned in the U.S. SO_2 program that goes on until 2030 (not 2012 like the Kyoto Protocol). Despite its rejection of the Kyoto Protocol, the United States is still pursuing GHG emissions trading, albeit at the state government level, and well in advance of any cap-and-trade regime. However, the green market will need to be mandatory, not voluntary as the Bush administration has advocated, in order to attain a verifiable and fungible financial value for carbon. While the debate rages on about how the rules for global environmental markets will be set, the reality is that the only workable environmental markets today are the U.S. SO_2 and NO_X markets. However, the green market model can be replicated throughout the world. The creation of renewable energy credit markets now in Australia and Texas, and this year (2003) in California, New York, New Jersey, and 10 other states offers other alternatives to traditional thinking on emissions trading. In effect, the platform for emissions trading is expanding to encompass all environmental attributes as financial commodities.

Finally, the electricity capacity and delivery shortages in certain regions of the U.S. grid have given rise to the negawatt market—a

term created by Rocky Mountain Institute over 20 years ago. The second coming of energy efficiency is now here, for the negawatt market has the double benefit of avoiding pollution and using energy more benignly. It values energy efficiency as a financial product, which is revolutionary because most energy efficient programs are government-mandated and framed in terms of avoided costs.

What Is Renewable Energy?

The renewable energy market encompasses wind, solar, biomass, hydropower, wave, and hydrogen sources of energy. The global wind energy market is currently growing by 40 percent annually, with solar increasing by 35 percent. While it can be argued that the installed base of these products is small, the key is to look at the growth trajectory. The older coal- and oil-fired equipment is significantly less efficient (typically around 30 percent thermal efficiency) and creates more GHGs than modern technology. These older units will be replaced by natural-gas-fired equipment with better technology to achieve efficiency gains of up to 70 percent using fairly conventional methods. Natural gas, in this environment, can be viewed as a transitional fuel to a future renewable and hydrogen economy. This efficiency gain cannot be understated because major developing countries can now leapfrog technologies using renewable and efficient methods to avoid many of the dirtier solutions to pollution. These projects can be scaled down for smaller installations.

Who Is Going to Play in the Green Trading Market?

The market players will be oil and gas firms, gas and electricity utilities, metals, pulp and paper industry participants, agricultural producers, automakers, and others vulnerable to the GHG issue. Solutions will originate at investment banks, insurance and reinsurance firms, energy companies, and end users as environmental markets converge with capital markets. Cross-border trade of these credits and allowances will accelerate over time as the multinational players recognize that good business can be made in the so-called "carbon kicker," i.e., the financial value of carbon reductions.

Smart energy and industrial companies already have realized it is cheaper to act now rather than being forced to comply with laws later—they are already thinking that it may be a fiduciary responsibility to comply in case more stringent environmental regulations are coming later. Venture capital funds and project finance groups are contemplating how to evaluate these credits in their projects throughout the world.

Markets for the Environment

There is always a maturation process for market development. In this case, the green market began in 1995 when the first SO_2 allowances were traded. Forward curves are developing now for more environmentally centric trading. More stringent standards have been introduced and more power stations have been added to the program. While some ill-informed observers of the market may feel that emissions trading is a way of paying to pollute, in reality the market is financing emissions reductions elsewhere and accelerating technology transfer.

OTC environmental brokers have a unique contribution to make to market development. Their data are important for market creation and their deal flow will contribute to market indexes and future trading liquidity. After all, OTC brokers are now making markets front and center with their buy/sell quotes. The financial value of the GHGs has been estimated to be as high as $2.3 trillion. Today, the SO_2 market alone is worth $6 billion annually and growing fast. Combining the green market with other markets presents a tremendous global financial opportunity.

