

Current issues in emission trading and global climate change policy *)

by

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and

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*) Summary Report of the Spring 2002 Meeting of the Emissions Marketing Association

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I. Introduction

This report summarizes presentations and discussions held at the Spring 2002 meeting of the Emissions Marketing Association (EMA) in New Orleans, USA. This association is a very active community of emissions traders (mainly in the US), regulators (from all over the world), and other industry experts (see the appendix for more information).

Discussions at the EMA meeting focused on a range of different topics. We start by summarizing the presentations on current developments on the largest active emissions market, the US SO₂ allowance market (section II). Directly related to this market is the energy market, and to understand completely what is happening on emissions markets, one needs to inquire into the products in whose production emissions are actually used. In the case of SO₂, this is mainly the energy sector, which was recently disrupted by the collapse of the largest energy trader, ENRON. Section III points out a fundamental issue that has been missed in the media coverage of the downfall of ENRON, namely the competition between two fundamentally different market models, a competition highly relevant for the design of tradable permit markets.

Sections IV and VI then focus on the developing greenhouse gas markets and their legal framework. A large part of the EMA meeting was devoted to this issue. On the one hand, people discussed recent developments concerning the *global* marketplace, both with respect to the ratification of the Kyoto Protocol (section IV.A) and the actual trading (section IV.B and IV.C). On the other hand, much interest was drawn to presentations and discussions of the most recent *domestic* emission trading scheme to achieve Kyoto requirements, namely, the UK emission trading scheme (section V.A). In addition, we also summarize the recent proposals of Canada and New Zealand to meet their own targets; drafts of these proposals were also discussed at the meeting.

Finally, let us note that this report is descriptive and is not meant to evaluate the discussions or the proposals made in the meeting.

II. SO₂ market update: Allowance auctions¹

Clearly, the most important emissions permit market is the US SO₂ allowance market (see Schneider and Wagner (2002b) and Stavins (2000) for summaries of experiences with that

¹ This section is based heavily on Sandor (2002a).

market). The SO₂ market is currently relatively slow. The slowness of the market and relatively low amount of trading should not suggest that the market does not help firms to achieve their environmental goals cost-effectively. As noted by Burtraw (1996), the option value alone of trading emission allowances is a considerable advantage of the program.

Because of the slowness of the spot market, discussions at the EMA meetings and conversations with industry experts focused mainly on the performance of the yearly allowance auctions. The 10-year experience of the US with these auctions (organized through the Chicago Board of Trade CBOT)) holds some important lessons for what can be expected for similar auctions in other, for example, European countries.

On March 25, CBOT held the 10th annual auction of sulphur dioxide (SO₂) allowances conducted by the Chicago Board of Trade (CBOT) on 25 March provided no surprises. But some people think it is newsworthy precisely because of its routine results

A decade is not a sufficient period to reach final judgement on a tool of public, social or environmental policy. However, during that time the price discovery and related information that is published by the CBOT has significantly altered the nature of the debate and possibly the future of emissions trading. Data provided by the CBOT provides us with both price discovery and a different kind of insight into the recent quiescent market (see

Table 1 and Table 2).

Table 1: Allowances available for auction

<i>Origin</i>	<i>Spot auction (first usable 2002)</i>	<i>7-year advance auction (first usable 2009)</i>
EPA	125,000	125,000
Privately offered	2,388	2,388
Total	127,388	127,388

Source: CBOT and EPA

Table 2: Spot auction results

<i>Allowances</i>	<i>Number of bids</i>	<i>Number of bidders</i>	<i>Bid price</i>
Bid for: 302,285	Successful: 46	Successful: 21	Highest: \$215
Sold: 127,388	Unsuccessful: 7	Unsuccessful: 6	Clearing: \$160.50 (the clearing price is the lowest price at which a successful bid was made)
Total	53	27	Lowest: \$150 Average: \$167.74 (weighted by the number of allowances in bids)

Source: CBOT and EPA

The clearing price in the *spot auction* was \$160.50 while the weighted average of winning bids was \$167.74. This was consistent with recent pricing in the over-the-counter (OTC) market. Furthermore, the difference between the highest and lowest bid was \$65.00, which compares with \$120.00 last year. The results confirm the reduction in OTC volatility that has occurred in recent months. The number of successful bidders was 21 while six were unsuccessful. This also reflected a more uniform set of expectations by market participants. By comparison, last year’s auction had 14 successful and 71 unsuccessful bids.

