Summer 2003

The Chicago Climate Exchange: Greenhouse Gases be Reduced Absent Government Mandates?

Angie Farleigh

Sustainable Development Law & Policy

Volume 3
Issue 2 *Summer/Fall 2003*

Article 7

The Chicago Climate Exchange: Greenhouse Gases be Reduced Absent Government Mandates?

Angie Farleigh

ARTICLE

THE CHICAGO CLIMATE EXCHANGE: CAN GREENHOUSE GASES BE REDUCED ABSENT GOVERNMENT MANDATES?

By Angie Farleigh *

The Chicago Climate Exchange ("CCX") is a voluntary tradable permit program for reducing greenhouse gas emissions. The program includes voluntary emissions reductions and trading for all six greenhouse gases. Trading in carbon dioxide is expected to generate the most interest. Member companies make a legally binding agreement to reduce their emissions of greenhouse gases by 4% below the average of their 1998-2001 emissions by 2006.[1] This figure was reached during the design phase, through consensus among the founding member companies. It was a goal that all of the companies felt they could reach, but CCX representatives note that it is possible this number will change once the program is up and running.[2] It is unclear whether this was a reduction that many of the companies were going to achieve through other means, regardless of their participation in the CCX.

CCX was initially funded by a $347,600 Joyce foundation grant, administered by the Kellogg Graduate School of Management at Northwestern University. Environmental Financial Products, LLC performed the principle research for the study. The exchange will be regulated by the National Association of Securities Dealers ("NASD") and N.M. Rothschild & Son Ltd. will provide investment banking services.

Program Structure

The program is presumably modeled after the U.S. acid rain ("SO_2") trading program which CCX Chairman and CEO, Richard L. Sandor, helped design. Participants can receive credits by reducing emissions, or generate "offset" credits by engaging in offset projects.[3] The market would consist of tradable commodities, in the form of a ton of carbon dioxide equivalent that could be bought and sold like shares of stock.[4] The participants will use a web-based system regulated by the NASD to buy and sell the credits.[5] Each participating company will have an account on the CCX registry containing tradable emission allowances based on the 1% per year reduction goals. Members will use the website to exchange bids and offers, but will not know counterparties' identities until trades clear.[6] Any member that achieves greater reductions than the stated goal would be granted a credit slip, which could be traded to companies that did not meet their goals. A participating company must surrender one allowance or offset for every ton of CO2 emitted over its limit.

The exchange will be available to greenhouse gas emission sources, farm and forest carbon sinks, offset projects and liquidity providers in the United States, as well as to offset providers in Brazil. Emission sources and offset projects in Canada and Mexico will also be integrated into the program after trading begins.[7] The advisory board hopes to eventually expand the program to include other international sources.

The program will be run principally by the CCX Board of Directors, assisted by a small CCX staff. Richard Sandor will serve as CCX's CEO and Chairman.[8] Maurice Strong, former Chairman of the Earth Council, a Canadian NGO, will serve as a Vice-Chairman of CCX.[9] Mr. Strong is also the former Under-Secretary General of the United Nations responsible for the 1992 Earth Summit in Rio de Janeiro, Brazil. The other Vice-Chairman of the exchange will be Les Rosenthal, a principal of the Chicago-based commodities and futures trading firm, Rosenthal Collins.[10] Mr. Rosenthal is a former Chairman of the Chicago Board of Trade. Finally, former Illinois Governor James R. Thompson, current Chairman of Winston and Strawn, will serve as Director of CCX.[11]

CCX will also have a "high level" advisory board consisting of a mixture of academics, scientists, policy experts, and industry representatives.[12] The role of the advisory board is to provide "input as needed."[13] As the name suggests, their function will be to give advice and not to participate in the decision-making process.