California at the Forefront

California did not wait for the Bush administration to act on greenhouse gas emissions, and enacted legislation, Assembly Bill 1493, which regulates carbon-dioxide emissions from motor vehicles. The legislation requires the California Air Resources Board to develop regulations to achieve the "maximum feasible and cost-effective reduction" of GHG emissions from passenger vehicles and light-duty trucks by January 1, 2005. Passenger vehicles and light-duty trucks account for approximately 40 percent of greenhouse gas emissions in the state. The regulations will not take effect until January 1, 2006, and will apply only to model year 2009 and later vehicles. As a result, it is possible that vehicle manufacturers could receive credits for reductions in greenhouse gas emissions achieved prior to the effective date of the regulations, with the 2000 model year serving as the base line for measuring reductions. The state of New York will replicate many of these California standards.

Turning to the renewables market, while 14 states already have renewable energy portfolio standards (RPS), California's program began on January 1, 2003. The Californian market currently has 12 percent renewable energy compared with the total U.S. renewable market of 2 percent; its three investor-owned utilities are now mandated to reach 20 percent by 2017. PG&E (currently at 12 percent) and

Southern California Edison (at 14 percent) can reach that goal by 2010. Sempra, the third largest utility in the state, was at 1 percent for 2002 and has until 2017 to reach the goal. These three utilities account for 75 percent of California's electricity supply, so RPS will create a stronger trading market for renewable energy in California as credits can be banked and increased liquidity will be created by more projects entering the trading pool.

Texas was the first state to establish a mandatory renewable energy portfolio standard with the tradable commodity being the renewable energy credit (REC), defined as 1 megawatt-hour (MWh) of renewable energy metered in Texas in 2002. A similar regional green certificate market is being developed in the northeastern states.

European Renewables Markets

The driver behind renewable energy certificate markets is voluntary or mandatory requirements to produce a certain percentage of the electricity and heat through renewable energy resources. In the EU, a 2001 renewable energy directive targets the establishment of a framework to increase the share of green electricity from 14 percent to 22 percent of gross electricity consumption and the share of renewable energy from 6 percent to 12 percent of gross energy consumption in Europe by 2010. EU governments are currently preparing plans on how to help achieve these targets. Already, 173 European companies have set up a voluntary market for trading RECs, which are standard certificates evidencing the production of 1 MWh of renewable energy. Eleven out of 15 EU countries have joined the REC scheme and 11.4 million 1-MWh certificates have been issued.

The Dutch Green Certificate System, which was introduced in the year 2001, has been the world's first national green certificate system. Green certificates are issued when a producer demonstrates production of a certain amount of renewable energy. On the basis of a green certificate, the Dutch tax authorities can grant the supplier an exemption from the energy tax ("eco tax").

The U.K. Utilities Act 2000 has an obligation for suppliers to supply at least 5 percent renewables in 2003 and 10 percent by 2010. This obligation has to be fulfilled by surrendering enough renewable energy obligation certificates (ROCs) to the electricity regulator Ofgem before the end of each year. ROCs began trading in July 2002. Similar programs are under way in other EU countries as Italy, Belgium, Sweden, and Austria. From 2001 through 2010, the total size of green certificate trading in Western Europe is expected to reach 41 billion euros.

Opportunities and Challenges

It is highly likely that green trading will evolve at varying speeds in the global economy, given the uneven degree of political initiatives and industry support; it is even conceivable that some European and Asian countries could catch up quickly with the United States. The Netherlands is the most progressed green market at present with the electric utility Nuon and financial institution Rabobank leading the way. Should the parties that have ratified—or plan to ratify—Kyoto manage to move beyond political posturing and work out the practical issues crucial to the development of a traded market, green trading certainly will evolve at a more rapid pace. While individually these countries may be small contributors, as a whole their will in creating liquidity could significantly help propel green trading.

However, green trading still faces many challenges. As countries move to establish their own individual policies, it is possible there will be a number of competing standards. This situation may work as long as green trading is confined within national boundaries. But if this trading is to become global, it is imperative that a uniform set of standards be developed. These standards would ensure that tradable units are mutually recognized by domestic and international trading systems. Multinational businesses must be able to exchange tradable units around the globe without the hindrance of converting them every time they expand in a different country; otherwise, the cost of adapting to various standards could become prohibitive. Parties involved in cross-border trading must feel confident that the mechanisms for tracking covered emissions sources are flawless. Moreover, there must be a proper enforcement mechanism in place to ensure that units traded are in compliance with international standards and that nations are not exceeding their emissions limitation quota. Accurate and timely information also will be essential to the growth of these emerging markets, for example, accurate price reporting, timely news, and analysis of various market fundamentals. There is no doubt that markets with a long tradition in trading commodities will have the resources and networks in place to take advantage of the arbitrage opportunities that are likely to emerge as these markets evolve.

