CHAPTER 14

Green Finance: The Emerging Financial Markets for Protecting the Environment

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INTRODUCTION

The energy business is already globalized and multinational as 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, CNN, and television have significantly changed public perception about the environment. In effect, pollution can not be exported across borders anymore as a new, globally conscious environmentalism has been created over the past decade. This global environmentalism is even more true of greenhouse gas emissions, which affect the entire planet. With carbon content increasing in the atmosphere at 4 ppm per year, the fear is that inaction will only lead to ecological disaster. Thus, the potential for web-based emissions trading is beginning as the web is borderless and international trading platforms are global. However, before this changes, we need to review where we are today and the emissions trading experience that has evolved so far.

Environmental protection in many countries in the past has followed the heavyhanded command and control approach that has proved to be expensive and cumbersome. Instead, more cost effective market-based incentives using tradable permits have been gathering momentum over the past decade. The initial successes to date have been the trading of chlorofluorocarbons under the Montreal Protocol of 1987 to save the ozone layer, and the United States emissions trading scheme for sulfur dioxide (SO_2) for acid rain abatement,

which began in 1995. The key has been the introduction of tradable permits combined with sanctions for non-compliance.

KYOTO PROTOCOL SETS THE STAGE

The Kyoto Protocol of December 1997 obliged the following greenhouse gas (GHG) reductions over the 1990 period baseline: United States at 7 percent, Japan and Canada at 6 percent, EU, Switzerland, and most of Central and Eastern Europe at 8 percent. Each country is setting its own program to deal with emissions reductions. Commitments made by the Annex 1 countries can be fulfilled by the purchase of emissions rights from other countries. The agreement needs approval by 55 countries accounting for the 55 percent of Annex 1 (developed countries) emissions in order to be implemented. The Kyoto Protocol will come into force 90 days after the date on which it receives the required number of ratifications. The goal is to get the agreement activated in 2002 due to the Conference of the Parties (COP6) consensus developed at the Bonn meetings of July 2001 and COP7 meetings in Marrakech in November 2001.

The resumed sessions of COP 6 in Bonn resulted in a flawed agreement that is often referred to as "Kyoto Lite." COP7 further weakened Kyoto targets. The agreement over carbon sinks as a means of achieving the Kyoto targets has inevitably watered down the agreement further. The Kyoto Protocol of 1997 had sought greenhouse gas emission reductions from developed countries to 5 percent below their 1990 levels by 2012. The Bonn agreement cuts emissions only 1 percent to 3 percent. It also remains unresolved how carbon sinks will be recognized and how credits will be calculated. Besides the lowered emissions goals and lack of United States participation (which emits 25% of greenhouse gases) as well as that of developing countries, makes this an agreement without teeth. It is essentially a fig leaf to cover the lack of real progress on greenhouse gas emissions.

Tables 14.1 and 14.2 show the percentage of CO_2 emissions for each country in Annex 1.

TABLE 14.1 Percentage of ANNEX 1 1990 CO2 Emissions

	Individual	**Cumulative (without United States)**

United States	36.1	0
European Union	24.2	24.2
Russian Federation	17.4	41.6
Japan	8.5	50.1
Canada	3.3	53.4
Poland	3.0	56.4
Australia	2.1	58.5
Czech Republic	1.2	59.7
Romania	1.2	60.9
Bulgaria	0.6	61.5
Hungary	0.5	62.0
Slovakia	0.4	62.4
Estonia	0.3	62.7
Norway	0.3	63.0
Switzerland	0.3	63.3
Latvia	0.2	63.5
New Zealand	0.2	63.7

TABLE 14.2 European Union Breakdown of CO2 Emissions

Germany	7.4
United Kingdom	4.3
Italy	3.1
France	2.7
Spain	1.9
Netherlands	1.2
Greece	0.6
Austria	0.4
Denmark	0.4
Finland	0.4
Sweden	0.4
Portugal	0.3
Ireland	0.2
Luxembourg	0.1
Total	**24.2**

MOVING BEYOND KYOTO

The private sector will take the lead on the development of emissions trading markets since they have a vested commercial interest in emissions

reductions. Compliance responsibility, however, will rest with government. There is also the strong belief that markets will form first and that government should not inhibit their growth.

Since European, Japanese, and U.S.-based companies are now moving ahead to develop pilot programs, there exists a first mover advantage in this field since 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.