Program Governance

In order to be a member of CCX, participants must sign a contract promising to meet the stated emissions reductions and to trade only on the CCX exchange for the four-year pilot period.[14] Like other commodity exchanges, the NASD will look to verify reductions and has worked with the CCX to devise compliance procedures for the program.[15] The NASD will be in charge of enforcing the caps and ensuring that the credits traded in the exchange represent real, permanent emissions reductions.[16] To accomplish this goal, CCX and the NASD have based much of the verification system on the Greenhouse Gas Protocol Initiative ("GHG Protocol"), which was developed by the World Resources Institute in 1998 in order to standardize and legitimize GHG emissions from companies around the world.[17] The GHG Protocol helps companies calculate and report their GHG emissions by providing standards for accounting, setting reporting boundaries for the company, setting baseline emissions levels and reporting the emissions data.[18] It also provides guidance to companies on calculating GHG emissions, managing their inventory quality

and verifying their GHG emissions data.[19] The GHG protocol includes calculation tools that represent a "best practice" for emissions calculation.[20] In order to calculate its GHG emissions, a company must input data on its activities into an Excel spreadsheet and then select the appropriate emissions factors, based on the Protocol's step-by-step guidance. Emission factors and calculation methods vary depending on the type of GHG, the type of industry, and other site-specific activity data.[21]

The GHG Protocol, although helpful in designing a verification system, was not a perfect fit for a trading program like CCX.[22] CCX is in the final stages of developing a new protocol[23] that will be approximately eighty percent based on the GHG Protocol, and about twenty percent "custom fit" to the needs of the program and its members.[24] The result will be a standardized emission submission protocol that all members of the CCX must follow in order to participate in the exchange. Standardizing the data that is submitted to the CCX will ensure that all members are held to the same standard and will make it easier for the NASD to audit the submissions. Most of the initial member companies are large multinational corporations that have already been tracking their GHG emissions since 1990, either through the GHG Protocol or some other comparable means.[25] All of the companies participating in the CCX pilot program already have emissions inventories built up and will be able to meet the new CCX emission submission standards. Because CCX is still in the pilot phase, officials have yet to develop procedures for smaller companies that may want to join in the future, but do not have the systems in place to meet the CCX rules.[26]

Once the protocol is in place, the NASD will verify compliance with the rules by auditing each of the member companies.[27] Auditors from the NASD will look at the underlying data and documents that support the baseline and emission numbers that the companies submit to the CCX. These documents will include invoices, deliveries, receipts and any other paperwork that the company used to establish its baseline number and emissions.[28]

The NASD will also use its market surveillance technologies to monitor trading activity for fraud and manipulation.[29] CCX is the final arbiter of the treatment of the submitted data, not the NASD.[30] The NASD scores the submissions for accuracy and reports its findings to the CCX. Any violations, whether through fraud or negligence, will be policed by peer review under the same kind of enforcement provisions for defaults on the stock exchanges.[31] Companies that fail to meet their commitments may face sanctions. Sandor says he expects peer review to be effective and does not anticipate the kind of market manipulation that has occurred in the energy markets.[32] Apparently, NASD officials share Sandor's faith in the honesty of the CCX members. One NASD representative stated that, although there is always a risk of falsifying documents, because most of the members of CCX are huge corporations, they didn't have to worry about fraud as much as they would with smaller businesses.[33]

The Current Market for CCX Credits

Like other commodities, the buyers and sellers will determine the price of the credits. Trading is expected to have begun early in the summer of 2003. A few companies have already conducted a handful of bilateral trades for greenhouse gas emissions. CCX says that carbon trades have already surpassed $100 million, and, with the start of CCX, annual trading could increase to the tens of billions.[34]

Most of the participants seem to be companies who have experience with other pollution exchanges, either abroad[35] or with the U.S. SO_2 trade allowances. Some of these companies hope that participating in the CCX will allow them to learn better ways to meet mandates abroad.[36]

One of the purposes of the exchange is to allow companies that are subject to mandatory emissions reductions in other jurisdictions, to take credit for the reductions made in the United States. To this end, the designers of CCX will create a registry of reductions claimed by each participant. They hope to make the registry sufficiently accurate/adequate to gain international credibility? a high enough quality that other programs in other countries will accept it.[37] However, acceptance will still be on a case-by-case basis.

