IETA

INTERNATIONAL EMISSIONS TRADING ASSOCIATION

SUSTAINABLE MARKET SOLUTIONS FOR GLOBAL ENVIRONMENTAL PROBLEMS

Greenhouse Gas Market 2003

emerging but fragmented

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Acknowledgments

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Message from the Chairman

Emissions trading constitutes one of the exciting new innovations, linking market forces to the delivery of environmental benefits. The concept began 25 years ago with SO_2 and NO_x trading in the United States and will be employed by the EU for CO_2 trading in 2005. While not without controversy, emissions trading is now widely accepted across the industrialized world to lower costs, lessen market disruptions, and speed the achievement of environmental compliance goals. Above all it is a concrete new tool for implementing sustainable development.

While the concept is relatively simple, the policy implementation is difficult. It is a whole new way of doing things, midway between traditional regulation and voluntary practices. It raises some serious issues for governments and industry. Can markets deliver Kyoto targets with certainty? Some critics question that environmental integrity can be delivered by emissions trading while participants insist third party independent verification will document the real benefits for carbon regimes. But further innovation is still needed to find the proper balance so complex rules do not erode market potential.

In this volume, we see a variety of market participants giving informed commentary on the state of carbon markets in the last year. While our industry has made great progress in the last five years, we need even greater progress in the next five years. We must ensure markets have sufficient liquidity to function effectively. We must have full fungibility for our different GHG products, from different regimes, generated in different years. We must ensure that the individual national regimes have common building blocks and compatibility for the development of regional and later global markets. We must be aware that in the Age of Enron our transparency and accountability is an essential precondition for public credibility and government acceptance. To achieve all of the above industry and governments must work more closely and more effectively together to design the market based tools. If we can meet these challenges, I see an exciting new future for emissions trading. This volume is a good introduction to those challenges.

Bob Page

Message from the President

The 2003 edition of the Greenhouse Gas Market is the first time IETA is undertaking such an ambitious project. We hope that this document will provide insights and perspectives that will benefit all those who work to ensure that market mechanisms are an important part of the solution in addressing the challenge of climate change.

The Greenhouse Gas Market 2003 represents collective views of those who have worked in this market in 2003. Their conclusions are based on hands on experience in developing projects, interacting with regulators, developing new protocols and products.

The articles included cover a broad range of regions and topics. The GHG market is only emerging and in selecting submissions we tried to illustrate the richness of experiences, views and approaches that we see around the world. As this is the first effort for this publication, we look forward to your comments as to what you found useful, what worked and what did not.

Andrei Marcu

Introduction

IETA's State of the Greenhouse Gas (GHG) Market 2003 aims to provide an analysis of the evolution of the GHG market over the last year from the point of view of private sector actors engaged in the field.

"Overall Market Developments", the first section of this publication, identifies global trends, key developments in individual markets and lingering uncertainties related to GHG trading. The analysis identified the main driving forces and uncertainties shaping the market development in 2003. Main driving forces include the ratification of the Kyoto Protocol by key Parties, as the protocol is seen by many as the necessary global framework for a credible GHG market, as well as the final approval of the European Emissions Trading scheme (EU ETS) last July. The major uncertainty still lies in Russia's position on ratification and the entry into force of the Protocol, with its broad consequences, as well as its direct implications for the availability of a framework for project credits for the EU ETS. Forecasts assess how different actors will influence future GHG markets and reflect on recent changes in trading patterns, as well as provide different scenarios for international emissions trading in the future.

"General Market Issues", such as currencies, sinks and verification are addressed in the second section. The strength of various GHG currencies has seen major changes in 2003. This can be reflected in the price that different type of units will command. The market has also signalled a renewed interest in Clean Development Mechanism (CDM) Certified Emission Reduction units (CER) given the increased level of knowledge on processes and requirements by the CDM Executive Board. The developments of agriculture off-sets, and difficulties encountered in the process of defining rules for GHG sinks are reviewed. Sinks in the CDM is one of the subjects that will be followed with great interest at COP 9 in Milan. Issuing an affirmative verification opinion with a high level of assurance is essential to give confidence in the units being traded and to allow governments to acquire the confidence required for trading to take place. However, it emerges that there continues to be a lack of consensus in this field.

"Regional Markets", the last section, analysis emerging regional markets development and provides accounts of the authors' hands-on experience as well as their views of future trends. This section includes discussions on the increased definition of rules for domestic GHG markets in Canada, Japan, Central and Eastern Europe, the EU ETS, France, the Nordic Countries, and the UK, for regional schemes in the US, and for CDM markets in Indonesia, Thailand, South Africa and South America.

In 2003, the GHG market is still at an early stage of development, however, a series of fragmented markets are emerging, promoted by governments as a response to private sector concerns about costs of compliance with carbon constraints. Most of the effort and progress has been in the development of clear and transparent rules. Overall, trading activity has increased in 2003 as trading rules are becoming clearer at the international, regional and domestic levels. The analysis suggests that the rise in GHG trading activity seen since the first trades took place in the mid 1990's will continue. The rate of this rise and the development of a fluid and integrated market will depend in part on the extent to which market fragmentation can be reduced through the harmonization of trading rules.

Overall Market Developments

01

Global Carbon Markets: Driving Forces and Future Prospects

Jorund Buen, Kristian Tangen, Anders Skogen, Arne Eik, Ian Roche and Atle Chr. Christiansen
Point Carbon

Introduction

This short overview article contains three parts. In the first part a forecast is provided, as of September 2003, of the volumes to be traded in carbon markets globally in 2003.[1] The second part is an overview of trades done in relation to the EU emission trading scheme (EU ETS), and the total projected volumes of these trades in 2003.[2] —The final part contains an updated estimate of carbon prices during the first commitment period under the Kyoto Protocol (2008-2012).[3]

Volume forecast 2003

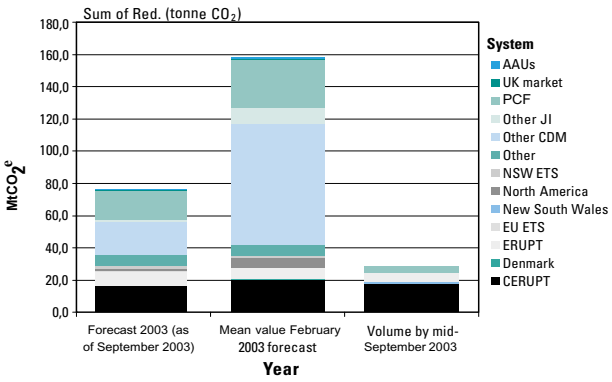
Point Carbon forecasts that 73,1 million tonnes of carbon dioxide equivalent emissions ($MtCO_2e$) will be transacted in different segments of the global market in 2003. The forecast is based on observed trends in carbon transactions registered in Point Carbon's proprietary Carbon Transaction Database, interviews with market actors, as well as our assessments of policy developments and their market impacts. The figures presented in this report are based on registered transactions in Point Carbon's Carbon Transactions Database. The database currently includes detailed information on about 600 transactions that have taken place since 1996, amounting to 420 million tonnes of CO_2e

Table 1: Forecast for 2003, as of September 2003

System	Target $MtCO_2e$	Range $MtCO_2e$	Range February $MtCO_2e$
UK ETS	0,2	0,1 - 0,3	0,1 - 0,5
Denmark	0	0,0 - 0,1	0 - 0,3
NSW, Australia	1,7	1,4 - 2,0	0,5 - 2
USA	0,3	0,1 - 0,5	8 - 20
Canada	1,1	0,1 - 0,5	3 - 20
EU ETS	1,0	0,8 - 1,2	0,1 - 0,6
AAUs	0,1	0,1 - 0,3	0,2 - 100
Erupt (JI)	8,6	0 - 50	5 - 9
Cerupt (CDM)	16,5	7 - 10	10 - 30
Prototype Carbon Fund	19,6	16 - 17	20 - 40
Other CDM	15	14 - 24	50 - 100
Other JI	2,5	10 - 20	7 - 14
Other	6,5	1,5 - 3,5	5 - 9
Sum	**73,1**	**50 - 138**	**110 - 345**

Table 1 above and Figure 1 below, both show that the actual market development over the last six months has led us to scale down our overall 2003 volume forecast target. Going into each of the market segments, we can see that the targets for the UK emissions trading scheme (ETS), Denmark, New South Wales (NSW), the Dutch tenders (CERUPT and ERUPT) and others lie within the range of our February forecasts. Targets for volumes traded in the USA, Canada, Assigned Amount Units (AAUs), other Clean Development Mechanism (CDM), other Joint Implementation (JI), and the World Bank Prototype Carbon Fund (PCF) have been scaled down, while targets for the EU ETS are adjusted upwards compared to the February forecast.

Figure 1: Volumes for 2003 ($MtCO_2e$)



In a Global Market Outlook published early this year (*Carbon Market Analyst* 16 February 2003), Point Carbon expected 2003 to be a year for policy learning. This still seems to be a valid assumption. In that analysis we questioned the small and voluntary schemes' ability to create an active and fledgling emissions trading market. After witnessing the activity – or, rather, the lack of such – in the Danish and UK schemes over the last 6 months (and assuming that our forecast for the last four months is correct), our expectations have largely seem to have been proven right. In regards of the Chicago Climate Exchange (CCX), another voluntary scheme, it is too early to pass judgements, although we would be surprised if the transaction volume in this scheme turned out to be large. The development within the NSW and EU schemes are about as positive as we expected in February.

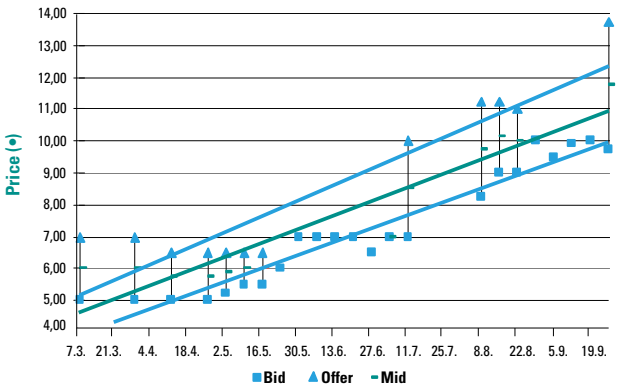
The scale-down of volumes from previous analyses is almost solely due to slower investment rates in CDM and JI projects and lower trading activity in North America. Among the key reasons for reduced market activity are the sustained uncertainty in regards of Russian ratification of the Kyoto Protocol, and risks pertaining to the rules and guidelines for CDM and JI projects. Actors working with project-based mechanisms have gained experience both with respect to transactions and requirements for baseline and monitoring methodologies. As more methodologies – and, hopefully within the end of the year, actual CDM projects – get the green light, the market is definitely going to accelerate; numerous projects are waiting for CDM Executive Board approval.

Note that all aggregated volumes are assigned to the year the contract is signed. Hence, projects with long lifetimes have large effects on the aggregated numbers.

Current carbon prices: the EU example

Not unexpectedly, significant trades in the EU ETS have been few and far between. Broker Evolution Markets has announced two significant trades this summer; one for 150.000 tonnes split between 2005, 2006 and 2007 at an average cost of €5,50-6,50/tCO_2e, the other for 90.000 tonnes split between 2005, 2006 and 2007 at an average cost of €9/tCO_2e. Adding to that the first publicly announced trade between Nuon and Shell, which most likely was for 50.000 tonnes at €5,50/tCO_2e, and various small-scale test trades that have been going on, the total volume traded in the EU market so far is estimated to be approximately 325.000-350.000 tonnes. Assuming that the small-scale trades have followed the bigger transactions' steadily increasing price level, it seems reasonable to estimate that the total value of contracts in the EU market so far is in the area of €2,25 million.

Figure 2: Bids and Offers in EU market



We expect the tendency towards small trades (in the order of 1.000-20.000 tonnes) to continue for the rest of the year, as companies seek to gain experience in how to do business in this emerging market. Brokers have been working hard for several months to get companies to enter the market. At present, it seems unlikely that more than a few bigger trades will be done before yearend. On this basis, we estimate the

total volume of CO_2 to be traded in the EU ETS in 2003 to be 1.000.000 tonnes.

The increased knowledge that will come with the draft National Allocation Plan (NAP) will also reduce the level of risk involved from the sellers' point of view. This, in turn, may cause a downward pressure on prices.

Price estimate 2008-12

Point Carbon has recently examined carbon prices under different scenarios for international emissions trading in the Kyoto period 2008-2012. Perhaps contrary to what one might expect, model-based simulations suggest that prices will not be significantly lower in a scenario where the EU ETS (including EU15, EU candidates and Norway/Switzerland) operates in isolation from the Kyoto market (including Japan, Canada, Russia and New Zealand), than in a scenario where all Annex I countries take part in a scheme for international emissions trading. The reason is, put simply, that demand from the group of current EU Member States (EU15) is almost balanced by potential supply of excess allowances from the EU candidates. Moreover, Russia will not be able to set prices at an arbitrary level at their discretion, simply because the preference for (and cost-effectiveness of) domestic action increases with increasing prices in countries like Japan and Canada, which are likely to become large net-buyers of compliance instruments.

Using what we at present perceive as the 'most likely' scenario, i.e., international emissions trading among all Annex I countries less the U.S., Australia and Ukraine, the updated estimate of carbon prices in 2010 is 9,9 USD/tCO_2e, with low (25th percentile) and high (75th percentile) estimates of 5,0 and 13,7 USD/tCO_2e, respectively. Using a discount rate of 7 per cent per annum, the present carbon value (PCV) is then 6,2 USD/tCO_2e, with low and high estimates of 3,1 and 8,5, respectively.

Conclusions

Three main conclusions emerge from this brief overview of market volumes, examples of current carbon prices and estimates of future prices:

- The projected volume to be traded in 2003 has been scaled down from previous analyses, mainly due to uncertainty related to procedural aspects of the project-based Kyoto mechanisms as well as uncertainty and risk stemming from Russia's continued reluctance towards ratifying the Kyoto Protocol.
- Trading of prospective EU allowance units is gradually picking up, with trades being done at up to €9/tCO_2e. However, such speculative trades do not provide sufficient basis for predicting that prices under the EU ETS will continue to increase or even stay at their present level.
- Demand from the group of current EU Member States (EU15) is almost balanced by potential supply of excess allowances from the EU candidates. Therefore, carbon prices in the first commitment period might not be much lower in a scenario where the EU ETS (including EU15, EU candidates and Norway/Switzerland) operates in isolation from the Kyoto market (including Japan, Canada, Russia and New Zealand), than in a scenario where all Annex I countries less the U.S., Australia and Ukraine take part in a scheme for international emissions trading.

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Point Carbon (2003), Carbon Market Europe, http://www.pointcarbon.com/category.php?categoryID=43.

[1] A more detailed description of the background for the forecasted volumes is provided in Point Carbon's analysis "Global Market Outlook for 2003", made available 5 September 2003 to the subscribers to the Carbon Market Analyst.
[2] For continuous updates on transactions related to the EU emissions trading scheme, refer to Carbon Market Europe, Point Carbon's weekly newsletter covering the EU carbon market: http://www.pointcarbon.com/category.php?categoryID=43.
[3] A more detailed description of the scenarios on which the price estimates are based is provided in PointCarbon's analysis "Japan, Canada and Russia: Monopolistic prices?", made available 27 June 2003 to the subscribers to the Carbon Market Analyst.

02

Overview of Emerging Markets for Greenhouse Gas Commodities

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Introduction

As the international community negotiated an international treaty to limit greenhouse gas (GHG) emissions, the sulfur dioxide (SO_2) allowance trading provisions of the US Clean Air Act Amendments (CAAA) of 1990 began to provide the first practical evidence of the potential benefits of emissions trading. The positive environmental and economic results from this trading program, which was designed to reduce the adverse impacts of acid deposition in the United States, were a key factor in facilitating the inclusion of several trading provisions in the 1997 Kyoto Protocol (KP) to the United Nations Framework Convention on Climate Change (UNFCCC). Additionally, the fact that the geographic location of GHG emissions is unimportant from an environmental perspective makes the challenge of controlling GHG emissions particularly amenable to an emissions trading solution.

Although emissions trading framework and binding emissions limitations elaborated in the KP and successor agreements have not yet entered into force, the inclusion of emissions trading provisions in the treaty has spurred the development of a variety of markets for greenhouse gas (GHG) commodities over the past several years. This article provides an overview of these emerging GHG markets by: (1) describing the nature of the commodities that are traded in these markets; (2) reviewing key developments and trends in each individual GHG market, with particular emphasis on experience from the past year; and (3) identifying key global trends and lingering uncertainties related to GHG trading.

GHG Commodity Types

A variety of GHG commodities are traded in various markets around the world. This section describes these GHG commodity types and provides examples of each[1].

A. Emission Reductions

Emission reductions (ERs) refers to a quantifiable change in emissions resulting from a specific activity not required by existing law or regulation and which may be usable against future compliance requirements. ERs carry only the possibility, but not a guarantee of future government recognition as a permit that can be utilized for compliance with an emissions limitation.

B. Emission Permits

Emission permits represent a legal authorization from a government or international authority to emit a given amount within a legally established emission trading framework, or an instrument that can be used by a regulated entity to demonstrate compliance with a binding emissions limitation. In cap-and-trade programs, such as the UK Emissions Trading Scheme (ETS), emission permits are often known as "allowances." Project-based permits are often called "credits." Examples of credits include Certified Emission Reductions (CERs), which could be created under the Clean Development Mechanism (CDM) of the KP, and Emission Reduction Units (ERUs), which could be created under the KP's Joint Implementation (JI) provisions. Allowances and credits are types of emission permits. To date, the only GHG permits in existence have been allowances under domestic cap-and-trade programs[2].

C. Financial Derivatives

Financial derivatives, such as call options and

put options, are contracts involving rights and responsibilities between two parties concerning the terms of potential future trades of GHG permits or reductions. A buyer of a call option, for example, acquires from a seller the right but not the obligation to purchase a fixed quantity of permits or reductions at a fixed price by or on a fixed date in the future. A buyer of a put option acquires the right but not the obligation to sell at fixed price to the seller of the put.

Evolution of Trends by Market

This section reviews key developments and trends in individual markets for GHG ERs and permits. Trade of derivatives, the third category of GHG commodity listed above, is discussed within the following two subsections on ERs and permits rather than in a separate section.

A. The Emission Reduction Market
This sub-section examines ER market trends.

1. Trading Framework
Companies began trading ERs in the mid 1990s, before any governments had established binding GHG emissions limitations. During the early years of the ER market's development, few of the rules that would govern credit creation from projects were known, because they had not yet been negotiated at the international level. Those developing ER projects at that time were guided by a loose framework of rules derived from voluntary programs such as the US Initiative on Joint Implementation (USIJI), Canada's Pilot Emissions Reduction Trading (PERT) program, and the Activities Implemented Jointly (AIJ) pilot phase initiated by the international community in Berlin in 1995 COP-1, the first Conference of the Parties to the UNFCCC.

Over time, the rules and modalities governing the project-based mechanisms of the KP have become clearer. This has increased certainty for developers structuring ER projects and the probability that ERs generated by projects may eventually be converted into permits such as CERs and ERUs. ERs that appear to conform to evolving international rules under the CDM and JI can be viewed as "candidate CERs or ERUs." If the KP enters into force, it may be possible to convert these *candidate* permits into *actual* ones.

2. Participants
In the early days of GHG trading, private-sector entities were the most active buyers of candidate CERs and ERUs. Canadian and Japanese buyers were particularly active buyers during the mid to late 1990s. These and other buyers were motivated by a variety of objectives including: (1) fulfillment of voluntary emissions reduction commitments; (2) demonstration of environmental leadership; (3) illustrating the practical benefits of emissions trading to inform public policy debates; and (4) learning by doing. In recent years, governmental and quasi-governmental entities such as the Government of the Netherlands and the World Bank's Prototype Carbon Fund (PCF) have been the most active buyers. Together, these entities have purchased over 35 million metric tons of ERs over the past three years. Private sector entities continue to engage in ER purchases, though less actively than in the past.

Developers of projects supplying ERs involved in transactions have been located in a variety of locations around the world. The entities involved in the projects included small companies, large multi-nationals, and governments. During the latter part of the 1990s, many of the projects supplying traded ERs were located in Canada and the United States. More recently, Latin America and Central and Eastern Europe have emerged as common locations for projects involved in trades. Few trades have involved ERs generated in Africa. Projects involving renewable energy generation and landfill methane capture have been common sources of traded ERs.

3. Volume
In 2001, Natsource estimated in a report for the World Bank's PCF that approximately 55 millions tons of carbon dioxide equivalent (CO_2e) had changed hands in approximately 60 trades between 1996 and 2001[3]. This conservative estimate understates total market volume, since it excludes known trades for which volume was not disclosed and trades involving less than 1,000 tons. In a second report issued in 2002 based on analysis by Natsource, Point Carbon, and CO_2e.com, PCF projected that traded

volume for 2002 alone would reach almost 70 million tons in approximately 100 trades, which demonstrates that activity in 2002 was greater than what had occurred in the five previous years combined[4]. This was due primarily to the progress made in international treaty negotiations. A forthcoming third annual report is expected to demonstrate that this growth in trading activity has continued.

During the first five years of the GHG market's existence, derivatives involving project-based ERs accounted for approximately 25% to 50% of traded volume. In the last two years, far fewer derivatives have been traded.

4. Prices

ERs generated in locations or during time periods that would disqualify them for international recognition as permits have traded for approximately $.60 to $1.50 per ton of CO_2e. ERs that could potentially be converted into permits (i.e., candidate CERs/ERUs) have traded for prices between $1.65 and $8.00 per ton, with most occurring between $3 and $5 per ton.

Table 1 illustrates prices and the share of traded volumes for ERs generated by a variety of project types. Trades analyzed to generate this table include those conducted by the World Bank's Prototype Carbon Fund and the Government of the Netherlands, as well as a sampling of recent trades by private buyers.

Table 1: ER Prices and Volumes by Technology Type

Technology T		Volume (metric tons CO2e)	% of Total Volume	Approx.Price (US$/ton CO2e)
Afforestation		1,018,000	2.35%	3.63
Cogeneratior		2,460,730	5.69%	8
Energy Effici		2,610,319	6.03%	2.46 - 5.18
Flare Vent Re		100,000	0.23%	3.00 - 5.00
Fuel Switch		5,000,000	11.55%	3.50
Landfill Gas (		3,655,644	8.45%	0.65 - 6.79
Process Cha cal)		131,000	0.30%	2.00 - 4.00
Renewable E		27,604,800	63.78%	3.02 - 7.92
	Biomass	6,835,636	15.79%	3.15 - 7.92
	Geothermal	464,553	1.07%	3.02 - 5.99
	Hydropower	14,807,674	34.21%	3.00 - 5.99
	Wind	3,746,937	8.66%	3.43 - 7.92
	Unspecified	1,750,000	4.04%	3.83
Unspecified		700,000	1.62%	2.50 - 6.00
TOTALS		43,280,493	100.00%	1.03 -8.00

B. Permit Markets

At present, there are no formal emissions trading programs that allow for the creation of project-based permits. However, trades have occurred involving permits not generated by projects (i.e., allowances).

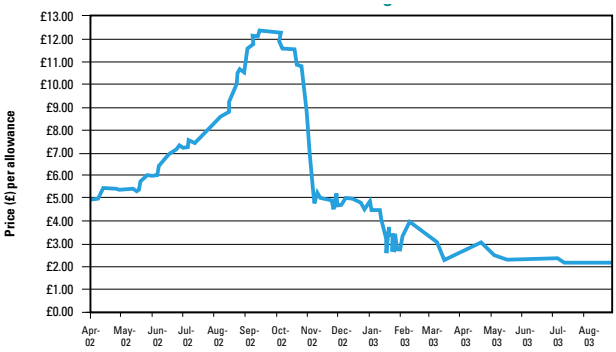
1. United Kingdom Emissions Trading Scheme

The UK's voluntary ETS is the world's largest national GHG trading program[5]. Most participating companies agreed to join the program in return for an 80% discount on a tax on industrial and commercial energy consumption known as the Climate Change Levy (CCL). In order to receive this discount, companies were required to adopt either an absolute or rate-based limitation on either their energy consumption or GHG emissions[6]. The type of limitation adopted by each company determines what rules govern its participation in the market. The diversity of limitation types (i.e. absolute or rate-based targets defined in units of energy or emissions) and of trading rules in the UK ETS makes it a hybrid program, unlike some programs in which all participants face a uniform set of rules.

Natsource brokers estimate that approximately 1.6 million UK allowances have changed hands in approximately 500 company-to-company trades[7]. Derivatives are not commonly traded. In a few cases, companies have swapped UK

allowances of different vintages and swapped UK allowances for Danish allowances. Prices rose from around $7 (£4) per ton CO_2e in August 2001 to a peak of approximately $20 (£12) per ton in the fall of 2002 (see Figure 1 below). Later in 2002 prices fell back to their earlier level and prices continued to decline to a current level of approximately $3 (£2) per ton[8].

Table 2: UK Allowance Prices (current vintage)



2. Danish CO_2 Quota Act
Natsource brokers estimate that approximately 17 trades have occurred, involving approximately 450,000 Danish allowances. As indicated above, Danish allowances have also been involved in swaps.

3. Other Permit Markets
A handful of trades have occurred involving permits that do not yet exist. These include European Allowances, in anticipation of the European Union Emissions Trading Scheme (EU ETS) becoming operational in 2005, and Assigned Amount Units (AAUs), in anticipation of emissions trading under Article 17 of the KP.

In a few locales, such as the US state of Oregon and the Canadian province of Alberta, owners of new fossil fuel fired power plants are required, as a condition of their operating permit, to offset a portion of their plants' projected future emissions. Reductions purchased to comply with these requirements could be viewed as emissions permits because they are usable for compliance with a requirement to reduce emissions. However, they differ from other emissions permits in that they may not be traded freely amongst a variety of market participants. Rather, they are purchased or generated and then directly surrendered to the government in order to demonstrate compliance.

Outlook

This section identifies key global trends that will continue to impact the evolution of GHG markets around the world.

A. Continuing Fragmentation

In the absence of a clear international trading architecture, governments that developed early GHG trading programs, such as those in the UK and Denmark, have adopted unique programmatic elements. For example, the UK and Danish programs cover different gases and sectors and utilize a variety of allowance-based and credit-based approaches, posing barriers to trade between firms in these countries. While swaps occasionally occur between companies that may have interests in both countries, neither program authorizes the import of the others' permits for domestic compliance use. Many of the provisions in the UK and Danish program also differ from those in the EU ETS, and so far, none of these programs authorize the use of ERs for compliance (though the EU ETS is likely to authorize use of CERs and ERUs for compliance during the scheme's second phase.) In addition, EU officials have expressed reservations about linking the cap-based EU ETS with Canada's emerging rate-based domestic trading system.

These differences and incompatibilities across trading systems have produced a fragmented global GHG market that consists of several sub-markets operating independently of one another. This patchwork of distinct trading programs differs considerably from the single global market for a homogeneous GHG commodity that had been envisioned by some market observers[9].

B. Greater Clarity of Trading Rules

As indicated above, trading rules are becoming clearer at the international, regional and domestic levels. As clarity has increased, so has overall GHG trading activity. For example, the creation of the first two domestic GHG trading systems in 1999 and 2001, in Denmark and the UK, respectively, spurred significant trading increases,

particularly in the case of the UK. Also, trades in these legislated programs were the first to involve permits rather than ERs. Similarly, the Marrakech Accords, which were negotiated by the international community at COP7 in 2001, provided additional clarity on the rules that would govern the emissions trading framework outlined in the 1997 KP. Over the past year, institutions established in the Marrakech Accords, such as the Executive Board of the CDM, have begun to operate and have provided further guidance on what rules will govern the creation and trade of project-generated permits. As a result, we continue to see more quality supply being brought to market. Though significant uncertainties remain (e.g. how to interpret the concept of "additionality"), each new piece of guidance concerning trading rules further reduces barriers to more active trading.

The clarity of trading rules is likely to continue increasing in the near future, as the EU and Canada shape their domestic trading programs, as treaty negotiations continue at the international level, and as the EB continues to issue decisions concerning operation of the CDM. In addition to spurring more active trading within individual sub-markets, this greater clarity is also likely to reduce the fragmentation discussed above. For example, as the EU ETS begins, it will operate alongside and ultimately supersede previously established domestic trading systems within Europe.

C. Government Participation

In most emissions trading programs to date, obligations to comply with emission limits and rights to engage in trading have resided exclusively with private sector entities. Governments, for their part, have traditionally acted as regulators, defining firms' emission reduction requirements, establishing rules for trade, and monitoring compliance. Although the KP imposes emissions limitation obligations for governments, rather than private entities, there has long been an expectation among many observers of the international response to climate change that private sector entities would nevertheless be the main participants in GHG markets, as they have been in other emissions markets. This expectation was based on the assumption that governments would devolve emissions trading rights to private sector entities and thereafter would perform their traditional regulatory roles.

Contrary to this expectation, some governmental and quasi-governmental entities have begun to participate in emerging international GHG markets as buyers. In particular, as indicated above, the Government of the Netherlands and the World Bank's PCF have been among the most prominent and active buyers of GHG reductions to date. Several other governments have also announced tenders or plans for tenders to acquire GHG commodities. Some, like the Government of Canada, include large-scale governmental purchases from the international GHG market as a key element of plans for complying with their national emissions limitations adopted under the KP. Analysts are only just beginning to consider what might be the impacts of continued active participation by governments in GHG markets. A preliminary analysis suggests that significant governmental participation may lead to market segmentation and price differentials among different instruments, among other things[10].

D. Lingering Uncertainties

Amongst the numerous uncertainties that still surround the global GHG market, the two most significant concern Russia and the United States. Following the US' rejection of the KP and most other developed countries' ratification of the agreement, Russia was thrust into a position in which its decision about whether to ratify the KP is the single factor that determines whether or not the agreement enters into force. Though the Russian government has publicly expressed its intention to ratify the agreement, it still has not followed through on this intention.

The continuing controversy surrounding climate policy in the U.S. and the fact that the US remains outside the international framework casts some doubt on the KP's long-term prospects. Without participation by the world's single largest emitter, which accounts for roughly a quarter of global GHG emissions, other countries may be reluctant to accept more stringent GHG emissions limitations beyond the

timeframe covered by the KP's first commitment period (2008-12).

E. Conclusion

This survey of GHG commodity markets around the world has revealed a generally positive outlook, along with remaining uncertainties. In the near term, rules governing trading are likely to become increasingly clear, and more companies will face binding GHG limitations as the EU ETS and Canadian domestic systems move closer to implementation. Both factors suggest that the rise in GHG trading activity seen since the first trades took place in the mid 1990's will continue. The rate of this rise will depend in part on the extent to which market fragmentation can be reduced through the harmonization of trading rules. Notwithstanding significant lingering uncertainties related to Russia and the US, the now widespread acceptance of emissions trading as a tool for reducing the costs of achieving environmental objectives bodes extremely well for the long-term prospects of the global GHG market.

[1] For a discussion of buyer preferences with respect to the following commodity types, see "*currency of choice AAU,ERU, CER*" by Steve Drummond in Chapter 06 of this volume.

[2] In some cases, distinguishing between ERs (described in the preceding sub-section) and project-generated permits (described in this sub-section) is not a straightforward process. For example, some GHG contracts that supposedly involve CERs/ERUs include a provision that terminates the contract if the multi-year stream of candidate-CERs/ERUs underlying the trade ultimately fails to earn international recognition as actual CERs/ERUs. This implies that any payments to the seller prior to the date of the contract's termination were made for the delivery of candidate CERs/ERUs (i.e. ERs), not actual ones.

[3] Varilek, M., G. Edward, and R. Rosenzweig (2001) "*Review and Analysis of the Emerging International Greenhouse Gas Market,*" report prepared for World Bank Prototype Carbon Fund.

[4] F. Lecocq and K. Capoor (2002) "*State and Trends of the Carbon Market(s),*" World Bank Prototype Carbon Fund, www.carbonfinance.org.

[5] For a more detailed analysis of the UK ETS, see "*The UK ET scheme*" by Garth Edward in Chapter 16 of this volume.

[6] Limitations on energy consumption are converted into emissions units for purposes of emissions trading.

[7] Inclusion of intra-company trades would significantly increase this volume estimate.

[8] For a more thorough discussion of reasons for these price dynamics, see R. Rosenzweig and M. Varilek (2003) "*Key Issues to Be Considered in the Design of Rate-Based Emissions Trading Programs: Lessons Learned from Past Programs*," discussion paper presented at Electric Power Research Institute workshop, Vancouver, British Columbia, available for download at www.natsource.com/uploads/features/Draft%20Discussion%20Paper%20-%20Rate-Based%20Emissions%20Trading.pdf

[9] For further discussion of GHG market fragmentation, see R. Rosenzweig, M. Varilek, and J. Janssen (2002) "*The Emerging International Greenhouse Gas Market"*, Washington, DC: Pew Center on Global Climate Change.

[10] For example, R. Rosenzweig, R. Youngman, M. Varilek, and T. Sheehan (2003) "*Governments as Participants in International Markets for GHG Commodities,*" forthcoming discussion paper, Paris: International Energy Agency.

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03

Some Insights on the State and Trends of the Carbon Market

Franck Lecocq & Karan Capoor
PCF*plus World Bank*

Some Elements on the State of the Carbon Market

In October 2002, the Carbon Finance unit of the World Bank released a "State and Trends of the Carbon Market" Report[1] which concluded that:

- The year 2002 had been the most active year so far in the carbon market, both in number of trades and in volume;
- Project-based transactions—as opposed to exchanges of allowances—dominated in volume, although no longer in number of trades;
- More buyers were entering the market, the range of technologies on which project were based was expanding, and contracts were becoming more complex;
- While most carbon transactions were within the OECD, private buyers appeared to be more comfortable making transactions in developing countries and emerging economies as part of public-private partnerships.