The clearing price in the *seven-year advance auction* was \$68.00 while the weighted average of winning bids was \$81.87 (see Table 3). Despite the proliferation of market intermediaries, the forward OTC market still appears to be inefficient and price discovery is insufficient, making price information from the CBOT forward auction even more important. The profile of price ranges and the relationship of successful to unsuccessful bids followed the same patterns as the spot auction. There was a greater range in bids than in the spot market but a narrower range than last year. In contrast to last year, there was also a similar ratio of successful to unsuccessful bids, as in the spot market. Furthermore, there was a higher number of successful bidders than last year.

Table 3: Seven-year advance auction results

Allowances	Number of bids	Number of bidders	Bid price
Bid for: 273,388	Successful: 13	Successful: 5	Highest: \$120
Sold: 127,388	Unsuccessful: 3	Unsuccessful: 3	Clearing: \$68 (the clearing price is the lowest price at which a successful bid was made)
Total	16	8	Lowest: \$60 Average: \$81.87 (weighted by the number of allowances in bids)

Source: CBOT and EPA

In a pattern that has continued for the last few years, the difference between spot and forward prices remained much higher than it was during the 1990s. Some market participants attribute this specifically to regulatory uncertainty. Others say it is due to general market uncertainty.

What do market participants and industry experts infer from this particular auction and the 10-year history? Most people agree that this year's results specifically suggest that the SO₂ market is functioning very effectively. Prices continue to be well below levels that were forecast in 1992. In that year, the median forecast was \$600 with a low of \$309 and a high of \$981. During the past 10 years, spot prices have averaged \$135.8 and forward prices \$106.1. This is well below what experts had predicted. Furthermore, sulphur emissions have fallen faster than required. Recent analysis by the EPA and others suggests that the total cost of the programme ranges from \$750 million to \$2 billion. Benefits range from \$25 billion to \$40 billion. The question that remains open is how much greater the gains *could* have been (Carlson et al. 2000). The judgement on the overall efficiency of the market is still out (Ellerman and Montero 2001, Wagner 2002).

III. Energy markets: Impacts of the ENRON collapse

Clearly, energy companies are strongly affected by emission trading programs like the SO₂ allowance program. Therefore, market participants are keenly interested in the impacts of the ENRON collapse on the feasibility of efficient energy and emissions markets.

Attendees of the EMA meeting did not focus as much on the stories of financial ruin and the loss of jobs and pensions in the wake of the ENRON collapse, but rather considered the

fundamental story behind (Sandor 2002b): the competition between two totally different market architectures.

In one of them, there is a dominant principal (buyer or seller) for a wide variety of energy and power products and their derivatives. That dominant economic actor provides liquidity in hundreds of products to thousands of participants. In the case of Enron, the principal appeared to have a virtually endless capacity to extend credit in all of these markets and to all of the participants. It appeared to be infinitely scalable in new products because the dominant player's corporate culture fostered innovation.

In the alternative market architecture, which has emerged over many centuries, there is either a significant number of bilateral trades in an over-the-counter (OTC) market or a centralised multilateral market. Principals, or their agents (brokers), consummate transactions relying on the creditworthiness of their counterparties. The creation of an independent clearing service occurred when the supply of credit could not satisfy the demand for credit. Increases in the capacity for credit were limited by the totality of capital of the individual participants and/or their clearing corporations. The scalability of new products in the bilateral market depends on the creativity of the individual buyer or seller. In the multilateral market new products' scalability depends on the innovative capacity of all buyers or sellers exercising their creative skills through trade associations or exchanges.