For the immediate future, the program's pollution credits will only be valid in parts of the U.S., Canada, Mexico[38] and, to a limited extent, Brazil.[39] None of these countries have mandatory GHG programs.

Incentives to Participate

There are currently no mandatory Federal laws requiring companies to reduce their greenhouse gas emissions. This raises the question of why the CCX members are participating in the program in the absence of a legal requirement to do so. There are several possible reasons. Companies may hope to develop a "green" reputation among stockholders and the general public (i.e. *potential* stockholders). Additionally, they may hope to reduce operating costs by reducing energy costs and raising productivity.

The most likely reason is that companies may want to get a head start in anticipation of any mandatory emissions programs that the Bush Administration may implement. Participation in the CCX; will not only reduce long-term costs of controlling emissions, but it will also build the members' GHG management and trading skills thus putting them in a position to shape future policy debate.[40] CCX companies will also have strong grounds to ask U.S. lawmakers to recognize emissions credits retroactively in the event that mandatory reductions are ever implemented.[41]

Additionally, many multinational corporations might want to get involved in this program because they may already be feeling the effects of the Kyoto Protocol even though the U.S. has not adopted it. In today's global society, corporations are increasingly interacting in foreign jurisdictions and are subject to the laws of those jurisdictions, namely the provisions set forth in the Kyoto Protocol.[42] Therefore, many U.S.-based companies that are forced to reduce GHGs in a foreign jurisdiction could either buy additional credits in the foreign jurisdiction, or decrease production in the foreign jurisdiction or in the U.S.[43]

However, the much-touted perks of the program may not be beneficial to all companies. For instance, TXU Corp. was one of the companies that participated in the design of the program, but has since decided not to participate in the trading because it was not sure if it would be financially

beneficial.[44]

Evaluating the Effectiveness of the CCX Program

A. The General Theory of Tradable Permit Systems

There are two types of tradable permit systems. First, there is the cap-and-trade program where a total resource access limit is defined and then allocated among users. This is commonly thought to be the most effective program because the fixed upper limits guarantee that, even if there is an increase in pollution sources, there will not be an increase in pollution.[45] The second type of program is the tradable credit program, which establishes an individual baseline for each user, usually based on an existing technology-based standard.[46] This type of program is less effective because it only establishes a limit for each source of pollution without setting an overall limit.[47] Therefore, more sources can mean more pollution. CCX is more similar to a tradable credit program because each participating company has pledged to reduce their GHG emissions 4% below their original baseline. This approach makes the most sense given that CCX involves only a small percentage of the total U.S. emission sources. A cap and trade program would be more reasonable if the responsibility for meeting an overall GHG limit were divided amongst all sources in the U.S. Regardless of the type of system, because *no* emission source in the U.S. is currently required to reduce GHG emissions, *any* participation in voluntary programs such as CCX will result in increased environmental protection.

In theory, a tradable permit system can be an effective approach to dealing with many environmental problems. Market driven policies are advantageous because they can internalize the costs of compliance and lower the costs for governments.[48] In a perfectly competitive market, the permits or credits will flow toward their highest value. [49] A system such as CCX can optimize the value of the target resource—in this case, the resource would be a GHG-free atmosphere. Such permit systems will not achieve this goal if the market conditions are not right.[50] For instance, the system needs to be designed to minimize the possibilities for market power and the presence of high transaction costs or large uninternalized externalities.[51] Furthermore, without government involvement there must be a reliable system of private sector independent audits and verification procedures in place.[52]

In a report by the National Academies of Science entitled, *The Drama of the Commons*, Professor Elinor Ostrom recommends several factors by which to assess the effectiveness of such a system.[53] Ostrom suggests analyzing the feasibility of implementing the system, evaluating the environmental effects on the resource as well as other affected resources, and considering the economic effects on the regulated industry and those who use the resource.[54]

