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Market-Based Solutions to Climate Change: An Economist's Story

Richard L. Sandor, Ph.D.
Chairman and CEO, Chicago Climate Exchange
Research Professor, Northwestern University

This is dedicated to my teachers and mentors Bruce Birkenhead, Oswald Brownlee, David Alhadeff, Charles O. Finley, Les Rosenthal, and Maurice Strong.

Graduates and families, Dean Cowhey, faculty and staff and friend of IR/PS, thank you for inviting me to speak with you on this important day. Graduates, your parents and friends must all be so proud of you. Since the school of International Relations and Pacific Studies was established less than 20 years ago, neither you nor your family could have foreseen this event. Yet today you stand ready to take on leadership roles in international policy and politics, development and economics. Many have sacrificed to get you to this point, and deserve a round of applause and gratitude.

I've always loved stories. It really didn't matter if I was listening to other people's stories or telling my own. The best are always personal. I'd like to take this opportunity to pass on a part of my own story, in the hopes that you'll take lessons from it that your parents would deem worthwhile. It's an economist's story but it's not dismal. It's about high hopes and determination. It's also a story about dealing with frustration and what felt like failure. Both, after all, are inevitable in any story about invention.

Fifteen years ago climate change was a concern to a limited number of scientists and environmentalists. An even smaller number of individuals were thinking about a market-based solution to climate change. Today global warming is the subject of international treaties and sovereign law. It's discussed in the media, journals and books. It has become so ubiquitous that Roland Emmerichs' "popcorn" movie "The Day After Tomorrow" is attracting large audiences. Its opening weekend grossed 70 million dollars. Less heralded, but perhaps more significant, the Chicago Climate Exchange was launched late last year. This market based solution to global warming has attracted corporations whose emissions of the greenhouse gas – carbon dioxide – are approximately equal to those of the United Kingdom's program which will be launched in 2005. They annually emit approximately 250 million tons of carbon dioxide into the atmosphere. Its more than 60 members include such domestic corporations as Ford, Dupont, IBM, Motorola, International Paper and the largest utility in the U.S., American Electric Power. International corporations with North American operations, such as Rolls Royce, Bayer and ST Microelectronics and Manitoba Hydro, have also joined.

Each emitter has voluntarily taken a legally binding commitment to reduce emissions by 4% from a baseline of 1998-2001.

Companies that cut emissions below the targets can sell “allowances” or the “right to emit” to those that can’t make the cuts internally. Since the annual targets are below historical levels there is a systemic reduction. Companies that can more cost effectively reduce emissions have the incentive to make the greatest possible cuts because they can earn profits while those that are less efficient must bear the additional cost of buying from others. By making environmental protection more affordable, this is socially superior to inflexible “Command and Control” regimes.

Emissions from Canada and Mexico can also be brought into the program. Projects from Brazil are also eligible. Members also include environmental organizations such as WRI and Natural Capitalism as well as law and consulting firms. These Associate Members commit to purchase and retire emission allowances to fully offset their carbon emissions - i.e. they agree to become GHG neutral.

To date, the Chicago Climate Exchange has traded almost 1 million tons of carbon dioxide allowances. It has been the subject of global press coverage, including the Wall Street Journal, Financial Times, Forbes, Time Magazine as well as CNN and the BBC. The exchange has been the guest of the Government of France, the Government of Austria and others. Paradoxically the first multi-sector multi-national market has emerged in the United States where there is no legislative imperative. This is the story of how it all happened.

It all began in Ipanema. It was the week of the Earth Summit held in Rio de Janeiro in 1992. In 1991 I was invited to Geneva to plan a panel that would be concerned with emissions trading. My topic was market architecture. At Rio I presented a paper at a “side show” sponsored by the U.N Conference on Trade and Development. These “side shows” were events held by Non-Governmental Organizations in parallel to the governmental negotiations. It was a lively setting that reminded me of teaching days at Berkeley in the 1960’s. There was more tie dye there than a Grateful Dead concert. It felt like a movement.

Following the side show I made another more formal presentation to the Rio de Janeiro Chamber of Commerce on the same subject. It had been an exhausting flight and both presentations had also taken their toll. It was time to sit on the beach, eat some barbecued shrimp purchased from a man with a small hitachi stove and drink a “caipirinha” [kay-pee-ree-na]. I felt that sense of calmness that comes to me only after hard work and the sharing of new ideas with others. The guilt that I normally had when being inactive wasn’t there.