EnronOnline embodied the first type of market architecture . It was a dominant principal in the energy and power markets and their derivatives. It was commonly accepted by a significant part of the investment community that the company could dominate several existing and new markets. Enron came from relative obscurity to be the seventh largest corporation in the US in terms of sales. Its model seemed to be infinitely scalable with no credit constraints and a boundless ability to innovate. The proof lay in its market power in markets as diverse as natural gas, weather derivatives and bandwidth. The company's ability also seemed boundless because of the emergence of the internet – a key facilitating technology of the 1990s.

Enron's sudden demise was a surprise to most except for a few very wise short sellers. In retrospect, a simple study of a few commodity and capital markets would have revealed that this type of market architecture generally has a short life. Variants of this story occurred in both the grain markets and the bond markets during the 20th century. According to Sandor (2002b), "while the halcyon days of Enron captured huge amounts of attention, the second type of market architecture quietly proceeded to grow, transform and mature into a deep market that is effectively filling the gap left by Enron's collapse." Both the New York

Mercantile Exchange and the International Petroleum Exchange (IPE) – traditional examples of the multilateral, voice-brokered format – experienced substantial volume growth during the 1990s. The OTC markets continue to thrive and are being transformed by the introduction of new approaches to trading. In the latter part of the decade, the industry experienced a move towards electronic marketplaces. The Atlanta-based Intercontinental Exchange (ICE) and Tradespark are two examples of this new trend. At ICE, the number of participating firms and users soared by more than 400% last year, while the number of trades it executed grew 15-fold. With the acquisition of the IPE, ICE added a broad range of exchange-traded energy-based futures and options markets to its extensive roster of energy and metals-based OTC derivatives markets. Last year, ICE also signed an agreement to offer optional clearing services through the London Clearing House.

These recent events indicate a move towards a ‘fusion’ of these two types of OTC/multilateral markets. Though some may have feared that the collapse of a dominant player like Enron would have caused massive disruption to the market(s), this was not the case. After the firm’s demise its business was seamlessly transferred to other markets, as evidenced by the huge increase in deal flow at the ICE. Despite the fact that Enron’s collapse could have caused major disruption to the energy markets, this smooth transition during the busy winter trading season was barely noticed by the media.

Observers at the EMA meeting deduced the following conclusions:

- First, the collapse of the dominant player can cause financial ruin for its counterparties (in addition to its creditors, employees and community) and may introduce systemic problems that cause economywide damage.
- However, it is also a time when its market shares are divided among other participants. To the extent that trading migrates to public exchanges, market participants will benefit from more transparent prices and the steady flow of data on volume and open positions. The self-regulating markets may again enjoy expanded benefits from the market confidence provided by their systems of rules, checks and balances and exposure to external inspection. The results are greater profitability for the survivors and more efficient markets. It is the expectation of market participants in the US that this ultimately leads to lower transactions costs. Improved efficiency in these markets will help ensure economically rational allocation of energy resources.

IV. Developments on the global greenhouse gas market

Significant parts of the EMA meeting dealt with expectations of industry experts concerning the developments of the greenhouse gas markets. In this section, we deal with recent events in the realm of *international* environmental policy: recent developments concerning ratification of the Kyoto Protocol (section IV.A), the development of the Chicago Climate Exchange (section IV.B) and a brief description of the first swap of emission allowances in the international arena (section IV.C). Instead, section V focuses on *domestic* compliance strategies.

IV.A. Recent developments concerning the Kyoto Protocol

In a separate report, we describe in detail the outcomes of the most recent Conference of the Parties (COP-7) meetings in Marrakech (Schneider and Wagner 2002a). Here, we just highlight two very recent events that were not yet discussed at the EMA meetings.

IV.A.1. The situation in the EU

The European Union ratified the Kyoto Protocol on May 31, submitting its ratification instruments to the United Nations. EU Member States. Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom completed their domestic ratification processes in time for the EU deadline. The EU aimed for the May 31 deadline in order to make possible entry into force of the Kyoto Protocol by the World Summit on Sustainable Development in Johannesburg in August. Entry into force, however, is dependent on ratification by Japan and Russia to meet the required minimum representation of 55% of Annex I (developed) countries' 1990 CO₂ emissions by ratifying Parties.