Preliminary data for end of 2002 and 2003 suggests that the carbon market continues to grow steadily and consistently. The number of trades since July 2002 appears to have increased largely, both for allowance trading on the U.K. market and for project-based transactions. Volumes seem to have followed a similar trend, with overall volume since July 2002 apparently higher than during the previous year.

Within that broad picture, various trends emerge:

- The global distribution between allowance trading and project-based emission reductions seems to have remained globally the same: most of the recent trades have occurred on the allowance market, whereas the bulk of the volume remains in project transactions. This is not surprising, since the U.K. trading system is the only allowance market with a significant number of transactions to date. The picture might change once large-scale trading markets, such as the European Trading Scheme, enter in operation.

- Within project-based activities, government buyers (acting either on their own or through public-private funds such as the World Bank carbon funds) remain a dominant player. The limited participation of private firms in JI and CDM so far seems to stem mainly from continued carbon regulatory uncertainties. Indeed, although the rules of JI and CDM transactions have been substantially clarified over the past year, the contours of domestic regimes remain uncertain in Canada, Europe or Japan (although to differing degrees).

  Once the rules of the domestic regimes are clarified—inter alia the allocation plans for emissions allowances where trading regimes are in preparation, clear definition of emissions monitoring and reporting requirements, eligibility of CDM/JI type credits under those schemes, and registration of CDM/JI projects for the purposes of the Kyoto Protocol—more private entities might be driven into JI and CDM projects.

  Yet several new commitments by governments in 2003 to buy emission reductions through JI and CDM projects, and the much lower transaction costs associated with allowance trading, especially for small and medium enterprises, both suggest that governments will continue to play a major role in the market for project-based emission reductions, and in the carbon market as a whole.

- In terms of prices, early indication suggests limited variations compared with last year. Prices for project-based transactions seem to have consolidated in the range of U.S.$3 to U.S.$5 per ton of CO_2e. These figures, however, must be viewed with caution. First, price information is notoriously hard to get. Second, compared with other buyers, the World Bank and the Dutch Government are in general more transparent about prices paid. This may skew the averages into that range. Finally, commodities are rarely comparable. Indeed, risk distribution, penalties, guarantees, and other features of the contract might go a long way towards explaining seemingly important price differences. For example, preliminary data analysis suggests that higher prices accrue to sellers who are willing to take on the Kyoto Protocol risk. The authors, unfortunately, do not have enough information on the structure of transactions to put a price tag on each of these various contractual features.

  In terms of technology distribution, early data indicate that renewable energy generation dominates in recent transactions, followed by landfill gas to energy and biomass. This is consistent with observation of PCF project portfolio, which suggests that in the U.S.$3 to U.S.$4 price range per tCO_2e, projects that mitigate methane emissions—e.g., landfill gas recovery coupled with electricity generation, various forms of agricultural waste recovery—get substantial boost by adding a CDM or JI component. In fact, observed increases in Internal Rates of Returns (IRRs) for such projects within PCF portfolio are typically in the range of 5% or more. The impact on energy efficiency projects is usually lower, in the 2% to 4% range. Hydroelectric projects get around 1.2% to 2.6% increase in IRR and wind energy between 0.9% and 1.3%, with in both cases strong variations depending on the displaced source of electricity, at current prices. On the other hand, carbon finance has little impact at current prices on the economics of projects in capital-intensive sectors, such as transportation.

- A fourth observation is that some regions of the world appear to be more active in attracting carbon finance. There are reports of increased activity in India, Brazil, Central and Eastern Europe and South Africa. China continues to be of interest to buyers and authorities are reported to be cautiously determining the best way to participate in the market.

  Poorer African countries, in particular, have not yet been able to access the market, although many are setting up Designated National Authorities in order to do so. The slow interest in poorer countries could be a result of the perception of larger market or strategic risks/opportunities that companies see in some markets versus others, as well as a translation of the difficulty to leverage investment in these regions. In the early days of the market, the benefits of market participation have yet to be experienced by many countries that are engaged in efforts to mitigate climate change.

Some Insights on the Future of the Carbon Market

Key milestones for the future of the carbon market are obviously the decision by Russia to ratify, or not ratify the Kyoto Protocol, and the start of operations of the European Trading Scheme in 2005. We will not speculate here on the probability of Russia ratifying, except to note that OECD governments are, for the most part, only just beginning to gear up to comply with their carbon obligations.

Should the Protocol not enter into force rapidly, it remains plausible, at least at this stage, that Canada, the EU and Japan would still want to meet their Kyoto (or EU bubble) targets. The EU Trading Directive, one must recall, is independent from the Protocol itself. However, in the prolonged absence of the Kyoto Protocol, the directive linking the two instruments might not be sufficient to make project-based mechanisms accessible to European firms under the EU scheme unless new regulations are passed.

Should the Protocol enter into force rapidly, on the other hand, the price signal on the European market should have major impact for all flexibility mechanisms. It would indeed give a first clear indication of what the domestic abatement costs in Europe might be. And if it is higher than the current price of carbon—as indication from early European allowance trading suggests—such development might lead to an increasing interest in JI and CDM, as well as in the purchase of Assigned Amount Units.

To what extent CDM and JI can fill the gap, however, is unclear. In fact, lead times for project-based mechanisms are long. Given the time required to come to financial closure, then to actually build the infrastructure, get all the authorizations (power producing licenses, etc.), and start operating, World Bank experience suggests it can take up to 3-5 years before projects start generating emission reductions. This figure is valid only for types of projects where limited capital is built (some energy efficiency, landfill gas, etc.). Capital-intensive projects typically require 5-8 years before the first "yield" of emission reductions. In order to get emission reductions for the period 2008-2012, it is thus necessary to start project preparation by 2006 at the latest.

In this context, the current interest of governments to purchase CDM/JI reductions can be seen as a welcome and strategic move. Yet without clarification on the validity of emission reduction credits beyond 2012, new purchases from CDM projects are likely to diminish rapidly far before the end of the first commitment period. That would leave domestic abatement or purchase of allowances as the only issue for firms and governments alike to meet their commitments.

The preceeding remarks are the sole responsibility of its authors. They do not represent the views or outlook of the World Bank, its executive directors, or the countries they represent. They also do not represent the views of the World Bank's Carbon Finance Business, or of the Participants in any of its Funds. The authors thank Charlotte Streck for very useful comments.

The Carbon Finance team of the World Bank manages three carbon funds on behalf of a number of private and public participants: the Prototype Carbon Fund (PCF), the Netherlands Clean Development Mechanism Fund, and the Community Development Carbon Fund. These Funds are an opportunity for the World Bank to channel new public and private resources for development of clean infrastructure and poverty alleviation in its client countries. All three funds purchase emission reductions from projects in transition economies and in developing countries which reduce greenhouse gases emissions. Participants in the funds receive a pro rata share of emission reductions that they can use towards their compliance under the Kyoto Protocol or other climate regimes. The pioneering companies and governments that have contributed to the funds also support the development of the carbon market and disseminate the lessons learned from their activities.

1 Lecocq Franck and Karan Capoor (2002) "State and Trends of the Carbon Market", www.prototypecarbonfund.org, PCFplus Research Section.

04

Why Emissions Trading Works, Lessons from Real Markets

Alastair Dutton, Lisa Parker & Mark Proegler
BP

General View

Emission trading is a market mechanism that has wide appeal. It encourages participants in such a scheme to look at the options they have to cut emissions in a quantitative way. When the market exists, it creates real incentives for reducing emissions. It is also a stimulus to develop new technology because it sets a real cost on emissions and provides incentives to reduce that cost.

Learning's from Emissions Trading Markets

BP operated an internal emissions trading system for GHGs between 1999 and 2001. The system was an important tool in helping meet a voluntary target of reducing operational GHG emissions to 10% below 1990 levels in the most cost-effective way possible. The system also provided a platform from which to engage all parts of the business and focus attention on climate change issues.

Operating the system provided a number of insights into the effective development of an emissions trading scheme:

- Target setting is the key. The target defines the environmental goal – emission trading provides the flexibility and incentives to achieve that goal cost effectively.
- Starting slowly, and providing flexibility to change and learn, helps overcome any 'teething-problems' with the system.
- It is crucial for future system participants to be engaged in the planning stages.
- An open, transparent and accurate reporting system is vital for the efficient functioning of the market and for credibility.
- The rules need to reward good behaviour, avoid distortions and encourage energy efficiency or processes/projects that result in environmental benefits.

Following the experience gained from its internal emissions trading scheme, the UK emissions trading scheme (UK ETS) provided the first opportunity for BP and other companies to experience an external GHG emissions trading system involving the transfer of real money and allowances.

Since its inception in 2002, the prices of UK ETS GHG allowances have reflected basic supply/demand theory and the market structure design. When the market first opened there were only a few participants with verified baselines, which reduced the number of issued allowances. This proved a constraint on supply and, with early demand, the allowance price rose steadily from £5 to a mid-year price peaking at £12.40. The price fall back rapidly as new supply came to market. Despite active trading as first compliance dates loomed, the price slipped further to £3 in an over-supplied market. In the second year prices remain depressed; a major source of demand was absent since climate change agreement participant's targets are bi-annual. In addition to these price signals it generates, the UK ETS is continuing to provide an excellent opportunity for companies to 'learn by doing' ahead of the mandatory EU cap and trade scheme.

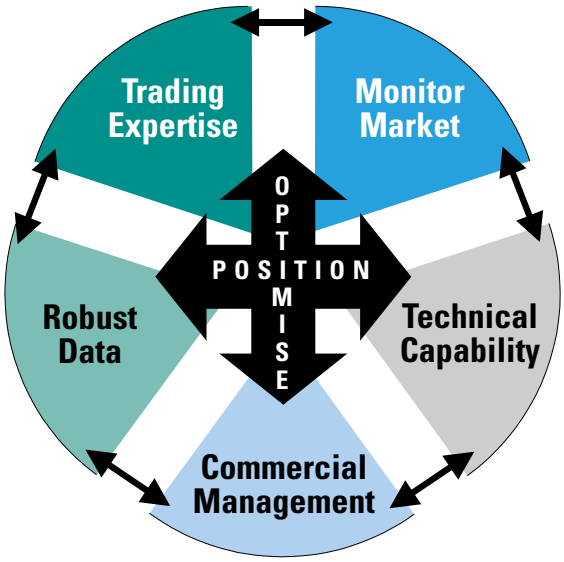
Although the UK ETS represented the first "real" GHG trading scheme, involvement in emissions trading for other emissions has also provided invaluable lessons and experience. Since the mid-1990s, there have been active US "cap and trade" emissions trading programs for sulphur dioxide (SO_2) and nitrogen oxides (NO_x). Since the onset of this program, emissions of SO_2 have

been reduced by approximately 50% at a savings of roughly $20 billion—an estimated 60% reduction — from the cost of alternative "command and control" (e.g. tax) mechanisms . With the regional expansion of NO_x emissions trading underway, emission trading represents a growing opportunity for efficient emission reductions and compliance in the US.[1] Key lessons from involvement in these schemes include:

- In an emission trading environment, both technical and commercial expertise is required for success.
- Understanding of internal cost abatement curves (e.g. capital costs for emissions reduction) is paramount to permit effective comparisons between projects or the emission allowances market as a means of emissions compliance.
- Longer milestone periods allow for enhanced decisions around capital investment planning.
- Having good emissions data (historical and forecast) is critical to achieving success in developing or established emission markets.

Our finding is that, where real markets exist, the actual trading of emissions is not necessarily the primary driver for successfully participating in a scheme. Rather, a key activity also involves the understanding of existing emissions performance, the ability to accurately forecast future emissions, and the development of a thorough understanding of the costs and opportunities for internal mitigation options. Only after a clear emissions "picture" is developed can good decisions around new market entry be made and a suitable forward strategy for optimising compliance created in an existing market, using the market as a tool for flexibility and price signals.

Figure 1: Creating the right linkages is critical to making the most of an emissions trading scheme



What's Needed Going Forward

Across the company we have discovered the importance and benefits of learning from progressively more active participation in emission trading via internal systems, the UK ETS and the US SO_2 and NO_x emission trading schemes. We have also found that the creation of new emission trading capabilities, processes, and awareness leads to more innovative solutions for achieving emission reductions. The upcoming EU ETS represents another opportunity to demonstrate how emission trading, when coupled with mandatory emission reductions, is the most efficient and cost-effective means of delivering emission reduction targets. We encourage the additional flexibility offered by the European Commission Linking Directive for CDM and JI mechanisms and would like to see the development of a global CER trading market involving all countries.

The success of future emission trading schemes such as the EU ETS depends on how effectively past lessons are accepted and applied. In particular, every effort needs to be made to ensure that emerging trading markets exhibit common, verifiable means of emissions measurement and reporting, transparency, fungibility and flexibility, and are underpinned by a stable regulatory environment. Companies, in turn, need to

develop a keen understanding of their emission profile, both past and future, and recognize that emission trading markets offer opportunities to commercially optimise emission compliance.

BP p.l.c. is the holding company of one of the world's largest petroleum and petrochemicals groups. Our main activities are exploration and production of crude oil and natural gas; refining, marketing, supply and transportation; and manufacturing and marketing of petrochemicals. We have a growing activity in gas and power and in solar power generation. BP has well-established operations in Europe, North and South America, Australasia and Africa.

One of BP's goals is to "do no damage to the environment". We have been actively involved in Climate Change policy debate, worked with others on mitigating technologies, demonstrated global emissions trading, and reduced the emissions from our facilities.

1 "Emissions Trading in the U.S.: Experience, Lessons, and Considerations for Greenhouse Gases", Pew Center for Global Climate Change; A.Denny Ellerman, Paul L. Joskow, MIT; David Harrison, Jr., NERA.

5

Shifting Powers on the carbon markets: Large sellers moving to centre stage in 2004?

Laurent Segalen & Kristian Rajakaltio
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How to interpret market data and characteristics?

New markets seldom emerge without differences in the preparedness between companies on the supply and demand sides; one side may lack the capacity and understanding of the market to prevent it from starting to trade, or there may be regulatory uncertainties which impact one side more strongly than the other. Unevenly shared information often leads to biased markets. The unequal positions between buyers and sellers in a newly formed market can significantly restrict liquidity as speculative trade is hampered. This has particularly been the case in the carbon markets where enthusiastic dips into this new sea of opportunity have been regularly slammed by waves of uncertainty.

Nevertheless, in the past 5 years the global carbon markets have witnessed some 350 transactions of various sizes totalling nearly 400 $MtCO_2e$. Despite the fairly large number of transactions there is little coherent data on these deals to support a robust analysis of the market. As is to be expected in any nascent market, prices paid for emissions reductions in the past few years have varied widely, from less than $1 to nearly $20 per tCO_2e.

Buyers biased - sellers absent...?

Large institutional buyers of carbon credits have dominated the early carbon markets and this has consequently led to a somewhat biased view of the market. The World Bank's Prototype Carbon Fund (PCF), and the Dutch government's carbon tenders (CERUPT/ ERUPT) together accounted for over half of the volume of deals closed in 2002. These institutions have, rightly so, benefited from their early mover status, (partial) taxpayer-funding and the risk tolerant structure of the institutions. It has allowed them to use their buying power by selectively using non-recourse buying terms, taking limited project risk and pushing prices down. At the same time they have provided the market with very valuable infrastructure and processes for carbon transactions. Despite large contributions to the general infrastructure for bringing carbon credits to the market, their buying processes alone have not yet been enough to facilitate a steady flow of transactions from private business.

In stark contrast to the buying-side, the seller-side of the market has been mostly characterised by one-off projects that have emerged as additional opportunities within existing projects. They have often been constructed as pilot projects with specific learning purposes. Few sellers have yet approached the CDM/JI potential of their projects or assets from a long-term perspective. We have experienced this in the last year with some of our clients, who have potentially large amounts of CERs and ERUs tied to their business plans, but have so far chosen, due to uncertainty and low price indications, to move forward on a project-by-project basis rather than assess the CDM potential of all their projects as a portfolio of long-term assets. Our view is that uncertainty has and will delay many potential CDM projects, which could not only increase the scarcity of CERs in the 2008-1012 period but also reduce the importance of CDM as a global market mechanism in the first Kyoto period.

Changes during 2003: Good and bad news

Good news. In 2003 we have seen clarification of several aspects of the global and regional carbon trading rules. Most importantly, the EU Emissions Trading Scheme moved swiftly from political debate into the core of corporate strategic planning. During the year PricewaterhouseCoopers has been working together with CDC Ixis and Baker&McKenzie for the EU Commission in defining technical and functional specifications for the national carbon registries, which constitute the necessary back-office of the EU trading system. This is only one of the key processes providing structure, clarity and confidence to the scheme. The rapid emergence of the EU trading scheme from all the various building blocks - the directive, consultations and draft national allocation plans - also has brought more focus to emission trading in general. It is apparent that unlike in earlier trading years trading decisions are now based on a real foreseen compliance need or on a real ability to produce allowances or credits of a desired type.

More good news. During 2003 the CDM Executive Board has taken big steps in setting up the framework for credit based trading which is also expected to provide the framework for credit trading in the EU ETS. With the approval of the first methodologies the CDM registration process is well underway. The dual progress of the EU ETS and CDM has highlighted the future complexity of trading (and pricing) between different schemes. The likely inclusion of Kyoto CER's and ERU's into the EU scheme provides a direct price link between the schemes and opens up the possibility of a truly "global" carbon market.

Not all good news though. In our experience from auctioning credits from renewable projects, the buying side has generally reacted overcautiously with much scrutiny and slow internal bureaucracy to the opening of the credit market. This has hampered interest in developing credit projects. So far, we have seen little appetite for risk-taking, which, despite apparent risks in credit trading, seems surprising given the upside potential in many of the early abatement opportunities. However, buyers' focus on counter-party and delivery risk above regulatory risk seem to indicate that for all new regulatory clarity the financial solidity of the project developer is the real clincher for moving the market forward.

More bad news. Current general opinion of the credit market expects there to be a lack of credits during the first years of the initial commitment period; uncertainty has delayed project developers from starting projects in numbers that would make an immediate impact on the market. Numbers also speak for scarcity of credits; Japan is currently around 150Mt above its Kyoto target, Canada is around 25 Mt above its target and the EU around 200Mt. If, on top of that, EU applies some form of limits on the use of CER/ERUs from 2008 onwards, it is very likely that the early credit market will be characterised by an early "frenzy" to secure any required credits.

For global companies, buyers and sellers alike, the mix of good an bad news has further emphasized the complexity of managing the issue of climate change regulation. The complexity caused by the heterogeneity of markets and instruments has increased with the differences in the planned time schedules for regional and international trading regimes.

A 180° shift: from buyer's market to seller's market

Moving forward towards 2004 we expect to see institutional buyers being "pushed aside" by large corporate buyers, many of whom have so far refrained from entering the market. With a new selective and diverse group of corporate buyers entering the market, large counter-parties are likely to emerge. In our experience, companies with a long-term climate change strategy and who are large buyers will tire of cherry-picking projects by the tons of reduction and will require large volumes of traceable good quality compliance tools. They will seek partners who can deliver credits flexibly in terms of volume, location and vintages. Consequently, this will also further benefit various pooling arrangements between smaller projects.

Many of the potential large sellers of carbon credits are, like their counterparts on the buy-side, global companies with a vast international asset base. Despite differences in climate change policy and regulation between countries and regions they will need a global solution in the long-run. To illustrate: any global company has a range of global/international procurement contracts: cars, computers, fuel, electricity and professional services etc. In a carbon constrained future a move towards similar "procurement arrangements" for carbon credits and offsets might be the most cost-effective for a global company. This means that large sellers also need to include a "global perspective" to the monetisation of their carbon credit assets.

For large international sellers this is an opportunity to provide a global supply of quality credits to international companies who are facing a variety of carbon compliance issues across jurisdictions. Given the benefit of a "one-stop-shop" service that large sellers can provide, they are likely to be able to command a premium for their value-adding service. This does not necessarily mean a premium price for the supplied credits, instead, they could get the premium by pricing carbon credits into supply-contracts, especially with buyers who are also clients. For instance, by including the carbon credits from an industrial coal-to-gas conversion into a new gas purchase contract could see a drop in the gas procurement costs. Or, a waste management company could sell carbon offsets/credits from its waste management site to increase the scope of service to its industrial customers.

However, we have seen that the ability to deliver CERs on a broader scale is not achieved through a half-hearted management commitment. Companies need to put in a serious effort to grasp the carbon credit opportunities associated with their assets and projects. This requires meticulous homework on the assets to understand the size of the opportunity. To do this, assets need to be evaluated against transparent and robust criteria such as detailed country-specific legal and technical assessment of the broad additionality requirements, length of contracts, opportunities in the local value chain, approved sustainability metrics, financing needs etc.

This exercise will reveal the broad scope of the carbon opportunity and provide a starting-point for management to decide how to best harness the opportunities. Theoretically, the global carbon market could be segregated into at least seven OECD ETS by 2006. Links between regimes put aside, credits will be the only instrument available to all these markets. For instance, a project currently being managed by us in Latin America could (in the future) be in a position to "choose" its buyer between buyers in a US state scheme, a US voluntary scheme, a NAFTA scheme, a domestic Japanese scheme, the EU ETS and Kyoto CDM/ET. In this situation the credits should be able to claim a premium for their fungibilty. However, today the situation is less diverse; assuming guaranteed EU ETS approval the price could be around €9-10 per ton in the EU, €6 per ton on the CDM market and US$1 per ton on the US voluntary/offset market. In the future well-managed global carbon assets should be able to optimise the delivery of various types of credits across all trading regimes.

The cornerstone of any corporate-wide assessment of carbon assets is data management; site information, operational data, local management practices and data collection responsibilities. In our experience, the quality of data collection in climate change projects are seldom even close to the standards set by financial- or operational reporting. The quality of data obviously determines the usefulness of the results from any broad assessment. Only after the "homework" on own assets has been done properly should a potential seller start to approach the market with a long-term selling strategy. This applies even more to the buying side. How many trading managers of the EU ETS participants know the internal GHG marginal abatement cost of their company?

Towards 2004 - large sellers will start shaping carbon markets

The carbon credit market will be initially driven by demand from the EU ETS but it will be increasingly influenced by other emerging schemes in which credits can be used. This will not only apply to the credit markets but also to

the EU allowance market, where we think Eastern European sellers, in particular, will see the early benefits of a seller's market, provided their opportunity is not diminished by other considerations such as the "acquis communautaire" or "hot air" eligibility. The timeframe in which this transformation will take place depends not only on the speed of development and the number of potential trading schemes but also on the links established between these schemes.

We think the developments with the EU ETS and in the CDM executive board will start pushing buyers to the market and open more clear opportunities for sellers of carbon credits. As a result the market will shift from public buyers to corporate buyers, from a buyer's market to a seller's market, and from one-off reductions to packaged and tailored streams of compliance tools and offsets. Consequently, companies with a large international asset base from which to produce emission reduction credits will begin to see their role on the market grow substantially.

General Market Issues

06

Currency of choice: CERs, ERUs, AAUs, or EAUs?

Steve Drummond
CO_2e

Note: The jargon used has been summarised in the glossary at the end of this article.

2003 has seen a sea change in global greenhouse gas markets. A year ago, the broker's stock in trade was the verified emission reduction (VER), and some, including myself, were confidently predicting the slow death of Joint Implementation (JI) and the ascendancy of the Assigned Amounts Units (AAU) as the carbon currency of choice. A year is a long time in politics, and in the global carbon markets too it seems. Volumes are up, brokers are smiling, Certified Emission Reductions (CERs) are all the rage, the good old VER is hardly getting a look-in, and the AAU has been virtually banished from sight in Europe, the largest concentration of buyers in the world.

There are two reasons for this sea-change. The first is the ratification of the Kyoto Protocol by Canada, Japan and the European Union. The second is the enactment in Europe of the mandatory European Emissions Trading scheme.

Ratification of the Kyoto Protocol by all the main Annex B countries increased the expectation of a compliance burden among businesses emitting greenhouse gases in those countries. Companies who had previously been buying VERs as part of voluntary programmes switched their attention to CERs, a compliance instrument of the future in most jurisdictions. New buyers and sellers entered the market.

The market underwent a step change. Whereas early movers had no choice but to source VERs, and hope to get them certified (as CERs) later, new entrants looked to the seller to take that risk. We now see a stratified market. Commercial buyers are almost exclusively contracting to take delivery of CERs. No certification, no ratification, no delivery, no payment. Prices in 2010 are around $5.50 - $6.50 per CER. On the other hand, the World Bank and government agencies are still contracting to take "proto-CERs" - VERs with a strong conversion promise - and will pay out even if the Kyoto Protocol does not enter into force. Prices in 2010 in this category are around $3.00 - $4.50 per VER/CER, though the propensity for these agencies to pay a proportion of the price up-front increases the present value of these transactions. The implied pricing on Kyoto ratification risk is therefore around one dollar, and it is interesting to speculate about the prospects of price conversion between the public and private sectors post Russian ratification.

Is the CER a carbon currency of choice? Most definitely. Active commercial buyers are currently outside Europe and are expecting to use CERs directly as compliance instruments in national schemes. Inside Europe, the currently draft "linking proposal" creates a strong expectation that CERs will be able to be converted into European Allowance Units (EAUs), for use by companies within the European Emissions Trading Scheme (EU ETS). The only worry in the minds of many observers of CERs is that they will not be created fast enough to satisfy their full potential, though I am less pessimistic than many.

So what about the ERU? Joint Implementation is less codified than the Clean Development Mechanism (CDM) and needs more active involvement from the host government. A year ago, some observers were asking the question "what is the difference between an ERU and an AAU?[1] " An AAU, as the equivalent of a sovereign bond, appeared to be a "harder" currency than an ERU and therefore the more attractive option for

buyers. Ask the same question today and you will get a clear answer: an ERU can be converted for compliance in the EU ETS, and an AAU cannot.

Because of this early ambiguity, the ERU did not get off to such a good start as the CER. Some of the initial trades sourced from Central Europe indeed took the form of "project-backed AAUs", rather than ERUs. These may still be useful as compliance instruments for companies in Japan and Canada, though it remains to be seen whether environmental lobbyists succeed in persuading those governments that corporate purchases of AAUs need to be "greened"[2] . Assuming the "linking proposal" is passed however, ERUs are assured of a compliance value for emitters in Europe. Interest in ERUs has therefore resurged, and we are seeing new sources of quality ERUs coming to market. Activity should increase further as ambiguities regarding double counting rules in the EU ETS get resolved.

Pricing? Well there are fewer transactions. Pricing seems to be about the same as CERs, but it is arguable that there is a wider spread of policy associate risks for an ERU transfer. An ERU generated from Track 1 JI has less certification risk than a CER, but more transfer risk due to the need for the host country to be fully compliant with its obligations under the Kyoto Protocol. An ERU generated from Track 2 JI carries about the same risks as a CER, but the approval framework is less developed. As transaction volumes increase, these risks will be priced more keenly, and it is probable that price differentiation according to source country will become more readily identifiable.

Is the ERU a carbon currency of choice? After what appeared to be a still-birth, the answer seems to be increasingly YES, after the European Commission elevated its status in the EU ETS. There are still structural issues to be deal with, but 2003 is the year of the ERU come-back.

AAUs? The European Union has created what could potentially be a fatal blow to the AAU as a carbon currency of choice among corporations. It is not a compliance instrument in Europe, and therefore lacks fungibility with some 60% of global demand for greenhouse gas emission instruments. Even if the AAU becomes a compliance instrument in domestic trading systems in Canada and Japan, this lack of fungibility will be a disincentive to invest. For those who clearly can use them however, i.e. national governments, AAUs hold many advantages. They are a clear, sovereign instrument, they do not carry any project risk, and they are available in large quantities so you don't have to transact often. The downside is the politics that follow them round, centred on concepts of "hot air".

Is the AAU a carbon currency of choice? Yes if you are a government, though you have to take note of the politics. Maybe if you are a corporation in Canada or Japan, though it depends on how domestic trading schemes in those countries evolve.

The EAU is the new kid on the block. It is expected to have a measure of fungibility with CERs and ERUs, under the terms of the draft "linking proposal". Under this proposal however, the CERs and ERUs will be actually converted into EAUs by EU member states. So for installations collectively responsible for around 45% of the emissions of 25 European countries representing some 60% of global demand under Kyoto, the EAU is the currency of choice.

Pricing of EAUs? Very hard to say. Some initial forward transactions of EAUs have priced them at around €10.00 ($11.00) per EAU for the 2005-07 compliance period, though this is on relatively small transaction volumes. There is no market pricing for 2008-12. The European Commission released a price forecast of €26.00 ($28.60) per EAU for 2005-07, and €14.00 ($15.4) per EAU for 2008-12 (since you can only convert CERs and ERUs from 2008 onwards). The underlying variables to any price forecast are so wide at the moment however (e.g. the national allocation plans of each EU member state will not be submitted to the European Commission until 31 March 2004) that making any sort of a price forecast is a brave act.
So is there a single currency of choice? No, but there are some clear choices emerging. If you

are a corporation in a domestic trading scheme, then the local compliance instrument comes first. In the Kyoto markets however, somewhat surprisingly, the CER has leapt to the fore. Worries persist over the speed and approach of the CDM Executive Board, but nevertheless the certification process and delivery risks associated with a CER remain more certain than much current ERU activity. Above all, assessment of the underlying risks of a CER is straightforward. The ERU is making a strong comeback however, and some high quality ERUs are now becoming available with strong guarantees from governments who are well on the way to fulfilling the Kyoto compliance requirements necessary for delivery in 2008. The EU ETS reduces the scope of ERU activity in accession countries, so the opportunity for significant volumes of ERUs depends on activity in Russia. AAUs, once expected to be the "hard currency" of the Kyoto flexibility mechanisms increasingly appear to be reserved for governments. So in 2004, we can expect the competition for good emission reducing projects to continue to intensify.

CO_2e is a leading global broker of greenhouse gas emissions and other environmental instruments. Its market-focussed services include environmental brokerage, climate neutral solutions, trading and risk management tools, advice and market information. CO_2e is owned by Cantor Fitzgerald and Mitsui.

Glossary:

AAU Assigned Amount Unit – a subdivision of the national cap of an Annex B (developed) country under the Kyoto Protocol.

Annex B A list at the back of the Kyoto Protocol of those developed nations that have agreed to collectively cap their emissions from 1 January 2008. This is now generally accepted to not include the USA (at least before 2013) and the inclusion of Australia is also currently open to question.

EAU European Allowance Unit – for use in the European Emissions Trading Scheme (EU ETS). 'Allowance' means an allowance to emit one tonne of CO_2e during a specified period. Medium and large emitters in the energy, steel, cement, glass, ceramic, pulp and paper sectors in Europe are included in the EU ETS. The exact nature of an EAU is not yet finalised, but for inter-governmental purposes it is an AAU.

CER Certified Emission Reduction – a project derived emission reduction from a non-Annex B (developing) country certified under the Clean Development Mechanism of the Kyoto Protocol.

ERU Emission Reduction Unit – a project derived emission reduction from an Annex B (developed) country certified under the Joint Implementation rules of the Kyoto Protocol.

Track 1 JI A Joint Implementation project carried out in a country that is fully in compliance with all its obligations under the Kyoto Protocol and is therefore able to transfer Kyoto instruments to and from its national registry. Track 1 JI projects need no third party confirmation of environmental additionality (this being left to the host government).

Track 2 JI A Joint Implementation project carried out in a country that is not in compliance with all its obligations under the Kyoto Protocol and is therefore unable to transfer Kyoto instruments to and from its national registry.

VER Verified Emission Reduction – a project derived emission reduction that has been monitored and verified according to a protocol agreed between buyer and seller, but which has not been certified by a regulatory body for compliance purposes.

A single example of each instrument is worth the emission or reduction of one tonne of carbon dioxide equivalent.

[1] An AAU and an ERU each represent the ability to emit one tonne of carbon dioxide equivalent in an Annex B nation. The difference is in the paperwork.

[2] Some observers believe that the trading of AAUs that are surplus as the result of the collapse of an economy (sometimes referred to as "hot air") conveys no environmental benefit. The "greening" of an AAU is the idea that you can make a transfer more politically acceptable if you attach an additional emission reducing action to it.

07

Development and growth of greenhouse gas emission reduction systems in agriculture

Len Eddy
AgCert

Background

In many countries livestock production has shifted away from family farming to large Confined Animal Feeding Operations (CAFOs). Fueled by breakthroughs in genetics and animal science, livestock production has increased steadily for the last 15 years. However, increasing concerns for pollution have all but halted further capacity expansion. Indeed, livestock production growth has stalled in most developed nations because of point-source pollution concerns – chiefly, water pollution and odor; Livestock operations can also be a significant contributor of GHGs.

GHG from livestock operations include carbon dioxide, methane, and nitrous oxide. Livestock manure management techniques vary by operation, and therefore affect the quantity and types of GHGs emitted. For example, spreading raw manure on land typically results in carbon dioxide and nitrous oxide emissions, while liquid manure management systems produce large quantities of methane and nitrous oxide. The largest CAFOs are organized systems with a single corporate entity controlling hundreds of individual farm operations; aggregate production can exceed one million animals annually.