B. Implementation Feasibility

No matter how lofty the goals of a trading program may be, it will not accomplish anything if it is not feasible to implement. To determine implementation feasibility, one must first analyze the method by which the resource is allocated among the users. For instance, some systems use a "first come, first served" approach, while some allocate permits randomly like a lottery.[55] The most common method of allocating access rights is a method known as "grandfathering." Grandfathering bases the initial allocation on historic emissions so that existing sources only have to purchase any additional credits they may need over and above the initial allocation.[56] Because the costs of implementing a tradable permits system are typically large, the grandfathering approach has commonly been a necessary ingredient in building the political support necessary to implement the system.[57] Accordingly, the CCX system allocates an emissions amount equal to 4% below historic emissions levels to participating companies. If they do not meet that 4% goal, they will have to purchase credits that will bring their emissions levels down to the 4% allocation.

The second factor in analyzing implementation feasibility is whether a system has sufficient monitoring and enforcement mechanisms. Insufficient monitoring and enforcement can lead to increased emissions because the aggregate limit could be breached, either on accident or purposely.[58] In order to increase compliance, many members of the academic community feel it is important that the regulated community have a substantial role in the "co-management" of environmental resources.[59] Some argue this is because the government is not efficient at verifying and monitoring such systems and should, therefore, let the private sector implement the system once the government has set the rules.[60] Despite their arguments, the most common form of governance in the U.S. today is a system of top-down management where the regulated community plays a small role.[61] CCX, on the other hand, has no government input whatsoever and is run solely by "the regulated community." Although CCX has an advisory board of non-industry representatives, it has no decision-making power. This raises obvious concerns over the credibility of the monitoring and enforcement of the CCX. It is unclear what incentives the designers of CCX have to ensure that the system is properly monitored and enforced and is otherwise free from fraudulent activities. The most likely incentive is that, if the CCX program is sufficiently credible, participants will be able to trade their credits on exchanges in foreign jurisdictions, or they can receive credit for them if the U.S. ever adopts mandatory GHG reductions.

Assuming CCX designers wanted to ensure sufficient monitoring and enforcement, they would first need to ensure there was a proper monitoring system in place. Every successful monitoring system must be able to identify the data needed to monitor the trading and operations of the program, but also gather, interpret and act on this information.[62] The monitoring system for CCX was designed partly by experienced staff at the NASD, and was based in part on the widely-accepted GHG Protocol. It will also utilize the NASD's state-of-the-art market surveillance technologies. Assuming that the final CCX emissions submission protocol does not differ too much from the GHG Protocol, it seems that CCX has an adequate system in place to properly monitor the program. However, another important component in a sufficient monitoring system is to have an integrated computer system where all users can access the trading system on a real-time basis.[63] The CCX will operate on a web-based system which will make monitoring easier. However, the system will only be open to registered members

of the exchange. The only information that will be publicly available on the website will be the price of the credits and other "nonproprietary" information.[64] This creates a weakness in the monitoring system as the companies are not under any public pressure to report accurate information. Public scrutiny is especially crucial in this case because it seems that both CCX and the NASD have placed a lot of trust in the honesty of these companies to report accurately. This seems unreasonable after such recent scandals as Enron and WorldCom.

The most problematic element of the CCX program is its enforcement mechanism. Even if the monitoring system was fail-proof and caught every mistake and deception, it is still unclear how the rules will be enforced. Member companies must sign a contract promising to abide by the rules, and may face sanctions if they violate the contract. It is unclear if these sanctions will ever be imposed. Even if the NASD finds that a company has purposely submitted false data, the final arbiter is the CCX itself. It is unclear how lenient the CCX will be on defaulting members.

C. Environmental Effects

In order to be effective, a tradable permit system must start by defining a sustainable target.[65] This target might not necessarily be efficient for many of the effected pollution sources. In many cases, it provides the only opportunity to achieve an environmentally beneficial outcome. The CCX members agreed to reduce their GHG emissions to 4% below the average of their 1998-2001 emissions. This is a modest goal considering that the framers of the Kyoto Protocol agreed that the world's emission sources would need to reduce their GHG emissions by *at least* 7% below 1990 levels if there was any hope of curbing global warming.[66] The few members of the CCX, with their modest 4% goal, are not likely to reduce the world's GHG emissions to a "sustainable" level. If run properly, the program can still produce positive environmental results.