With the recent ratification of the Protocol by the EU and Norway, the total number of countries having ratified rises to 70, surpassing the 55 threshold needed for entry into force. Annex I countries having ratified the Protocol represent 26.9% of that group's 1990 CO₂ emissions. Romania and the Czech Republic are the two other Annex I countries having ratified the Protocol.

IV.A.2. Japan

Japanese Environment Minister Hiroshi Oki announced on May 24 that the Cabinet would approve ratification of the Kyoto Protocol in June. He said that the Japanese

government would submit the country's ratification documents to the United Nations immediately afterwards. The Lower and Upper Houses of the Japanese Diet approved the Kyoto Protocol on May 21 and 31, respectively. They also approved a bill to revise the Law Concerning the Promotion of Measures to Cope with Global Warming, which outlines domestic measures that will be taken to achieve Japan's emissions reduction target under the Protocol. Government supporters of the Protocol aim to ratify the treaty before the World Summit on Sustainable Development in Johannesburg in August.

IV.B. Chicago Climate Exchange

The Chicago Climate Exchange (CCX) is a 2-year-old project with the goal of designing and implementing a voluntary 'cap-and-trade' market for greenhouse gases (GHGs). Participants at the EMA meeting were generally optimistic about the promise of this centralized exchange, although most acknowledge that it has a long way to go toward universal acceptance; there is no actual trading going on currently. One reason for optimism comes from the growing number of participants and, even more importantly, from the type of participants. Recent additions are of interest for three reasons:

- CCX's increasingly penetrates existing sectors in both the United States and Canada as well as European Union-based companies with North American operations. In the past half year, six new companies have joined from the power sector including three of the top 10 US utilities. The participants from this sector now account for 180,000 MW of capacity representing 20% of US generation. This is equivalent to the entire generating capacity of France. In Canada CCX has expanded to include OPG and Manitoba Hydro from the power sector. In the EU, the inclusion of Nuon adds to the exchange's design capabilities. Furthermore, Finland-based Stora Enso (the second largest forest products company in the world) is an important addition to the CCX forest products sector which already includes International Paper, Temple Inland and Mead.
- New participants have joined from Mexico and Brazil. A first Brazilian company, Cataguazes-Leopoldina, a leading generator of electricity based in the state of Minas Gerais, joined the CCX. Cemex, the largest Mexican cement company and the second largest cement company in the US, and Grupo IMSA de Mexico, a leading diversified steel and manufacturing group, have recently agreed to participate. Pronatura de Mexico, a major national conservation group, is joining as well.

- Finally, according to many observers, one of the most exciting new developments has been the addition of two major cities in North America – Chicago and Mexico City. The commitment of these two municipalities provides expertise to deal with GHG emissions from transportation systems as well as city-operated energy and power production. Cities also manage landfills, offering opportunities for the capture and destruction of methane, a major greenhouse gas.

Table 4 contains the current full list of participants.

Table 4: List of Chicago Climate Exchange participants as of March 2002

Energy	Industry	Service providers
Alliant Energy	Cemex	American Agrisurance
American Electric Power	DuPont	IT Group
BP	Ford Motor Company	Swiss Re
Calpine	Grupo IMSA de Mexico	Carr Futures/Crédit
Cinergy	Interface	Agricole
CMS Generation	ST Microelectronics	Forest products
DTE	Waste Management Inc	companies
Exelon	Offset providers	International Paper
FirstEnergy	Agriliance	Temple-Inland
Manitoba Hydro	Cataguazes-Leopoldina	Mead Corp
Midwest Generation	Ducks Unlimited	Stora Enso
NiSource	Growmark	Municipalities
Ontario Power Generation	Iowa Farm Bureau	City of Chicago
PG&E National Energy	Federation	Mexico City
Group	National Council of Farmer	
Pinnacle West Corporation	Cooperatives	
(APS)	Navitas Energy	
Suncor Energy	Nuon	
TXU Energy Trading	Ormat	
Wisconsin Energy	Pronatura de Mexico	
	The Nature Conservancy	

Source: Chicago Climate Exchange.