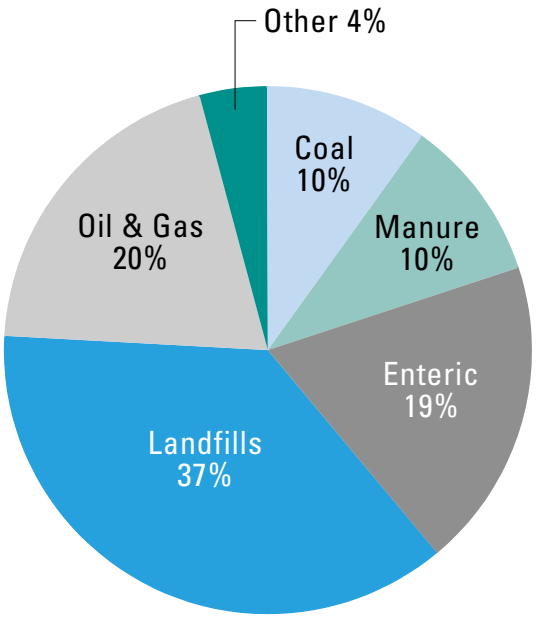
Different organizational structures exist, but the common design has the producer providing the barns and daily animal management while the system provides the animals, feed, and payment for facilities and herd management. Concerns for disease drove the trend to production farms, spread out over large geographic areas. A system consists of a number of individual farms.

The Trade Off

There are always tradeoffs, and significant issues often constrain CAFO expansion. Large concentrations of livestock produce *enormous* quantities of manure with associated risks of fouled air and water contamination.

CAFOs also produce significant GHG emissions. In fact, the US and Canadian GHG inventories identify manure as the source of almost 10% of all methane (CH_4) with lesser quantities of nitrous oxide (N_20) and carbon dioxide ($C0_2$); all known contributors to global warming. Practice changes that afford reduced CAFO GHG emissions also afford reduced risks of water pollution and effluent odor.

Figure 1: Sources of US Methane Emissions in percent



Practice changes that afford reduced CAFO GHG emissions also afford reduced risks of water pollution and effluent odor.

Technical Hurdles

Audit and verification of agricultural GHG offsets have been difficult without government approved project protocols. Agriculture has been especially problematic without sanctioned baseline definitions, measurement techniques, and acknowledged emissions factors. Even more problematic, the Kyoto Protocol affords little recognition to agricultural emission reductions, except through the clean development mechanisms (CDM) process.

To resolve many of these issues a Cooperative Research and Development Agreement (CRADA) was undertaken between private companies and the U.S. Department of Agriculture, leveraging USDA's many years of GHG research in both manure and soil management. Under this agreement the USDA has critically examined "business as usual" practices to develop standardized baseline definitions for different practice areas, as well as determining appropriate emissions factors, measurement techniques, and error factors. They have also characterized the emissions performance of a many practices, making it possible to consider/apply different baselines in different countries, to serve local policy needs. This CRADA builds upon USDA's previous work that has been recognized by the IPCC.

Agriculture can be scaled up to provide high offset volume:

- By creating a consistent supply of offsets, using the same techniques, measurement methodologies and protocols developed under the CRADA, and
- Utilizing the CAFO systems to facilitate aggregation of large "blocks" of offsets to be useful to large industrial emitters.

Data transparency and reliability necessitates a rigorous management system and companies need to implement a strong quality program addressing both internal controls and external processes. Quality platforms usually will incorporate aspects of both ISO 9001 and 14001, and include robust data management that can serve as one element of data/process verification.

Marketing and Sales

Building market awareness and acceptance has been challenging for private companies.

While the USDA CRADA offers strong foundational science, it was left to private companies to develop other mechanisms to assure buyers that the company was a credible supplier of "gold standard" offsets. These include, in the case of AgCert, a transparent aggregation system built upon ISO 9001/14001 platforms, and a variety of well regarded partner services such as delivery risk insurance.

Additionally, the emitters (buyers) have been unsure of government policy direction; a sentiment expressed in all major markets. The Kyoto Protocol has yet to be ratified, and buyers express reticence towards paying to hedge for a risk yet to be confirmed. Though few doubt future action is coming, it is difficult to quantify the dimensions of risk, and therefore, very difficult to value the tradeoffs. Hence, many emitters continue to debate whether they should buy offsets and, if so, at what price and quantity. Most buyer interest, thus far, has come from companies entering the market early to buy at a discount, or those which believe an arbitrage opportunity will appear in the near future.

The Kyoto Protocol, itself, poses an additional challenge: agriculturally derived offsets are largely unrecognized, except through the CDM process. Thus, it is important to continue to advocate recognition amongst nations that have both significant Kyoto commitment shortfalls and complementary agricultural systems (who could develop this rich source of offsets themselves). It is also important to clarify transparent methodologies for sink projects. One such methodology is currently being submitted to the Methodology Panel of the CDM Executive Board, in line with a sink project proposed to the Executive Board. Other sink methodologies will be submitted in the future. This may ultimately foster broader recognition for agricultural offsets, as the science, measurement, and verification issues become better understood.

A last significant challenge is that CRADAs are an instrument of the US government, which withdrew its support for the Kyoto Accord. While CRADA backing does not guarantee that buyers from other countries will endorse the science, each country and regional jurisdiction has expressed some interest in examining the USDA science.

Canadian and European Union (EU) policy have become clearer as they publish their respective plans for invoking reduction/offset requirements for large industrial emitters. The Canadian ratification of the Kyoto Accord appeared to jump start buyer interest in both Canada and the EU. The first indication of a shift of the buyers' position appeared when several Canadian and EU emitters moved from a technical due diligence phase and started to discuss actual purchases of both CDM emission reductions and Canadian verified emission reductions.

Canadian CDM/JI office and other Canadian authorities have been supportive of companies CDM efforts, and have been working in close collaboration with companies such as AgCert's. AgCert has thus been able to aggregate large volumes of Canadian agricultural offsets and design long term contract agreements that survive through to 2012.

The Impact?

Today, some 30% of potential offset buyers (in Annex I countries) appear to be seriously contemplating a purchase. The remaining 70% continue to hold fast based on their perception of low risk.

Flexible contract alternatives, including escrow provisions within long term contracts, have proven an effective means of moving emitters towards a purchase decision. This approach escrows the full amount of the contract within the first two (2) years of the contract. This provides the emitter with important benefits:

- The emitter knows the offsets are produced and readily available from a trusted third party. In turn, pooled offset availability leads to a second benefit – the flexibility of varying the quantity of offsets that may be "drawn down" (from escrow) each year. The escrow language provides the buyer great flexibility as it allows the "draw down" of more or less than what was originally expected on an annual basis.

- Finally, the passage of time provides better definition on government allocations and shortfalls, and a continued opportunity to provide updated science and offset products.

Today agricultural offset production is focused on large CAFO operations where agricultural practices can be consistently applied; these include North and South America and soon Europe. Companies need to continue to partner with customers to create long term agreements, netting a true "win - win" proposition. There is a need to continue to advocate for broad recognition of agriculturally derived offsets by defining the underlying science, measurement, and verification technologies and by promoting complete transparency. The authors strongly believe agricultural offsets will become the true "gold standard" for meeting the world's environmental and GHG compliance needs.

AgCert International, L.L.C. and its subsidiary, AgCert Canada, have developed a systematic process for qualifying and quantifying agriculturally derived GHG emissions reductions for use as qualified offsets under national systems and the Kyoto Accord. AgCert believes this departure from the traditional "high friction" project-by-project approach is a critical aspect of realizing cost-effective offsets that enable economically sustainable climate change solutions.

08

The verification market and the growing importance of "high level of assurance"

Gareth Phillips
SGS [1]

Introduction

The purpose of this paper is to reflect on the growing understanding and significance of the term "level of assurance" and to explain why a high level of assurance is required for successful GHG emission trading. Before that, it is firstly necessary to introduce the key principles and secondly, to explain why third party verification is so important in GHG inventories. Then the paper moves on to discuss the topic of level of assurance and the current understanding of how best to ensure a high level of assurance (the verification process), followed by a brief analysis of the current state of the verification market. Finally the paper looks at the implications for verifiers. The article is presented in an evolutionary light, as befits a learning-by-doing process and is based on understanding and practical experience gained by the author in (a) the preparation of management systems for GHG verification and (b) the actual verification of GHG emissions particularly under UK ETS.

The Key Principles

The key principles for the measurement and reporting of GHG emissions are fundamental, as their name suggests, to the overall credibility and effective operation of a trading regime. The key principles draw heavily on financial accounting practices. In our experience to date, their significance has generally been understated. Consequently they have generally been poorly understood and coarsely applied, perhaps because those responsible for compiling the inventories have an environmental rather than financial background. However, it is the verifier's role to verify that emissions have been calculated and reported in conformance with the key principles, so their importance must be appreciated. Table 1 lists the Key Principles used by a selection of registries / programmes / GHG reporting initiatives.

Table 1: What are the Key Principles?

UK ETS	UNFCCC (CDM & JI)	EU ETS	CCAR	IETA / PCF VVM*
Complete	**Complete**		**Complete**	**Complete**
Consistent	**Consistent**		**Consistent**	**Consistent**
Reliable		Reliable		Reliable
Transparent	**Transparent**		**Transparent**	**Transparent**
Faithful representation				
	Comparable		**Comparable**	**Comparable**
	Accurate	**Accurate**	**Accurate**	**Accurate**
		Credible		
				Valid
				Cost-effective

* International Emissions Trading Association / Prototype Carbon Fund Validation and Verification Manual

There is considerable overlap in the exact terminology applied, they all strive for the same goal – to ensure credibility. Below, the five most common terms are reviewed:

Complete: Inclusion of all eligible sources. This takes into account the application of scheme specific rules for inclusion and exclusion of sources. What gases must be included? What sources may be excluded etc. If sources or gases are incorrectly excluded, the inventory is not complete.

Consistent: Consistency is important because most scheme wish to subtract this year's emissions from either allocated permits or a historic datum to draw conclusions about changes in performance relative to a specific target. If the measurement and calculation procedures

change from year to year, the result would be like comparing apples and pears.

Comparable: Inevitably, regulators and other stakeholders are going to compare one company or facility against another. If the same calculation techniques have been used, performance may be relatively comparable.

Accurate: Accuracy and uncertainty are two sides of the same coin. Uncertainty should be minimized. There are two sources of uncertainty. (1) Inherent uncertainty such as the use of an average emission factor. This is built into the approved measurement and calculation protocols and need not concern the participant. (2) Measurement uncertainty, such as estimated meter readings, missing data, transcription errors. Verifiers are typically able to class such errors as "immaterial" if they are expected to cause less than an x% error in the inventory. If the errors are above the materiality threshold, the inventory cannot be verified as accurate. In this respect, calculation protocols seldom specify how measurements are to be taken other than to specify that they should be appropriate. For example, there are few guidelines on the level of accuracy or calibration for measurement equipment and the verifiers are often required to apply their professional judgement in these circumstances. If measurement errors are identified, it may be possible to revise the figures to take these errors into account. However, there may also be circumstances where it is not possible to reach an accurate conclusion and in these cases, the verifier will not be able to issue a verification opinion and the participant may consequently face some form of penalty from the regulator.

Transparent: The sources of the data and the calculation steps must be clearly visible, backed by an audit trail and be repeatable. Normally, the calculations are laid out in spreadsheets so that at least the calculations can be easily checked. The California Climate Action Registry (CCAR) has developed an on-line reporting tool (CARROT) based on the WRI / WBCSD GHG Reporting Protocol that uses default values (or others as specified) to convert activity data into emissions. This makes the task of verification somewhat easier. The preparation of an inventory report as a free-standing document, complete with annexes and appendices will automatically encourage transparency and facilitate the verification process.

The need for independent verification

The credibility of a GHG emissions trading scheme is based on the extent to which the key principles are fulfilled. Given the potential to violate these key principles and rules (either intentionally or unintentionally), and the financial incentives and the environmental consequences of doing so, it is paramount that all emission inventories are checked. This understanding has been enshrined in the texts of the Kyoto Protocol and objective evidence to support it is growing as the number of registries and trading schemes grow. All the major GHG trading regimes and registers/inventories to date incorporate third party verification: UK ETS, CDM, JI, EU ETS, Californian Climate Action Registry and the WEF Global Register. Even the National Inventories of Parties to the Kyoto Protocol will be scrutinized by teams of independent experts. Exceptions are the 1605b and the enhanced 1605b programs running in the US where no verification is required and the compliance component of the UK Climate Change Levy (where holders of Negotiated Agreements self-declare their energy consumption and production).

The verification process

How should a verifier set about verifying these emissions? Fortunately there are already well-established management system standards for companies offering verification and certification services. Unfortunately, there are several such standards that can be applied to GHG emission verification. The UK ETS, the first GHG emission trading scheme to require independent verification, specified the use of ISO Guide 65 – "General requirements for bodies operating product certification systems". UK Accreditation Service (UKAS) collaborated with the UK Emissions Trading Group (UK ETG) to prepare "Guidance on the Application of ISO Guide 65 and EA-6/01, as related to General requirements for

bodies verifying Greenhouse Gas emissions within the UK Emissions Trading Scheme" (available from www.ukas.com). The Guidance developed by UKAS and the UK ETG was then used as the means to accredit verifiers deemed to be independent and competent to undertake the verification of GHG emissions for Participants in the UK ETS.

The UKAS Guidance embraces the view that since emissions trading is about money, someday, somewhere, a verifier will end up in court and will be required to justify how and why they reached a particular verification opinion. Consequently, great emphasis is placed on the justification for the final verification opinion (i.e. the number of emissions).

Applying these guidelines successfully results in a verification opinion that carries a high level of assurance. In other words, the verifier will have confidence in their opinion and will be prepared to state that the number is "complete and free of material error or omission" etc. The important point is that this is a strong, unequivocal and positive opinion that the verifier can and will defend, in court if necessary.

Although it was less obvious at the time that this guidance was developed (because it was for the UK ETS, which is a voluntary scheme), this high level of assurance is going to become much more important as we move into mandatory schemes with significant liabilities, penalties and value at risk. In short, this guidance document should be highly influential in the laying of ground rules for GHG emission verification.

Unfortunately, the international community has not benefited from this experience. Whether deliberately, or through a lack of understanding, trading schemes have either failed to specify a particular management system standard, or have allowed a range of standards to be applied. The EU ETS Directive and guidance does not currently specify any particular type of management system standard, whilst the CDM Executive Board invited applications for accreditation under ISO Guides 62, 65, 66 or other appropriate management system standards. The danger that we now face is that different national jurisdictions in the EU will adopt different "standards" of verification with different guidance resulting in different "levels of assurance" given in the verification opinions. This will hamper the integration of registries and cross-registry trading, and ultimately undermine the credibility GHG trading regimes. A further complication is that some Registries are not, initially at least, trading registries but rather registries or inventories. The CCAR is a voluntary non-trading registry and therefore may not require such a high level of verification. As our understanding of these issues grows, it is becoming apparent that there is a real danger that those registers will set a standard for verification that, in due course, will not be sufficient for trading purposes.

How do these different approaches impact upon the current market for verification services? Currently the verification market is relatively small and there are few, if any, opportunities for real cross-registry trading. The UK ETS is the only place where there has been a significant amount of verification and this is still a small scheme limited to 34 Direct Participants and several hundred agreement participants. There have been several preliminary verifications of PCF projects, and at least two "full-scale" verification engagements for potential CDM projects. The rest of the verification activity has been associated with voluntary projects and entries to voluntary registries. EMAS verification is currently more common but we are aware of a significant difference in the level of assurance offered under EMAS. Consequently, the process of verification is still relatively poorly understood outside one or two specific markets; but bearing in mind that all CDM projects and all participants in the EU ETS and CCAR will require periodic (annual) verification within the next few years, the size of the market will soon become substantial.

Why is a high level of assurance required?

As explained above, a high level of assurance is required because registries, regulators and the broader stakeholder community require demonstration of the credibility behind a trading regime. The importance of a high level of assurance is also becoming clearer to financial man-

agers and accountants as they start to quantify the value at risk. In financial accounting terms, allowances must be treated as assets and emissions as liabilities. As these assets are created and destroyed, they must be reported through balance sheets and profit and loss accounts, which means that the financial auditors and Chief Financial Officers must have a high level of confidence in emission inventory data. Although the links between GHG emissions, balance sheet and profit and loss accounts have yet to be widely established, the advent of trading regimes such as the EU ETS and the sheer size of the capital assets represented by, for example, EU Allowances, will very rapidly bring GHG emissions to attention of these kinds of managers. It is becoming increasingly apparent that effective management of these assets and liabilities will be based on the kind of high quality information provided by a "high level of assurance" verification opinion.

What does this mean for verifiers?

The role and responsibilities of the verifier are becoming increasingly clear. As the importance of the concept of a high level of verification becomes more widely understood, participants will seek verifiers that can demonstrate independence and competence to deliver such an opinion. It is in everyone's interests to strive for the greatest level of confidence. In particular, it is important that the verifiers themselves do not enter into a "race to the bottom" to see who can cut the most corners and deliver a verification opinion for the lowest price.
There are two mechanisms to stop this from happening. (1) Accreditation by a recognised accreditation body or notified body should ensure that sufficient time and expertise is always applied to enable the verifiers to reach a sufficiently high level of assurance and (2) within IETA, where verification companies who are members of IETA (SGS, DNV, LRQA, KPMG, PWC, TUV Sueddeutschland) regularly meet to progress their understanding of the issues associated with verification of GHG emissions.

Conclusion

Verification of GHG emissions is fundamental to the success of GHG trading and register/inventory initiatives. At the same time, GHG verification presents a real business opportunity to verification companies. In my view, these verification companies have recognised the importance of their role and are taking it seriously. A solid core of internationally renowned companies, particularly those represented within IETA, is working hard to protect the environmental credibility of emission trading schemes and to facilitate trade by ensuring that verification opinions are given with a comfortingly high level of assurance.

SGS is the world's largest inspection verification and testing organisation with offices in 140 countries. Our core function is to facilitate trade through independent inspection. SGS runs a Climate Change Program that validates projects and verifies emissions from projects and entities. SGS is committed to serving the major GHG registries and trading initiatives worldwide.

[1] The views presented in this article are those of the author and not SGS.

Regional Markets

09

Greenhouse Gas Trading in Canada

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Voluntary Greenhouse Gas Trading in Canada

Canadian companies have been among the world's most active in formulating and executing strategies to reduce greenhouse gas (GHG) emissions. Since the mid-1990s, these strategies have included efforts to explore the benefits of and increase the support for market-based policy solutions through participation in voluntary GHG trades.

Canadian companies' interest in emissions trading has been motivated in part by the recognition that Canada would likely have difficulty achieving a binding national emissions limitation without the possibility of trading. In the context of the Kyoto Protocol (KP), Canada is expected to be a large net buyer. Under most business-as-usual (BAU) emissions scenarios, it is estimated that Canada will be approximately 240 million metric tons (MMT) short of its target. Many of the Canadian companies that have engaged in voluntary trading have sought to ensure Canada's reliance on emissions trading as a means of reducing the costs associated with making up this shortfall. Other objectives that have motivated voluntary GHG trading in Canada include fulfillment of voluntary emissions reduction commitments, demonstration of environmental leadership, and learning by doing.

Many voluntary GHG trades involving Canadian companies took place in the context of pilot trading programs such as the Greenhouse Gas Emission Reduction Trading (GERT) pilot and the Pilot Emission Reduction Trading (PERT) project[1]. Both programs established rules defining tradable emission reductions (ERs) and procedures for external review of proposed trades in order to ensure their environmental integrity.

Most GHG ERs purchased by Canadian companies were generated or will be generated by projects located in North America. Through mid-2001, ERs not intended for compliance with a binding emissions limitation have traded for approximately US$.60 to $1.50 per ton of carbon dioxide equivalent (CO_2e). ERs that could potentially be used for compliance have traded for approximately US$1.65 to $3.00 per ton CO_2e. While most transactions involved outright purchases of reductions, some involved financial derivatives such as call options, which grant buyers the right, but not the obligation to purchase a specific quantity of ERs at a fixed price in the future.

Development of Canada's Domestic Emissions Trading System

Following Canada's ratification of the Kyoto Protocol, voluntary trading activity in Canada has slowed, as most companies have turned their attention to the federal government's efforts to develop a Domestic Emissions Trading (DET) system. The system would impose emissions intensity (EI) targets on 670 "large industrial emitters" (LIEs) and is a key component of the nation's domestic implementation strategy. EI targets define firms' allowable emissions as a mass quantity per unit of production. This approach differs from that of "cap-and-trade" systems, in which governments authorize an absolute quantity of emissions that does not fluctuate according to changes in production.

The DET system is designed to reduce LIEs' emissions from a business-as-usual (BAU) projection of 334 million metric tons (MMT) in 2010

to an actual figure of 279 MMT. This represents a net reduction of 55 MMT, or 16% below BAU estimates. The government has also committed not to require additional reductions from LIEs without providing some form of incentives, and to capping compliance costs at CAN$15 per ton CO_2e.

Other key features of the trading system in addition to the EI target and the price cap are being elaborated in five "non-papers" issued by the Government. Together, these will outline a draft generic framework for the LIEs' participation in the system. Industry and other stakeholders have been invited to submit comments on the non-papers that have been released to date.[2] Once this phase of the process is complete, the Government will develop more formal proposals on these subjects. The remainder of this section contains a brief description of the non-papers that have been disseminated to date.

A. Allocation and Credit for Early Action

The Government released the first non-paper on allocation of GHG targets and credit for early action during the last week of April 2003. It provided some insight into how the Government might consider competitiveness impacts and recognition for early action in the establishment of EI targets. With respect to competitiveness, the non-paper states that: (1) it should be addressed at the sector level and not at the company level; (2) it is a financial concept and will reflect a firm's ability to cost-effectively purchase compliance instruments in the market as well as make internal reductions; and (3) the Government will consider the normal useful life of facilities in determining competitive distress.

With respect to credit for early action, the government identifies potential qualifying tests. These would require firms to demonstrate that: (1) their early ERs resulted from direct company activities; (2) the investment resulted in a financial disadvantage; (3) the firm is a world leader in terms of its EI; (4) the firm achieved a minimum EI improvement from 1990 beyond business-as-usual; and (5) a visible discontinuity in its EI performance occurred. For qualifying early actors, the non-paper proposes a general framework that could be used for determining companies' compensation for their early action. Under such a framework, early actors would receive compensation for EI improvements in excess of BAU improvements. The level of improvement necessary for recognition has apparently not been decided. The non-paper also indicates that the Government may impose a cap on the level of compensation provided for early action.

B. Domestic Offsets

A second non-paper outlining the key elements of the domestic offsets system was released in early May. According to the non-paper, the domestic offsets system would be based on the principles of enhancing market liquidity, being as open as is practical, and contributing to achievement of Canada's Kyoto commitment. Under the "open as practical" approach, any project activity outside of the LIE system that conforms to eligibility criteria could create a domestic credit. The government proposes a three stage process for the creation of offsets credits: (1) *ex ante* validation, (2) *ex post* verification, and (3) certification. By validating projects *ex ante*, the Government hopes to facilitate forward transactions of offsets and improve liquidity in offsets trading. Creation of a system of domestic offsets has also been touted as a way of encouraging a "made in Canada approach" to complying with the KP's emissions limitation. The ability to purchase domestic offsets would reduce the capital expended outside of Canada for the purchase of international compliance tools. A well-designed system could also facilitate domestic innovation and technology development. However, the quantity of domestic offsets available for purchase could be adversely impacted by adoption of an arbitrary start date for crediting.

C. Covenants and Legislative Backstop

In August, the Government released a non-paper on the structure of covenants and their relationship with a legislative "backstop." Such a backstop would consist of a generic regulation that applies to LIEs that do not wish to negotiate a covenant. Under a "sectoral model with company-specific covenants," sector associations will facilitate negotiation of sectoral EI targets, which will be activity- or process-specific and

applied to each company based on a common formula. For example, if a company's activities included three different processes, it would receive allowances equal to its level of production for each activity multiplied by the EI target for that activity. Companies would either accept the targets agreed in sector-level negotiations or seek to negotiate their own target in a company-specific covenants with the Government. To date, the Government has outlined only a few circumstances that would warrant unique treatment through a company-specific negotiated covenant. In this non-paper, the Government indicated that it would consider negotiating company-specific EI targets to address issues of capital structures (i.e. capital stock turnover, timing of breakthrough technology), or to account for early action. Penalties for non-compliance with covenant obligations would be imposed. The paper anticipates that compliance will be assessed annually, and penalties could be financial in nature.

Corporate Responces

Corporations have undertaken a variety of activities to prepare for the onset of binding GHG emission limitations in 2008. These activities can be grouped into internal and external activities.

A. Internal Activities

Risk Assessment. As a first step towards understanding the potential costs of complying with an emissions limitation, many companies undertake a risk assessment. Understanding risk requires a determination of whether companies will have an emissions shortfall or surplus. This can be calculated by comparing forecasted emissions levels against hypothetical EI targets. In cases of projected shortfalls, cost exposure is assessed by multiplying the emissions shortfall and estimated GHG prices.

Evaluating Internal Emission Reduction Opportunities. Once companies understand their exposure, they begin to evaluate their opportunities for reducing emissions internally. To the extent that they possess cost-effective opportunities, companies then begin to integrate the costs associated with those opportunities into capital and operating budgets. Internal workshops may be held to identify opportunities to use new technologies, to use energy more efficiently, and then to identify and prioritize emission reduction projects. Simultaneously, accounting and reporting procedures are created and implemented to allow for timely determination of both energy usage and GHG emission per unit of output.

B. External Activities Trading and Risk Management

Though voluntary trading has slowed since the mid-1990s, Canadian companies still participate in pre-compliance GHG trades, in part to gain experience in contracting for ERs and in navigating the process of earning international approval necessary to convert ERs into compliance tools. Several departments including environment, finance, tax and accounting are often engaged in these efforts. Ultimately, companies develop overall compliance strategies by comparing their internal cost of abatement with external allowance prices and develop an optimal mix of internal actions and external purchases to comply with their emissions targets.

Carbon Funds. Corporations are also engaged in the development of private sector carbon funds that seek to acquire high quality ERs and compliance tools for participants. Investment in such activities minimizes direct company participation in the GHG market.

Policy Development. Corporations have been and currently remain actively engaged in development of domestic climate policy including the DET system. Industry trade associations play a significant role in the policy development process, though many individual companies remain active in this process. Many companies have also initiated direct dialogues with the Government.

One key point regarding the design of the DET system that has been emphasized by many corporations is the need to ensure that the system creates a market with adequate liquidity. Liquidity in emissions permit markets is important not as an end in itself, but rather because it facilitates achievement of the cost savings that make

emissions trading a desirable policy instrument. While companies generally support the EI-based design of the DET system, some commentators have noted that the effectiveness of some past and existing EI-based programs has been limited by low liquidity.[3]

Several means of ensuring adequate liquidity have been suggested. One would involve delivery of tradable GHG permits to LIEs on an up-front basis rather than at the conclusion of each compliance period, as has been done in previous EI-based programs. This would allow firms to trade the current year's permits throughout each compliance period instead of having to wait until the end of the period. This would also allow regulated firms to trade their entire allocation instead of limiting permit trading to the difference between firms' actual emissions and allowable emissions. Companies have also emphasized the need to ensure that they have access to international GHG permits and that eligibility criteria for the creation of domestic offsets not be overly restrictive.

Outlook

Throughout policy discussions leading up to the KP and later during development of the DET system, companies have emphasized the need for maximizing flexibility as a means of reducing the costs associated with binding GHG emissions limitations. Desired elements of flexibility have included reliance on international emissions trading and project-based offsets, inclusion of all six GHGs regulated under the KP in a domestic trading system, and access to domestic offsets including sinks projects, among other things. Some have also sought the flexibility to demonstrate compliance at the consolidated corporate level rather than on a facility-by-facility basis. Features of the DET system outlined to date suggest that the Government is considering these elements of cost-saving flexibility.

In coming months, details of the DET system will continue to evolve as the remaining non-papers are released and the Government considers input from stakeholders. Developments during this time will likely help to provide answers to key outstanding questions about the system's design and its relationship to other domestic policies and other trading systems. In particular, the Government has communicated that it may be a significant player in the GHG market depending upon the success of its domestic implementation plan. The magnitude of the Government's participation and associated costs are unknown.

Several other key issues are important in the functioning and structure of the domestic market. One issue identified previously is market liquidity. There appear to be several mechanisms available to policy-makers to ensure adequate liquidity. Given the gap Canada currently faces in achieving its Kyoto target, it is likely that many Canadian companies will participate in the international marketplace as well. Another key issue in system design is the magnitude of the emission reductions that will be required of Canadian firms covered under the DET, as determined by the level at which regulated entities emissions limitations are set. A debate has also arisen as to whether targets should be assigned at the facility level or at the sector level. Companies have urged that targets not penalize the use of new technology and clean energy used in the production process. We expect that once firms have greater clarity on these issues, market activity will pick up. It also remains to be seen how the Government will implement the price cap. Care must be taken to ensure that the attempt to minimize compliance costs does not have adverse impacts on the market.

Finally, a new Government will be taking power in 2004. New Governments exercise their prerogative to review important policy decisions. The new Canadian Government will likely review the status of climate policy and seek to impose their imprimatur on that policy. Private firms covered under the DET system may choose to wait until they understand the new Government's intentions before engaging in significant market activity.

Notwithstanding these outstanding questions about the details of Canada's evolving DET system, the enthusiasm with which GHG trading has been embraced by both the Government of

Canada and by many companies throughout the Canadian economy suggests that for the foreseeable future the country will maintain its broad support for market-based solutions to the threat of global climate change.

Natsource LLC is a provider of strategic advisory, brokerage, and asset and portfolio management services for energy related products in emissions permit, power, natural gas, coal, and weather hedging markets. A pioneer in energy and environmental brokerage, Natsource assists leading private firms and governments around the world in strategic management of energy and environmental risk. Natsource is headquartered in New York and has a global reach, with offices in many of the world's major financial centers.

Shell Canada Limited is one of the largest integrated petroleum companies in Canada. The Company is a major producer of natural gas, natural gas liquids and bitumen, and is one of the largest producers of sulphur in the world. It is also a leading manufacturer, distributor and marketer of refined petroleum products in Canada. The Company, with its headquarters in Calgary, employs more than 3,800 people across the country. In 2002, Shell Canada's consolidated earnings were $561 million on assets or $9,355 million.

1 www.gert.org and www.cleanaircanada.org

2 Three of the five non-papers have already been released and are discussed in the remainder of this document. These include papers on: (1) allocation and credit for early action; (2) covenants and a legislative "backstop"; and (3) a system of domestic offsets. The two papers still to be released will discuss: (4) measurement and verification; and (5) issues to consider in the implementation of a CAN$15 per ton cost cap.

3 For example, see Rosenzweig, R. and M. Varilek (2003) "Key Issues to Be Considered in the Development of Rate-Based Emission Trading Programs: Lessons Learned From Past Programs", presented at EPRI Workshop, Vancouver, April 29, 2003 www.natsource.com/uploads/features/Draft%20Discussion%20Paper%20-%20Rate-Based%20Emissions%20Trading.pdf. The paper cites two main reasons for the low liquidity seen in some EI-based trading programs. First, because the allowable quantity of emissions under such programs is dependent upon firms' level of economic output, tradable permits are typically provided after a given compliance period, when emissions performance and output levels can be determined. Consequently, during a given compliance period, firms do not possess emissions permits for that period. This makes trading difficult. Second, regulated firms may trade only the difference between their actual and allowable emissions rate, multiplied by their output. The effect of this is that the total quantity of tradable permits in existence, and thus available to be traded, is lower in such programs than in cap-and-trade programs. In the latter category of programs, firms typically receive an allocation equal to their entire amount of allowable emissions rather than just the difference between their actual and allowable emissions.

10

Role of Emissions Trading in Canada's Kyoto Climate Change Plan

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Introduction

Canada's ratification of the Kyoto Protocol is controversial, largely because of the perceived risk of high costs being imposed on Canada's economy and the resultant loss of competitiveness and trade with the non-participating United States. Keeping compliance costs down points to a significant role for emissions trading, both internationally and domestically. The Canadian government's commitment is to achieve almost 25% of its reduction targets from "large final industrial emitters" such as the upstream and downstream oil and gas industry, thermal electricity generators and the mining and manufacturing sectors. The economic concerns referred to above resulted in a plan to use sectoral caps on emissions which would be imposed on the basis of emissions intensity in order to permit production expansion and new entrants. This approach was coupled with emissions trading among capped entities and with creators of domestic "offset" reduction credits or holders of Kyoto compliance units to keep costs low. As well, a federal government commitment to provide access to GHG credits at a cost of no more than CDN $15 per tonne and to limit the contribution of the petroleum sector to a 15% reduction in emissions intensity during the first commitment period as compared to "business as usual" made the cap plan more acceptable to industry. The design of the system, including allocation of allowances, trading, offset credit production and integration with the international Kyoto system, is now underway. At the same time, Canada is not losing sight of the need to keep its options open to permit harmonization with U.S. plans as negotiations for the post-2012 period begin to be contemplated.

Role of Emissions Trading in Canada's Climate Change Plan

With the ratification of the Kyoto Protocol by Canada in December 2002, a lengthy, very public and quite rancorous debate was concluded in Canada. Canada is a country with a growing population, an expanding economy and climatic and geographic conditions that seem to require significant energy consumption. Having accepted a 6% reduction from 1990 GHG emission levels as its Kyoto Protocol first commitment period target, Canada would be one of the most challenged, if not the most challenged, developed country, assuming Russian ratification occurs. This resulted in strong resistance to Kyoto Protocol ratification by some segments of Canadian society. The Canadian federal government proposed a "Climate Change Plan" designed to achieve the 240 megatonnes of reductions against "business as usual" (BAU) levels required to achieve Canada's Kyoto cap. Emissions trading, both through the use of the Kyoto mechanisms and internally in a proposed domestic GHG emission reduction trading arrangement, took a prominent role as a way of achieving reductions on a cost-effective basis.