Suddenly it all seemed clear. Identifying the problem of global warming was only the first step. The bad news had to be delivered. But there had to be the hope of a solution. Markets were the answer. I knew how to pioneer new markets. I had done it with financial futures when others thought that interest rates didn’t fluctuate and there was no

need to hedge. The challenge would require thousands of tasks, but all were feasible. I also believed that I could weather the roller coaster of emotions that came with this inventive activity. Arthur Schopenhauer the German Philosopher made the observation centuries ago:

“Every truth passes through three stages before it is recognized. In the first it is ridiculed, in the second it is opposed, in the third it is regarded as self evident.”

I had seen it first hand and thought I was prepared for the ridicule and the opposition. But I underestimated both the enormity of the tasks and extent of both ridicule and opposition. During the next twelve years I would feel moments of misery, frustration, anger, irritation, fear and defeat. These were more than offset by feelings of happiness, exhilaration, serenity, satisfaction, hope and victory.

After leaving Rio I set about the tasks at hand. The first major objective was to help assure that the “cap and trade” program in SO₂ allowances that was established by the Clean Air Act of 1990 was an overwhelming success. I had already taken steps in that direction. We had successfully advocated a market based solution to acid rain and helped with the lobbying efforts. I had taught the first course in Environmental Finance at Columbia. The academic world, both professors and students, were always the foundation of my work in pioneering new markets. The involvement of exchanges was another critical step. I had served on the Board of Directors of the Chicago Board of Trade. We persuaded the exchange to form a “Clean Air Committee” which I chaired. It included leading members of the capital markets as well as public directors. We wrote the first environmental futures contract. We entered into an agreement with EPA to conduct their spot and forward allowance auctions. This gave us a platform to distribute prices and attract media coverage. The latter is always critical for the establishment of a new market. Of course, almost every victory was accompanied by some frustration. Successful auctions were often characterized by headlines such as “Smut Traders” or “Dirt Traders.” Marchers from Greenpeace chanted “trading pollution is not the solution.”

As an investment banker, we traded over 100 million dollars of SO₂ allowances. We did the first trade registered at the EPA. We gained experience in trading, clearing and settling SO₂ allowances trades. We used trades to help finance pollution scrubbers installed by municipal power plants to reduce emissions. When it appeared that we had done all that was possible intellectually and commercially we left that business. All of those experiences would prove invaluable in developing a GHG emissions market.

Fueled by the success of the acid rain program, I then began focusing on weather derivatives. We developed markets for catastrophic insurance. Weather futures that facilitated hedging of hurricanes and tornadoes were developed. We also invented earthquake futures. Once again we had to deal with failure. Although these new instruments succeeded in the day to day business of insurance companies, they failed on the Chicago Board of Trade. Nevertheless, the invention of these new financial instruments led to the development of key relationships within the insurance sector. This

was critical because they would be the biggest losers in any global warming scenario. I continued to write and lecture on market-based solutions to climate change. We took every opportunity to present our ideas. At that time, there was no commercial logic to many of these activities. It was a series of frenetic activities. I was the environmental supplicant at industry meetings and seminars. It wasn't easy.

The right wing objected to our vision because they thought we were environmentalists.

The left wing objected because they thought we were capitalists.

This actually gave us some comfort. I was always taught that in chess, politics and football the game was controlled from the center. Nevertheless progress was extraordinarily slow. I always had a sense of anxiety and there were many sleepless nights. Despite these setbacks, I continued to be excited about the work. It was one big chess game.

Then our first moment of fortuity occurred. You must understand luck is very important in any endeavor. But you should also strongly believe in Louis Pasteur's comment that "chance favors the prepared mind."

The previous five years had prepared us. In 1995 we made a presentation to a UN conference in Glen Cove, N.Y. It was exciting because I took my youngest daughter with me. She was a budding poet who took little or no interest in my work in the capital markets. It's hard to come home every night and explain to your children what you do. Financial derivatives left them bored and indifferent. Environmental derivatives were different. They were interested in, and proud of, the work I was doing.

That conference was the beginning of a turning point in my work. I met Paula DiPerna, who then was a Vice President for the Costeau Society. She would subsequently become President of the Joyce Foundation, which financed the vision that I outlined at that conference.