The Chicago Climate Exchange holds much promise for becoming a global hub of greenhouse gas emissions trading. It remains to be seen how well and fast the market will develop over the next few years.

IV.C. First swap in international arena²

On May 7, global energy company the Royal Dutch/Shell Group of Companies and Danish electricity supplier Elsam A/S announced the first swap of government-backed greenhouse gas emission allowances. Through the swap transaction, brokered by Natsource-Tullett Europe, Shell sold UK allowances and bought Danish allowances, while Elsam sold Danish allowances and bought UK allowances. Denmark and the United Kingdom are the only countries that have developed formal greenhouse gas trading programs to date.

Although regulatory fungibility (transferability) of these allowances has not yet been established, both Elsam and Shell see a compliance value in both Danish and UK allowances. Elsam has a mandatory cap under the Danish CO₂ Allowance system. Shell, which has facilities in the UK and Denmark, has taken on a voluntary cap under the UK Emissions Trading Scheme as well as a mandatory cap under the Danish system. By swapping their Danish allowances for UK allowances, Elsam will be able to bank its emissions assets into future compliance periods. In contrast to Danish allowances, which may not be bankable after the currently envisioned end of the program in 2003, UK allowances are bankable until at least 2007.

Industry experts at the EMA expect a growing number of similar trades in the near future.

V. Domestic measures to comply with international commitments

Despite the significant uncertainty concerning the ratification of the Kyoto Protocol, countries are preparing to fulfill their requirements should the Protocol come into action. If it does, countries only have a few years until the first compliance period, so their planning ahead today has considerable option value. A large part of the EMA meetings focused on the very recent launch of the UK emission trading scheme. We report in detail on this in section

² We would like to thank Natsource for providing the information contained in this section.

V.A. On the sides of the meeting, participants also discussed recent proposals by Canada and New Zealand. These are described in sections V.B and V.C.

V.A. UK emissions trading scheme³

V.A.1. Introduction

The UK emissions trading scheme is a new policy initiative which forms part of the UK Climate Change Programme. In the design of an effective emission trading program, many issues are important from a theoretical perspective. We refer the interested reader to the survey by Schneider and Wagner (2002b) for details.

Because the UK program is very new – it launched in April 2002 – it cannot yet be evaluated properly. Even industry experts need to get to know the specifics of the program better. The discussion at the EMA meetings focused mainly on practical implementation issues. Similarly, we also devote considerable space below to describe the administrative workings of the system. It will form an important model for other countries contemplating domestic trading as a means to comply with international commitments.