In the Kyoto Protocol, it was envisioned that three international mechanisms would enable Annex 1 to reduce emissions to reach Kyoto targets beginning in 2008 through 2012. These mechanisms included emissions trading, joint implementation (JI) and the clean development mechanism (CDM).

All three modes are currently being used. It is thought that bilateral trade between countries would be the most effective means to initially trade emissions. The emissions unit to be traded is one ton of carbon dioxide equivalent for the six greenhouse gases. NOX and CH_4 (methane) emissions, two other greenhouse gases are more difficult to quantify in many countries. The United States has already established an Over-the-Counter market for both NOX emissions which began in 1999 and CO_2 emissions. It has also 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 greenhouse gases as a carbon reduction strategy and as a means to influence the spread of energy efficiency technologies for industry. Governments also expect industry to make the largest greenhouse gas reductions and this falls heavily on electric and gas utilities, manufacturing, and automakers.

Japan has been slow to establish emissions trading although many projects have been proposed by NEDO, a semi-governmental organization under the auspices of the METI and established in 1980 with the objective then of establishing alternatives to Japan's oil dependency. Later, its mission was expanded to include energy conservation and research and development of industrial technology. This is the natural progression toward developing and implementing sustainable developments projects throughout the world. It is currently identifying and promoting potential private projects, which will reduce greenhouse gases through the introduction of energy

efficiency and alternative energy technologies. NEDO projects are evaluated on the basis of energy savings, greenhouse gas reductions, and effect of technology diffusion. It has proposed projects in Russia, Poland, Indonesia, and Bangladesh to show the breadth of its global mission.

It has been estimated that Japan will have the highest cost of compliance in an emissions trading market of more than $500 per ton of carbon. The numbers are even higher for a market without allowances and have been estimated to reach $1,075 per ton. These are very onerous costs to industry and should accelerate the moving to adoption of a domestic emissions trading scheme in Japan.

THE U.S. EMISSIONS TRADING EXPERIENCE

Despite the fact that many countries continue to propose emissions trading schemes in the form of green certificates, the reality is that the United States is the only country that has successfully developed an emissions trading market that has worked well for the past seven years. As initially proposed by the Environmental Defense Fund (a U.S. environmental organization now called Environmental Defense) to the first Bush Administration for the trading of sulfur dioxide (SO_2) credits, the emissions trading market has been successful beyond what its architects envisioned. Basically, the U.S. Environmental Protection Agency runs an emissions auction during March of each year that is supervised by the Chicago Board of Trade. Under Phase I which began on January 1, 1995, the 110 highest emitting utility plants were mandated to reduce their annual sulfur dioxide emissions by 3.5 million tons. This process was begun in 1995 for sulfur dioxide and extended to nitrous oxides (NOX) in 1999. The Over-the-Counter (OTC) forward markets trade these vintaged credits through the year 2030. Several OTC energy brokers are involved in brokering these credits including Evolution Markets, Natsource, Prebon, and Cantor Fitzgerald, and over one million trades per year occur. Thus, the market is liquid and has created emissions credits that are a fungible financial product. It has also saved $1 billion per year over command and control strategies. Under Phase II which began on January 1, 2000, a more stringent standard calling for an additional annual reduction of 5 million tons of sulfur dioxide was required, and the program was expanded to another 700 utility plants throughout the U.S.

Under the SO_2 program, utilities are given one allowance for each metric ton of sulfur dioxide 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. In order to buy allowances, other utilities must reduce their emissions below their emissions limit. These emissions allowances are fully marketable once they are allocated through an EPA auction. The allowances therefore can be bought, sold, and banked. The allowances are allocated in phases. The later phases tighten the limits on previously impacted sources of pollution and are also imposed on smaller cleaner units. Compliance is assured through continuous emissions monitoring at plants and regular reports to the EPA. Fines are assessed if companies don't comply with the law.

The 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 solution to pollution has been that from 1995 through 1999 the market not only met its emissions reduction targets but was 30 percent under compliance. This approach has exceeded expectations by lowering emissions below the announced targets because some companies demonstrated unexpected behavior such as banking rather than selling emissions credits. Companies such as Minneapolis-based 3M Company did not sell their sulfur dioxide emissions credits as part of their corporate philosophy to be perceived as an environmentally benign company. Other companies followed this example of corporate environmental stewardship.