A third event also happened in 1995. Although I was no longer involved commercially in the SO₂ allowance market, I was generally invited to attend or Chair the Chicago Board of Trade/EPA annual allowance auction. 1995 and 1996 really turned out to be extraordinary. Among the winning bidders in the auction was a fifth grade class from Glens Falls, N.Y. Their class assignment was to learn as much as possible about acid rain, which was prevalent in New York state. They studied the impact of sulfur emissions on lung disease, and acid rain's effects on forests, rivers and streams.

The teacher then asked the class "What would you like to do to help solve the problem of acid rain?" The class responded with great creativity. They would like to buy SO₂ allowances at the Board of Trade auction and then gift them to the American Lung Association to be permanently retired. The problem that the class faced was how to raise the money. Their solution was a stroke of genius. They decided to have a "cap and trade" market for chewing gum allowances. Students were given a fixed amount of chewing

gum allowances. If they did not use their allotments they could sell them to their fellow students. If a student wanted to chew more than their allotment then they purchased them in the market. If a fifth grade class could believe in the power of markets and successfully implement one then why should I ever have doubts. When twelve-year olds proved their savvy at emissions trading, I knew no CEO or congressman could ever say they didn't get it.

New scientific and anecdotal evidence of global warming attracted a growing interest in our work in subsequent years. The data said the climate was getting warmer and more erratic. The snow on Mount Kilimanjaro was melting. Pieces of ice bigger than Singapore were breaking off the poles. We were invited to the White House, testified before various Senate Committees and made presentations to industry groups in the US and around the world. We attended Kyoto and gave our input to a variety of government officials and business leaders. As the years passed, we continued to attend virtually any event to which we were invited. It was a constant struggle but we would go anywhere at any time. The continuous exposure to industry of financial innovations is critical to the inventive process. I finally knew what it was like to be a lounge act.

Subsequently, in the year 2000, the Joyce Foundation funded a feasibility study of a voluntary, pilot program to trade greenhouse gases in advance of U.S. participation in Kyoto. We engaged experts from all fields - attorneys, accountants, scientists, foresters etc. - and studied issues of monitoring and verification of emissions. We concluded it could work: we could start a self-governed exchange that would issue the allowances directly - without the government. We included emissions offsets to issue credits based on the capture of carbon in soil and trees. We thought the concept of financing ongoing environmental services might someday be a valuable tool a tool in helping avoid the destruction of the world's rain forests.

In the midst of these intellectual challenges being met, the world as we knew it began to turn. The U.S. turned its back on Kyoto. Our efforts seemed dead. The Joyce Foundation remained undeterred in its support and gave us another grant to implement the idea. We asked 30 companies to help build a consensus on the specifics of a market. We sought opinions of over 100 experts. Each triumph was matched by some sobering event. After September 11th, 2001 our efforts properly seemed to take a back seat to terrorism. That tragedy was important, but I knew that global warming was potentially another future tragedy. We just kept pushing. The war in Afghanistan, the burst in the dot com bubble, the crash in the stock market and the decline in the economy all posed a succession of body blows. Our financing ran out. I had to spend personal savings and seek financial help from that oldest funding source: "friends and family."

We stopped all other commercial activity, so there was no alternative but to move forward. We completed the implementation study, which included a plan to arrange additional funding and turn our research into a sustainable business. The economy was still weak and firms were reluctant to commit to emission reductions, which would be costly. We had bloody knees from begging and a braided stomach from crawling. We groveled at every moment. It didn't matter because we felt we could help save the world.

In the months that followed we finally got 14 heroes to join the exchange, including some of the major companies in the United States as well as the city of Chicago. Mayor Richard Daley - a visionary who is dedicated to making Chicago the greenest city in America - agreed to become honorary Chairman of the Chicago Climate Exchange. We continued to recruit and hired an investment banker to raise capital. The economy stayed in a recession and the second Iraq war started. Once again our resolve was tested.

But another critically important individual had the vision – you will see in your careers that special single persons can make a huge difference. Mr. Neil Eckert, Chairman and CEO of Brit Insurance, was a hero. Indefatigable in his efforts, he helped us raise capital. He introduced us to creative investment bankers in the UK who came up with a very original form of financing. We formed a closed-end investment company - Chicago Environmental - that would be listed on the London Stock Exchange. This allowed institutional investors to make an investment in a private non listed company. We completed an \$18 million dollar round of financing one week before the exchange opened.