Voluntary Trading

Canadian companies have long been prominently involved in trading international and domestic GHG emission reductions on a voluntary basis. Through voluntary mechanisms like the Pilot Emission Reductions Trading project (PERT) and the Greenhouse Gas Emission Reduction Trading project (GERT), companies like Ontario Power Generation (OPG), Suncor and TransAlta built significant experience with emission reduction trading. Moreover, the extensive debate related to real-life projects built a body of expertise with respect to issues like verification, additionality and ownership of reductions that inform

current efforts to construct an emissions trading scheme in Canada. The key requirements that the credits be "real (a reduction in the emission rate rather than merely a reduction from a change in activity level), quantifiable (the amount of reduction could be determined and calculated in a reliable and replicable manner), surplus (resulting from activity not required by an existing regulation or otherwise committed to voluntarily), verifiable (other parties are able to audit and confirm source data), and unique (created and registered only once from a specific reduction activity at a specific time)" developed by PERT seem certain to be among the fundamentals of the Canadian system. Moreover in PERT, many of the emission reductions reviewed were "offsets", i.e. created outside of the large industrial final emitter group that would be the target of a "cap and trade" system. These offsets, including reductions achieved through fuel additives and energy demand management, demonstrated the power of the market in uncovering hidden opportunities for emission reductions. An important element of PERT's success, however, should not be overlooked and that is the key role of OPG's commitment to a challenging GHG emissions cap that provided the demand which stimulated the market forces that PERT serviced. With the advent of the Canadian government's Climate Change Plan, voluntary trading has become much less prominent as the focus is now on preparing for a legislated system. Moreover, significant doubts about credit for early action and baseline protection have surfaced and these have served to deter voluntary, pre-legislation reduction activities.

Provincial Initiative

While the Canadian government was developing its Climate Change Plan, the Province of Alberta (home to Canada's petroleum industry and the site of major planned expansions in GHG emitting oil sands processing facilities) has moved to deal with climate change on a basis which it sees as more compatible with the interest of industries and consumers in its province and elsewhere in Canada. Concerned about the US's non-participation in the Kyoto regime and the potential for loss of competitiveness for Alberta products (both oil sands petroleum, conventional oil and gas and other products), Alberta advocated the creation of a long-term commitment to achieving greenhouse gas reduction goals rather than signing on to the Kyoto goals. As well, Alberta implemented requirements for new coal-fired electricity production in that province to obtain GHG offsets to make such facilities as GHG emission efficient as natural gas state-of-the-art production facilities (Alberta is defining eligible offsets in a uniquely Alberta-centric way) and threatened (as it still does) to set up its own independent system for dealing with GHG emission reductions in Alberta. Alberta has a statute being considered by its legislature that would require reductions in GHG emissions by 2020 to 50% or less of 1990 levels but importantly this cap is measured relative to economic activity and thus is an "intensity" target; the parameter that would be measured and controlled under the proposed Alberta statute is GHG emissions relative to Alberta's Gross Domestic Product. This approach is reminiscent of the US "Clear Skies" commitment but, with the much tougher goal of a 50% reduction by 2020 (as compared to the US goal of 18% by 2012), Alberta's approach is seen by many as extremely challenging for Alberta's industry. The spectre that arises from Alberta's initiatives is the possibility of competing GHG emission reduction programs and of incompatible GHG emissions trading systems. That Alberta's legislation is drafted with a view to finding a constitutional basis for its program is an example of the legal issues that may be encountered as efforts are made to implement a climate change plan in a federal country like Canada.

A related provincial emissions trading initiative outside of the GHG area is also interesting. As part of the restructuring of its electricity sector, in 2001 the Ontario government put a regulation in place prescribing a NO_x and SO_2 emissions reduction for the dominant producer, OPG, supported by an emissions trading scheme. The regulation reflected some of the lessons from the PERT voluntary program (which dealt with emission reductions of NO_x and SO_2 as well as other gases, including GHGs) in that it mandated an emissions cap for OPG's six fossil-fuel generating facilities. The cap is intended to be expanded to cover other major

fossil fuel electricity generators in Ontario and ultimately other sectors that emit significant quantities of NO_X or SO_2. Although its history is limited, several features of the Ontario regime should be of interest to the architects of an emissions trading scheme. First, the Ontario regulations create a "cap and trade and credit" system with similarities to that being considered by the Canadian federal government (the "credits" have some similarity to the "offsets" proposed by the Climate Change Plan). Second, Ontario emitters may procure extra-jurisdictional offset credits from facilities in approximately a dozen US states that form part of the Ontario airshed. Any such experience with cross-border accreditation and fungibility would be an asset in dealing with the issues presented by the Alberta plan and/or future integration with a US system. Third, while electricity is the only sector for which the emissions reductions are mandatory, it is part of a larger multi-sectoral attempt to address NO_X and SO_2 emissions. Finally, the Ontario scheme imposes fines for non-compliance. Given the acrimony surrounding Kyoto implementation, it will be interesting to see transgressors' reactions to punitive action, especially once the Ontario regime is expanded to emitters other than OPG.

Climate Change Plan

The absence of the United States from the Kyoto regime, given the high levels of integration which exist and continue to grow between the Canadian and US economies, posed a significant concern for Canada in developing and implementing an emission reduction program. Of the overall 240 megatonnes of reductions anticipated to be required as against BAU during each of the first commitment period years, the Government of Canada acknowledged that fully 25% or 60 megatonnes would be achieved through a number of unspecified programs yet to be devised. The Government committed to buying not less than 10 megatonnes per annum under the Kyoto mechanisms, primarily the Clean Development Mechanism. The Canadian Government took the position that measures already in place in Canada prior to 2003, as well as Canada's right, achieved through hard bargaining at Marrakesh, to achieve the ability to count additional land use and land use management reductions, would achieve another 80 megatonnes. Of the remaining 90 megatonnes, Canada looks to achieve 55 megatonne of reductions from the "large industrial emitters" consisting of larger firms in the following areas: upstream and downstream oil and gas, thermal electricity generation and mining and manufacturing (pulp and paper, chemicals, iron and steel, smelting and refining, cement and lime and glass and glass container production). In the Climate Change Plan, it was stated that these 55 megatonnes would be achieved through sectoral covenants requiring, likely under a law having regulatory force, reductions in emissions, calculated on an emissions intensity basis, which would be sufficient to achieve the 55 megatonnes of reductions. The entities governed by the covenant system would be entitled to participate in a domestic emissions trading system (DET) in order to permit the achievement of reductions on the lowest cost basis. As discussions related to the DET have progressed, the focus on covenants given regulatory force through a regulation has shifted towards a regulation prescribing emission reductions for industry sectors with covenants being used to accommodate situations where less onerous requirements are appropriate because of early action or competitive factors.

A vexing question relates to allocation of emission "allowances", i.e. the right to emit GHGs in compliance with the applicable regulations. It seems likely that "grandfathering" will be broadly adopted, particularly as the intensity based "caps" are intended to permit the entry of new participants and rapid growth of existing participants in regulated sectors. However, at a political level, certain parts of Canada that have relied almost exclusively on hydroelectric power (i.e. Quebec and British Columbia) consider this unfair and may see political advantage (and ultimately economic advantage) in advocating other allocation techniques.

Offsets

To facilitate cost-effective achievement of reductions, the Canadian Climate Change Plan also contemplates the production of "offset" reduc-

tions in sectors of the economy not covered by the regulatory cap system. While the Climate Change Plan mentioned forestry, agriculture and landfill gas projects as capable of generating credits which could be acquired by emitters subject to the covenant system to facilitate their compliance, the government's plans now seem to contemplate extending the ability to generate offset credits more widely. Of considerable interest is the unwillingness (to date) of the Canadian Government to allow indirect reductions achieved through the substitution of "green" energy like hydro and wind-generated electricity to earn offsets. This seems unfortunate in light of the PERT experience and the fact that the intensity-based system adopted by Canada should facilitate giving offset credits to such power producers.

Government Assurances on Costs

Two important concessions were made by the federal government which made the Climate Change Plan more acceptable to industry, at least in the short run. Those were the use of an emissions intensity-based system for the allocation of emission allowances to entities subject to the regulatory cap system and the agreement by the federal government to make emission reduction credits available to capped industries at a cost no greater than CDN $15 per tonne. In addition, to assuage the petroleum industry, a commitment was made to require no more than a 15% reduction in intensity levels as against BAU for the petroleum industry. The CDN $15 cap on credit costs transferred the price risk of the Kyoto mechanisms and the Canadian DET/offset system not operating effectively to the Canadian government (and thus the Canadian taxpayer). The 15% reduction in intensity cap for the petroleum industry frees that sector to make the large investments it needs in the oil sands, although arguably at the risk of imposing higher costs on other industries which tend to be located in the central Canadian provinces of Ontario and Quebec. The use of the intensity-based system was designed to permit growing industries (where state of the art equipment would likely be used with low emissions per unit) to flourish. The Canadian federal government recognized and accepted the risk that the economy would for unforeseen reasons shift to more emissions-intense production, thereby jeopardizing Canada's Kyoto target in the absence of international purchases or additional government funded domestic programs.

Recently, the Canadian government provided a further assurance in a letter to the President of the Canadian Association of Petroleum Producers committing the government to negotiating longterm (i.e. past 2012) caps for major developments like the oil sands. This appears to have provided sufficient certainty for the petroleum industry to proceed with these projects without the concern of an unacceptable Kyoto cost being imposed at a later date.

Implementation

In 2003, the Canadian federal government has been moving to mature its Climate Change Plan from the sketchy outline set out in its public document issued as part of the debate in late 2002. Consultations with industries that will be part of the regulated sectors, particularly through discussions with industry associations, have been ongoing. The responsibility for creating and implementing the DET was assigned to Natural Resources Canada ("NRCan") and a capable team has been working vigorously in that area in close consultation with industry. The offset system and the targeted measures are the responsibility of Environment Canada. Following early 2003 consultations, NRCan and Environment Canada published "non-papers" with thoughts on allocation of emission reduction allowances (including some thoughts on credit for early action) and on the offset system, respectively. Environment Canada followed its "non-paper" with a Discussion Paper on the Offset System published in June 2003 and conducted a series of consultations across Canada on that paper in late June. It is anticipated that the remainder of 2003 will see strong efforts inside of Canada to flesh out that system.

One area of interest in the industry is the manner in which the Climate Change Plan will be implemented. The Canadian government anticipated the need for a domestic emissions trading system and placed a number of provi-

sions in the Canadian Environmental Protection Act, 1999 (CEPA 1999) that create federal regulatory powers relating to emissions trading. CEPA 1999 allows for the creation of a broad range of regulations regarding "tradable units" for the prevention, control or correction of international air pollution. This federal power is circumscribed to those situations in which the source of the pollution is federal (i.e. emanating from the federal government, its agents, federally regulated industries or an undertaking outside the exclusive legislative authority of the legislatures of the provinces) or where the government responsible (i.e. a provincial government) is unable to or does not act effectively. This raises interesting legal issues as to the extent to which a Canadian system promulgated based on these CEPA 1999 provisions would be effective in Alberta, assuming Alberta were to pass and implement its planned statute. It is also interesting to consider the extent to which GHG emissions would be treated as "air pollution", a term defined in CEPA 1999 to mean, among others, a substance that "endangers the health, safety or welfare of humans" or "degrades or alters, or forms part of a process of degradation or alteration of, an ecosystem to an extent that is detrimental to its use by humans, animals or plants". Should the Canadian government rely on the existing CEPA 1999 provision, we can expect the science of climate change to be an issue.

International Dimensions

International dimensions of the Climate Change Plan are largely the responsibility of the Department of Foreign Affairs and International Trade (DFAIT). DFAIT earlier established the Joint Implementation and Clean Development Mechanism office and in 2002 and 2003 strengthened the office considerably. Given Canada's likely dependence on the Kyoto mechanisms for a significant portion of the credits needed to meet its Kyoto target, this is an important agency. Canada has announced that it will not buy "hot air" credits unless there are mechanisms in place to ensure that the proceeds are expended by the selling countries to further reduce GHG emission reductions (this will not apply, however, to international purchases of credits by Canadian industry).

There is an announced intention by the Canadian government to tie the DET and offset system closely to the Kyoto unit system through making DET allowances and Canadian offset credits interchangeable with internationally tradable Kyoto units (i.e. CERs, ERUs, AAUs and RMUs), likely through a Government of Canada exchange mechanism. This commitment will be an important driver in structuring Canada's DET and offset system.

Concluding Thoughts

Canada will be extremely challenged in trying to reach its Kyoto first commitment period target. Emissions trading must be a central element if this is to be accomplished on a cost-effective basis. As well, those with their eyes on the future in Canada are more concerned about the period after 2012 where, under renegotiated Kyoto Protocol targets or otherwise, much larger reductions may be required. In that regard, it is unlikely that Canada would continue on its current course in the absence of participation by the US. Consequently, for many, developments in the US are as important as those in Canada and the encouragement of U.S. participation and the need to find on a temporary basis some ability to move credits (likely not for compliance purposes related to Kyoto but perhaps for other purposes) back and forth across the Canadian-US border are of real interest.

Davies Ward Phillips & Vineberg LLP is a leading business law firm of over 200 lawyers concentrating on our clients' most critical matters in Canada, the United States and internationally through offices in Toronto, Montreal, New York (practicing New York law) and Beijing and through an affiliated office in Paris. We manage sophisticated, complex transactions focused in select, inter-related practice areas where we can be best-in-class. One focus is on climate change transactions and policy where we act for Canadian and international GHG emitters, financial intermediaries and credit suppliers and participate in the on-going debate on the Kyoto Protocol and the implementation of GHG emission limitation and trading arrangements. We value the opportunity to be creative and measure our success by that of our clients.

11

Evolution of Climate Change policies and GHG market in Japan

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General Overview on its Economy

As we cross the threshold of the 21st century, we are compelled to stop and look back at the one we left and consider where we have been and where we are going. The seemingly limitless possibilities brought about by technological advances and economic development over the past century have gradually given way to deep concern about what this evolution is doing to our planet. Our growing awareness of the Earth's delicate ecosystems and of the finite nature of the resources it provides has become perhaps humankind's greatest achievement of all. Of course, Japan is not an exception.

From fiscal 1970 to 2002, Japan's GDP increased by 7 times to 499 trillion yen. Despite this growth, however, the prices of land, securities, and other assets collapsed during the 1990s. The end result, combined with an adjustments in consumer durables and capital stock, and decreases in consumer confidence and spending, led to the current state of economic stagnation.

Though the government launched several initiatives to turn the Japanese economy around since 1992, Japan's low (less than one percent) growth rates have left the country in the midst of an unprecedented recession, marked by chronic stagflation, and high unemployment.

And yet, despite Japan's economic malaise, national Greenhouse Gas (GHG) emissions have continued to increase every year, and present the country with the dilemma of complying with their Kyoto Protocol mandated emission reduction targets in such a way as to avoid further damage to the Japanese economy.

Greenhouse Gas Inventory

Energy consumption increased significantly with the growth of the Japanese economy during the 1960s through the first oil crisis in 1973, after which it leveled off and began to decline. During this period, many Japanese manufacturing companies also began rapidly developing the energy-conservation technology. These efforts added to Japan's already stringent energy conservation practices, established Japanese industry among the most energy efficient in the world, and left Japan with fewer options for realizing low cost reductions in their GHG emissions in the current period.

The energy use trends of the 1990s can be summarized for the different sectors as follows: Energy consumption levelled off in the industrial sector, but it significantly increased in the residential and commercial sectors. In transport, energy use has remarkably increased during the period 1990 and 1995; however, since 1995 the rate of increase has slowed.

Table 1. Sector trend of CO_2 emissions

Sector	Fiscal 1990	Fiscal 2001	
Industry	476	452	5.1%
Transportation	217	267	22.8%
Private (Office)	144	188	30.9%
Private (Household)	129	154	19.4%
Energy Conversion	82	78	5.6%
Industrial Process	57	51	11.3%
Wastes (Burned Plastic & Waste Oil)	17	25	44.7%

Note:CO2 emissions from electricity generation are allocated to each sector. Source:MOE

Japan's total greenhouse gas emissions during fiscal 2001 was 1,299 million metric tons of CO_2 equivalents (CO_2e). That is an increase of

approximately 5.2% over 1990 levels, the Kyoto base year (1990 for emission of all global warming gases CO_2, CH_4, and N_2O, and 1995 for emissions of HFCs, PFCs and SF_6). According to the Kyoto Protocol, Japan is committed to reduce 6% of GHG from 1990 level. In other words, Japan should actually cut as much as 11.2% from the level of 2000 by 2010.

Domestic Measures taken by the Government

1. New Guideline for Measures to Prevent Global Warming

For Japan to achieve its target, strenuous efforts by the government, private sector and individuals will be necessary. In March 2002, the government of Japan announced the "New Guideline for Measures to Prevent Global Warming", promoting the additional measures necessary to achieve the country's GHG emission reduction commitment as stipulated in the Kyoto Protocol, and to address the continuing increase in national emissions. The basic principles of the New Guideline and relative information are as follows:

Basic Principles

- Balance between Environment and Economy: Japan will prepare and establish mechanisms that contribute to the balance between the environment and the economy by fostering technological innovation and creative initiatives in business circles, in order to link the efforts to prevent global warming to economic revitalization and employment creation.
- Step-by-Step Approach: Japan will undertake assessment and review of the progress of measures being taken at regular intervals (in 2004, 2007), and take necessary measures step-by-step.
- Promotion of Combined Effort by All Sectors of Society: It will by no means be easy to achieve the targets of the Kyoto Protocol, thus it is essential that all entities, from national government to local governments, businesses to the people, join forces with all their might and in their respective roles to achieve the goals. From this viewpoint, Japan will continue to promote voluntary initiatives of businesses and at the same time strongly advance the measures particularly in the residential and commercial sectors and transportation sector.
- Ensuring International Cooperation for Measures to Prevent Global Warming: Japan will continue to make the utmost effort to establish a common regime in which all countries, including the United States and developing countries, will participate.

Table 2: Approximate Target for each type of Greenhouse Gas and other categories to achieve the 6% target

CO_2 emissions from energy sources	±0.0%
CO_2 emissions from non-energy sources, methane, dinitrogen monoxide	^0.5%
Innovative technological development and further promotion of activities to prevent global warming undertaken by Japanese people from all sectors of society	^2.0%
Three Gases including Alternatives for Fluorocarbon (HFC, PFC, SF6)	+2.0%
Securing Sequestration	^3.9%
Others (Government did not disclose details but commonly understood that usage of the Kyoto Mechanism by the government would be considered)	^1.6%

2. Trials by METI & MOE

In Japan, 5 public ministries are involved in policy making of national emission reductions METI (Ministry of Economy Trade and Industry) and MOE (Ministry of Environment) lead the initiative.

METI will start an experimental use of a national registry, using project-based domestic emission reductions from this year. Its aim is to support industrial circles' effort to alleviate their GHG emissions, to improve the inventory and to develop the Japanese OE.

On the other hand, MOE has designed an emission trading model simulation with 30 companies. The objective of this trial is to use the inventory and the system, and to become accustomed to their use. Unlike METI, MOE will adopt a Cap-and-Trade model.

The result of these trials may be of great importance in deciding further domestic measures.

Initiatives by the Private Sector

1. General Overview
For Japanese private sector companies, there is an increased awareness that the emissions of GHGs create a load on the environment and, therefore, is a future liability. The extent of the problem and long-term impact are unknown because the emission amount itself is unknown. The idea is taking root that those who have achieved reductions, or used sequestration to establish a defense against global warming, recognize these as assets, and those who produce emissions over a certain amount have liabilities.

But the task at hand is an exercise in risk management to control the assets and liabilities and consequently, to control cash flow. The point of risk management for individual countries or companies is to start enforcing what are considered anti-risk measures, as soon as such risks are identified. This should be done at the stage of seeking low cost answers, rather than waiting for the compliance period.

2. Movements by Keidanren
In July of 1996, Keidanren (Japan Business Federation) published its Appeal on the Environment, which sought to encourage industrial circles to deal with environmental challenges more concretely through measures to counteract global warming and by creating a recycle-based society. In addition, Keidanren issued a call to the Japanese business community to organize Keidanren Voluntary Action Plan on the Environment based on the Appeal.

Today 34 industries participate in the Voluntary Action Plan on the Environment. These industries emitted 500million t-CO_2 in fiscal 1990, equivalent to around 45% of the 1122 million t-CO_2 emitted by Japan as a whole during that year. Moreover, the emissions of the 34 industries represented approximately 93% of the total amount of CO_2 emitted by the country's industrial and energy-converting sectors in fiscal 1990 (558 million t-CO_2). Keidanren has declared that it is "to endeavor to reduce CO_2 emissions from the industrial and energy-converting sectors in fiscal 2010 to below the levels of fiscal 1990," and industries and companies are striving to achieve this target. Results of the 5th Follow-up indicate that CO_2 emissions in fiscal 2001 were 484 million t-CO_2, a 3.2% decrease compared to fiscal 1990.

According to results in the current follow-up, CO_2 emissions in fiscal 2005 will be 509 million t-CO_2 (approximately 1.8% higher than in fiscal 1990); on a business-as-usual basis, CO_2 emissions in fiscal 2010 will increase to 542 million t-CO_2 (+8.4% compared to fiscal 1990).

3. Utilization of the Kyoto Mechanism
Recently, many companies are concerned about GHG emissions and they take various kinds of voluntary measures, though Japan doesn't have any regulatory frameworks yet. Resource and energy-intensive industries have high CO_2 emissions and, therefore, take the Kyoto Protocol as a future risk. Some of them even show concern about the Kyoto Protocol and, moreover, these industries are the main players of Keidanren.

Meanwhile, trading companies, engineering companies and plant manufactures take it as a business chance in general. They proactively join emission mitigation projects and some actually obtained CO_2 credits created through GHG mitigation projects. They are steadily preparing for the Kyoto Protocol.

On the other hand, industries with relatively less emission are just watching how this issue will develop.

Utilization of the Kyoto Mechanism is a key for individual countries and companies. Some companies are getting to recognize as Table 3 lists activities from Japanese companies.

Table 3 below lists activities of Japanese companies.

Table 3: Recent Utilization of the Kyoto Mechanism in Japan

Actor	Description	Date
Six power companies, two trading companies, Japan Bank for International Cooperation (JBIC)	Participation in World Bank Prototype Carbon Fund (PCF)	January, 2000
Chubu Electric and Tomen	Purchase of Australian emission reduction	March, 2001
Cosmo Oil	Purchase of sequestration rights call option from Australian forestry	June, 2001
Tohoku Electric	Press release: purchase of 'Carbon neutral' coal with emission reduction	October, 2001
Hitachi	Press release: introduction of internal emission trading scheme	December, 2001
Shikoku Electric	Purchase of emission reduction from DuPont Canada	January, 2002
Mitsubishi Corporation	Purchase of UK allowances from Shell	June, 2002
Mitsubishi Corporation	Purchase of emission reduction from Hidroelectrica Guardia Vieja (Chile)	June, 2002
Toyota Tsusho Corporation	Purchase of emission reduction from iron project	
In Brazil	October, 2002	
Aichi EXPO Mitsubishi Pavilion	Purchase of emission reduction from Conservation International to offset their CO_2 emissions during construction and operation at AICHI EXPO	May, 2003
Daiwa Securities SMBC, Idemitsu Kosan, Nippon Oil, Okinawa Electric	Participation in World Bank Community Development Fund (CDCF)	July, 2003

To put some examples more clearly in perspective:

- Toyota Tsusho Corporation has a project called 'Production of Fire Wood Charcoal and Charcoal for Pig Iron Production in Brazil'. This project will generate CDM credits from carbon sequestration and fuel switch. Carbon sequestration results from plantations of eucalyptus, the wood being a source for charcoal in Pig-Iron production. Charcoal releases less CO_2 into the atmosphere than coal.
- Mitsubishi Corporation has agreed to purchase CO_2 emissions credits from a small hydro-power generation project, in Chacabuquito, Chile, one of the earliest projects supported by the PCF.

Next Steps

As mentioned before in this report, the Japanese government had announced that it will follow a step-by-step approach, and it is expected that the government will introduce further regulatory measures in the beginning of the year 2005 to curve the actual increase of 5.2% over 1990 GHG emissions level. What will then happen in Japan, could follow one of the following three scenarios.

- Case 1: Introduction of "environmental tax" or "carbon tax"
- Case 2: Emission regulation on each industrial group
- Case 3: Emission regulation on each company

It will be possible that the government will use a policy mix of the above cases. In this context, the Japanese private sector may be further inclined to use the Kyoto Mechanisms, especially CDM/JI in order to be internationally competitive and to be friendly with the earth.

Natsource Japan was established in a joint initiative by Natsource LLC, Tokyo Tanshi, and Mitsubishi Corporation. Shortly afterwards, it increased its capital by undertaking of 11 other leading companies from the energy sector, commercial sector and financial sector. With its international network and expertise in global climate change and related issues, Natsource Japan provides solutions to companies and governmental bodies in the field of energy and environment, fortified by its financial and technical skill, to be internationally competitive and also to be friendly with the earth.

12

The EU Emission Trading Scheme: Allocating Carbon Liabilities

Anthony Hobley, Peter Hawkes & Anna McCann
Baker & McKenzie

Whatever your views on climate change or the Kyoto Protocol, if your business operates in Europe, it must prepare now for the impact (direct or indirect) of the European Union Community-wide Greenhouse Gas (GHG) Emission Allowance Trading Scheme (EU ETS). Forward looking companies such as BP, Dupont, Lafarge, Nuon, Tractebel and Shell, amongst others, have made climate change an important business issue for some time. Now, however, mainstream European industry, including multinational companies with European interests, must quickly adapt and prepare for a carbon constrained future.

The EU ETS is expected to eventually cover maybe as many as 17,000 installations in 28 European countries (including the current 15 EU Member States, Switzerland, Norway, Liechtenstein and the 10 accession countries) and will be the world's first multi-national emissions allowance trading scheme for major carbon dioxide (CO_2) emitters. Some experts estimate that the market will create carbon assets and liabilities worth many billions of euros. The sheer scale of the EU ETS may result in it becoming the foundation of international emissions trading to which other countries, including, potentially, Canada, Japan, even Australia and the US, will subscribe.

It is estimated that the EU ETS will cover approximately 46% of CO_2 emissions in the EU and, whilst the scheme is just one of a range of measures the EU is adopting as part of a wider European Climate Change Programme (ECCP), it is considered key to the EU being able to cut emissions of the six GHGs by an average of 8% below 1990 levels between 2008 and 2012 in order to meet its commitment under the Kyoto Protocol.

The EU ETS - How does it work?

The Directive[1] establishing the EU ETS entered into force on October 13,2003. It is designed to reduce emissions of CO_2 from installations involved in (1) energy activities[2] ; (2) the production and processing of ferrous metals; (3) the mineral industry (e.g. cement, glass or ceramic production); and (4) pulp, paper or board production. Each operator of an installation carrying out one or more of the activities above the relevant thresholds will be required to hold a site-specific and non-transferable GHG Permit. The GHG Permit will require the operator to hold EU Allowances in its compliance account in the Member State's registry at the end of each calendar year at least equal to the actual GHG emissions monitored, reported and verified from that installation during that calendar year.

Failure will result in heavy penalties: EUR40 in the first period (2005-2007) rising to EUR100 in the second period (2008-2012) for each tonne of CO_2 equivalent by which an installation exceeds the number of Allowances it holds. Moreover, these penalties do not constitute a buy-out price as operators will need to obtain additional Allowances in the following year to rectify their shortfall.

The Allocation Process

The allocation process is extremely important to operators in the EU ETS as it determines the baseline of their carbon liabilities. National Governments are in the process of developing their National Allocation Plans and are at varying degrees of readiness. The timeline for implementation of the EU ETS Directive is extremely

tight. Member States must implement the Directive by 31 December 2003, a Directive which was only adopted in July, barely 18 months after the scheme was proposed by the EU in a green paper. This unprecedented timetable will make it extremely difficult for Governments to implement the Directive in a timely and considered fashion. In addition, they have the added pressure of drawing up the Plans by March 2004 for the first phase of the scheme (2005-2007), a highly political, technical and complex process. This tight timetable may cause the incomplete or imperfect implementation of the Directive, which could create fertile ground for litigation challenging either the implementation of the Directive or, more likely, the distribution of allowances in the National Allocation Plans.

The Commission has promised to make allocation criteria available by December 2003 which Member States can follow in drawing up their individual Plans. While the Commission retains a right of veto over the Plans, there may be substantial differences between the allocation mechanisms adopted by each Member State, which could lead to discrepancies in the way similar industries are treated across the EU. For example, for the first phase it may not be necessary for Member States to require an overall emission reduction and some Member States may opt for a static level of emissions. One can envisage operators of installations within the Scheme being unhappy at the allocation that they receive either in absolute terms, or relative to others. These real or perceived inequalities may lead to legal action.

The Commission may take action against a Member State for failing to implement the Directive properly or at all. If an allocation amounts to State Aid (i.e. a Member State effectively affords an unfair economic or other advantage to a national, thereby distorting competition between Member States), an action can be brought under the State Aid rules. In certain jurisdictions, individuals or corporations may attempt to challenge the constitutionality of the implementing legislation, on the basis that it affects their fundamental rights. They may also bring administrative proceedings before their domestic courts against the competent authority if they believe it acted unreasonably or ultra vires when awarding the allocations, or did not adopt a fair procedure. These potential claims may delay the timing of the scheme which is due to start on 1 January 2005.

However, we have spoken to some large companies that will be subject to the EU ETS and many made it clear they would not consider such legal action or would only take such action reluctantly if there had been clear breaches of competition or state aid rules giving their competitors a clear advantage.

Pitfalls for the Allocation Process

Whilst leaving responsibility for the allocation process to individual Member States was one of a number of political master strokes by the Commission which helped the Directive to be approved in an almost unprecedented timescale, it does give rise to some potential problems. These problems could arise from different approaches by Member States to issues such as banking, new entrants and closure.

If one Member State allows unlimited banking from the first period to the second, it may find its Registry flooded with banked allowances from operators in other Member States which do not allow banking or limit banking in some way. Another problem will arise when formulating the National Allocation Plan for the second period. If banking is unlimited, Member States will not know how many allowances are likely to be banked at the time the Plan is due in mid-2006. In our view, the issue of closure and new entrants is closely linked. For example, if the UK government allow operators to keep allowances on closure of an installation, and the Polish government offers new entrants free allocation then a company could (in theory) close down its production in the UK (keeping the allowances) and move production to a new plant in Poland, thereby receiving double allocation for the same emissions. Time will tell whether this is likely, or indeed possible, in practice.

Many Member States are clearly alive to these issues and in informal meetings are discussing

the possibility of coming up with a co-ordinated approach. The certainty which such harmonisation would provide is likely to be welcomed by the market.

Legal nature of Allowances

There appears to be a clear consensus from many of the companies we spoke to that harmonisation across the EU of the legal nature of Allowances and the consequential tax and regulatory treatment would help the market function more efficiently. One company with experience in trading in the "green markets" stated that different VAT treatment across Member States had created considerable market distortions. A number of companies said these issues could be managed, but would add significantly to the administrative costs of trading which could make use of the market a less attractive option. Again, we are aware that this is an issue of concern to a number of Member States who are in informal discussions on whether they should consider taking a co-ordinated approach.

What is happening now?

Many companies are already lobbying relevant Member State Governments both as part of and separate from formal consultation processes about their likely allocation under the National Allocation Plan. This is the critical moment in which industry can attempt to influence the allocation they are likely to receive. Once the Plans are published, operators must work with what they are given or take legal action if they feel they have been unfairly treated.

There are a number of other decisions that must be made by operators, particularly companies with installations across a number of Member States, before trading begins in 2005. How will the company manage its obligations? Will there be a central management function or will the liabilities be managed on an installation level? The company should also address who retains 'ownership' of any emission reductions that are achieved by specific installations. Some companies we have spoken to have screened, or are in the process of screening, all relevant contracts to assess where ownership of such rights lies. One major energy company was of the view that this was only likely to be an issue for the joint ventures they are involved in.

Perhaps the most important question is how will companies meet their obligations where emission reductions are required? Some companies are already working to reduce their emissions through internal efficiencies or external programmes such as the WWF CO_2 reduction commitment. Others have purchased, or put aside the funds to purchase, the right to Allowances or credits from future projects. Some companies are preparing to do this by investing directly in CDM or JI projects. For example, one major European energy group has entered into inter-group emissions reduction purchase agreements in relation to CDM projects as a "learning by doing" exercise. Other companies are looking to institutions such as the World Bank and CDC IXIS who are providing funds through which CERs or ERUs can be purchased from a broad portfolio of projects thereby spreading the risk of any individual projects failing. Investment in renewable energies is emerging as a leading method for meeting carbon obligations. The Commission is currently proposing an amendment to the EU ETS Directive to allow operators to effectively use credits generated by Joint Implementation (JI) and Clean Development Mechanism (CDM) projects towards satisfying their obligations under the Directive. The linking of Kyoto projects to the EU ETS, particularly recognition of CERs, will be key in driving global demand for project-based credits and is likely to have a large impact on the renewable energy investment market.

A large number of contracts have already been awarded for a wide range of renewable energy projects under the Dutch ERUPT (for JI projects) and CERUPT (for CDM projects) programmes. Many other countries around the world are developing similar and sometimes different ways of investing in renewable energies as a result of the development of carbon markets.