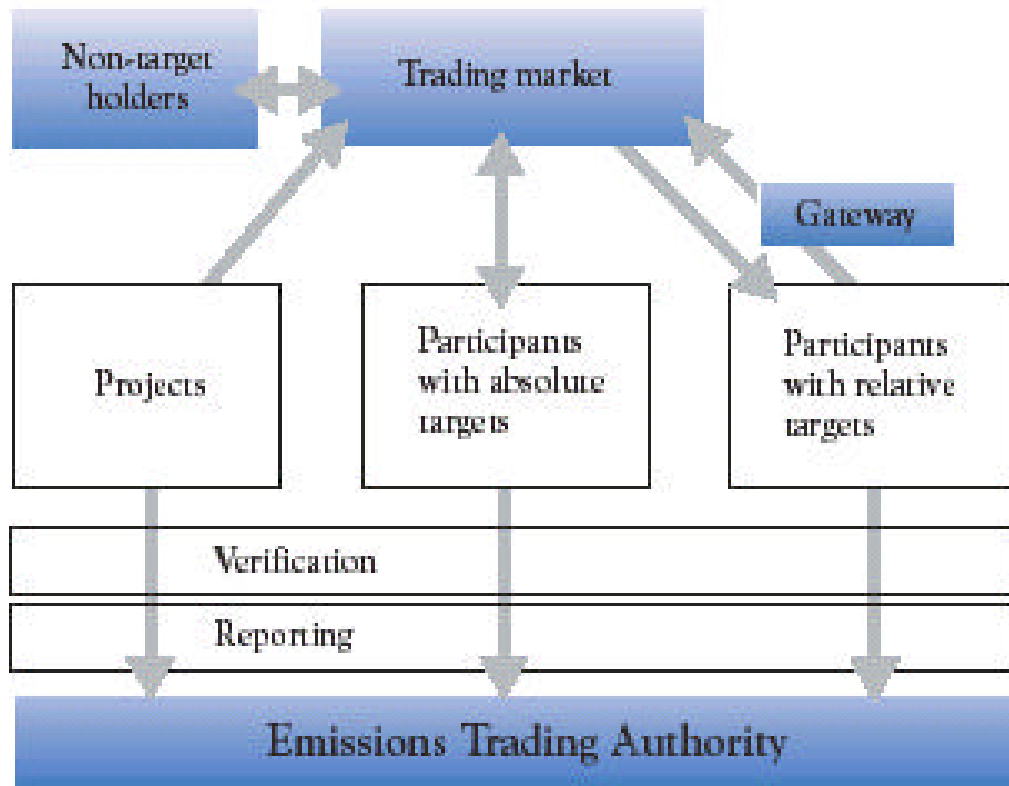
V.A.2. Structure of the scheme

Because the scheme is so new and will likely be a model for many emission trading programs around the world, let us give an overview of the structure of the scheme. Figure 2 gives a graphical summary; we will talk through the elements in detail below.

³ This section contains information presented at the EMA meeting in Mai 2002 by Olivia Hartridge of the UK Emissions Trading Scheme. Additional information is available at www.defra.gov.uk.

Figure 1: The UK Emissions Trading Scheme

Structure of the emissions trading scheme



Source: UK Department for Environment, Food and Rural Affairs.

V.A.2.a. Who can participate?

The UK emissions trading scheme is a voluntary scheme that started in April 2002. There are four main ways to enter:

- The UK government has agreed to provide a financial incentive for organisations that agree to take on voluntary targets for a five-year period, 2002-2006. Up to £215 million has been made available, equivalent to £30 million per year after tax. Participating organizations are required to make absolute reductions in emissions against a 1998-2000 baseline. The targets and the level of incentive payment are set through a competitive bidding process. Each participant was be able to bid in absolute levels of emission reduction at prices set through an auction, held in March 2002. The government aimed obtain the maximum level of reductions for the incentive money.

Organisations successfully bidding in the auction then have to deliver five equal annual emission reductions to qualify for their incentive payments.

- Companies which already have emission or energy targets set through the Climate Change Agreements are able to use the trading scheme either to help meet their target or to sell any overachievement if they can do better than their target. Many of the targets set through the Climate Change Agreements are efficiency targets – i.e. relative rather than absolute emission caps – so trading by these companies are subject to certain restrictions. A “gateway” will control the flow of allowances from this sector into the rest of the trading scheme.
- Organisations are able to undertake emission-reduction projects and sell the resulting credits into the scheme. These credits can then be used by other participants to meet their targets. A project must be additional to emission reductions that would have been delivered under business as usual. This additionality requirement is necessary, but it leads to considerable complexity in monitoring.
- Anyone who doesn't want to enter the scheme on the basis of an emissions target or an emissions reduction project can simply open an account in the registry to buy and sell allowances. For example, this leaves the door open for environmental activist groups.

V.A.2.b. Who can apply for the financial incentive?

The incentive is available to most businesses and other organisations that are responsible for greenhouse gas emissions within the UK, although some emission sources are not eligible. Ineligible sources include emissions already covered by a Climate Change Agreement and those from electricity generation for usage off-site⁴. It is possible for a participant to take on a target based on emissions from one or more other organisations. An energy services company, for example, could join the scheme by taking a single target covering emissions from a number of client sites.