CREATION OF THE MARKETPLACE

Because of the ability to establish exchanges quickly on the Internet, it is thought that this may be a desired outcome for emissions trading. Internetbased emissions trading would allow immediate disclosure for market players and has low costs of operation. The concept behind the allowances was to foster the implementation of demand side efficiencies or use of renewable energy. These concepts are tailored to the developing CO_2 market development and the use of the Internet as the means to implement change.

The thought is that the creation of a marketplace for emissions trading will 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 will 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. The argument today is that to do it early 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 delivers significant environmental reductions as reduced compliance costs as well as promotes environmental technologies.

There are several similar characteristics of emissions trading schemes, and in many countries the dual process of electric power industry liberalization. Emissions trading and electric power deregulation intersect since the power industry contributes to the greenhouse gas emissions. The impetus will be there to move the process forward.

CORPORATE RESPONSES TO KYOTO

The Kyoto Protocol is unfortunately a market failure in its present form without the participation of the United States which emits 25 percent of greenhouse gases. Moreover, the present form of Kyoto under COP7 has significantly lowered the goals of Kyoto. Greenhouse gas emission reduction will take decades to achieve rather than the limited goal of 2012 envisioned under Kyoto. In effect, Kyoto is a very modest effort to contain emissions. It is only a first step.

The need to create market liquidity is the primary challenge for CO_2 emissions trading to succeed. With electric load growth and economic activity increasing each year, there is need to create incentives for new technologies to penetrate new markets due to liberalization. One obstacle to change has been the fossil fuel subsidies in many countries. These must end since they create the wrong economic incentives. These incentives must have the flexibility to develop market-based solutions but should not be overly onerous as not to work.

Many private companies are moving forward under their own initiatives. They are, in effect, creating a global emissions portfolio that will develop as a result provided that energy companies can assume the risk. The BP and Shell internal emissions trading systems are leading the way for energy companies to reduce greenhouse gas emissions. BP has about 150 of its business units operating in more than 100 countries involved in a cap and trade scheme to reduce its greenhouse gas emissions. It began the program in January 2000. Both CO_2 and methane are traded in the BP system. The concept is to aggregate reductions from all business units. At the end of 2000, BP has traded 2.7 million tons of CO_2 at an average price of $7.60.

Shell has pledged to reduce its GHG emissions by 10 percent by 2002 compared to the 1990 baseline levels. Shell's upstream oil, downstream refining and chemicals businesses are trading emissions. Estimates are that Shell's carbon reductions range in value from $5 to $40

per ton. The program is reconciled internally on a yearly basis. Both Shell and BP plan to extend their programs externally as they develop expertise and further success.

These companies and others should be encouraging companies to trade their emissions permits internally between countries as a means to accelerate technology transfer and reduce greenhouse gas emissions. In essence, we need to create global emission permit allocations, and essentially have a market-based solution for global pollution. They have the added benefit that it is cheaper to buy credits today as an insurance play.

CREATING THE GLOBAL CO_2 EMISSIONS PORTFOLIO

The goal is a gradual reduction in emissions driven by measurable targets using market-based incentives. These can include outright purchase of emissions reductions. The aim is to encourage better technologies, better fuel choices, and better results and accelerated technology transfer. Multinational companies in North America, Europe, and Asia are developing 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 50 trades including one North American/Europe carbon trade and one European/ Australian trade. Other factors that influence trading are caps. The reality is that the greenhouse gas emissions market is in its infancy and trading caps can either be adopted by government or left open-ended for the markets to decide.

There is competition to create global environmental exchanges. They need not be mutually exclusive as today's Internet technology creates a borderless trading environment. In effect, we can have world greenhouse trade through the Internet.

Today, exchanges getting into the act include the Sydney Futures Exchange, the International Petroleum Exchange, the Paris Bourse/UNIPEDE, and the Chicago Climate Exchange. Over-the-Counter brokers active in GHG emissions trade include Evolution Markets, Natsource, Prebon, and Cantor Fitzgerald.

GREEN FINANCE: PROJECT FINANCE AS THE WAY FORWARD

But the key breakthrough for CO_2 trading will be the use of the project finance mechanism to create "clean development mechanism" credits. In

this way, a stream of emissions credits for 30 to 40 years (the life of the project) can be banked upfront. Investment and commercial banks can later create environment checklist for banks so that further streams of credits can be created. Finally, the creation of a global CO_2 market will be traded on the Internet as the Internet will accelerate trading, is cross border, and can 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.