In addition to these public funds, there has been a great deal of activity in the private sector surrounding the development of funds or other

financial mechanisms for investing in renewable energies. Organisations such as Swiss Re, Allianz, Bank Sarasin, Rabobank and Henderson Global are all backing renewable energies with their investment power. Many of the investment banks, private equity houses and asset management firms[3] have prominent specialist environment or energy funds for investment in renewable energies. These developments are driven in a large part by the evolution of the carbon markets and the need to offset any of the associated potential carbon liabilities. At the same time it can also be said that investment has partly been driven by the opportunities presented by these new carbon markets in that any 'credits' generated represent an 'added value' to the project because they will have value in a carbon market.

Conclusion

The creation of the EU ETS creates potentially enormous carbon liabilities depending on the price for allowances and the corresponding costs of achieving emissions reductions. In practice their will be both winners and losers resulting from the national allocation processes in each Member State. Certainly, emitting carbon dioxide and other greenhouse gases will no longer be free. Costs to reduce GHG emissions and/or purchase EU allowances or credits will be significant for many companies and must be accounted for on balance sheets although exactly what methods are used to do this has yet to be determined. Mainstream European industry, including multi-national companies with European interests, must quickly adapt and prepare for a carbon constrained future. Carbon liabilities are real now.

Baker & McKenzie's Global Clean Energy and Climate Change Practice Group advises on all aspects of renewable energy and climate change. The Firm's global team combines general commercial and energy law expertise with that in project finance, major projects, environmental, construction, taxation, international trade and public international law.
The authors are Associates in Baker & McKenzie's London Office and are part of the firm's Environmental Law Group and Global Clean Energy and Climate Change Practice Group. Baker & McKenzie is a global law firm with 67 offices worldwide including 27 European offices.

1 Directive 2003/87/EC of the European Parliament and of the council.

2 eg. power generation, oil refining, etc.

3 Including Merrill Lynch, Impax, ISIS, SAM and Accrued Equities, Charterhouse Development Capital and HG Capital.

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EU emission trading scheme, will the current state of affairs in the development of national registries lead to fiercesome competition?

Remain Fremont
CDC IXIS

The adoption of the Directive proposal on the emissions trading scheme in July 2003 by both the European Council and the Parliament places GHG emissions trading within a regulatory framework. This adoption now ensures that an emissions trading scheme will exist in Europe from 2005 onwards whatever happens to Kyoto. However, before European companies can settle trades, Member States, have to implement national registries.

The role of a national registry is to track transactions among participants and ensure the accurate accounting of allowances and Kyoto units. Integrity of the tracking system, by means of the system of national registries, is vital to the effective functioning of the emissions trading market. Irregularities and fraud would endanger the environmental integrity of the scheme.

Not only Member States but also the Commission now face a tight schedule to set up their registries before January 2005, starting date of the scheme. If the regulation on registries is adopted early 2004 as scheduled, Member States will have less than a year to develop their systems, test them with the other systems and put in place the necessary operating and maintenance teams. Moreover, Member States will have to nominate a competent au-thority to monitor the whole process, draft the transposition laws and put in place a back-office team to manage the national registry system.

The Commission faces the same deadlines and has recently launched a call for tender for the building of the Community Registry and the Community Independent Transaction Log (CITL). Bearing in mind the Commission's procurement process, it is doubtful that the chosen contractor could starts its mission before the end of 2003.

Despite some remaining uncertainties, it seems that very few countries have started developing their national registry. Except France and the UK, no other Member State has publicly announced its desire to develop its own registry to be ready by the end of 2004. The UK, benefiting from experience gained with its existing UK ETS domestic registry, is building a registry to be compliant with the Directive and Kyoto requirements, whereas France is building a registry based on existing financial securities systems. This state of affairs leads us to think that what is called the European Emissions Trading Scheme may actually rely on very few entities: two or three national registries, the Community registry and the CITL with hosting of other Member States registries in a consolidated system with one or more of the above registries as foreseen under the Directive.
On the other hand, for other Member States, anxious to maintain their independence and eager to manage their own registries, strategies remain open. While some Member States may want to run their registries in a consolidated system, others may want to accelerate their developments to be ready by 2005.

Technically speaking, it is feasible to host several countries' registries on a single system, as long as enough firewalls are put into place to ensure confidentiality of data between registries and the hardware has sufficient capacity to avoid system overload. Likewise, nothing prevents Competent Authorities from supervising their national registries via a secured web access, whatever the location of the machines may be. Economic rationale could therefore suggest that all national registries be located in a country such as India, where manpower costs are lower than in Europe.

There is however the political aspect to consider. Registries are a tool for Member States to manage their national emission reduction schemes and the information contained on these registries is commercially sensitive as allowances and Kyoto units will have a monetary value. Confidentiality of information held on a consolidated scheme should not be a concern as explained above. However, there is always the cosmetic aspect to consider no matter how ill-founded.

EU countries, including the accession countries, have very little time to implement the right strategy in a market which is, for the time being, "oligopolistic". An *Oligopoly* exists when there are a small number of firms selling in a single market. The usual reason for this situation is that the optimal size of firm, i.e. the size at which average cost is minimized, is so large that there is only room for few such firms. This applies to the case of national registries: Very few large countries have an interest in developing their own registries at a high cost. One can therefore identify at least three major factors explaining this market status:

Subject and timeline: The subject of Kyoto and the Marrakech Accords is still a new and complicated subject. Considering the distant deadlines put forth by Kyoto, few governments considered there was a pressing need to think about the concrete implementation of Kyoto tools such as a GHG registry.

Uncertain environment: Up until quite recently there were still some doubts as to whether the European Directive would see the light of day and of course this sentiment is still prevalent concerning Kyoto for non-Member States.

Cost level: Building a fully compliant registry is expensive and small member states with only a few installations find it hard to justify building their own registry, let alone having the budget resources available.

This market structure will probably lead to fierce competition between a few registries if less than five countries have set up their own registry by the end of 2004. To attract potential "clients", including both Member States and companies, national registries will have to display an effective marketing strategy. Several Member States may, however, decide to work together to offer a joint product reducing the political concerns. The marketing arguments national registries may use when competing will encompass:

Price: Price is always a decisive argument in attracting customers. As regards, national registries, a fee could be charged on the opening of accounts, the management of accounts, custody rights or even per transaction. It is likely that companies open their trading accounts and carry-out most of their transactions wherever it is the cheapest, and only repatriate their holdings into their compliance accounts at the end of the compliance period (before March 31st of each year). As for Member States, the emphasis will probably not so much be put on transactions as on hosting and management lump-sum contracts, let alone the development costs to translate the web interface into the various national languages apart from English which will be the language of communication between registries and the Community Independent Transaction Log.

Taxation: Taxation levels may be an issue for companies operating in different Member States. Whether Member States choose to tax transfers (VAT treatment) or gains on holdings directly (capital gains tax), taxation levels will determine the inflows and outflows of allowances and Kyoto units. If Member States with lower tax levels host national registries, one can envisage companies transferring all their holdings there for their trading activities and repatriating a sufficient number of allowances to the national registry where their compliance account is opened to cover their emissions in their domestic jurisdiction.

Quality of Services: The level of services to be provided by national registries will undoubtedly constitute a major argument. Ease of use and options available will help differentiate national registries. National registries will have to be user-friendly, limit recourse to red-tape (applica-

tion forms for opening an account), offer options for companies to easily manage their accounts and installations, and keep delays to a minimum. For Member States, factors that will be taken into account are:-ensuring that a web interface is available in the national language, ease of access and generation of key reports, and ensuring that the national competent authority can retain control over their own accounts in the registry.

Security: Considering that quotas and credits can be assimilated to financial assets, with a real market value, security over their registration is essential to the effective functioning of the system. For companies, it means secured access to their accounts and the impossibility for competitors to view their holdings (except in the case of a trustee of course). For Member States, it means the impossibility for the country in which the servers are hosted to view and access hosted Member State's accounts. Likewise when servers share governmental functions, the hosting country has to ensure that access from outside does not threaten security of the whole system.

Whatever the arguments used by private or public entities to market their national registries, timing is probably going to be the main factor for choosing a national registry with which to consolidate its system. Considering the time needed to develop and test a fully compliant registry, fulfilling all the Directive's and Kyoto's requirements, and the tight schedule ahead, the saying "first come, first served" may be a sensible one to use here. Those registries which are first in place (and fully developed) are more likely to be those hosting the other Member States' national registries. Other strategies could be implemented in such a market structure, and one can easily envisage a different outcome, such as the formation of joint ventures or even mergers. As the businessman Warren Buffet once said: "In the business world, the rearview mirror is always clearer than the windshield."

CDC IXIS, investment bank and asset manager, is a subsidiary of the Caisse des dépôts et consignations and the Caisses d'Epargne. Working on the subject of national registries since 1999, CDC IXIS is in charge of developing the French national registry and is the leader of a consortium advising the European Commission in drafting the future regulation on the registries system.

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The French way

Patrick Nollet
Entreprises pour l'Environnement

In order to understand the current situation in France, it is necessary to recall a few elements of the special context of this country relating to its GHG emissions.

Because of its vigorous efforts in energy savings after the first oil crisis (in the 70's), and, mostly because of its large investment in nuclear energy (75 to 80% of electricity generating capacity) and hydroelectricity (10 – 15% of electricity generating capacity) France is one of the lowest emitters of GHG among the developed countries (6.5tCO_2eq/hab, against 10,77 in Germany and 20,5 in the USA). This has been consequently translated into a 0% target for emissions in 2010 compared to 1990 set inside the European Union burden sharing agreement between EU member states to achieve globally 8% reduction of GHG in 2010 compared to 1990.

Two additional factors have restrained the French government from being one of the leaders in the climate change international debate:

- a relatively limited position in the fossil fuel production market
- the archaic reluctance from 1997 to the end of 2001 of the Green minister of environment towards anything that would bear any relation to market mechanisms.

Consequently it is the French industries, acting inside "Entreprises pour l'Environnement" (EpE), which have constantly made proposals and tried to push the French administration into action. With the dynamic development of the EU Emission Trading Scheme (EU ETS) and the evidence of action by its European partners (UK, Netherlands, Germany), the message finally got through at the beginning of 2002, leading to the present situation.

Regarding the project mechanisms Joint Implementation (JI), and Clean Development Mechanisms(CDM)), it is only recently that the French administration has been preparing the necessary guidelines for French companies to participate in these projects because, previously, the theory was that France would not require any reductions from abroad. Nonetheless, French industries have participated in some AIJ projects and some companies, like Gaz de France and SUEZ, are active members of the Prototype Carbon Fund.

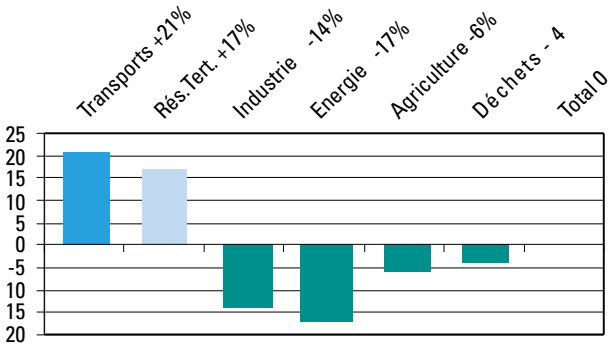
There is a great disappointment at the fact that the directive amendment proposal for linking projects to the EU ETS in fact excludes JI projects for the 10 countries accessing the EU in 2004, and that the bureaucracy designed by the CDM executive board (CDM EB) for projects seems designed to stifle it.

Figure 1: French government climate change Action Plan January 2000, 6 gases, in MtCeq

	199		2(		2010/19		
			Reference scenario		Target		
	MtCeq	%	MtCeq	%	MtCeq	%	
Industry	37,73	25,9	30,55	19,1	27,13	18,9	- 28
Transport	32,71	22,4	43,4	27,2	39,4	27,5	+ 20,5
Buildings	26,3	18,0	28,4	17,8	25,74	17,9	- 2
Agriculture and Forests	28,21	19,3	28,76	18	28,01	19,5	- 1
Wastes	3,20	2,2	4,2	2,6	3,1	2,15	- 3
Energy production	17,68	12,1	20,87	13,1	18,24	12,7	+ 3
Refrigeration gases			3,4	2,1	1,95	1,35	
Climate correction	– 2,36						
	143,47		**159,58**		**143,57**		

The 2001 situation as recently reported is described in Figure 2.

Figure 2: Evolution of French GHG in 2001 compared to 1990



French GHG emissions in 2001 compared to 1990 show clearly that the real problems facing the French Climate Change Action Plan concern the transport and the Tertiary/housing sectors, while industry has already done most of its part in the national effort. The French climate action plan is being revised and should be made public in November 2003.

Meanwhile, and after detailed consultation with the new government, French manufacturing and energy industries have established a new organisation, "AERES" (Association of companies for the reduction of GHG), managed by EpE. Its objective is to examine, approve and register voluntary GHG emissions projections (including all 6 Kyoto gases) for the years 2003–2004 and 2005–2007 together with the possibility of trading emissions between partners and a 10€/tCO_2eq penalty for non compliance.

Starting in October 2002 with 20 companies, this system now includes 37 companies of which 24 have already seen their individual emission commitments examined by a consultative committee with independent experts and administration observers.

Together they represent around 2/3 of the manufacturing sector and 80 to 90 % of the energy sector. These commitments were presented to the government on July 10, 2003 (Ministers of Environment and of Industry) who stated that the government would take these voluntary commitments into account in establishing its national climate action and national allocation plan under the EU ETS (to be reported to the European commission in March 31, 2004).

How much the government will be able to take into account these purely voluntary commitments for the establishment of the national allocation plan under the strict rules of the European Emission Trading Directive remains to be seen. The problem will be made particularly difficult by the fact that some of the main reductions in the manufacturing industry come from chemicals (N_2O) and Aluminium (CF_4) which are now very foolishly excluded from the first period of the EU ETS. Moreover, French industries have been quite energy efficient and the new requirements for sulphur reductions in car fuels will increase dramatically refineries emissions.

French industries have no doubt about the necessity of a very important effort in Research and development, innovation and investment to participate in the Climate Change battle but are very worried by the potential loss of competitiveness compared to heavy manufacturing from countries without the same constraints. With the probable exceptions of energy industries (EDF, Gaz de France, TOTAL, SUEZ- Electrabel, el.) who view trading more as a compliance tool than for profit. The financial sector is following all these actions carefully but has not taken a leader role up to now.

Entreprises pour l'Environnement regroups 45 large multinational companies operating in France. Most industrial sectors (chemicals, car manufacturing, steel, aluminium, cement, oil, nuclear, electricity, gas, glass .) and services (banking, auditing, insurance, airline, airport .) constitute the membership of this association. Together they work inside commissions to study the different issues of sustainable development, exchange their experiences, conduct dialogue with other stakeholders and finally define and advocate possible solutions to handle the problem in a most efficient and sustainable way.

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The Nordic Countries

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Introduction

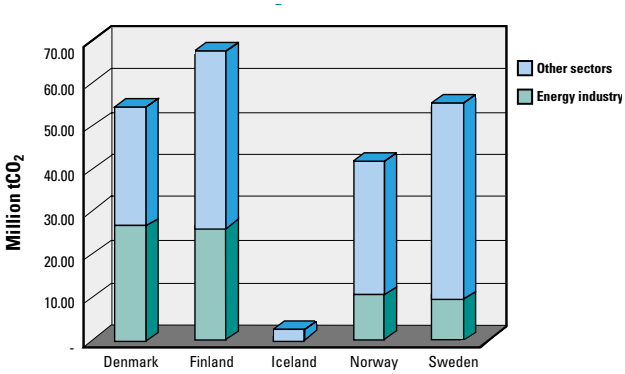
The Nordic Countries

The Nordic countries include Denmark, Finland, Iceland, Norway and Sweden totaling about 24 million inhabitants. The five Nordic countries share many common features but are also distinct in several respects. Denmark, Finland and Sweden are members of the European Community, whereas Norway and Iceland are not. In Iceland, Norway and Sweden, power production is mainly based on hydropower whereas Denmark and Finland rely predominantly on thermal plants. Finland and Sweden also have nuclear power. Denmark has implemented a national emissions trading scheme already in 2001 and Sweden has started an obligatory system for renewable electricity certificates.

The total greenhouse gas emissions from the Nordic countries in 2001 were approximately 280 million tonnes excluding land use changes and forestry. This represents some 6.7% of the combined emissions of the European Community, Norway and Iceland. Emissions are highest in Finland and lowest in Iceland, whose emissions were less than 3 million tonnes in 2001.

CO_2 emissions make up around 80% of the total greenhouse gas emissions in all the Nordic countries. Energy industries account for on average about one third of the total CO_2 emissions with the highest shares in Denmark and Finland. Iceland is a remarkable exception with high proportions of geothermal energy and hydropower.

Figure 1: CO_2 emissions in Nordic countries in 2001 Emissions are divided in energy industries and other sectors



Note: Figures are compiled from the national GHG inventories and do not take into account the impact of land-use change and forestry (including energy use in transport and other non-energy industries).

Nordic Electricity Market

One important feature in Nordic countries is its common electricity market. The Nordic electricity market is a common integrated system comprising all the Nordic countries (with the exception of Iceland).

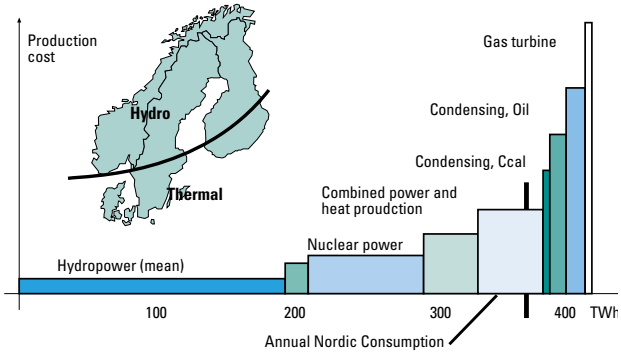
The development of a common Nordic electricity market began with the Norwegian electricity sector reform in 1991. The Finnish Electricity Market Act came into force in 1995 and, in 1996, the Swedish electricity market was reformed. The Danish electricity market has been gradually liberalised since 1999 and beginning in 2003 all consumers are free to choose their electricity supplier. The last cross-border tariffs across the Nordic countries were removed in March 2002 when Sweden abolished the border tariffs between Sweden and Denmark.

In 1996, Norway and Sweden set up a common market for electricity and the Nordic Power

Exchange (later renamed as Nord Pool) was established. Finland joined Nord Pool in 1997 and Denmark in 1999-2000. All the four countries now have access to a common Nordic wholesale power market. Nord Pool is the world's first international commodity exchange for electrical power. Nord Pool organises trade in standardised physical and financial power contracts including clearing services to Nordic participants. Nord Pool plays a key role as part of the infrastructure of the Nordic electricity power market providing public price information on electricity.[1]

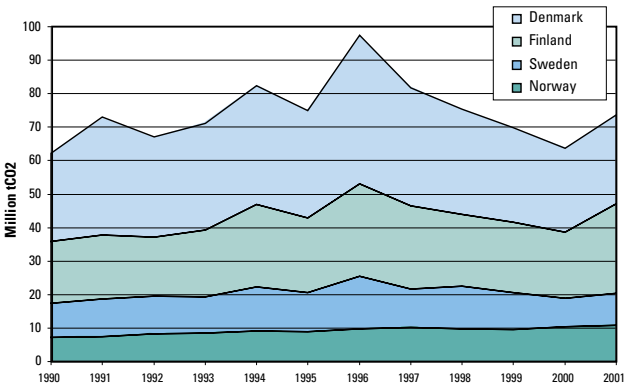
CO_2 emissions vary greatly from year to year due to intensive international trading, varying economic growth and weather conditions,as well as electricity exports and imports in the Nordic countries. This has important implications regarding emissions trading. In addition, the EU emissions trading scheme will change the pattern of Nordic electricity production. According to a study by Electrowatt-Ekono Oy for the Finnish Ministry of Trade and Industry, the emissions trading scheme seems to increase marginal prices by €4-16/MWh (depending mainly on the allowance price level €5-20/tCO_2) compaired to the baseline scenario in a normal year. This is due to the fact that in normal hydrologic years, coal-fired power plants operate at the margin, typically setting wholesale market prices.

Figure 2: Power production in the Nordic countries



Note: The region can be roughly divided in hydropower area in the north and thermal power area in the south. In normal years, coal-fired power plants operate at the margin. This implies that the emission allowance price will be transferred almost directly to the marginal price of electricity. Source: Nord Pool. The Nordic Power Market, January 2003.

Figure 3: Combined CO_2 emissions from energy industries in four Nordic countries, 1990-1991.



Note:The significant annual variation is principally due to changes in precipitation and temperatures and is most significant in Denmark and Finland, which rely on thermal power. Source: Compiled from the annual GHG inventories by the author.

Emissions Trading in the Nordic Countries

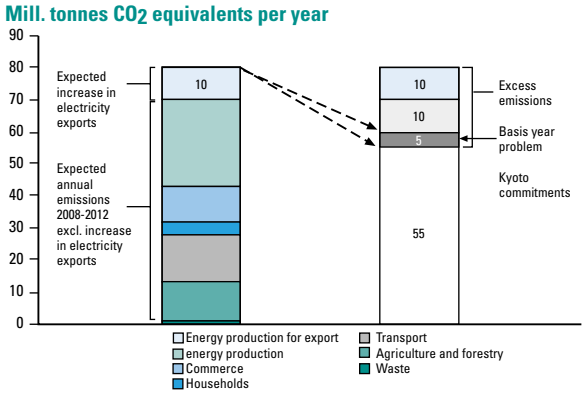
Denmark already has a domestic emissions trading system in place for the years 2000-2003. From 1st January 2005, Denmark, Finland and Sweden will be under the EU Emissions Trading Scheme. In Norway, the parliament has approved a domestic emissions trading system that should also start in 2005. Iceland will not be a significant player in emissions trading due to its small size and it's high proportion of renewable energy. The five Nordic countries and the emission allocation and trading systems are discussed below.

Denmark

Denmark has an emission reduction target of -21% under the Kyoto Protocol and the EU burden sharing agreement. The assigned amount under the Kyoto Protocol will be around 55 million tonnes annually for the period 2008-2012. The business-as-usual estimations project emissions of some 80 million tonnes per annum for said period, implying an annual shortfall of about 25 million tonnes. Denmark has, however, made a claim for an adjustment to their base year due to unusually large electricity imports in 1990, which resulted in an artificially low baseline. If this were taken into account in the final decision on the

assigned amount units, Denmark's shortfall would be an estimated 20 million tonnes.

Figure 4: Denmark's excess emissions.



Note: Assigned amount is estimated at 55 million tonnes per annum and the emissions at 80 million tonnes. Denmark hope the change to get 5 million additional tonnes assigned due to the "basis year problem" caused by unusually high electricity imports in 1990. 10 million tonnes of the excess emissions are estimated to be due to increase in electricity exports.
Source: Proposal for a climate strategy for Denmark. Government of Denmark, February 2003.

As part of the Danish response to the 21% greenhouse gas reduction target, Denmark launched a domestic emissions trading scheme for the period 2001-2003 to control power plant CO_2 emissions. Emission allowances were allocated for power companies emitting more than 100,000 tonnes of CO_2 annually, which limited the number of participants to 8 companies, although it captured the vast majority of GHG emissions from the electricity sector. Allowances were based on the electricity producer's CO_2 emissions in the period 1994-1998, taking also into consideration new approved power plants and emissions due to export of electricity. Under the scheme, a total cap for electricity producers was set at 23 million tonnes in 2000 decreasing to 20 million tonnes in 2003. By comparison, the historical average annual emissions from electricity production in the period 1994-1998 were 30.3 million tCO_2. There is a penalty of 40 DKK/tCO_2 (about €5.40/tCO_2) for non-compliance in the scheme.

Most of the allowances have gone to two largest energy companies, Energi E2 A/S and Elsam A/S. The dominance of these two players together with small total number of players in the market has resulted in only a few transactions:

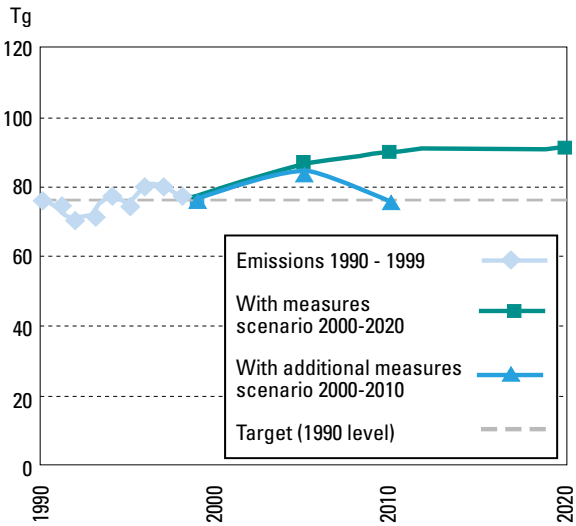
- In the first trading period 2001, seven trades totalling 260,000 tCO_2 and five swaps of emission reductions totalling 200,000 tCO_2 were carried out. The average price of allowances was somewhat lower than the penalty level.
- In the second period 2002, 10 trades totalling 300,000 tonnes and one swap were carried out. The average price was generally lower than in 2001.

According to the original proposal, the Danish trading scheme is to be renegotiated for the post-2003 period. In the light of the recent approval of the EU Emissions Trading Scheme, it is likely that the scheme will now converge to the EU scheme that starts in 2005. The total amount of allowances that Denmark will allocate for its installations is not decided yet. It can be estimated that the annual allocation for the period 2005-2007 would be between 25-35 million tCO_2.

Finland

Finland has an emission reduction target of ±0% according to the EU burden sharing agreement. Total greenhouse gas emissions in 1990 were about 77 million tonnes, excluding land-use and forestry. In 2001, Finland's GHG emissions totalled near 81 million tonnes and CO_2 emissions 67.7 million tonnes. It is estimated that compared to a business-as-usual (BAU) scenario, additional reductions of some 14 million tonnes per year will be required. According to the Finnish climate strategy, this will be achieved mainly through increasing nuclear power capacity (or limiting coal consumption) and through energy conservation and renewable energy. Taking into account these measures, Finland's GHG emissions are estimated to grow to some 84 million tonnes in 2005 and then decrease to 76 million tonnes by 2010 (see Figure 5)[2]. If these additional measures are implemented as planned, Finland would fulfil its Kyoto obligations and therefore it would be neither a significant net buyer nor a significant net seller in the international emissions trading markets.

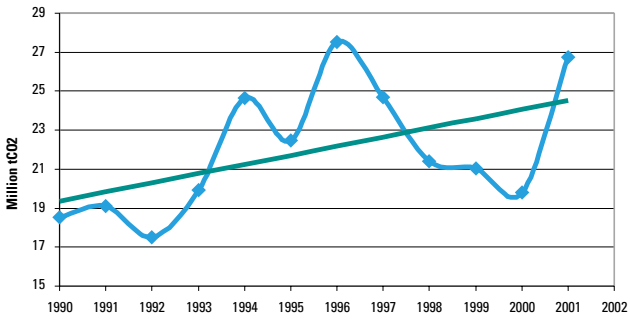
Figure 5: Projected Greenhouse emissions in Finland.



Note: "With measures scenario 2000-2020" includes the current measures. "With additional measures scenario" includes additional nuclear capacity, as well as additional energy conservation and renewable energy measures.
Source: Finland's Third National Communication under the UNFCCC.

Nevertheless, under the EU emissions trading scheme, high annual variation of energy emissions, due to weather and economic factors, makes Finland an interesting case. Depending on the allocation method, Finnish energy companies may trade more frequently in order to even out the annual variations (see Figure 6).

Figure 6: CO_2 emissions from the Finnish energy industries 1990-2001.



Note: If there had been a trading system in place and the allowances had been allocated annually according to the linear trend, the result would have varied between 5.3 million tonnes of deficit in 1996 to 4.2 million tonnes of surplus in 2000. Longer allocation periods naturally even out the differences to some extent.
Source: Data from the annual inventories.

According to a study by Statistics Finland , the EU Emissions Trading Scheme will cover 188 installations in Finland with combined emissions of 31.7 million tCO_2[3].This is about half of Finland's CO_2 emissions in 2001 and thus the directive has higher relative coverage in Finland than in any other EU country.

Iceland

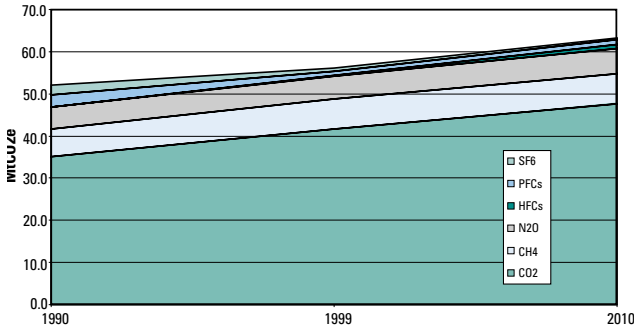
The total emissions of greenhouse gases in Iceland were only about 2.99 million tonnes in 2000.The principal emitting sectors are industry, transport and fisheries.Total primary energy supply is based predominantly on geothermal energy (53%), oil (27%), hydropower (17%) and coal (3%).The greenhouse gas emissions profile of Iceland is quite unusual in three regards:

- First, emissions from the generation of electricity are essentially non-existent due to predominance of generation from renewable sources.
- Second, emissions from the fishing fleet are about one-fourth of total emissions.
- Third, individual sources of industrial process emissions, especially in aluminium production, have a significant proportion of emissions at the national level. Because of this, Iceland has been allowed to leave out one ferroalloy and one aluminium plant from its inventories using the "single project" provision in the Kyoto Protocol and the Marrakesh Accords.

Norway

Norway has a target of +1% according to the Kyoto Protocol. In 2001 Norway's greenhouse gas emissions, excluding land-use and forestry, were about 56.2 million tonnes of CO_2-equivalent, about 8% higher than in 1990 (52 million tonnes). Industrial processes and oil and gas production are the largest sources of GHG emissions in Norway. Electricity production, except for the offshore operations, is based almost entirely on hydropower. It is estimated that with current and adopted measures Norway's GHG emissions in 2010 would be in the order of 63.2 million tonnes, which implies excess emissions of some 10.7 million tonnes per year compared to the Kyoto target (See Figure 7).

Figure 7: Norway's greenhouse gas emissions by gases and projected emissions based on current policies.



Note: (including current CO_2 tax) in 2010.

Norway implemented a CO_2 tax already in 1991 and this tax currently covers about 65% of CO_2 emissions at various rates. However, most GHG emissions from energy and emissions intensive industries are not subject to the tax. Based on the government white paper on climate policy, the Norwegian Parliament Storting approved in June 2002 a proposal for a mandatory domestic emissions trading system that will start in 2005. The proposal is to establish a cap and trade system that would cover as many sources as possible that are not subject to the current CO_2 tax. The sectors covered would mainly be industrial processes (i.e., aluminium, cement and petrochemical industries), gas and oil leakage, burning of coal and coal used in cement production. The scheme would cover about 30% of Norway's emissions in 2005-2007 covering most sources not already subject to the CO_2 tax.

For the 2008-2012 period, the proposal would broaden the emissions trading system significantly. The system should include CO_2 emissions from the use of fossil fuels in industrial processes and transport, as well as emissions of N_2O, PFCs and SF_6 from industrial processes. These emissions account for about 80% of Norway's total emissions.

Even if Norway is not a member of the European Community, it is part of the EU's internal market through the EEA (European Economic Area) agreement and thus has to a large degree the same obligations to implement EU legislation as the EU member states. Therefore it may have to apply the EU emissions trading directive as such. This is however a political issue on the current agenda of the Norwegian authorities and the outcome is still to be seen. As there are significant differences between the EU emissions trading directive and the Norwegian domestic proposal, a full or close-to-full implementation of the directive in Norway would mean a drastic reduction of the coverage of the trading as compared to the domestic proposal. This is mainly due to the fact that the aluminium industry and the chemical industry are not covered by the EU scheme.

The possible outcome of this process ranges from a full implementation of the EU directive to an implementation of a pure domestic scheme as defined in the current decision by the parliament. However some degree of integration with the EU scheme is expected and required for a Norwegian trading scheme to function well. A realistic scenario would thus be either a mutual recognition of the two schemes, establishing a gateway or alternatively a close to full implementation of the EU directive, but with some "special" Norwegian opt in/outs to reflect the atypical structure of the country's industry and its intention to cover a substantial part of its emissions through this scheme. The issue is being handled and prepared by the Ministry of Environment and the political clarifications and consequentially the implementation of a detailed set of rules for a domestic scheme is expected to be well under way during the latter half of 2003.

Sweden

Sweden has an EU burden-sharing target of +4% but in 2002 Sweden unilaterally committed itself to a stricter target of -4%. The total greenhouse gas emissions in 1990 were 72.8 million tCO_2eqv and in 2001 70.5 million tonnes. Estimated emissions in 2010 are 70.9 million tonnes. Comparing this to the Kyoto/EU target, Sweden would have a surplus of assigned amount units (AAU) of some 4.8 million tonnes annually. However, Swedish emissions would be about 1 million tonne above the national stricter target.

Sweden has progressed the furthest compared to other Nordic countries with respect to its

national allocation of emission allowances under the EU emissions trading scheme. In June 2003, the Parliamentary Commission on the regulatory framework for the flexible mechanisms of the Kyoto Protocol presented its report to the Ministry of Industry, Employment and Communications. The report deals with the principal aspects of the allocation and describes how the national allocation plan should be drawn up. The Commissions assessment is that the Swedish trading sector's aggregate emission allowance requirement may amount to some 24 million tCO_2 per year for the period 2005-2007. The breakdown of this amount is presented in Table 1.