V.A.2.c. Reporting emissions

As emphasized in Schneider and Wagner (2002b), monitoring and enforcement is crucial for the success of an emissions trading scheme. A first part of a successful compliance enforcement strategy is to make sure emissions are reported correctly. A participant's

⁴ Some additional restrictions are set out in the framework document for the scheme. See www.defra.gov.uk for details.

emissions include both direct emissions – such as those from fossil fuel combustion or other industrial processes – and indirect emissions associated with energy usage. In this way all measures that reduce energy use or emissions will contribute towards delivering the target reductions. Each participant needs to measure and report their initial (baseline) emissions and their annual emissions according to the Government's reporting guidelines. All reported emissions are subject to independent third-party verification.

V.A.2.d. Allocating allowances and credits

Three cases must be distinguished:

- Organisations which receive the financial incentive have emission targets covering each annual compliance period. Organisations are allocated emissions allowances equal to this target each year, provided they have been in compliance in the previous year. For the first year of the scheme, organisations received allowances for the compliance period January to December 2002 in April 2002. For subsequent years, allocation of at least some allowances may be made earlier than this. At the end of each compliance year, organisations will have a three-month reconciliation period to compile their verified emissions report and to undertake any further trading necessary to meet their target. This “grace period” is similar to the SO₂ allowance trading program in the US. By the end of this period each participant will have demonstrated to the Government that it has sufficient allowances to cover all of its emissions. This form of emissions trading is called “cap and trade”.
- By contrast, companies entering the scheme through the Climate Change Agreements will not receive allowances up front. At the end of each “milestone year” in which they have targets (every second year starting from 2002) they will receive allowances if they have beaten their target, or they will be able to buy additional allowances if they have not achieved their target. This form of emissions trading is called “baseline and credit”. Economists generally see this program as much more problematic to achieve cost-effective solutions (Stavins 2000).
- Emission reduction projects will only receive credits after the emission reductions have been verified. The rules for projects are being developed separately to those covering the rest of the scheme but the Government hopes to allow projects to start as soon as possible after the trading scheme is up and running.

V.A.2.e. Trading allowances

All allowance holdings are recorded on a computerised registry. All target-holders will have a compliance account in the registry for their allowances issued by Government. Following each compliance period the Government will check the total holdings in each compliance account and all allowances needed to cover emissions over the preceding year will be retired. Any allowances that remain can be banked for future use or sold. There are no restriction on banking up to 2007. Participants with absolute emissions targets are be able to bank any over-achievement of their own target into the Kyoto Protocol commitment period starting in 2008. Participants in the scheme are able to trade directly between themselves or through third party brokers.

V.A.2.f. Compliance

If a trading scheme is to deliver the expected environmental benefit there must be a robust compliance mechanism to ensure that it is always preferable for participants to buy allowances rather than miss their targets. The scheme is equipped with penalties that are sufficiently strong to ensure it operates effectively but are not disproportionate for a voluntary scheme. A participant must be able to demonstrate that it is in compliance in order to receive an incentive payment and a full allocation of allowances the following year.

V.A.3. UK emissions trading scheme auction results

The first auction was held on March 11-12, 2002. Below are the results of this first auction: the individual targets for each successful organisation (constrained by the percentage limit on the amount of incentive monies any single company could receive: 20%), and the unconstrained quantity of tonnes bid into each round of the auction.