While we were sustained by our belief in the concept, this was insufficient. To persevere was even more important. As the American philosopher George Santayana observed:

“Nature rules with a loose rein and a vitality of any sort can mutter through many a predicament in which reason would despair.”

This became our rallying cry. Our hope was critical and gave us the energy to continue.

While we were creating a carbon market in North America from scratch, the U.K. started a pilot GHG emissions market in 2002. Their incentives to participate cost the government \$300 million, and there were other costs. There are no such incentives at the Chicago Climate Exchange and our total costs of research and implementation barely totaled 5 million dollars. We should not underestimate the benefits of a free market economy.

Our challenges continue to be enormous. In spite of our good beginning we are still a start up company. We have proven some things but still have a long way to go. A significant milestone occurred just one month ago. We signed a Memorandum of Understanding with the London-based International Petroleum Exchange (the largest energy exchange in Europe) to license them our intellectual property. We are now forming a venture to develop the European Union’s Emission Trading market. This is the beginning of the European Climate Exchange.

The Pacific region could become an important nexus for Asian emissions trading as the markets spread to Tokyo, Shanghai and even Bombay.

The world faces some massive environmental problems that will take decades for us to learn how to manage. Marine temperature shifts caused by climate change are expected to have devastating effects on ecosystems in the Pacific Ocean, which threaten to

irreparably damage coral reefs as well as the socioeconomic systems that depend on commercial or subsistence fishing. Increased incidence of El Niño events may lead to droughts in some areas of the Pacific. The combination of droughts and a possible rise in sea level would again have strong negative impacts on the socioeconomic systems of the Pacific island nations that depend heavily on natural, native resources to support agriculture, tourism, and other aspects of their economies.

Rainforest destruction, globally-spread pollutants, and expansion of deserts in north Africa and China pose serious problems to local populations. Desertification may be an even more pressing problem than global warming. We are looking into establishing water markets both domestically and internationally. We hope to expand into the use of markets to preserve biodiversity and endangered species. Market failures also occur in medicine. We also hope to make a contribution in this area.

Perhaps the most satisfying experience I had was making a presentation to the Tufts School of Medicine. Dr. John Ludden had invited me to share our work with the faculty and students. More than one hundred tired, hard working medical students came alive one Saturday morning. They seemed to understand the relevance and promise of markets and economics in their own profession. For example, a citizen of Illinois can commit to participate in a donor organ program when they get a drivers license. Market type mechanisms might increase the size of the program. Perhaps the waiving of all state fees for those that participated in the program would increase the number of donors. I was subsequently informed that this inspired numerous papers on the subject. A medical resident and her husband called me sometime later. She was a physician and he was an Ecuadorian environmentalist. I thought that perhaps they could at some future date work on problems together. Two caregivers using markets to make the world a better place. What a truly satisfying moment.

So what's the point of the story and why should it be of interest to the graduating class of the School of International Relations and Pacific Studies at the University of California, San Diego? The point of the story is that a sound concept is not enough to win the day. It only helps. Hope, perseverance and vitality are even more important. I can think of no audience that should be more interested in global problems of clean air and clean water.

The planet is a small piece of real estate that is running out of resources. The solutions to these problems lie in international cooperation. Your studies have prepared you for these challenges of the 21st century. You have had the privilege of being at a school that is interdisciplinary in studying policy, international relations, corporate finance and accounting. You benefit from a truly international education that recognizes Shanghai, Tokyo and Bombay as well as European capital cities such as London, Paris and Berlin. Your orientation is unique in this country.

You are the best and the brightest. I have every confidence that you can make this a better world. You should be armed with sound concepts, a sense of vitality and hope, and a willingness to experience frustration and failure. Create new ideas – run with them – don't let go of idealism, but be ready to put it all on the line to make them real. We need

you, the planet needs you – my children, my grandchildren - your children and your grandchildren.

When I am exhausted and the world seems its bleakest I stop and watch a movie.

Since we began with reference to popular culture perhaps we should end that way.

A song in Frank Capra's 1959 film *A Hole in the Head* sums up the spirit that I hope you will have. The song is "High Hopes." It's about an ant that tried to move a rubber tree plant.

*Anyone knows an ant can't
Move a rubber tree plant*

*But he's got high hopes, he's got high hopes
He's got high apple pie in the sky hopes*

*So, any time you're getting low,
'stead of lettin' go,
just remember that ant.
Oops there goes another rubber tree plant*

One final recommendation to you, the graduating class of 2004: Go move some rubber tree plants.