Table 1: Proposed basis for the annual Swedish inital allocation during the period 2005-2007.

Historical fuel-related emissions	11.2 $MtCO_2$
Historical emissions related to non-replaceable raw materials	6.2 $MtCO_2$
Statistical uncertainty	2.0 $MtCO_2$
New entrants, including	
New installations	2.0 $MtCO_2$
Forecast increase in emissions related to non-replaceable raw materials	2.3 $MtCO_2$
Others	2.0 $MtCO_2$
TOTAL	**24.3 $MtCO_2$**

Source: Handla för bättre klimat (SOU 2003:60). Swedish Ministry of Industry, June 2003.

Emissions Trading Market Activity

Apart from the Danish National Emissions Trading System, where 23 transactions took place in 2001-2002 and which is discussed above, there is little public information available on actual trades in the Nordic countries. Three known examples of international trades are:

- In November 2000, the Finnish power company Fortum and the Canadian EPCOR Utilities Inc. from Alberta announced at the time the world's largest trans-Atlantic trade of CO_2 emission reduction credits. EPCOR purchased 50,000 tonnes of verified emission reductions from Fortum. The deal was based on Fortum's reduction of CO_2 emissions by about 200,000 tonnes per year at its Joensuu power plant in Finland through a shift to biomass. The price was not disclosed but it is believed to have been in the order of USD 1 per tonne.

- In May 2002, Royal Dutch/Shell Group and Danish electricity supplier Elsam A/S announced the first ever swap of government-backed greenhouse gas emission allowances. In the transaction, Shell sold UK allowances and bought Danish allowances and vice versa. Elsam has a mandatory cap under the Danish CO_2 allowance system and Shell has facilities and obligations both in Denmark and the UK. Danish Allowances are valid only until 2003. UK Allowances, on the other hand, are bankable until 2007, and possibly also bankable into the first Kyoto compliance period. By swapping Danish Allowances for UK Allowances, Elsam is hoping to bank its carbon assets into future compliance periods.

- In October 2003, the first transaction in EU Allowances in the Nordic countries was concluded between the power companies ENERGI E2 A/S from Denmark and Joensuun Energia Oy from Finland. Joensuun Energia Oy is part of the E.ON Finland Oyj Group. The deal was small in size and was used for learning the practicalities of the EU emissions trading scheme rather than for taking a market position.

All the Nordic governments as well as some companies are also involved in the CDM/JI process. The governments of Finland, Norway and Sweden are participants in World Bank's Prototype Carbon Fund, as are the Norwegian companies Statoil and Norsk Hydro and Fortum from Finland. All four countries also have bilateral programmes related to JI and CDM projects.

Conclusions

The estimated positions of the Nordic countries as to their Kyoto targets vary from an annual surplus of 5 million tonnes in Sweden to a deficit of 25 million tonnes in Denmark. The

annual variations of CO_2 emissions are high due to climatic conditions, especially in Denmark and Finland, which is likely to increase the activity and liquidity in the emissions trading market in the coming years.

Founded in 2001, GreenStream Network Ltd. is the first Nordic company to build its business entirely around the emerging green certificate and GHG emission markets. GSN's main business areas are:

- *Brokerage of renewable energy certificates, emission allowances and greenhouse gas (GHG) offsets;*
- *Development of Joint Implementation (JI), Clean Development Mechanism (CDM) and other GHG offset projects; and*
- *Tailoring of innovative solutions for customers with GHG liabilities or needs to promote green corporate values.*

1 More information on how Nord Pool functions can be found at www.nordpool.com.

2 Ministry of Trade and Industry, Finland. Emissions Trading and the Nordic Electricity Market. Electrowatt-Ekono Oy, January 2003, Helsinki, Finland.

3 EY:n päästökauppadirektiiviehdotuksen piiriin kuuluvien toimipaikkojen päästö- ja taloustiedot (Statistics of Finland). Ministry of Trade and Industry, June 2002.

16

The UK Emissions Trading Scheme

Toby Philip Campbell-Colquhoun
Shell Environmental Products
Trading Business

The Scheme

In response to the challenge of meeting its commitments under the Kyoto Protocol, the UK government launched the world's first cross-sectoral GHG Emissions Trading Scheme (ETS) in April 2002. In order to understand why the market has behaved as it has done, it is necessary to first look at the structure of the system and the participants involved.

Entities were able to participate in three ways:

A. Direct Participants
Direct participants took on voluntary absolute targets to be achieved on an incremental basis from 2002 to 2006. These targets were against a 1998-2000 baseline, determined by a 'descending clock' auction held by the UK government. An incentive fund of £215,000,000 was made available. The outcome was that 34 companies offered to reduce emissions below the baseline by an aggregate total of over 4MtCO_2e[1] , with a final incentive payment of £53.37 per tonne of reduction achieved by 2006. The incentive payment is paid annually to companies once they have demonstrated compliance by holding allowances equivalent to or greater than the level of verified emissions. The direct participants include companies from the oil and gas, chemicals, air travel, retail and mining sectors, amongst others.

There was some debate as to what should have been the market price for UK Allowances. Assuming a flat emissions projection, the incentive payment equates to £17.79 per tonne of reduction, as reductions have to be achieved incrementally over the five years. Ideally, this would have related to the marginal abatement cost for the Direct Participants. There are a number of reasons why this is not the case. The UK Scheme was the first of its kind. Companies had limited experience in terms of managing a compliance position, and were unwilling to take on targets with an associated risk of non-compliance that would be subject to the liquidity of supply. Companies therefore generally offered conservative volumes that they were comfortable could be achieved. In some cases the necessary reductions had been achieved before the start of the scheme. Direct Participants as a whole seemed to be fundamentally long absolute allowances, with little incentive to trade if the target had already been met. This meant that the incentive payment was not a good reflection of the predicted market price.

B. Climate Change Levy Participants
Companies with sectoral Climate Change Levy Agreements (CCLAs) took on targets to be achieved every two years in return for an 80% reduction in the climate change levy, a tax on downstream energy usage. 44 CCLAs were negotiated, including steel, aluminium, chemicals, paper, cement, ceramics, glass and various food and drink sectors. The CCLAs were negotiated such that either individual companies or sectors were liable for compliance. The negotiated targets are either to achieve relative (based on emissions or energy usage per unit of output) or absolute emissions reductions. The majority of sectors negotiated relative targets. Companies could meet compliance by making internal changes, or by purchasing allowances from the market. If a company exceeded its target at the end of a compliance period, it can undergo verification of the excess amount, resulting in the receipt of an equivalent issuance

of allowances from the government. One of the results of relative targets is that companies may become more efficient, but actually have a net increase in emissions for the year due to increased output. To fulfil the aim of achieving absolute reductions, relative allowances and absolute allowances are not freely interchangeable. A gateway was established to ensure that there is never a net positive flow of relative allowances to the absolute sector, preserving the integrity of the absolute targets.

C. Trading Participants

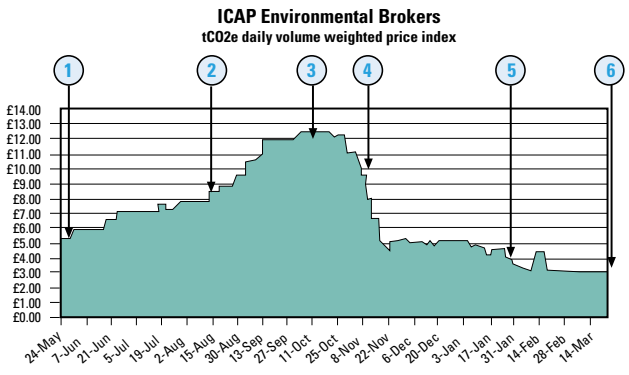
In addition to companies with natural compliance positions, participants could open trading accounts to allow the purchase and sale of allowances. This encouraged the entrance of liquidity providers, including traders from UK, continental Europe, Japan and USA.

So, now we know the participants and the structure of the scheme.

What happened to the price and why?

The graph below represents the price history seen through one broker of vintage 2002 allowances from the start of the scheme (April 2002) until the first compliance year deadline for direct participants (end March 2003).

Figure 1: Price history in the UK emission trading scheme (March 2003).



There was a significant amount of activity, with the price moving around during the year, albeit with relatively low volatility. What caused the price to follow this pattern?

1. Vintage 2002 allowances began to trade at £5.00. There was no rationale for this price in terms of buyers comparing market prices against calculated marginal abatement costs. The first few trades were educational, and the price was agreed as reasonable between counterparties.

2. During summer 2002 the price increased from £5 to £12.50, in the opposite direction to what fundamental analysis would dictate. Why?

- CCLA Participant buyers came to the market to manage their compliance position early.
- Only 5 Direct Participants got baselines verified and received an issuance of allowances onto their registry account before October 2002.
- Other Direct Participants were unwilling to sell allowances before they had received issuance, and had no incentive to get their baselines verified, especially once the price began to increase.
- CCLA Participant sellers did not want to take on the risk of non-delivery by selling forward allowances before they knew their position. The first trade of relative allowances did not occur until September.
- Traders tried to capture a profit by purchasing allowances while the market was bullish.
- Hence there was competition on the buy side and only one or two companies were able to sell.
- This resulted in a price increase, which caused further competition amongst buyers and further reduced the incentive for sellers to make offers.

3. The deadlines for the CCLA sectors varied from end September through to end December. This meant that during October CCLA companies that had exceeded compliance knew that they had allowances to sell if they underwent verification to receive issuance of allowances. At the same time one or two large direct participant sellers also underwent baseline verification and received allowances to sell. Prices had reached a plateau.

4. As soon as the price started to decrease, the fundamentals started to bear out. There were a number of panicked sellers, including companies with natural positions and traders trying to realise a profit, who competed strongly in trying

to place the best offer in the market. This resulted in a decrease from the peak price of £12.50 down to £4 over a period of a month on the back of very few trades.

5. As the price reached £4, sellers became less willing to offload allowances and preferred to bank. However, in recognition of the supply and demand fundamentals, some sellers continued to try and extract some revenue and the price continued to decrease to around £3 by March 2003.

6. Beyond March 2003, the price for vintage 2002 and 2003 allowances naturally converged and has fallen still further to today's prices where trades occur between £2 and £2.50.

What else did we see?

There are several other points of activity that are of interest to the analyst.

- At its peak, up to 15 trades a day occurred. Some liquidity was provided by traders with no natural position that picked up allowances from natural sellers. They increased options for supply and allowed the number of trades executed per day to increase, and encouraged price discovery.
- Trades were executed directly between counterparties and via brokers.
- Some entities acted on behalf of a number of clients with CCLAs to manage their position.
- Relative allowances traded at a discount to absolute allowances until the gateway was sufficiently open to remove any risk of non-transfer of relative allowances to the absolute sector, at which point the prices converged.
- UK allowance vintages were backward-dated. What this means is that vintages further into the future traded at a discount to current vintage prices as it is possible to bank vintage 2002 allowances for use in 2006 if need be.
- Not all trades were simple spot trades. A number of different structures were used in the market, including:
  - Inter-vintage swaps. Companies bought Vintage 2002 and sold Vintage 2003 and vice versa.
  - Inter-commodity swaps. Companies agreed an exchange ratio for Danish and UK Allowances.
  - Call options[2] were traded.
- The majority of companies that traded regularly used the Shell 2002 Emissions Trading Master Agreement. There was also a short-form contract that was used between counterparties less familiar with trading processes.

What prospects for the market?

As buyers in 2002 were predominantly CCLA Participants with targets to meet every two years, there is unlikely to be much activity this year. Trading is thin, with roughly one trade a week of small volume (<3000 allowances). Bids come to the market and get hit immediately. The only activity is from CCLA participants managing their position early in readiness for the 2004 deadline. The advent of the EU Emissions Trading Scheme has resulted in a focus shift. Many of the direct participants and CCLA participants will have installations covered by the EU ETS, and so until there is clarity on how companies will be treated under the scheme, there is a reluctance to trade in the UK ETS. Further clarity that would affect behaviour is the treatment of UK allowances beyond 2006, and into the First Compliance Period of the Kyoto Protocol.

Conclusions

The UK ETS was an ambitious piece of legislation which has allowed UK companies to gain experience and understand the business processes necessary for managing a position within an emissions trading scheme. Several lessons have been learned by companies, such as: trading processes, legal procedure, regulatory requirements, accounting principles and tax implications. The complexity of the scheme has now resulted in a large administrative burden on the government for establishing how the UK ETS will run in parallel with the EU ETS. The UK ETS did see a large amount of activity, in which regard it can be classed as a success. From a design standpoint, the UK learned that cap-and-trade systems allow efficient management of compliance positions, whereas baseline-and-credit systems encourage concentrated

periods of activity with no degree of constant liquidity on both the buy and the sell side. This can significantly affect the price, making compliance management more difficult. Much of the focus in the UK ETS is now on how participants will be affected by the EU ETS. The EU ETS is where things are becoming interesting.

Shell Environmental Products Trading Business (EPTB) is a global business transacting on behalf of all Shell companies and some third parties covered by environmental regulations manageable through trading. EPTB also takes proprietary positions. EPTB trades in over 14 environmental markets, including emissions and green certificate based markets, from desks in London and Houston. Shell is recognised as the most active participant in the UK ETS, and executed the first transaction involving EU allowances.

1 For more information and analysis of the auction, see the DEFRA report at http://www.defra.gov.uk/environment/climatechange/trading/pdf/trading-progress.pdf

2 A call option is when a company buys the right (premium) but not the obligation to purchase allowances at a certain price (strike price) by a certain date (expiration date).

17

Central Europe in the Driver's Seat

Andrew Ertel
Evolution Markets LLC

Central Europe will play a pivotal role in global greenhouse gas emissions markets. Indeed, the region already has. As an excellent source for cost-efficient greenhouse gas reductions – and a stable political and economic climate – Central Europe is the region of choice for developing capacity in greenhouse gas markets. Governments and corporations from Central Europe have already engaged in carbon market's first trades.

The accession of Central European countries to the European Union[1] will impact economic decisions in greenhouse gas markets, ultimately influencing transaction volume through the Kyoto Protocol's flexible mechanisms and the EU allowance trading system. Whichever route they choose, Central European governments are beginning to contemplate the benefits of early participation in emissions trading and are developing the necessary infrastructure.

Carbon Finance Comes of Age

Many Central European nations desperately need to update their industry infrastructure. As with much of the industry held over from the Communist era, the power and other sectors are aging, costly, and grossly inefficient. However, cash strapped governments in the region are having difficulty raising the capital necessary to upgrade their industries.

Some innovative Central European governments are turning to emerging greenhouse gas emissions trading markets as a vital source of capital.

Retrofits at energy facilities to increase efficiency or switch from coal to cleaner fuels produce more power at lower cost. They also reduce emissions of CO_2. These reductions can be sold in global greenhouse gas emissions markets, where the value of reductions can account for 10-30% of a project's capital costs.

Kyoto: International Emissions Trading

Some Central and Eastern European governments are backing the reductions from projects with greenhouse gas allowances allocated under the Kyoto Protocol, known as Assigned Amount Units or AAUs. This strategy amounts to a new form of project finance in which governments back project risk with Kyoto allowances rather than their national treasury.

As part of its ERUPT program, the Dutch government has contracted 1.5 million project-backed AAUs from Romania. Actual trading in AAUs kicked off in December of 2002, when the government of Slovakia sold 200,000 allowances to Sumitomo Corporation of Japan. This trade provides a useful illustration of how Central European nations can leverage their allowance inventory to meet environmental goals.

The Slovak Republic was seeking ways to support investments in energy efficiency projects and the development of renewable energy. The Slovak government realized their allocation of AAUs was a monetizable asset that they could use to finance such projects without having to tap the country's monetary budget.

The Slovak government subsequently used their name and sound credit rating to offer a portion of their anticipated allocation of AAUs for sale. With government backing and by virtue of being part of an allocation and not project based emission reductions, the AAUs are an almost risk-free commodity carrying only sovereign risk. This attracted buyers who wanted to hedge their carbon risk exposure. Not coincidentally, the

government guarantee also ensured that the price for Slovakian AAUs would be higher than other project-based reductions currently available in the market.

Sumitomo hence bought a carbon commodity of the highest possible quality, and the Slovak government subsequently channeled the money to a Slovakian project developer who will use the funds to develop emission reduction projects. These projects (fuel switch, energy efficiency etc.) are expected to reduce an amount of GHG emissions equal or in excess to the amount sold as AAUs.

Other governments are looking at similar mechanisms. A "Green Investment Scheme" for Russia and Ukraine has long been discussed and is still in the making, and other countries such as Bulgaria are also looking at similar transaction schemes. One challenge, however, exists in form of the uncertainty associated with the use of such "green AAUs" for compliance purposes and how project-backed AAUs can be differentiated from "Hot Air AAUs".

Kyoto: Joint Implementation

The Slovaks are well ahead of other Central European nations in developing a strategy for the Kyoto allowance market. Other governments in the region are fostering greenhouse gas emissions projects under the Kyoto Protocol's Joint Implementation (JI) program. And, major international institutional buyers are driving demand and setting the standards.

The leading buyer of credits generated through JI (emissions reduction units or ERUs) is the Dutch government through its ERUPT program. ERUPT's two completed tenders have funded eight projects totaling more than 7.6 million tCO_2-eq. The emission reduction projects are located in the Czech Republic, Hungary, Poland, Romania, and the Slovak Republic.

Romania, in particular, is devoted to utilizing carbon finance to improve its energy infrastructure. The country has led the way in courting institutional buyers to fund emissions reduction projects within its borders. Romania, in fact, accounts for the lion share of projects under ERUPT with 4.6 million tCO_2-eq.
The World Bank has also been instrumental in funding capacity under JI. The Prototype Carbon Fund is supporting four projects in Latvia, Poland, and Romania reducing more than 1.9 million tCO_2-eq.

JI projects under both the ERUPT and PCF programs range from developing renewable energy generation to recovery of landfill methane, energy efficiency, and carbon sinks.

EU Emissions Trading Scheme

Despite groundbreaking trades in AAUs and institutional activity in JI and CDM, the carbon market currently showing the greatest potential is the European Union's Emission Trading Scheme. The program has all the right elements of a robust emissions trading program. It is clearly defined. It has binding emission reduction targets and penalties. It has a strong mix of buyers and sellers, as well as a massive pool of impacted companies (15,000 sources by some counts).

Most of the Central European economies are due to become accession countries in 2004, and they have considerable incentive to be sellers in the emissions trading program. Despite efforts by the EU Commission to restrain over-allocation, many companies in the region expect a generous allocation of EU allowances (EAUs) that would factor in future growth projections. The more "Hot Air" (i.e. surplus AAUs) countries have, the more willing they might be to generously allocate allowances under the EU ETS.

More importantly, Central European nations should be able to leverage lower marginal greenhouse gas abatement costs compared to their Western neighbours. Achieving greenhouse gas emissions in Central Europe is simply cheaper, with outmoded energy infrastructure and generally cheaper cost of goods and services.

Finally, the lure of hard currency has brought some Central European companies to the EU

carbon market. Central Europe has not yet adopted the Euro, but their industries are doing business within the EU. The ability to sell EU allowances in advance of allocation under terms including up-front payment provide companies access to valuable Euros to finance emission reduction projects.

Under these conditions, trading in the EU emissions trading scheme is heating up. Not surprisingly, buyers are largely from Western Europe and supply is coming from Central Europe, and the first trades are being conducted in advance of the formal allocation of allowances by the EU. By the end of August 2003, eight trades had been executed with a combined volume in excess of 350,000 EAUs. During this time prices rose from EUR6 to EUR10 as buyers chased intermittent supply.

Linkage Puts Market at Crossroads

In large part, the dearth of supply reflects the approach of a crossroads for Central European governments and corporations. Some players in Central Europe that will automatically be covered under the EU's Emissions Trading Scheme have the option of developing greenhouse gas emissions reduction investments under the Kyoto Protocol's Joint Implementation program. Projects approved as JI projects before 31 December 2004 are allowed to maintain their JI status. They would, however, be excluded from the EU ETS until 2012. The EU published a draft Directive outlining the linkage of emissions reduction mechanisms under Kyoto with the EU Emissions Trading Scheme. The so-called "Linking Directive" would substantially reduce the number of eligible JI projects in the European Union. For two reasons:

- First, the Directive will inhibit accession countries to use Joint Implementation as a means to achieve the acquis communautaire, the body of EU law that must be adopted by all EU Member States. ERUs will, according to the proposal, only be granted when over-fulfilling the measures required by the acquis. In practice it will be difficult enough to reach the acquis as to leave much room for the generation of ERUs.
- Second, the Directive, in an effort to avoid double counting, implies that every ongoing and future JI project that affects emissions from installations covered by the EU ETS should not be granted ERUs. In other words, if the basis for calculating emissions reductions is the displacement of fossil fuel emissions from the grid, as is the case in many energy efficiency and renewable energy projects, these kinds of projects will no longer be eligible for JI. This is unless the grid is exclusively fed by sources that would not fall under the EU scheme – a very unlikely scenario.

Left with almost no competition, the main targets for JI investments in accession countries will become projects that mitigate greenhouse with higher global warming potentials, like N_2O and methane (from landfill gas). The landfills, of course, cannot fall under the EU's Landfill Directive, which prescribes that "landfill gas shall be collected from all landfills receiving biodegradable waste and the landfill gas must be treated and used. If the gas collected cannot be used to produce energy, it must be flared." Some Eastern European countries, have a "grace period" until 2012 to implement the Landfill Directive.

The barriers for creation of ERUs leave few options for accession countries that have surplus AAUs to monetize this surplus. Those countries could either trade pure AAUs or, more likely, back those AAUs with real emission reductions that neither falls under the regulations of the EU ETS nor JI. This kind of "project backed AAUs" or "greened AAUs" would only be subject to emission reduction legislation in their respective countries.

With the prospects for sustained JI projects slim in Central European countries joining the EU in 2004, buyers seeking JI capacity may look to Bulgaria or Romania, which are scheduled to accede to the EU in 2007. Furthermore, buyers could turn to Russia and the Ukraine, which however present considerably higher risks due to political and regulatory uncertainties. As a result, finance earmarked for project-based emissions reductions will now more likely flow to CDM countries like Brazil, Mexico, or Costa Rica. These nations, which qualify as host countries under the Kyoto

Protocol's Clean Development Mechanism, are considered more politically stable and, last but not least, projects in these countries can already generate emission reduction prior to 2008 and for a crediting period of 10 or more years, as opposed to JI.

Infrastructure Building

As the EU's emissions trading program shapes up, the landscape of the carbon market becomes more clearly defined. Central European nations are faced with a number of new options, and most are moving ahead with developing the necessary infrastructure to take advantage of greenhouse gas emissions trading opportunities. Getting there, however, is a three-step process that includes building the requisite knowledge base, figuring out who is in charge, and then implementing an emissions trading strategy. Some countries are further ahead than others. Here is a rundown of current carbon market positioning of the EU accession countries in the Central European region:

Slovak Republic: Slovakia has perhaps the most developed infrastructure in the region for emission trading. Slovakia has the only existing SO_2 trading scheme in Europe and has, not surprisingly, been the most active in participating in greenhouse gas emissions trading. The country conducted the first trade of Kyoto allowances; a trade that pioneered the "green-AAUs" concept. Slovakia is also home to one of the counterparties in the largest trade of EU allowances to date (150,000 allowances transacted in May 2003). The country should continue to be a leader in Kyoto and eventually EU emissions trading markets.

Poland: Much attention has been paid to Poland because of the huge volume of surplus allowances the nation is likely to enjoy under the Kyoto Protocol and, perhaps, the EU systems. Home to a few JI projects, the Polish government is, however, well behind some of its neighbors in, for example, developing its National Allocation Plan for the EU ETS. On the other hand it is one of the few countries also looking into SO_2 and NO_X trading. Poland may have the largest volume of surplus allowances, but estimates by the UNFCCC indicate that recent economic growth is moving the country closer and closer to its cap. The closing gap may mean a less generous allocation of EU allowances on an installation to installation basis than in other Central European countries as Poland hedges the risk of an allowance shortfall.

Hungary: As with Poland, Hungary appears to be well poised for participation in carbon markets. It offers excellent investment climate and efficient bureaucracies. Yet, this nation is falling behind in setting up the systems to facilitate trades. The Ministry of the Environment is in charge of collecting data on national emissions, but the ministry (or any other, for that matter) has not been mandated with managing the country's allocation. Under the EU program, no national allocation plan development has yet been addressed with noteworthy effort as officials wait for more guidance from the EU. There has been some capacity building under JI, but there is still a high potential for further action. Observers note a lack of clearly defined competencies between the ministries involved.

Czech Republic: The Czech Republic is the only Central European nation whose greenhouse gas emissions levels are projected to fall in the period between 1999 and 2012. This positions the country well for both Kyoto and EU allowance markets, but the government has been slow to formulate a carbon market strategy. In a report on the region, the European Bank for Reconstruction and Development rated highly its business environment for taking advantage of JI opportunities. Other reports (e.g. by the PFC), however, point out the conflicts arising from EU accession. Because of the growing surplus of AAUs one might expect increased interest to monetize these with the help of the mechanisms described above.

The Baltic States: Both Estonia and Latvia have the greatest relative room to increase their GHG emissions in terms of surplus AAUs. Growth projections by the UNFCCC show that from 1999 to 2012 these countries will only use 50% or less of their remaining surplus AAUs. Compared to say Poland, they are therefore more likely to generously allocate EU allowances to industries – albeit at smaller volumes than other Central

European nations. Lithuania, while well below its cap, relies heavily on power from an aging nuclear facility. The country may tightly manage its allocation as a contingency against an upcoming shut down of this plant, which would necessarily increase emissions from fossil fuel generation.

Slovenia: That countries have "Hot Air" is largely the rule in Central Europe, but Slovenia stands out. The nation is the only in the region that may actually end up being a buyer of emissions credits and allowances. Recent UN growth projections put Slovenia short of emissions, and it may have to compete with Western Europe in the Central European market for carbon reductions.

The End Game is Clear

For those countries moving rapidly ahead to take advantage of global carbon markets, the end game is clear. Central European governments are looking for ways to monetize their surplus allocation of greenhouse gas emissions, either under the Kyoto Protocol or by participating in the EU ETS. Fortunately it seems like these countries are looking to ensure that revenues from selling surplus allowances goes to improving the local environment, not simply to enrich the national treasury.

Evolution Markets LLC structures transactions in the environmental credit, renewable energy, weather derivative, and over-the-counter (OTC) coal markets. The company has become the largest volume emissions brokerage firm in the world, facilitating trades valued at more than US$5 billion. Evolution Markets specializes in carbon finance, and the GHG team has closed some of the most important domestic and international carbon transactions, including the first trade under the Kyoto Protocol's emissions trading program and many of the first trades under the EU Emissions Trading Scheme.

[1] (Latvia, Lithuania, Estonia, Poland, Hungary, Slovakia, Czech Republic, Malta, Cyprus, Slovenia).

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Status of Greenhouse Gas Emission Policy and Markets in the U.S.

Bruce Braine & Daniel Francis
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Introduction

While the US is not a signatory of the Kyoto Protocol, there has still been a significant amount of activity at the federal and state government level as well as under voluntary partnerships between and among private organizations and non-government organizations (NGOs) to limit greenhouse gas emissions (GHGs). These activities have included the introduction of various legislative proposals in the US Congress, the Administration's voluntary greenhouse gas program, state-level cap-and-trade proposals, as well as a variety of voluntary private-sector initiatives. GHG market activity in the US remains dormant however, reflecting the lack of any mandatory requirements in the US, and only the initial phases of voluntary reduction and trading schemes.

Ferderal Legislative Proposals

Over the past few years, a number of legislative bills have been introduced or advanced within the US Congress. While the vast majority of these bills propose appropriations for GHG studies, tax incentives for sequestration R&D, and GHG emission voluntary or mandatory registers, three in particular have proposed mandatory CO_2 emission legislation. At present, the prospects for passage of GHG legislation are slim. The current Administration has indicated its intent to veto any GHG legislation with mandatory targets, and Democrats and other Congressional supporters of such legislation simply do not have enough votes to pass legislation in light of a Presidential veto.

The Carper Bill

The 'Clean Air Planning Act of 2003' (S.843) offered by Senator Thomas Carper (D-Delaware) contains several major provisions requiring mandatory limitations in GHG emissions:

- It is an electric-industry only proposal requiring reductions in SO_2, NO_x, Hg, and CO_2 or a so-called 4-E (4 emission) proposal. It contrasts in this regard with the President's Clear Skies Act proposal which is a 3-E proposal that excludes mandatory carbon or greenhouse gas reductions;
- CO_2 emission reduction targets are in two-phases, resulting in approximately a 3 to 5 % overall reduction in electric power emission levels:
  - Phase One requires emissions to be at 2005-levels by the year 2008;
  - Phase Two caps emissions at 2001-levels by the year 2012;
- The proposal allows for limited trading flexibility by permitting CO_2 offsets purchases from other sectors through applications such as sequestration, subject to validation procedures. These offsets are also capped or limited to 10% of 2009 emission levels.

The Lieberman/McCain Bill

'The Climate Stewardship Act of 2003' (S.139) is co-sponsored by Senator Joseph Lieberman (D-Connecticut and current presidential candidate), and Senator John McCain (R-Arizona). The US Senate voted 55-43 to reject the bill, although proponents hailed the vote as a symbolic victory. The bill includes the following major provisions:

- In contrast to the Carper bill, it covers a broader swath of the US economy than just the electric power sector, including nearly 85% of US emission sources from the electricity, industrial, and transportation sectors;

- The proposal uses a hybrid upstream/downstream greenhouse gas emission reduction approach:
  - Petroleum emissions resulting from transportation are covered through an upstream cap and trade system (with oil refiners or importers receiving the emission allowance);
  - Emissions from combustion of coal and natural gas are covered through downstream caps on the electric power and industrial sectors;
  - Certain sectors are not covered at all, such as residential and commercial gas and fuel oil use;
- The bill covers all six GHG's (CO_2, N_2O, CH_4, HFC, PFC and SF_6);
- Emission reductions were originally proposed in two-phases:
  - Phase I limits GHG emissions to 2000-levels by the year 2010;
  - Phase II would limit emissions to1990-levels by the year 2016. However, the revised version of the bill that was voted on by the Senate had eliminated the Phase II reduction targets;
- The bill directs the Administrator of the Environmental Protection Agency (EPA) to establish a CO_2 allowance trading system.
  - Additional flexibility is allowed through the banking of credits, use of offsets (e.g., project-specific offsets of non-CO_2 gases), international emissions trading, carbon sequestration, and other reductions from non-covered sectors;
  - Emission offsets, international trades, carbon sequestration and other reductions from non-covered sectors are restricted however, with only 15% of the required emission allowance target permitted to be met through the use of these mechanisms through 2010, and only 10% through 2016;
  - Allowance allocations are not specified -- the Commerce Department is to determine the optimal approach. To the extent there is an allowance auction, revenue-recycling methodology is also undetermined.

The Jeffords Bill

"The 'Clean Power Act of 2003' (S.366) is offered by Senator James Jeffords (I-Vermont). It has a companion bill in the House of Representatives, 'The Clean Smokestacks Act of 2003' (H.R.2042) sponsored by Representative Henry Waxman (D-California). The Jeffords bill is an electric-industry only proposal, covering SO_2, NO_x, CO_2, and Mercury. It would require reductions in CO_2 to 1990-levels by the year 2009, and is by far the most stringent in terms of its electric industry emission reduction requirements.

Regulatory and Judicial Challenges

There have been a number of regulatory and judicial challenges in the US with respect to GHG emissions (and specifically CO_2 emissions). The International Center for Technology Assessment, et.al. petitioned the EPA in October of 1999 to regulate CO_2 as a pollutant under the Clean Air Act. The EPA requested public comment on the ruling in 2001. The petitioners filed suit in December of 2002 to force the agency to rule on the issue. In August of this year, claiming it had no legislative authority to do so, the EPA finally rejected the initial petition for rulemaking. In a separate action in June of 2003, the Attorneys General of three New England states (Massachusetts, Connecticut, and Maine) filed suit to compel the agency to regulate CO_2. With the EPA's ruling on the original petition claiming that it has no authority to regulate CO_2, the plaintiffs withdrew their suit without prejudice. Several states and environmental organizations have refiled a suit challenging the rule-making, however the prospects of prevailing appear to be remote in light of the legal standards required to regulate an emission as a 'criteria pollutant' under the Clean Air Act.

The Administration's Voluntary Program

The Bush Administration announced the 'Global Climate Change Initiative' in February 2002. It proposes to slow the growth of GHG emissions and fund substantial climate change research to evaluate the need for more aggressive actions. The initiative's central philosophy is that private-industry should be provided with an opportuni-

ty to meet voluntary goals with flexible approaches, rather than being prescribed government-mandated targets for compliance. Only if these goals are not achieved are the concepts of hard-and-fast targets imposed. The emission reduction goals are intensity-based, linking emission levels with the nation's economic output. Overall, the target is an 18% reduction in GHG intensity over a ten-year period. Debate over the Administration's approach has been fierce, with opponents citing the weakness of intensity-based, flexible, voluntary goals, as well as debating the environmental improvements of achieving these goals compared to a 'Business-As-Usual' (BAU) baseline. The criticism has spawned a number of competing forecasts of the targets compared to BAU scenarios.