While green trading has the potential to develop into fragmented markets, it is highly likely that multinational companies, assisted by government, will establish uniform environmental standards throughout the globe since U.S. multinational corporations are concerned particularly with dual environmental standards in the United States and the rest of the world where they do business and are Kyoto-compliant. Regions such as Europe and the United States, which make

up a large part of the GHG market, would flourish in a global market. Smaller markets—including most developing countries—could face serious liquidity issues because of their inability to easily dispose of surplus units in a timely fashion if there is not a global market. In this case, the economic and environmental advantages envisaged by the proponents of green trading would be limited, at best.

Green Financial Indexes Will Jump-Start Market Liquidity

The growing awareness of green trading benefits has called for and enticed expansion into GHGs, renewable energy, and energy efficiency. As demand for green trading and environmental risk management evolves, so too will the need for more efficient metrics that allow for accurate valuation of market and corporate risks. Central to the debate is how crucial price transparency and market indexes are to the evolution of this market.

Green trading has emerged as a powerful tool for financing emission reduction. This has been particularly true in the United States where the established SO_2 allowance has evolved into a $6-billion market. This practice has caught the attention of leaders around the globe to the point that emission trading is now becoming an integral component of environmental policies in Europe, Asia, and North America. Trade organizations on both sides of the Atlantic, including the Emissions Marketing Association and the International Emissions Trading Association are working diligently toward an answer. Regardless of the routes chosen, the success of these efforts will depend on their ability to find a solution that speaks to the needs of the industrial community, environmentalists, and Wall Street financiers.

Why Are Market Indexes So Important?

Because government mandates are the primary market driver for environmental financial products, the scope of activity at present has been limited to a small number of players; that is expected to increase rapidly. The growth of emission trading and profit opportunities has attracted 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. Unfortunately, they are faced with one serious problem, i.e., the lack of price discovery mechanisms.

The lack of a reliable index has muted efforts to create a more liquid market. For instance, the current trading environment is handicapped by the operational complexity of having adequate allowance inventory on hand to complete a trade. This limits access only to

those with ample allowances or those that can borrow allowances. Furthermore, it takes time—even weeks—to transfer allowances from one party to another, limiting traders' ability to enter or exit the market with ease. An index would remove this impediment and make it possible to attract more players by allowing more trade structures and by turning the environmental market into a cash-settled operation.

In emerging markets such as carbon dioxide or renewables, where trades will be scarce at first, lack of transparency inevitably will keep buyers and sellers on the sidelines. In turn, this could encourage inefficient price signals that might create profit opportunities for a small number of arbitrageurs. Reliable market indexes will bolster confidence in the prevailing market price and enable buyers and sellers to agree on the true market value of their allowances or green certificates. Greater confidence in the true market value ultimately will generate more liquidity, making it easier for sellers to find buyers willing to transact.

Compilation of Green Financial Indexes

Constructing an index for a market that is in its early stages of development is extremely problematic. It is time consuming, requires a tremendous amount of intellectual capital, and often the returns outweigh the costs. As a result, only a small number of specialized organizations can deploy the resources necessary to make that kind of commitment and are involved already in the index business, such as Dow Jones, Reuters, Bloomberg, McGraw-Hill, or stock exchanges. Most likely commodity exchanges, such as the New York Mercantile Exchange, the Chicago Board of Trade, International Financial Futures and Options Exchange (LIFFE), or the Chicago Mercantile Exchange would have the means to create an index. Although some of these exchanges are beginning to explore the benefits of green trading indexes, it is not yet clear the extent of member commitment.