Carbon dioxide and other GHGs are arguably the best pollutants for a credit trading program such as CCX.[67] Carbon dioxide is not toxic so it does not endanger the health of local communities if an emission source chooses to buy credits to emit more CO_2 at a specific plant. Furthermore, reductions made at local sources can make a difference worldwide. Even though the CCX is currently localized to a few companies, mostly in the U.S., any reductions that result from the exchange will have a positive effect on reducing global warming.

Trading programs such as CCX also give flexibility to companies on how they propose to meet their reduction goals. This flexibility makes it more likely that participants will actually meet their goal.[68] However, there is always the danger of uninternalized externalities, like protecting one resource at the expense of another.[69] For example, CCX would not be environmentally beneficial if the companies chose to reduce their GHG emissions by installing technologies that caused them to increase their nitrogen oxide emissions. However, this is unlikely in such a program because climate change programs tend to result in reductions of other pollutants as a side effect.[70]

D. Economic Effects

In evaluating the effectiveness of a pollution prevention program, one must also evaluate the economic effects of the program. For the regulated industry (or in this case, the participating companies), there is a risk that the program will involve high transaction costs, making voluntary participation unlikely. Tradable permit programs, if adequately enforced, tend to "increase the value of the commons to which the permits apply."[71] Thus air pollution programs such as the CCX will probably make it cheaper to meet the pollution control targets.[72]

There is also the possibility that such a program can become *too* economically beneficial for some sources, creating market power in a few companies.[73] The fact that the credits are transferable allows the opportunity for some groups to accumulate permits and to use them to gain economic power in other markets. Typically, other programs have protections against such activities and may put a limit on the amount of credits one source can accumulate.[74] Such programs are also typically reviewed by the Department of Justice ("DOJ") to check for possible antitrust violations.[75] The CCX does not have any such limit on credit accumulation, nor has it ever been reviewed by the DOJ. This may cause problems once the trading actually begins.

Conclusion

In theory, the CCX is an admirable concept. It can help reduce GHG emissions from the U.S. immediately, even if the federal government does not adopt any GHG reduction measures. However, the CCX has some significant weaknesses that would need to be resolved in order for the program to be effective. The monitoring system appears adequate, but it is unclear how strictly violations will be enforced. Furthermore, although any reductions in GHG emissions would be beneficial, the program would need to significantly increase the 4% goal in order to reach a sustainable level of GHG emissions. Finally, the internal operations of the CCX seem to be hidden from the public view. The CCX will have to open its doors to public scrutiny if it hopes to receive respect from environmentalists and other critics. Despite a few necessary improvements, the CCX is an excellent learning tool. Overall, the CCX is more useful as a learning tool to help pave the way for a more comprehensive, mandatory emissions trading program.

(Endnotes)

* Angie Farleigh graduated from AU Law in 2003 and is currently an associate at the DC firm of Beveredge & Diamond.

[1] The timeline for reductions is: 1% from baseline in 2003; 2% in 2004; 3% in 2005; 4% in 2006.

[2] Telephone Interview with Rafael Marques, Economist, CCX (April 11, 2003) (noting that the CCX is in the process of developing a "rule book" which would cover the rules for such changes, but the rule book is not available to the public).

[3] Examples of offset projects include: reforestation or renewable energy systems such as wind and solar; energy efficiency process innovations; carbon sequestration such as no-till farming, agricultural grass and tree plantings; switching to less greenhouse gas intensive fuels; recovery and use of agricultural and landfill methane; and vehicle fleet efficiency improvements.