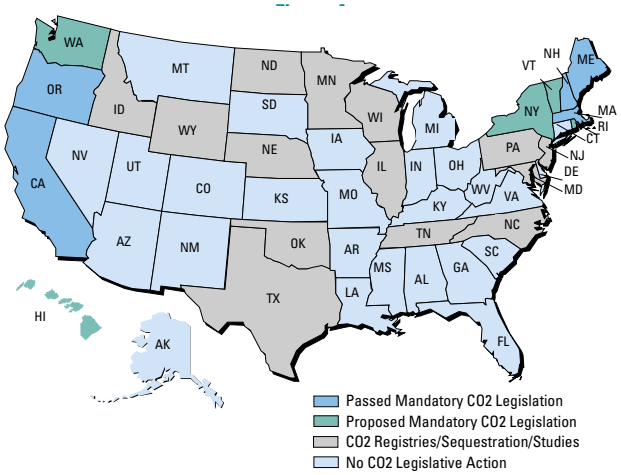
Several industry sectors have developed programs or targets to meet the President's voluntary initiative. Under the 'Electric Power Industry Climate Initiative' a coalition of electric-industry organizations have pledged to reduce carbon intensity 3 to 5 percent below 2002-levels by 2012, measured in CO_2 per Kwh (because of continuing efficiency gains in GDP per electric output, this translates to a much higher carbon per GDP intensity reduction). Other industry groups with voluntary reduction goals include the petroleum, mining, chemical, automotive, forest and paper, iron and steel, semiconductor, railroad, aluminum, and cement industries, among others.

Clean coal technology also plays a prominent role in the Administration's CO_2/GHG policy. Perhaps the most significant of these clean coal R&D initiatives is the "Future Gen" project. This $1 billion, 250-MW demonstration plant (with 80% funding from the federal government) is planned to be built by the year 2008. Future Gen will be designed to produce both power and hydrogen while sequestering 90% of CO_2 emissions below ground by the year 2008. The 2003 budget includes a sizeable investment of $62M for carbon sequestration.

State and Regional Actions

While debate continues over federal CO_2 GHG legislative proposals, there has been considerable activity at the state level (See Figure 1).

Figure 1: State level GHG legislative proposal activity.



There have been a number of notable state legislative actions regarding CO_2 and GHG's, mostly in the Northeast and on the West coast. However, at present, only five states have actually passed legislation mandating CO_2/GHG emission reductions (California, Maine, Massachusetts, New Hampshire, and Oregon). Additionally, five states are currently considering some type of mandatory GHG limit by virtue of a state legislative bill or regulatory action (Hawaii, New York, Rhode Island, Vermont, and Washington). A number of other states (14) have some form of GHG-related legislative law or proposal, whether it is a voluntary registry, a sequestration program, or merely a study of the GHG issue. The remaining states (26) have not considered any significant legislation concerning CO_2/GHG issue.

In addition to these legislative activities, nearly half of the states have some form of a regulatory-driven state-level EPA 'Action Plan' on addressing global warming. Mostly these include voluntary programs (some including incentives) for improving energy efficiency, recycling, forestation initiatives, etc. that will reduce GHG emission levels. Many states also have mandatory programs addressing the topic, including renewable portfolio standards (RPS), revisions to building codes, etc. Thirty-nine states have completed a GHG inventorying exercise identifying the

sources/sinks of all GHGs by sector. Five states have established GHG registrers for recording specific emission sources.

Regional Alliances

The 10-state 'Northeast Governors Climate Action Plan'[1], initiated by Governor George Pataki (R-New York), is a coalition-building effort to address regional CO_2/GHG public policy. Their stated goal is to achieve a regional market-based, cap-and-trade program. The initial goals are to reduce CO_2 emissions from power plants to 5% below 1990-levels by the year 2010, and 10% below by the year 2020. State leaders began meeting in September 2003 in an attempt to reach an implementation agreement on standards and protocols by April 2005. Their hope is to develop protocols that allow international trading. Concerns have already been raised regarding the impact on electricity prices and the resulting competitiveness of businesses in the participating states.

In addition to this initiative, three western states (California, Oregon and Washington) agreed in late September to develop a coordinated strategy to reduce GHG emissions. This includes developing consistent, coordinated emission inventories and reporting and accounting protocols. Vehicle, tire and appliance efficiency improvements, electrification of truck stops, and renewable energy development are also planned. No specific emission reduction targets have been established yet.[1]

Voluntary Efforts

While federal and state legislative debate continues, some notable private sector voluntary actions have begun. The most-often cited and most significant private-public-NGO coalition activities include the '*Chicago Climate Exchange' (CCX)*, the Environmental Defense's *'Partnership for Climate Action'*, EPA's *'Climate Change Partners'* program, World Wildlife Fund's *'PowerSwitch'* and *'Climate Savers'* programs, and the Business Roundtable *'Climate RESOLVE'* initiative (though this is not necessarily an all-inclusive list, as other individual companies and other multinational companies with US operations have also pledged or already have made reductions).

The *Chicago Climate Exchange (CCX)* is the first U.S. voluntary pilot program for trading all six GHG emissions. It is a self-governing, peer-reviewed organization with 21 member companies. The combined emissions of the current members is approximately 275 M tons of GHG annually or about 5% of US CO_2 emissions in the year 2000. Participation in CCX requires all members to reduce GHG emissions by a cumulative 10% over the next four years – 1% in 2003, 2% in 2004, 3% in 2005, and 4% in 2006. In addition to direct carbon reductions from member companies, reductions from all six greenhouse gases are included as well as off-system project reductions (e.g., recovery and use of landfill and agricultural methane, reforestation projects, and carbon sequestration). The organization just recently published its rulebook that documents the measurement, validation, and accounting protocols associated with their emission-trading scheme and conducted its first 'price discovery' auction at the end of September with allowances selling for approximately $1 per metric tonne of carbon.

The *Partnership for Climate Action* is an Environmental Defense (ED) designed organization whose motto is 'Learn by Doing'. The partners commit to measure, track, and publicly report CO_2 emissions, and seek innovative, low-cost ways to reduce those emissions. Many partners have made specific commitments to emission reduction targets. In total, reductions from these partnerships will amount to nearly 80 million tones of CO_2-equivalent by the year 2010.

EPA's *'Climate Leaders'* supports the Administration's *Global Climate Change Initiative* through its participant companies' establishing a voluntarily GHG reduction target and voluntarily reporting their GHG emissions. The EPA's *'State and Local Climate Change Partners'* program helps communities reduce emissions of greenhouse gasses. The program supports these efforts through estimating emission levels, estimating the economic and environmental risks, offering material and guidance for evaluating emission reduction options, and

providing case studies of solutions. The program offers workshops for members and recognition of innovative accomplishments on reductions to GHG emissions.
The Business Roundtable (BRT) is an association of CEO's of leading US and international corporations that are committed to furthering public policies that support economic growth for the world's economies. The BRT's *Climate RESOLVE* (Responsible Environmental Steps, Opportunities to Lead by Voluntary Efforts) initiative is designed to motivate member companies to seek innovative ways for practical, cost-effective opportunities to reduce the GHG intensity of the US economy. A unique aspect of the BRT's program is that the commitment to mitigate GHG emissions was made by ALL members of the association. As various mem-bers differ in their capacity to undertake climate change activities, the program has no mandated GHG emission reduction targets, and relies on voluntary reporting of reductions. The strategy includes avoiding, reducing, offsetting, and sequestering of GHG emissions, however, the focus for a significant number of BRT members is on the demand-side of the equation – reducing emissions by reducing energy consumption.

World Wildlife Fund's (WWF) *PowerSwitch* program was recently introduced with the stated goal of working toward a CO_2-free power sector by the middle of the century. Techniques to achieve this goal among electricity producers include engaging with them to commit to binding limits on CO_2 emissions, supporting renewable energy options, increasing energy efficiency, and retirement of coal-fired generation. Additionally, the program includes efforts aimed at elected officials, financial institutions, the wider business community, and consumers. As of May 2003, the *PowerSwitch* program has no US companies participating, though it includes nine European energy companies as "Power Pioneers". WWF also has the *Climate Savers Program*. That invites leadership companies to establish and implement greenhouse gas reductions.

GHG Market Activity

Given the almost exclusively voluntary-nature of the GHG emissions reduction activities in the US and limited mandatory state action to -date, the US GHG emissions trading market is currently in its early stages with only limited volume.
The outlook for market activity in the near-term future remains modest. Mandatory federal GHG emission legislation in the US remains unlikely under the current Administration. Therefore, the volume of near-term market activity is likely to remain dependent upon the passage of state-level cap-and-trade legislation and the scope of the voluntary markets.

American Electric Power owns and operates more than 42,000 megawatts of generating capacity in the United States and select international markets and is the largest electricity generator in the US. AEP is also one of the largest electric utilities in the United States, with almost 5 million customers linked to AEP's 11-state electricity transmission and distribution grid. The company is based in Columbus, Ohio.

AEP is a founding member of the Chicago Climate Exchange (CCX), the Business Roundtable's Climate RESOLVE initiative, and the Pew Center's Business Environment Leadership Council (BELC).

1 It should be noted that this isn't the first time a coalition of states have attempted to coordinate GHG reduction plans. In 2001, the governors of six northeast states and five eastern-Canadian provinces committed to cut CO_2 emissions to 1990-levels by the year 2010, 10% below that by 2020, and by as much as 75-80% long-term (referred to as the 'Regional Climate Change Action Plan'). However, the New England Climate Coalition (a group of over 150 health, energy, and environmental groups in the region) issued a report in September 2003 entitled 'Global Warming and New England: Progress, Opportunities and Challenges After Two Years of the Regional Climate Change Action Plan', claiming that the group is on--track to achieve only one-third of its targeted reductions.

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The First Chicago Climate Exchange Auction, The Birth of the North American Carbon Market

Dr. Richard L. Sandor
Chicago Climate Exchange

With the September 30 launch of the Chicago Climate Exchange (CCX) and the announcement of the results of its first auction of Exchange Allowances (XAs), we now have price discovery for CO_2 in North America. In an over-subscribed auction, Du Pont, City of Chicago, Baxter Healthcare Corporation, Manitoba Hydro, Ford, American Electric Power and Stora Enso North America were successful in their bids for XAs, each representing 100 metric tons of CO_2 equivalent. The weighted average price for XAs was $0.98 per metric ton for vintage 2003 and $0.84 per metric ton for vintage 2005. (Full details of the auction offering and the auction outcomes can be found in Tables 1 and 2 respectively).

The success of the CCX auction is an example of the significant role that auctions play in financial and environmental markets. Auctions provide both a distribution and price discovery function. Their prevalence in the market for U.S. Treasury securities indicates their importance in one of the largest financial markets in the world. CCX auctions play a parallel role to the annual SO_2 auctions. In the early stages of a market, when there is great uncertainty about price and when future participants may not have fully established trading and compliance strategies, auctions provide invaluable information on price and volume information as well as fostering additional trading and market liquidity. It is expected that CCX auctions will continue to serve as an important indicator of market trends.

Of course, the CCX auction is only a first step on the long road to price discovery. It is instructive to make a comparison with the evolution of price discovery in the US SO_2 market. Early predictions of the price of SO_2 allowances included an estimate of $981 from the United Mine Workers, $688 from the Electric Power Research Institute, $446 from the Sierra Club and $392 from American Electric Power. In reality, the average spot market price at the EPA/Chicago Board of Trade auctions has been under $140. The price for allowances in OTC trades has ranged from approximately $70 to a maximum of around $210-220. Likewise, the spread among bids in the SO_2 spot price auction has shown a dramatic narrowing over time. While the range of bid prices in the first few auctions was broad, from 1997 onwards the range between the highest bid (excluding bids of insignificant size) and the clearing price was less than 10% of the clearing price.

This history suggests two main lessons. First, we should beware of the confidence we place in price predictions before the price discovery process actually gets under way. Early predictions of the cost per ton of carbon included $265 per ton from Wharton Econometrics in 1998 and $150 per ton from Harvard's Professor Robert Stavins in 1997. This cautionary note even applies to the scenario of $20 per metric ton of carbon I discussed at the White House Conference on Climate Change and the US Senate Energy and Natural Resources Committee in 1997.

The second lesson is that price discovery becomes more robust over time as the market becomes more efficient. The first price in a market is not necessarily indicative of likely prices in a mature market.

The design of the CCX auction demonstrates the advantages for CCX member companies of participation in a voluntary market in advance of regulation. The initial auction design called for a sealed bid, discriminatory price auction modeled on the annual SO_2 auctions at the Chicago Board of Trade. In response to input from CCX

members who were more concerned about the implications of the auction for their compliance position than about price risk, a smaller, average price auction was also held. Members could bid for specific quantities of XAs at a price equal to the weighted average price from the discriminatory price auction. This supplement to the original auction design nicely illustrates the flexibility and responsiveness of a voluntary, member-governed trading system.

The auction served another significant purpose; to help members to make practical preparations for the beginning of continuous electronic trading at the end of October. The interactions with with exchange members in the planning of their strategies for the auction revealed that even the seemingly simple task of preparing to submit a bid required unusually close coordination between different parts of their organizations. Bidding in the auction enabled our members to establish robust internal systems for future emissions trading.

This is one example of how the discipline imposed by participation in a rules-based compliance system has been a catalyst for an immense amount of institutional capacity building. Members have gained direct, practical knowledge of potential climate change liabilities and how they may be most effectively mitigated. In drawing up their baselines, for example, companies have informed us that the prospect of scrutiny by their peers on the exchange and an audit of their data by the NASD, which is providing regulatory services to CCX, has forced them to pay the sort of attention to their environmental data normally reserved for reports to the SEC.

Also striking has been the way in which preparation for participation in the market has created a need for higher levels of integration between members' environmental, financial, legal and other departments. Professionals in environmental management have benefited from the high exposure that participation in CCX has given them at board level and within legal, finance and trading departments. Their profile has also been raised by the realization that an environmental department can now be a profit center rather than simply a compliance expense. The flip side is that senior executives, lawyers and finance professionals in some of North America's leading corporations have, in the run-up to trading on CCX, received an intensive education in environmental finance.

The auction has taken CCX closer to achieving several of the goals it set in the Chicago Accord which it marked its formal establishment. It has already demonstrated that a cross-section of North American private and public entities can reach agreement on a voluntary basis to enter into a legally binding commitment to reduce greenhouse gases and implement a market-based emission reduction program. Despite the fact that most people imagined that only a handful of companies, if any, would participate, CCX's members now include 22 major private, public and non-profit entities in multiple sectors and countries (including American subsidiaries of European multi-nationals, the City of Chicago, Tufts University and the World Resources Institute). They have made a binding commitment to use a rules-based market for reducing their greenhouse gas emissions (see Table 3 for a list of Founding and Charter Members of CCX). CCX is in the advanced stages of membership negotiations with numerous other organizations.

Clearly, CCX is already delivering on its stated goal of developing market infrastructure and the human capital in greenhouse gas emissions trading (see Table 4 for a list of key features of CCX). CCX's mechanism for developing and disseminating market information on an ongoing basis is its electronic trading platform, provided and serviced by the IntercontinentalExchange, a leading electronic venue for the trading of over 600 energy and metals commodities. The electronic trading platform, which will be launched at the end of October, is integrated with the CCX registry and clearing and settlement systems. The completion of the CCX rulebook also marks the first articulation of the structure and governance of a multi-sector and multi-national greenhouse gas trading program, including modalities of emission quantification, monitoring, verification, offset definitions and trading.

The leadership and vision of the Founding and Charter Members of CCX indicates the growing

belief that a pro-active approach to climate change is a sound business strategy. CCX is an immediate opportunity for GHG-emitting entities in North America to participate in a multi-sector, multi-national greenhouse gas emissions trading market operating as self-regulatory exchange. Voluntary efforts and pilot emissions trading programs are important because they can help inform the debate on the real cost of GHG mitigation, providing valuable information for policymakers, corporations and the public on the real costs of addressing climate change. CCX will offer an early test of GHG emissions trading concept on a scale with global potential.

Table 1: CCX Exchange Allowances available for each segment of the September 2003 Auction

	Exchange Allo	
Auction style	**2003**	**2005**
Discriminating Price	100,000 metric tons CO_2	25,000 metric tons CO_2
Average price	20,000 metric tons CO_2	5,000 metric tons CO_2

Table 2: CCX Auction Results
2003 Vintage Exchange Allowances
Discriminating Price Auction Results

Bidder	Bid Price ($ per metric ton CO_2)	Bid Quantity (metric tons CO_2)	Cumulative total sold (metric tons CO_2)
DuPont	$2.70	300	300
DuPont	$2.25	500	800
Baxter International	$1.90	400	1,200
DuPont	$1.75	800	2,000
Baxter International	$1.60	500	2,500
Stora Enso North America	$1.51	400	2,900
Manitoba Hydro	$1.50	4,000	6,900
DuPont	$1.25	1,000	7,900
American Electric Power	$1.20	12,500	20,400
Baxter International	$1.10	600	21,000
American Electric Power	$1.10	12,500	33,500
Stora Enso North America	$1.00	300	33,800
Manitoba Hydro	$1.00	4,000	37,800
Ford Motor Co.	$1.00	5,000	42,800
American Electric Power	$1.00	12,500	55,300
American Electric Power	$0.90	12,500	67,800
American Electric Power	$0.80	12,500	80,300
Stora Enso North America	$0.75	300	80,600
American Electric Power	$0.70	12,500	93,100
American Electric Power	$0.60	12,500*	100,000*

*Because this bid exhausted the available supply of 100,000 metric tons CO_2, the bidder was awarded the remaining 6,900 metric tons CO_2.

Weighted average price from 2003 vintage discriminating price auction: $0.98 per metric ton CO_2.

2003 Vintage Average Price Auction Bids

Bidder	Bid Quantity (metric tons CO_2)	Cumulative total sold (metric tons CO_2)
Baxter International	1,000	1,000
City of Chicago	200	1,200
Manitoba Hydro	10,000	11,200

2005 Vintage Exchange Allowances Discriminating Price Auction Results

Bidder	Bid Price ($ per metric ton CO_2)	Bid Quantity (metric tons CO_2)	Cumulative total sold (metric tons CO_2)
American Electric Power	$1.10	5,000	5,000
American Electric Power	$1.00	5,000	10,000
American Electric Power	$0.90	5,000	15,000
American Electric Power	$0.70	5,000	20,000
American Electric Power	$0.50	5,000	25,000

Weighted average price from 2003 vintage discriminating price auction: $0.84 per metric ton CO_2

No bids were received for the 2005 vintage average price auction.

Table 3 : Founding and Charter Members of CCX

Automotive
Ford Motor Co.

Chemicals
DuPont

Commercial Real Estate
Equity Office Properties Trust

Environmental Services
Waste Management, Inc.

Electric Power Generation
American Electric Power
Manitoba Hydro

Electronics
Motorola, Inc.

Food Processing
Premium Standard Farms

Forest Products Companies
International Paper
MeadWestvaco Corp.
Stora Enso North America
Temple-Inland Inc.

Technology
Millennium Cell

Liquidity Provider
Carr Futures
Natsource LLC
Evolution Markets LLC

Municipalities
City of Chicago

Non-Governmental Organization
World Resources Institute

Semiconductors
STMicroelectronics

Steel
Roanoke Electric Steel Corporation

Transportation
Amtrak

Pharmaceuticals
Baxter International Inc.

Diversified Manufacturing
Bayer Corporation

Private University
Tufts University

Table 4: Chicago Climate Exchange Key Features

Geographic coverage	U.S. emission sources and offset projects in the U.S. and Brazil. Sources and projects in Canada and Mexico to be added during 2003
Emission targets and timetable	Emission reduction commitments for years 2003 through 2006. Emission targets are 1% below baseline during 2003, 2% below baseline during 2004, 3% below baseline during 2005, 4% below baseline during 2006
Emission baseline	Average of annual emissions during years 1998 through 2001
Gases included	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6
Emission offsets	Landfill and agricultural methane destruction, sequestration in soils and forest biomass. Other project types accepted from Brazil
Early Action Credits	Credits from specified early projects to be included starting in 2004
Registry, Electronic Trading Platform	Registry will serve as official holder and transfer mechanism, and is linked with the electronic trading platform on which all trades occur
Exchange Governance	Self-regulatory exchange overseen by Committees comprised of members, directors and staff

The author is Chairman and founder of the Chicago Climate Exchange, Inc. and a Research Professor at the Kellogg Graduate School of Management at Northwestern University.

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Indonesia, Country of Many CDM Opportunities

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Indonesia is a developing country with a population of about 212 million making it the world's fourth populous country. The following information — obtained from the US Department of Energy — shows that Indonesia possesses a substantial energy sector both in terms of export and domestic consumption. It has proven natural gas reserves of 92.5 trillion cubic feet (Tcf), though the domestic gas market remains small. Despite significant natural gas reserves and its position as the world's largest exporter of liquefied natural gas (LNG), Indonesia still relies on oil and coal to supply most of its domestic energy needs. Indonesia currently has proven oil reserves of 5 billion barrels of oil, although reserves are declining. Indonesia has 5.92 billion short tons of recoverable coal reserves. Sumatra contains roughly two-thirds of Indonesia's total coal reserves, with the balance located in Kalimantan, West Java, and Sulawesi.

Indonesia has installed electrical generating capacity estimated at 21.4 gigawatts, with 87% coming from thermal (oil, gas, and coal) sources, 10.5% from hydropower, and 2.5% from geothermal sources. Most of the thermal power has been oil-generated though gas and coal have achieved an increasing share over the last few decades. Prior to the Asian financial crisis, Indonesia had plans for a rapid expansion of power generation, based mainly on opening up Indonesia's power market to Independent Power Producers (IPPs). The 1997 Asian financial crisis led to severe financial strains on state-utility Perusahaan Listrik Negara (PLN), which made it difficult to pay for all of the power for which it had signed IPP contracts. Most of these IPP contracts have since been renegotiated.

Indonesia offers a range of large- and small-scale CDM project opportunities for potential CER buyers. Indonesian companies, NGOs and the Government itself are knowledgeable about CDM – and many have been actively developing CDM projects under the principle of "learning by doing". Many major multinational energy companies – in partnership with the Government – operate in Indonesia as well and several are currently pursuing CDM projects of various types. At this time, approximately 20 projects are under development by project proponents ranging from large state-run companies to multinationals to small and large NGOs. Pertamina Geothermal (Perusahaan Tambang Minyak Negara Panas Bumi), which manages Indonesia's geothermal resources on behalf of the Government, and foreign companies have proposed a range of large 100 MW+ geothermal projects. PLN (Perusahaan Listrik Negara), Indonesia's state-run power company, has expressed interest in developing small-scale hydro for Indonesia's outlying rural islands as well as some larger gas fuel switch power projects. Multinational firms are pursuing gas fuel switch and geothermal power projects as well as efficiency projects, such as flare/vent reduction and cement production.

Indonesia's power demand is growing at 7% per year in recent years and this growth is expected to at least continue at that level. Margin reserves are below acceptable levels, particularly in the Java-Bali grid. Cheap coal is widely available in Indonesia. Given these factors, geothermal and gas power projects are arguably the most attractive means to produce significant Certified Emission Reductions (CERs) at this time while also producing direct and indirect sustainable development benefits by bolstering Indonesia's flagging power supply. Most major geothermal and gas power players are incorporating CDM into their geothermal and/or gas power development

plans, including PLN, Pertamina, Amoseas (ChevronTexaco), BP and Unocal.

Pertamina, who manages Indonesia's geothermal resources on behalf of the Government, either develops geothermal projects itself or cooperates with foreign developers under Joint Operating Contracts (JOC). PLN purchases power from the geothermal projects under long-term contracts. Currently, about 800 MW of geothermal power have been developed. In the next 10 years, the possibility exists to develop about another 1000 MW in N. Sumatra, Java/Bali, Sulawesi and Nusa Tenggara where demand for electricity is beginning to outstrip supply.

Gas power options are limited due to infrastructure constraints. However, isolated opportunities exist in parts of Java, southern Sumatra and E. Kalimantan. Plans are being made for gas distribution systems within and between Kalimantan, Sumatra and Java/Bali. If and when this happens, gas power projects will become more feasible and coal and oil use should decline markedly.

A key reason for the significant progress in developing real projects involving private companies or public-private partnerships may be the result of efforts of a local NGO named Yayasan Bina Usaha Lingkungan (YBUL) and its local partners. Since mid-2002, YBUL has aided project developers through targeted technical assistance and a series of public forums – in partnership with IETA — involving public and private project developers, Government officials and NGOs. Their efforts have directly fostered the development of quality projects as well as dissemination of market-oriented CDM knowledge. The final workshop was a regional CDM event in Manila held in September 2003, and organized in collaboration with IETA – the SE Asia Forum on GHG Market Mechanisms and Sustainable Development.

Although the Government of Indonesia has not yet ratified the Kyoto Protocol, Indonesia is among the most active and CDM-friendly countries in the Asia region. The Government formally approved 2 large projects prepared in response to the Dutch Government's Certified Emission Reduction Procurement Tender (CERUPT), one of which was offered a contract by the Dutch Government. This project, which is being developed by Magma Nusantara Ltd. project company, is a 110 MW geothermal project located in West Java. The Government has indicated that it would endorse World Bank Prototype Carbon Fund (PCF) projects and other projects provided they meet the Government's sustainable development criteria and are consistent with national priorities. The Dutch Government also recently offered a bilateral carbon purchase agreement to Indonesia, which is currently being considered by the Government. The Japanese Government and private companies have also expressed an interest in Indonesian CDM projects and are currently conducting analyses of several energy sector CDM projects.

Over the last 1.5 years, steps have also been taken to establish the Designated National Authority (DNA) institutional structure in order to approve projects in anticipation of Kyoto's ratification by Indonesia and Kyoto's entry into force internationally. Indonesia's Kyoto Protocol ratification process is advancing. Most analysts expect the Indonesian parliament to ratify the Kyoto Protocol, though the timing is unknown. Because the Presidential election will take place in mid-2004, it is hoped that ratification be addressed before the end of 2003. The UNFCCC focal point, the Ministry of Environment, has led the multi-stakeholder effort to create a viable DNA infrastructure. Most CDM institutional development progress has been on the Government's own initiative, but various bilateral capacity building assistance programs have aided their effort. The Dutch and German Governments have provided substantial capacity building assistance and others, like Japan, are considering it.

Notably, the Government has committed itself to creating a CDM project approval process that is transparent, clear and efficient in order to effectively compete with other countries to attract scarce CDM funds. It is taking steps to create a simple procedure and now claims that the entire CDM project approval process should take less than two months. Under the emerging process, CDM project developers must first submit their validated Project Design

Documents (PDD) to the Ministry of Energy and Natural Resource's energy sector CDM team for an initial assessment of sustainable development and consistency with national priorities. The team is made up of mostly Government officials, but also has NGO and state-run corporation representatives. The official representative sits in the ministry of Energy and Mineral Resources.

Upon their endorsement, the validated PDD and associated documentation is then submitted to a team called the National Climate Change Committee headed by the Ministry of Environment for final approval, including the formal letter. This group is made up of senior officials from most agencies of the Government as well as NGOs and state-run corporations.The official in charge sits in the Ministry of Environment.

Experience thus far has shown that the process can be completed within a few weeks and, secondly, that the two reviews – by the Ministry of Energy and Natural Resources and Ministry of Environment – are complimentary and do not significantly overlap. As the process becomes further refined and ultimately finalized, a commitment to a simple and efficient CDM approval procedure will be important. Special attention will need to be made to ensure that the two Ministries collaborate effectively and compliment one another's efforts. Upon Indonesia's ratification of Kyoto and its entry into force internationally, it appears Indonesia is set to become an active and significant participant in the global CDM market. Many CDM project proponents are eagerly awaiting these developments.

Founded in 1890, Unocal is one of the world's leading independent natural gas and crude oil exploration and production companies with activities in the U.S. and various countries around the world. Unocal is also a leading developer and operator of geothermal power in Southeast Asia. Unocal employs about 6,600 people worldwide.

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CDM market developments in South East Asia, the example of Thailand

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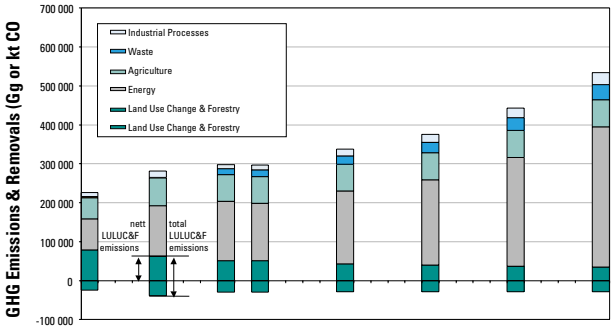
ERM

This paper investigates the host country aspects of the clean development mechanisms (CDM) market development and institutional set up processes taking as an example the case of Thailand. The analysis focuses on the process development and on the debate that arose after the Thai government initially delayed the implementation of the CDM due to disagreements on its benefits for Thailand. This example stresses that alongside the administrative burden to develop a CDM market lies an even more complex challenge, the host country's interpretation of the mechanism in terms of national benefits.

Thailand CDM National Strategic Study

The Thai government has been an active player in the development of the Kyoto Protocol and, as a first step in the development of a CDM market within Thailand, agreed in 2001 to carry out a CDM National Strategic Study (NSS) under the World Bank NSS program[1]. The National Strategy study[2] analysed Thailand's potential for emission reductions, identified sectors and types of projects in line with Thailand's sustainable development priorities, set institutional requirements, identified needs for capacity building, gave results on the potential market for Thai CDM credits and it made recommendations on how to attract investors.

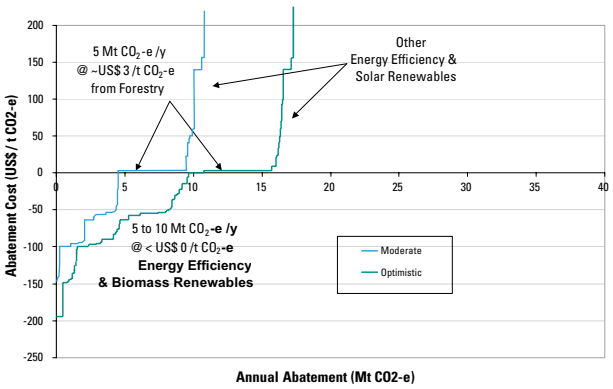
Figure 1: Historical and projected GHG emissions by sector in Thailand, 1990-2020.



Note: Historical data is for 1990, 1994, 1998 and 2000 and projections are the medium case for 2005, 2010, 2015 and 2020.

The NSS identified marginal abatement cost curves and types of CDM projects supportive of Thailand's strategy and planning directions, contributing to the country's sustainable development priorities, and attractive to investors (Figure 2 and Table 1). The inclusion of afforestation projects was subsequently criticised for the risks they pose to land use patterns.

Figure 2: Thailand marginal abatement cost curve.



Note: Marginal abatement cost curve without Major Generation Fuel Switching.
Source: Thailand CDM National Strategic Study, World Bank, 2002.

Table 1: Types of CDM projects

- Biomass renewable energy;
- Biogas renewable energy;
- Boiler feed-water system retrofit/Steam pressure reduction/Steam piping insulation/Blow down system retrofit;
- Steam trap retrofit/Boiler retrofit;
- Economiser for boiler/Steam leakage reduction/Condensate tank retrofit;
- Combustion efficiency improvement;
- Afforesting abundant agricultural land and poor forest;
- Production process improvement - non-metallic and paper industries; and
- Chiller system retrofit.

Source: Thailand CDM National Strategic Study, World Bank, 2002.

Analysis of market demand for Thai CDM credits was made using ERM WHETHER's model[3]. Results showed that sales of Thai permits could range from 70 Mt CO_2eq when both demand and supply are restricted, to 150 MtCO_2eq in a free market void of constraints. In terms of monetary transfers net revenues[4] could vary between $163 million and $542 million, with the highest figures under conditions of high demand. The model results also showed that there was a clear market signal that the earlier options could be developed, the greater the chance that permits generated could be sold. Based on these results the Thai government was concerned that the current and projected market prices, especially following the withdrawal of the US, do not represent "fair" prices for credits that would allow Annex I countries to achieve their commitments. There was also some concern that the total suggested potential for CDM investments in Thailand was not as significant as anticipated.

Debate on the implementation of the CDM strategy

In a first positive announcement following the ratification of the Kyoto Protocol by the Cabinet in August 2002, the Science, Technology and Environment Ministry was asked to act as the CDM Designated National Authority (DNA). The DNA was to be set up within the Office of Environment Policy and Planning (OEPP), previous focal point for CDM, under the ministry's International Environment Division.

However, to the surprise of the international community, ten days after ratifying the Kyoto Protocol in August 2002 and designating OEPP as the CDM National Authority, and regardless of strong interest from investors, the cabinet announced, in September 2002, delays in the assessment of proposals from developed countries that wished to invest in projects reducing greenhouse gas emissions in exchange for emission credits. The government also announced that sink projects will not be accepted at this early stage as CDM projects in Thailand, however this direction may be clarified after COP9. The delays arose due to lack of consensus on how best to promote Thailand national interest through CDM and due to on-going restructuring of the Thai government. Following this announcement, and due to government restructuring, the creation of the DNA and the definition of the requirements for a CDM market were delayed. The cabinet proposed that, while Thailand was preparing its CDM DNA and defining its CDM requirements, CDM projects could be brought up to the cabinet on a project by project basis. Thai CDM requirements have slowly been clarified after systematic and comprehensive debates have taken place on the issue and work on the creation of the DNA is taking place now that the restructuring of the government has been finalised.

The arguments put forward by the Thai cabinet to explain it's decision included questions of aforestation and reforestation projects' impacts on Thai land use practises, the determination to save "low hanging fruit" emission reductions for the time when Thailand will be asked to take on targets, the key question of the equity of current market prices, and the fact that a reliable national body was not yet in place to screen the CDM projects. These issues started a long debate over the CDM issue.