Given its early stage of development, green trading certainly will face some similar issues, and lack of liquidity will make real-time indexes impossible. This phase usually lasts several years until market participants grow accustomed first to new market practices and then to the tools and technologies crucial to the development of a real-time market. Thus, most indexes published during this embryonic stage of market development may be based on voluntary reporting of transactional prices. In this case, the reporting arrangement could revolve around informal data submission by market participants to various pricing services. Although limited by the quality of the underlying data, this method is widely used in the oil, natural gas, and power

industries where market indexes serve as the key benchmarks used for pricing financial swaps and options worth tens of billions of dollars.

Alternatively, green financial indexes could be compiled based on a method similar to the London inter-bank offered rate (LIBOR), the fixing mechanism used by The British Bankers' Association. This approach is most widely known to traders dealing in short-term interest rates. The LIBOR, one of most widely used methods for fixing short-term interest rates, is fixed daily for the British pound, Canadian dollar, euro, U.S. dollar, Australian dollar, Japanese yen, and Swiss franc. It is published simultaneously on more than 300,000 screens world-wide by major information vendors such as Money Line Telerate, Thomson Financial, Reuters, Bloomberg, Nomura Research, and S&P Comstock. The LIBOR approach may be a more reliable means of generating indexes for an emerging market like green trading as it requires a level of commitment that goes beyond what most trade publications may be able to provide. For example, most trade publications do not generate any direct revenue from indexes but typically use price indexes as marketing tools to help sell their news. The commitment involved in the fixing approach would far outweigh the benefits for many of these institutions.

Benefits of Green Financial Indexes

Besides providing the necessary tools for managing market and corporate risks, green financial indexes could help reduce business costs. The emerging environmental markets will need a certain level of price transparency to function efficiently. Absent that transparency, traders will need to rely on their own price-gathering mechanism. This could prove expensive, time consuming, and unreliable. Even the most elaborate price-gathering systems will not be a good substitute for an independent source of information on which most traders can agree. As a result, many would rather use indexes published by a neutral party as a reference benchmark that often can be purchased at a fraction of the cost involved in gathering their own information.

Green financial indexes also could serve as major triggers for capital investment and technology transfer in markets exposed to environmental risks. Among the many players ready to enter this market are investment banks, insurance and reinsurance firms, oil and gas firms, agricultural companies, gas and electricity utilities, metals, pulp and paper industry participants, automakers, and others vulnerable to the GHG issue. Many of these firms will be the solution providers as environmental markets converge with capital markets. A number of these players will be reluctant to move too early for fear of

diverting valuable resources from profitable activities. However, they will not want to miss out on an opportunity by waiting until it is too late. As a result, many firms will time their entry around the publication of reliable market indexes.

Ultimately, the elements included in green financial indexes will determine their usefulness. The data used to compile them will also have a major bearing on their accuracy and reliability. To the extent they are based on the voluntary reporting approach, buyers and sellers must be ready to disclose the true price at which they buy or sell green products. Given a large enough pool of market participants, these surveys may promote liquidity in this emerging market. The impact, however, could be limited. If these indexes are based on a more involved approach, such as the LIBOR, they could accelerate the growth of financial futures and options at a rate that may astound even the most ardent proponents of these markets. The onus lays with organizations such as the emission-marketing associations, especially in their ability to attract financial investors and other creators of liquidity.

The Market Opportunity

A major market opportunity exists for the $205-billion environmental industry to create new financial services related to the challenge of climate change. Green financial indexes offer one means to jump start this emerging commodity market as climate change directly affects the energy and agricultural industries in both current operations and future investments. The more stringent environmental standards being implemented in many countries are having an impact on decisions regarding future investment. Price discovery is still an important function for establishing liquidity in this emerging market. Indexes will add to the development of these markets and assist in the participation of many of these new market players.

What's on the Horizon?

Today, there are several risks associated with the generation and trade of emission reductions. First are uncertainties related to the development of international or regional regulatory schemes. These risks relate to uncertain modalities of international emission-trading systems (like JI and/or CDM under the Kyoto Protocol) as well as regional-trading schemes (as in the EU) that are under development. Changes in Kyoto rules (base line, additionality, validation/certification, transaction costs, adaptation tax, and other levies) might affect project eligibility and price of emission reductions. These risks are largely due to prejudgment of international carbon laws for which

secondary legislation does not yet exist. Mitigation options are money-back guarantees, cross-project insurance, bundling of projects into a portfolio diverse in project types and geographical locations, continuous monitoring of market development, transfer of risks to buyers as well as development of options structures.