[4] *Smog for Dollars, Pilot Plan Uses Markets to Set Pollution's Price, Spur Cleanup*, Dallas Morning News, Dec. 5, 2002.
[5] *Chicago Climate Exchange to Trade Greenhouse gases; Opens in Spring,* Electric Utility Week, Jan. 20, 2003.
[6] *Id.*
[7] Telephone Interview with Rafael Marques, Economist, CCX (May 7, 2003)
[8] Press Release, CCX, Leaders from Environment, Business and Government to Serve as Directors of New Exchange (April 15, 2003) *available at* http://www.chicagoclimateX.com/html/CCXDirectors.pdf.
[9] *Id.*
[10] *Id.*
[11] *Id.*
[12] The advisory board includes: Warren Batts, Adjunct Professor at the University of Chicago Graduate School of Business, and former CEO of Tupperware Corporation, Premark International and Mead; David L. Boren, President of the University of Oklahoma, former OK Governor and U.S. Senator; Ernst Brugger, Chairman of Brugger Hanser & Partner Ltd. in Switzerland, and a professor at the University of Zurich; Lucien Bronicki, chairman of Ormat International; Paula DiPerna, former President of the Joyce Foundation and Vice-President for International Affairs for The Cousteau Society; Elizabeth Dowdeswell, former Executive Director of the United Nations Environment Programme (UNEP); Jeffrey E. Garten, dean of the Yale School of Management, and former undersecretary of commerce for international trade in the first Clinton Administration; Donald P. Jacobs, former Dean of the Kellogg Graduate School of Management and former Chairman of the Board of Amtrak; Joseph P. Kennedy II is Chairman and President of Boston-based Citizens Energy Group, and former Congressman; Israel Klabin, president of the Brazilian Foundation for Sustainable Development, former chairman of Klabin, SA forestry company, and former mayor of Rio de Janeiro; Bill Kurtis, news anchor; Jonathan Lash, president of the World Resources Institute; Thomas E. Lovejoy, world-renowned tropical and conservation biologist; Dr. R.K. Pachauri, Director-General of the Tata Energy Research Institute (TERI) and Vice-Chairman of the Intergovernmental Panel on Climate Change; David Moran, vice president of ventures for the Electronic Publishing group of Dow Jones & Company and president of Dow Jones Indexes; Sir Brian Williamson, Chairman of the London International Financial Futures and Options Exchange (LIFFE); Robert K. Wilmouth, President and CEO of National Futures Association (NFA); Klaus Woltron, Vice President of the "Club of Vienna " think tank and former CEO of Simmering Graz Pauker (SGP) and General Manager of ABB Austria; Michael Zammit Cutajar, former Executive Secretary of the United Nations Framework Convention on Climate Change.
[13] Telephone Interview with Rafael Marques, Economist, CCX (April 11, 2003).
[14] CCX will not release copies of such contracts to the general public because it claims they are "intellectual property". Telephone Interview with Rafael Marques, Economist, CCX (April 11, 2003).
[15] *Trading Hot Air*, The Economist, Oct. 17, 2002.
[16] *Id.*
[17] GHG Protocol Initiative, *About the GHG Protocol Initiative*, *at* http://www.ghgprotocol.org/ (last visited April 24, 2003).
[18] GHG Protocol Initiative, *Corporate GHG Accounting and Reporting*, *at* http://www.ghgprotocol.org/standard/index.htm (last visited April 24, 2003).
[19]GHG Protocol Initiative, *GHG Calculation Tools*, *at* http://www.ghgprotocol.org/standard/tools.htm (last visited April 24, 2003).
[30] *Id.*
[20] *Id.*
[21] Telephone Interview with Pierre McDonnaugh, Futures Policy Analyst, NASD (April 23, 2003).
[22] Michael J. Walsh, Ph.D., at CCX and Pierre McDonnaugh, Futures Policy Analyst, at NASD, have been the two people most involved in the development of this verification system. *Id.*