Carbon sinks project in particular lead to a strong controversy. They were seen as potentially harmful to developing countries, as it was not clear whether the recipients must be obliged to

compensate the rich countries if the reforestation projects proved to be unsuccessful and they were disqualified from claiming the carbon credits. Moreover the argument that these could present cheap sources of credits for when Thailand would be required to take on emission targets was highlighted. Disagreeing with the government over this issue, the Democrats in the opposition asked for a revision of the decision. However, they agreed to adhere to legal experts' recommendation against the use of reforestation or afforestation that could impact land use patterns[5] . Sink projects are not likely to be included in the initial phase of Thai CDM development until clearer technical and financial rules are established.

Impact on investors

This debate meant that, despite Thailand's ratification of the pact in August 2002 and potential Thai CDM projects from various countries, mostly in the energy sector, lining up to apply for carbon dioxide emission credits, the implementation process of a CDM market in Thailand has faced a lengthy delay and investors were forced to wait for Government clarifications.

Thailand is generally seen by international investors as an attractive place to invest in projects due to its political stability and current strong economic growth. Before and even after the debate arose, a series of investors were actively looking at potential projects and starting working on writing PDD for these projects. For example, the Japanese Mitsubishi Research Institute (MRI), under its "Carbon Offset Initiative[6]" was aiming to carry out a full feasibility analysis of potential CDM projects in Thailand, aiming to identify projects and develop PDDs to be submitted to the DNA.

In June 2003, a bid by a Japanese power development firm, Gulf Electric, who claimed 60,000 tonnes worth of carbon credits from its investment in a biomass power plant in Yala province, was unsuccessful. According to the Natural Resources and Environment Department, the Yala power plant had passed its environmental impact assessment, and had the potential to become a CDM project. Finally, the project did not pass the screening review as it was considered to be 'business as usual' and thus was not accepted as a CDM project. In the end, Gulf Electric decided to go ahead with the 800 million Baht project without CDM. This example sent a precaution signal to investors who felt that the absence of definite criteria for screening CDM was hindering the creation of a Thai CDM market.

Putting an end to the debate, in July 2003, the government gave assurance on carbon credits by clarifying that Thailand would consider carbon credit trading offers from developed nations but it would be *selective* about which deals to pursue. The Ministry of Natural Resources and Environment conferred that they had a positive view toward CDM at a CDM Forum talk held in August, highlighting that one reason for the delay, amongst others, was the restructuring of the Thai Government office in October 2002. The government emphasised that it will select only deals that use "appropriate" technology, emphasising public participation and sustainable development. From the economic perspective, it also stated that the price offered must be more than the going rate of US$5 per tonne, as "Thailand will not sell its emission quota at a fire-sale price". In July 2003, the new national committees on climate change have been appointed as well as a working group to oversee the establishment of the CDM designated national authority, DNA. These final announcements sent a clear signal to investors interested in the CDM in Thailand that the market was opening and clarified what investors could expect in the Thai CDM market. Despite the strong requirements from the government, investors are still keen to go ahead with CDM projects in Thailand.

The royal Danish government is currently working with ERM to roll out a call for CDM project ideas in Thailand. Key meetings are due to take place early October 2003 to start the call for a proposal process. This program going ahead is a clear indication that, despite the delays, western governments and companies still see Thailand as a good and interesting place for CDM projects development.

The Thai story, what can we learn?

This story gives a very good example of key host country issues that can arise in the development of CDM markets. All the issues raised by the Thai Government: lack of demonstrable action by Annex I countries, controversy over aforestation and reforestation, will to save cheap emission reductions to use them in achieving potential future targets and the will to wait for fair prices for its emission reductions are very interesting as they could be made by many of the countries that have attractive markets for foreign investors.

The issues should be differentiated for a proper analysis. The case for saving "low hanging fruit" may be weak as there is a high probability that today's emission reductions may be obsolete and not recognised in later commitment periods. This policy therefore risks forfeiting revenue altogether and losing out on technology transfers and on opportunities to implement sustainable development priorities now. Moreover using the argument of early action and commitment to the spirit of the treaty would be a better argument for negotiating any future commitment.

The debate also demonstrates the difficulties aforestation and reforestation projects will face as the uncertainties associated with measurement of carbon capture present un-acceptable risks for host countries. The problems arising with one type of project should not, however, hinder the entire CDM process in a country. Instead, host countries should use their right to define CDM criteria, ensuring that their sustainable development priorities and other key national issues, such as land use patterns, are taken into account. Investors have no leverage over these issues and should always check with the DNA what types of projects will be in line with the country's requirements.

On the other hand, the issue of a "fair price" for emission reductions raised by Thailand is important from an equity perspective. The current CDM market, still in its early stages, does not provide a good incentive (high prices) for host countries, or for local and international actors to invest in CDM. However, with the emergence of legal requirements in Annex I countries such as the EU[7], Japan and Canada, the demand for CDM credits will increase and it is expected that prices will evolve in line with national penalties for non-compliance under the various national schemes. Certain host countries may decided to wait until market prices for CDM reach a level perceived as "fair" under the commitment of Annex I countries. This, in turn, could delay the development of the market.

The Thai example demonstrates the complex issues associated with the development of CDM markets, especially in those host countries which investors are interested in the most. For investors, this could mean delays in implementation of projects, or refusal to have such projects validated, before the country concerned has clarified its interpretation of CDM and set a clear validation process. Eventually, they may have to wait until the market matures, ensuring higher prices. This should remind us of the importance of host country considerations in the development of a CDM market, especially considering that it is easy to imagine such debates taking place in other major CDM host countries such as India and China.

Thailand is a very good example to review these issues because the government and its lead agency, The Ministry of Natural Resources and Environment, have shown remarkable diligence in this area, understanding the key issues and taking a comprehensive and systematic view to address national concerns. The debate was handled in a systematic way, analysing all the issue and ensuring that Thailand national interests were preserved, with significant debate taking place at cabinet level. Despite the delays, the outcome of the debate is a much clearer definition of Thailand CDM requirements that take into account national interests and opens up a transparent market for CDM.

ERM is one of the world's leading environmental consultancies, with a proven team of international experts in climate change and a high degree of technical expertise in economic modelling and analysis. ERM works worldwide with business to identify risks and opportunities related to greenhouse gas emission constraints and new carbon trading regimes.

1 Thailand CDM National Strategic Study was funded by the Government of Australia under the umbrella of the World Bank CDM NSS programme.

2 for which ERM was the consultant

Source: Thailand CDM National Strategic Study, World Bank, 2002

3 ERM's WHETHER, When to Emissions Trade and How to Estimate Risk, is a global carbon market simulation model, developed and maintained entirely by ERM.

4 It should be noted that these net revenue figures include provisions for transactions costs and the CDM Levy.

5 According to Phetchaburi Democrat MP Alongkorn Polabut, Bangkok Post, GENERAL NEWS - Wednesday 2 October 2002, "Democrats in bid to sway govt on CDM".

6 The aims of the initiative are to find and evaluate commercially viable projects that result in emission reduction; to explore opportunities to expand businesses related to credit trading, and; eventually set up a pilot system to assess, trade and verify credits from such projects.

7 The EU Emission Trading Directive will enter into force in January 2005, setting absolute reductions to main GHG emitters across a series of sectors of the economy.

22

An Overview of the Current South African Climate Change Position

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Eskom
Lwazikazi Tyani & Kelebogile S Moroka
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Introduction

Global climate change is probably the greatest environmental challenge facing the world this century and is more about serious disruptions of the entire world's weather and climate patterns, including impacts on rainfall, extreme weather events and sea level rise, rather than just moderate temperature increases. There is little scientific argument about whether there will be global climate change impacts. It is rather the size of the impacts and their implications that remain uncertain. In general, the developing countries are most at risk from the impacts of climate change, due to the fact that they often have their own specific vulnerabilities which they are unable to combat to any significant extent on their own due to resource constraints.

For Southern Africa, sub-continental warming is predicted to be greatest in the northern regions. Temperature increases in the range of between 1^{o}C and 3^{o}C can be expected by the mid 21st century, with the highest rises in the most arid parts of the country. Of greater consequence for South Africa, as a semi-arid country, is the prediction that a broad reduction of rainfall in the range of 5% to 10% can be expected in the summer rainfall region. This will be accompanied by an increasing incidence of both droughts and floods, with prolonged dry spells being followed by intense storms. A marginal increase in early winter rainfall is predicted for the winter rainfall region of the country. South Africa is also a significant exporter of coal and would be impacted by a down turn in the international coal market as a result of global greenhouse gas mitigation measures.

The South African Government ratified the United Nations Framework Convention on Climate Change (UNFCCC) in August 1997 and acceded to the Kyoto Protocol in July 2002. In order to fulfil the requirements of the UNFCCC, South Africa has prepared an Initial National Communication to the UNFCCC, in accordance with Article 12 of the convention, although as yet unpublished officially. In addition, detailed South African Country Studies reports have been compiled on a sectoral basis. Using the results of this work, together with information from the Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report (TAR), the Department of Environmental Affairs and Tourism (DEAT) has developed a national climate change response strategy which is shortly to be presented to the National Assembly for approval. The objective of this strategy is to support the policies and principles laid out in the Government White Paper on Integrated Pollution and Waste Management, as well as other national policies including those relating to energy, agriculture and water.

National Climate Change Response Strategies and CDM

National climate change response strategies have been designed to address issues that have been identified as priorities to deal with climate change specifically in South and Southern Africa. Whereas any national strategy must recognise international realities, including the growing pressure for quantified commitments of some kind by developing countries, they must be seen within the context of the present economic realities of the country and the inequitable distribution of global wealth. Thus the point of

departure reflected in an effective national response strategy must be to achieve national and sustainable development objectives, whilst simultaneously responding to climate change to avoid negative impacts in areas of specific vulnerability. Thus a key element is to promote sustainable development utilizing various mechanisms and, in particular, it is recognized that the Clean Development Mechanism (CDM) of the Kyoto Protocol could play an important role.

Key Issues and Problems

DEAT, as the lead agency for climate change response in South Africa, recognizes that climate change is a cross cutting issue that has ramifications for diverse activities in other government departments. This implies that a cooperative interdepartmental approach to climate change will be essential to ensure that response measures are properly directed, acceptable to all and carried out with a national focus. In the case of the CDM, such activities need to support the existing trade development and investment strategies as directed by the Department of Trade and Industry (DTI) as well as the energy policies of the Department of Minerals and Energy. Thus a partnership between DEAT, DTI and DME, at the very least, will be essential for the development of a successful programme to implement the CDM in South Africa. Other departments and stakeholders, such as the National Departments of Transport, Agriculture, Water Affairs and Forestry, Health, Housing and several others will also need to be brought into the process, depending on the specific nature of a given proposed project.

The South African Government's national priorities include, inter alia, the creation of employment, the alleviation of poverty and the provision of housing, which implies a commitment to the process of sustainable development and advancement. Thus projects such as energization through comprehensive electrification schemes, both grid and non-grid, can continue to be important catalysts in this process. South Africa's position is to view climate change response, including carbon emissions trading, as offering just one specific avenue of opportunity for achieving the sustainable development objectives of those national policies and legislation that are concerned simultaneously with both development and environmental issues. At the same time, international action on climate change can be viewed as a significant vehicle to redress the historic, inequitable and unsustainable north/south divide of the world's economy and prosperity. In support of this objective, South Africa's national climate change response programme strongly supports the New Partnership for African Development (NEPAD). There are many benefits to be derived in integrating climate change response programmes across national and regional boundaries, to serve common areas of interest and to maximize the utility of available resources, and carbon emissions trading could play a useful role in this process.

According to the TAR, not only is climate change already happening, it will continue to happen even if global greenhouse gas emissions are curtailed significantly. There is now more confidence that global climate change is a threat to sustainable development, especially in developing countries, and this could undermine global poverty alleviation efforts and have severe implications for food security, clean water, energy supply, environmental health and human settlements. South Africa must thus be considered vulnerable to climate change impacts and it will thus be necessary to carry out adaptation measures. The most vulnerable sectors have been identified as health, maize production, plant and animal biodiversity, water resources and rangelands and these are the areas that need to be targeted initially for adaptation measures. Further, the South African economy is vulnerable to the possible response measures that may be implemented by Annex I (developed) countries, since the economy is highly dependent on income generated from the production, processing, export and consumption of coal.

South Africa, as a non-Annex I (developing) country, is not required to reduce its emissions of greenhouse gases in terms of the Kyoto Protocol. However, as the South African economy is highly dependent on fossil fuels, there could be benefits to be derived from adopting a future strategy that is designed to move the economy towards a cleaner development path. Thus there

is definitely a potential for the CDM and carbon trading in general in South Africa. This will require the rapid development of the national climate change strategy to access investment through the CDM, technology transfer and donor funding opportunities. Further, even given this scenario of moving towards a cleaner production path, emissions can still be expected to increase with economic development, albeit at a smaller pace than would have happened without intervention. This would tend to emphasize the market for carbon emissions trading. DME has developed a draft white paper on renewable energy and clean energy development as well as an energy efficiency programme to support the sustainable energy programmes proposed therein. Early CDM projects will almost certainly focus on low cost credits while working through existing investment routes and given these factors, the energy sector can provide several potential opportunities for CDM projects as expected. However, as a word of caution, some interventions may be necessary to ensure that small capital value projects, bringing benefits at a community level, are given a fair chance to get CDM funding alongside large scale capital intensive projects.

Climate change research needs to be properly co-ordinated and the benefits optimised to meet the needs of policy makers in South and Southern Africa. Attention needs to be focussed on such projects that will assist with the mitigation of, and adaptation to, climate change and address specific areas of vulnerability, whilst providing for the capacity building and skills transfer needed to operate and maintain such projects. Development and demonstration projects may be required to show the advantages and acceptability of a variety of specific technologies related to climate change to avoid South Africa taking on unproven and unworkable technologies to its detriment and the CDM could be used advantageously for this purpose.

Climate Change Obligations and Sustainable Development

South Africa, as a signatory to the UNFCCC, has to fulfil certain international obligations while other measures can be of a voluntary nature. Many of these can be seen to be consistent with a sustainable development path for the country.

There would thus seem many areas where emissions trading, amongst other measures, could become a specific part of international climate change co-operation between South Africa and several Annex I countries, particularly in the technology area, given the provisos already discussed. The challenge for the country is to implement policies that are appropriate to its own national objectives and the need to accelerate service delivery from the government sector. This notwithstanding, South Africa, as a developing country, could feasibly meet its obligations under the convention and, further, participate in the global change challenge through assistance from developed country parties.

It is thought that these actions will help South Africa achieve sustainable development objectives, while also fulfilling the need to respond to climate change. Specifically, CDM projects could provide a useful component for meeting the challenges when the Kyoto Protocol enters into force. There is currently much international interest in potential CDM projects that could be undertaken in South Africa in a wide variety of applications.

Priority Interventions

South Africa needs to accelerate its national climate change response programme to avail itself of the potential advantages that could stem from international action on climate change, whilst at the same time minimizing its vulnerability to such events. The following list contains a number of suggested priority interventions that cut across the entire spectrum of possibilities for climate change response actions for South Africa:

- Enhancing the capacity of national government to facilitate CDM projects by setting up a secretariat within the DME. This secretariat would function as the Designated National Authority (DNA) and, as already stated, would include extensive cooperative governance. This can be expected to happen within the next 3 months.

- Ensuring co-operation, co-ordination and the buy-in of all stakeholders to the climate change programme.
- Using climate change response to support sustainable development objectives. Sustainable development criteria have already been developed and work-shopped with a broad stakeholders' forum.
- Supporting the DME in the implementation of its national sustainable energy strategy.
- Screening projects and proposals to ensure that they promote national development objectives, even though they may also serve foreign and international interests as well and noting that the objectives of other environmental conventions and protocols, including the United Nations Convention on Biodiversity (UNCBD), the United Nations Convention to Combat Desertification (UNCCD), the Vienna Convention for the Protection of the Ozone Layer and the Ramsar Convention also need to be considered when evaluating projects and proposals.
- Raising awareness of climate change and its likely impacts so that actions can be initiated at all levels that will modify behaviour and foster a sense of responsibility at all levels of society.
- Promoting the use of donor funding to address vulnerability and adaptation issues.

Potential Projects

There appears to be several attractive possibilities for projects involving carbon emission offset funding in South and Southern Africa, providing there is a sustainable market for credits within the current European Union (EU) trading range of around Euro 10/t CO_2(e). Some of the larger projects could be viable with lower carbon trading values, although it is difficult to estimate the bottom end range for viability. Such projects include:

- New projects using gas as the primary fuel.
- Clean coal power generation.
- Re-powering.
- On and off-grid electrification.
- In situ coal gasification.
- Industrial energy efficiency.
- Commercial and domestic energy efficiency.
- Renewable energy projects including solar & wind power between 1 and 100MW in size.
- Off-grid projects, including micro-hydro, solar, wind and micro-geothermal energy, which promote community development.

This list is hardly exhaustive but does give an idea as to what could usefully be investigated.

Conclusion

Primarily, the country's main developmental needs will have to be met by domestic savings and investment, foreign direct investment, donor agency and UN funding. However, the CDM could make important contributions to both development and environmental issues. In its current stage of development, South Africa's national climate change response strategy essentially consists of a proposed broad framework for action and, as such, represents a starting point for such action. It does not, and cannot, contain detailed action plans with defined timescales. These can only be formulated meaningfully on a case by case basis, given the ever changing political backdrop to climate change, technological progress and the robustness of the assumptions about what can be expected to transpire from the international negotiation process, together with the relevant commitments that are likely to flow from them. While it is extremely important to understand the reality and constraints of the South African economy, no door is closed to any action based on sound economic principles, which can bring tangible benefits to the country and its people. To this end, there is no need to embrace an overly conservative approach to climate change response, even though both the physical and economic vulnerability of the country needs to be duly acknowledged. There is no doubt that the next few decades will see major changes, not the least of which will be technological progress. History teaches us that what is far-fetched today will be common practice tomorrow. Thus the developed nations of the world, with their immense capital reserves, need to be encouraged to develop appropriate technologies to mitigate global climate change. South Africa, as an integral part of the developing world, should always be willing to accept new develop-

ments, as they become appropriate to achieving its national goals and objectives. There is therefore a large potential for organisations and institutions from developed countries to undertake climate change related ventures in South Africa. This is particularly true given the fossil fuel base of the South African economy and the relatively developed industrial infrastructure on the one hand, and the overwhelming need for development on the other to eliminate intrinsic poverty. Concrete engagements in this regard, including projects that involve carbon emission offset funding, are thus to be encouraged. There is significant potential for such projects in South Africa

Eskom is a publicly owned power utility company which has an installed generating capacity of 40GW and a transmission grid system consisting of 325km of power lines with operating voltages of up to 765 kV. It generates about 95% of the electricity used in South Africa and over 50% of that consumed on the African Continent as a whole. Amongst other notable achievements, Eskom received the 2001 Power Company of the Year title at the Global Energy Awards.

The Department of Environmental Affairs and Tourism's vision is to lead environmental management and tourism in the interests of sustainable development and to contribute to the improvement of the quality of life of all South Africans through, amongst other measures, promoting the sustainable development, utilization and protection of natural and cultural resources, fostering equitable access to the benefits derived from natural and cultural resources and ensuring that all international participation and obligations are undertaken in the context of South Africa's environmental policies and principles.

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Latin America possibilities on the carbon market

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Introduction

This paper aims to provide an overview of the potential market for clean development mechanism projects, CDM, in Latin America. In order to do so, it looks at several international studies to determine the potential extent of CDM investment in the region. Finally, the paper concentrates on several examples of how Brazil, the most proactive country in the region, is preparing to take advantage of the opportunities presented by the carbon market.

Clean Development Mechanisms potential for Latin America

On its report for Latin America and Caribbean countries, ECLAC[1] estimated as a conservative assumption that between 500 to 1000 MtC/year (3,670 M tCO_2eq) Greenhouse Gas (GHG) emission reductions will be required globally in the first commitment period of the Kyoto Protocol to achieve Annex I countries targets (see table 1). A second more pessimistic scenario estimates requirements varying between 600 to 1300 MtC/year.

Table 1: Estimate of emissions reduction for annex I countries

GHG - millions of tons of equivalent carbon - MtC/year

	USA	Japan	Europe Union	Other OECD Countries	Eastern Europe	Ex-USSR	Total Annex1
Scenario 1	666	111	388	122	20	-28	1306
Scenario 2	461	71	60	58	17	-76	666
Scenario 3	403	65	103	51	30	-44	651
Scenario 4	424	71	29	60	15	-80	599
Scenario 5	679	79	150	116	-18	-275	1023

Note: Most studies looking at emission reduction projections present a wide range of variation (up to 50% variation index).

In the past, the Brazilian government negotiators for the Kyoto Protocol estimated in a conservative scenario that emission reduction of approximately 900 MtC/year or 3.303 $MtCO_2eq$/year will be needed by Annex I parties to achieve their commitments in the first commitment period.

Based on a series of sources ECLAC estimates that for the first commitment period around 12% (see Table 2) of global emission reductions will be achieved through flexible mechanisms, equivalent to about 80 to 180 MtC/year. This will be equivalent to a global demand for emission reductions from flexible mechanisms in the first commitment period varying between 400 to 900 MtC or 1.4 to 3.3 billion tCO_2eq.

Table 2: Estimated distribution of CDM investment

- China - 50%
- EX-USSR - 12%
- India - 12%
- **Latin America - 12%**
- Eastern Europe - 6%
- Others - 8%

Note: when projecting the distribution of investments, the study takes into account the investors' interests in JI projects; "hot air" (available through Emissions Trading with Eastern European countries); and the capacity for CDM projects in China and India.
Source: ECLAC "Oportunidades para America Latina y el Caribe dentro del MDL" (2001)

Finally, ECLAC, based on its conservative scenarios, estimated that Brazil's contribution to a total demand for emission reductions coming from Latin America and the Caribbean of 103 MtC/year would be about 22 MtC/year.

Table 3: Estimated Volume of CDM Market in Latin America (MtC/year)

	Volumes Latin America	Volumes Brazil	(US$) Latin America	(US$) Brazil
Expected Level of Implementation	103	22	3400	890

Source Gr tter (National Strategy Studies) - World Bank - cert

Notes: These results assume international GHG trading without restrictions and with the inclusion of sinks under the CDM. Volumes are expressed in MtC.

For comparison purposes, the WBCSD, in its report "The Clean Development Mechanism: Exploring for solutions through learning by doing" (2000), gave two estimation for demand for credits through Joint Implementation (JI) and the Clean Development Mechanism (CDM) that were somehow higher:

- One scenario estimated a demand for flexible mechanisms of about 1,9 billion tCO_2eq/yr, or 9.5 billion tCO_2eq for the first commitment period, 2008- 2012.
- Another scenario, estimating that Annex I countries will be more proactive and achieve more reductions at home, forecasted the demand for flexible mechanisms to be below 0.95 billion tCO_2eq/year, or 4.75 billion tCO_2eq in the first commitment period, a number closer to ECLAC high estimate of 3.3 billion tCO_2eq.

An Overview of the current situation in Latin America

Latin American Carbon Program (PLAC): In May 1999, with the support of the Center for Sustainable Development in the Americas (CSDA), the Andean Development Corporation (Corporación Andina de Fomento/CAF - the largest development bank in South America), established the PLAC (http://www.caf.com) to assist its clients and shareholder countries to position themselves and participate in the development of the emerging carbon markets. The primary objective of this initiative is to contribute to the establishment of the carbon market, to assist in the definition and development of innovative financial instruments and mechanisms, and to promote the participation of the private sector in this emerging market.

Agreement signed between CAF and the Netherlands: CAF (Dutch CDM facility) announced that they have signed an agreement with the Netherlands establishing a facility to purchase GHG emission reductions. The Agreement CAF signed with the Netherlands' Ministry of Environment, Housing and Spatial Planning (VROM) will enable projects in developing countries to potentially increase their revenue stream via the purchase of emission credits under the CDM. CAF has a target of placing up to 10 $MtCO_2eq$ in projects over the next three years.

CDM and Bilateral Agreements with the Netherlands[2]: Despite the Netherlands' decision not to enter into agreement with UNDP, the programme supported numerous negotiations with Latin American countries. MOUs with the Netherlands have been signed with: Panama, Guatemala, Costa Rica, El Salvador, Columbia and Uruguay[3]. MOUs are pending in: Belize, Honduras, Nicaragua, Ecuador, Peru, Mexico and Bolivia. The Netherlands' goal is to purchase 125 $MtCO_2$. As of October 2002, approximately 70% of the purchases have come from Latin American countries.

First Round of CERUPT Projects: Projects presented to the Netherlands for approval include: 2 projects in El Salvador, part of a maximum total of 5 million tons of CO_2; 7 projects in Panama, part of a maximum of totals of 20 million tons CO_2; 7 projects in Costa Rica part of a maximum of 30 million tons CO_2eq. Projects will come from the following sectors: renewable energy and energy improvement; transportation improvement; recovery and utilization of methane; fossil fuels switching to less carbon-intensive sources.

CDM Transactions and the Latin American Contribution

By March 2003, 37 CDM projects in 17 non-Annex I countries have been approved by PCF and CERUPT. Among these, 21 projects resulting in 71% of total GHG emission reductions are based in Latin America. They include 6 projects in Costa Rica, 6 projects in Brazil and 3 projects in Panama and some in Bolivia, Chile, Colombia,

Nicaragua and Peru (see table 5 below). The average emission reduction per project amounts to nearly 2 $MtCO_2eq$.Three very large projects significantly influence the average size of the reductions:

- fuel switch project in Brazil (21 $MtCO_2eq$)
- sinks project in Brazil (12.9 $MtCO_2eq$)
- hydro project in Uganda (7.6 $MtCO_2eq$)

Under the PCF and CERUPT, the average price for CDM credits is in the range of 3-4US$ per tCO_2eq. It is interesting to note that the crediting period is 20 years for the PCF and 10 years for CERUPT.

Table 4: Contribution of JI and CDM projects to the global project portfolio

Geographic region	Projects [#]	Greenhouse gas reduction [MtCO2-eq]	[%]
CDM total	37	90.4	
Latin America	21	64.3	71.2
Africa	6	20.6	22.7
Asia	10	5.5	6.1
JI	16	12.2	
Total	53	102.6	

Table 5: Key information on CDM projects in Latin America with host country approval

Country	Program	Type	Description	Greenhouse Gas Reduction [tCO2-eq]
Bolivia*	CERUPT	Energy efficiency	Efficient gas plant	319.392
Brazil	PCF	Sinks & fuel switch	Charcoal from mono-culture plantation used instead of coal	12.041.356
Brazil*	CERUPT	Biomass	Retrofit CHP bagasse sugar mill; 15 M/	259.506
Brazil*	CERUPT	Gas capture	Landfill gas recovery	700.000
Brazil	NCDF, Japan	Fuel switch	Charcoal based steel production	21.000.000
Brazil	NCDF	Gas capture	Combustion and flaring credits	11.800.000
Brazil	VEGA	Gas capture	8MW power from landfill gas	5.208.344
Chile	PCF	Hydro	26 MW run-of-river.	2.812.000
Columbia	PCF	Wind energy	19.5 MW new capacity	1.168.000
Costa Rica	PCF	Wind energy	9.6 MW new capacity	327.000
Costa Rica	PCF	Wind energy	8.4 MW new capacity	300.000
Costa Rica	PCF	Wind energy	25 MW new capacity	204.000
Costa Rica	CERUPT	Hydro	7.5 MW new capacity	184.360
Costa Rica*	CERUPT	Hydro	35.4 MW new capacity	806.800
Costa Rica*	CERUPT	Gas capture	3 MW landfill gas.	97.850
Nicaragua	CERUPT	Biomass	electricity production	212.395
Panama*	CERUPT	Hydro	120 MW new capacity	3.575.927
Panama*	CERUPT	Hydro	in total 100 MW new capacity	366.923
Panama*	CERUPT	Hydro	increase capacity	261.000
Peru	CERUPT	Hydro	90.6 MW new capacity	2.158.917
Total				**63.803.770**

**Selected by Dutch government for contracting under CERUPT*

An Overview of the current situation in Brazil

In anticipation of the entry into force of the Kyoto Protocol, Brazil is preparing to create a local market for the negotiation of Certified Emission Reductions (CER). The proposed model for the implementation of this new market is being developed by FGV (Getúlio Vargas Foundation). The studies are commissioned by UNCTAD, the Brazilian Social and Economic Development Bank (BNDES) and the Ministry of Science and Technology (MCT). A high level commission composed of the Ministries and other governmental entities was set up in 2001. It is responsible for the procedures related to host country approval of CDM projects.

The Brazilian market - Biomass Energy

Biomass energy generation projects have a great potential in the Mid-West and North of Brazil, where small communities are not linked to the national grid. Their fossil fuel based energy could be substituted by biomass, inevitably resulting in positive changes in employment and income.

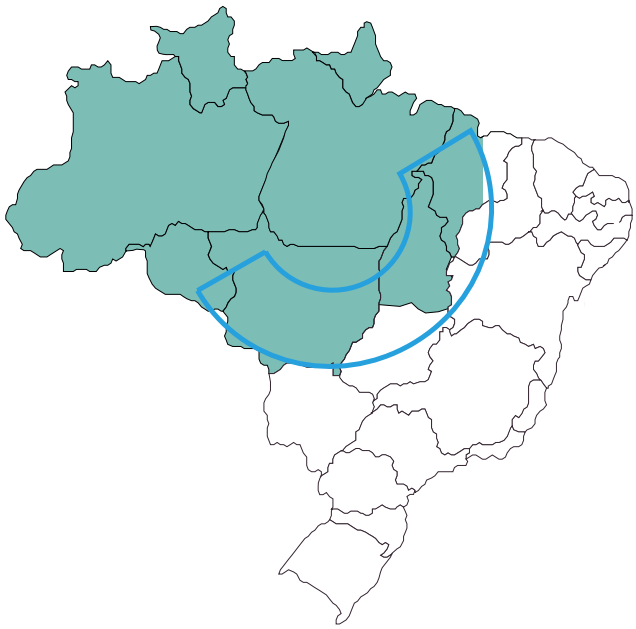
Many plants in the sugar cane and alcohol sectors have included CDM credits in their projects. Several projects on renewable energy from forest biomass are also underway. The biggest step for energy co-generation promotion is the option to sell excess energy to the national grid. Still, CENBIO (National Center of Reference in Biomass, 2002) calculated that, out of the potential production of 3,800 MW by 318 energy companies in Brazil (50 of which sell energy), only 158 MW are being produced.

The Brazilian Market - LULUCF

Because of its extensive territory, climate, soil characteristic and technology, Brazil has a vast potential for forestation and reforestation activities, creating an attractive investment environment for CDM land use and land use change (LULUCF) projects. In November 2001, the FNMA (National Environment Fund) started to select proposals for projects aimed at climate change mitigation and sustainable development. They approved 12 projects, 5 of which were LULUCF projects.

The Pre-Amazonic region of Northern Brazil, otherwise known as the "Deforestation Arch" (Figure 1 below), has great potential for LULUCF activities.

Figure 1: Potential for LULUCF in Brazilian regions.



A number of studies show that its baseline of low technology, low income/taxes, high environmental degradation, low human development index (HDI) and an unsustainable situation of pasture and abandoned pasture make it an ideal area for LULUCF projects. Indeed, a study by CVRD (Companhia Vale do Rio Doce) showed that, of the 450,000 Km^2 of Deforested Arch, 58,000 Km^2 had been deforested before 1990. It concluded that a reforestation project could fix 414 MtC. The table below provides an estimate of carbon stock values in Brazil.

Table 6: Carbon stock value estimates in Brazil

Carbon stock value estimates in Brazil			
Vegetation	Years	Carbon Stock (ton/ha)	Source
Pasture	-	3.4	Barbosa and Fearnside. 96
Regeneration Stage`	3 6 9 12	16 25 34 42	Alves et al. 1996 (direct measurement)
Improved Secondary Forest	40	152	Gra a. 1997
Primary Forest	-	172	Higuchi. 2000

The carbon market is already being taken into consideration in normal business transactions. For example, CVRD and an Annex I-based company have signed a shareholder agreement taking benefits from the CO_2 associated with industrial forests for charcoal production into account. The agreement contains a clause stating that any credits obtained under the Kyoto Protocol or any other similar protocol or legislation will be distributed to the shareholders in proportion to their ownership interest in the company.

Futures Market

According to Sandor and Walsh (2000), the carbon market will evolve until the futures market appears. The current state of the carbon market makes it impossible to guarantee that credits generated are commodities. This is mainly due to the fact that each project is individual and being negotiated on a case-by-case basis, rather than in a market exchange. CDM projects currently being carried out in Brazil are generating CERs that cannot be considered commodities yet, thus making it impossible to negotiate them as futures contracts, in an attempt to reduce the risks surrounding carbon prices.

Such a future market could emerge if the carbon market shows continuity, continuity which will depend on the establishment of reduction targets in the future commitment periods (beyond 2012) and on market instruments put into place to facilitate the fulfilment of such targets.

Companhia Vale do Rio Doce CVRD is the largest diversified mining company in America and the largest logistic operator in Brazil, in addition to participating in the electric energy generation segment. CVRD's competence, efficiency, and productivity are renowned worldwide. The Company's management model is grounded on the principles of clear role assignment, transparency, and stability, which are required for a real growth trajectory and the creation of value.

1 ECLAC - Economis Comission for Latin America and the Carribean.
2 Source: UNDP Workshop for Environment, Climate Change and Risk Management November 20th, 2002 San José, Costa Rica.
3 (www.cdmonline.org)

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