Second are the sovereign risks related to the carbon market. Countries that want to participate in emission trading under Kyoto Protocol rules need to fulfill specific requirements laid out by the United Nations Framework Convention on Climate Change. If a country does not meet these requirements, it can be restrained from the participation in emission trading, e.g., possibly leading to emission delivery default risks on forward trades. Host countries also might alter the eligibility criteria for JI or CDM projects or introduce taxes on the transfer of emission reduction, etc., which might affect transaction costs and the transfer of emission reductions.

The involvement of specific international financial institutions offering some form of political risk coverage or export credit agencies could provide comfort to buyers of emission reductions. So far, buyers largely take this risk, which is factored into the price of the emission reductions.

Finally, project-related carbon delivery risks exist: completion risks, e.g., construction delays affecting delivery of emission reductions; technical risks, e.g., equipment does not perform as specified; management and operation failures, e.g., nonregular maintenance reducing efficiency; commercial risks, e.g., input or cost risk, output, or price risk; and regulatory risks affecting overall performance of the project and investment climate, e.g., changes in tariff structures, taxation, or administrative barriers.

Some of these risks can be reduced with thorough technical and financial project due-diligence or transferred to other parties through contractual agreements, such as restructuring project completion guarantees with the contractor, provisions in operating contracts, and provisions in feedstock or fuel supply contracts. Some banks and insurance companies currently are considering providing credit enhancement for sellers of emissions in the form of financial guarantees and contingent capital to cover some commercial/market risks as well as technology risks.

Despite all these apparent obstacles to creating a viable green trading market, the time for environmental trading is now—as momentum moves the market forward. The political wherewithal is present, the technology is available, and, most importantly, the financial engineering and risk management tools are in place with the affected parties

ready to begin trading. The next trading market definitely will be in green trading.

NOTES

*Peter Fusaro is President and Founder of Global Change Associates (GCA), an energy and environmental consulting firm based in New York City that assists companies and governments to establish markets for trading energy and environmental financial products. The author has been advisor to the U.S. Environmental Protection Agency and Departments of Energy and State, the World Bank, Mitsubishi Research Institute, Institute of Energy Economics (Japan), Japan's Ministry of Economy, Trade, and Industry, and many multinational energy companies. A member of the Institute of Petroleum, the Energy Risk Management Association, and the Global Association of Risk Professionals, Mr. Fusaro is New York Chapter President of the International Association of Energy Economics. He recently formed Energy Environment Capital Partners LLC, an accelerator fund focused on energy and environmental technologies as well carbon-risk advisory services (www.eecapitalpartners.com). The author, who holds a B.A. from Carnegie-Mellon University and an M.A. in international relations from Tufts University, has published widely including the books *What Went Wrong at Enron* (John Wiley, 2002), *Energy Convergence: The Beginning of the Multicommodity Market* (John Wiley, 2002), *Energy Derivatives: Trading Emerging Markets* (Energy Publishing Enterprises (a division of GCA), 2000), and *Energy Risk Management* (McGraw-Hill, 1998). He also has contributed to *Distributed Generation: The Power Paradigm for the New Millennium* (CRC Press, 2001), among other volumes. Information on two forthcoming books, *Energy Trading in Asia* and *Green Markets: Time for a Change*, is available at http://www.global-change.com. Portions of this paper were published in "Green Light for a Cleaner Globe," (with Antoine Eustache), *FOW Power & Energy*, November 2002; "Green Indexes," (with Antoine Eustache), *Commodities Now*, December 2002; and *Energy Convergence: The Beginning of the Multicommodity Market.* The author would like to thank Nathalie Roth for her research assistance.

[1]Generally, it is more difficult to calculate emission reductions in demand-side energy efficient projects than in supply-side energy efficient projects.