[23] *Id.*
[24] *Id. See also* GHG Protocol Initiative, *Who's Using the GHG Protocol?*, *at* http://www.ghgprotocol.org/standard/users.htm (last visited April 24, 2003) (reporting that Ford Motor Company, Baxter Int'l, Int'l Paper, STMicroelectronics, and StoraEnso are already voluntarily using the GHG Protocol).
[25] *Id.*
[26] Telephone Interview with De'Ana Dow, Director and Chief Counsel for Futures Policy, NASD (April, 23, 2003).
[27] *Id.*
[28] Press Release, NASD, NASD and the Chicago Climate Exchange Reach Historic Agreement (Sept. 23, 2002) *at* http://www.nasdr.com/news/pr2002/release_02_046.html.
[29] Telephone Interview with Pierre McDonnaugh, Futures Policy Analyst, NASD (April 23, 2003).
[30] Morning Edition, National Public Radio, Jan. 17, 2003.
[31] Megawatt Daily, Jan. 17, 2003.
[32] Telephone Interview with De'Ana Dow, Director and Chief Counsel for Futures Policy, NASD (April, 23, 2003).
[33] *Smog for Dollars, Pilot Plan Uses Markets to Set Pollution's Price, Spur Cleanup*, Dallas Morning News, Dec. 5, 2002.
[34] For example, Denmark and Britain have greenhouse gas markets and Canada is currently piloting one. *Trading Hot Air*, The Economist, Oct. 17, 2002.
[35] Morning Edition, National Public Radio, Jan. 17, 2003.
[36] Telephone Interview with Rafael Marques, Economist, CCX (April 11, 2003).
[37] *Exchange in Pollution Credits Formed*, Chicago Sun-Times, Jan. 17, 2003.
[38] CCX members will initially work with the Brazilian Foundation for Sustainable Development to develop offset projects. *Thirteen Companies, Chicago Establish Greenhouse Gas Trading Exchange*, Energy Daily, Jan. 17, 2003.
[39] *Climate Change: Companies Launch GHG Trading System, Pledge to Cut Emissions*, Greenwire, Jan. 17, 2003.
[40] *Smog for Dollars, Pilot Plan Uses Markets to Set Pollution's Price, Spur Cleanup*, Dallas Morning News, Dec. 5, 2002.
[41] John F. Temple, *The Kyoto Protocol: Will It Sneak Up on the U.S.?*, 28 Brook. J. Int'l L. 213, 245 (2002).
[42] *Id.*, at 248.
[43] First last name of Author, *Smog for Dollars, Pilot Plan Uses Markets to Set Pollution's Price, Spur Cleanup*, Dallas Morning News, Dec. 5, 2002.
[44] Elinor Ostrom, et al., National Academy of Sciences, The Drama of the Commons 204 (2002).
[45] *Id.*
[46] *Id.*
[47] Bob Page, Address at the Earth Technologies Forum, Washington, DC (April 22, 2003).
[48] Ostrom, at 200.
[49] *Id.*
[50] *Id.* at 200-01.
[51] Bob Page, Address at the Earth Technologies Forum, Washington, DC (April 22, 2003).
[52] Ostrom, at 200.
[53] *Id.* at 216.
[54] *Id.* at 208.
[55] *Id.*
[56] *Id.* at 216 (explaining that the approach causes less disruptions from historical patterns and reduces the financial burden on parties).
[57] *Id.* at 212.
[58] *Id.* at 202 (explaining that in the U.S., there is more co-management in fisheries and water programs (where both parties stand to benefit from protecting the resource) than in air pollution programs (where only victims care how much pollution is being emitted)).
[59] Bob Page, Address at the Earth Technologies Forum, Washington, DC (April 22, 2003).
[60] Ostrom, at 202.
[61] *Id.*
[62] *Id.*
[63] Telephone Interview with Rafael Marques, Economist, CCX (May 7, 2003).
[64] Ostrom, at 206.
[65] Durwood Zaelke, et al., International Environmental Law and Policy 630 (Foundation Press 2d ed. 2002) (1998).
[66] Bob Page, Address at the Earth Technologies Forum, Washington, DC (April 22, 2003).
[67] Ostrom, at 218.
[68] *Id.* at 201.
[69] *Id.* at 220.
[70] *Id.*
[71] *Id.*
[72] *Id.* at 209.
[73] *Id.* at 210.
[74] *Id.* at 203.