Table 5: The March 2002 auction under the UK emission trading scheme

Winners (34 organisations):	Overall Target	Annual Target	Annual Incentive Payment
Ineos Fluor Ltd	805,635	161,127	£8,599,347.99
Dupont (U.K.) Ltd	500,000	100,000	£5,337,000.00
Shell UK Ltd	438,750	87,750	£4,683,217.50
Rhodia Organique Fine Ltd	430,000	86,000	£4,589,820.00
UK Coal Mining Ltd	400,000	80,000	£4,269,600.00
British Petroleum plc	353,500	70,700	£3,773,259.00
First Hydro Company	285,000	57,000	£3,042,090.00
Lafarge Cement UK	250,000	50,000	£2,668,500.00
British Airways plc	125,000	25,000	£1,334,250.00
British Sugar plc	100,000	20,000	£1,067,400.00
Asda Stores Ltd	80,000	16,000	£853,920.00
Tesco Stores Ltd	74,000	14,800	£789,876.00
Imerys Minerals Ltd	37,000	7,400	£394,938.00
Rolls-Royce plc	27,000	5,400	£288,198.00
Dalkia Utilities Services plc	22,400	4,480	£239,097.60
Ford Motor Company Ltd	12,500	2,500	£133,425.00
Dana UK Holdings Ltd	12,247	2,449.4	£130,724.48
Battle McCarthy Carbon Club	11,528	2,305.6	£123,049.87
Barclays Bank plc	10,000	2,000	£106,740.00
Dalkia Energy plc	10,000	2,000	£106,740.00
GKN (U.K.) plc	10,000	2,000	£106,740.00
Somerfield Stores Ltd	6,000	1,200	£64,044.00
Royal Ordnance plc	5,500	1,100	£58,707.00
Motorola GTSS	5,000	1,000	£53,370.00
General Domestic Appliances Ltd	4,525	905	£48,299.85
Budweiser Stag Brewing Co. Ltd	4,303	860.6	£45,930.22
Marks & Spencer plc	2,060	412	£21,988.44
Quantum Gas Management	1,500	300	£16,011.00
Land Securities plc	1,381	276.2	£14,740.79
Kirklees Metropolitan Council	1,000	200	£10,674.00
The Natural History Museum	1,000	200	£10,674.00
Lend Lease Real Estate Investment	977	195.4	£10,428.50
Mitsubishi Corporation UK plc	250	50	£2,668.50
EGNI (Wales) Ltd	111	22.2	£1,184.81
Wates Group	9	1.8	£96.07

Source: UK Department for Environment, Food and Rural Affairs.

The per-ton auction cleared at £53.37. The total constrained emission reductions (total of overall targets), i.e. the total amount of emission reductions bid in to the auction at the clearing price where the bids have been constrained to ensure that no single bidder receives more than 20% of the total amount of incentive monies, are: 4,028,176 tonnes CO₂-equivalents and 1,098,593 tonnes of carbon.

V.A.4. What will the future bring?

As mentioned above, at the EMA meeting, the discussion focused mainly on the above implementation issues. In addition, however, participants discussed where the UK scheme

will head in the future. Again, this might be important for other countries contemplating similar projects. A main issue clearly is a compatibility with a coming EU trading scheme (from 2005 onwards). From 2008 onwards, compatibility with international trading under Kyoto must be ensured. As shown in Hahn and Stavins (1999), the link between international and domestic environmental policy instruments is far more subtle than usually assumed. It remains to be seen how well this link can be implemented in the future. A second trend is to go from voluntary to mandatory participation and to increased coverage. Third, UK administrators aims towards including other Greenhouse Gases in addition to CO₂.

V.B. *Canada's compliance strategies*⁵

In May, Canadian Energy and Environmental Ministers at the federal, province and territory-level met to review the government's recently issued "Discussion Paper on Canada's Contribution to Addressing Climate Change." The paper – a policy draft of which was informally discussed at the EMA meeting - offers four proposed policy options for reaching Canada's GHG emissions target (6% below 1990 levels) under the Kyoto Protocol. Ministers also discussed an alternative climate change policy offered by Alberta. The Ministerial meeting marks the beginning of a consultation process involving 14 meetings in June with stakeholders throughout Canada, the identification of a "preferred approach", the drafting of a detailed plan, further analysis of the plan over the summer, and consultations on the plan in the fall. The meetings take place in an atmosphere of uncertainty regarding Canada's ultimate decision on ratifying the Kyoto Protocol. Canada's position on ratification has been thrown into doubt by the government's recent insistence that the international community recognize the global environmental benefits created by Canada's exports of cleaner energy to the U.S. Specifically, the Canadian government is hoping to obtain credit for exports of natural gas and hydro-electric power to the U.S., which, it argues, displaces 70 million metric tons (mmt) of CO₂e emissions in the U.S. The Discussion Paper's Policy Option 4 (see below), which appears to be the favored approach, incorporates the assumption that Canada receives this amount of "cleaner energy credits."

However, despite Canada's efforts to make its case to other Kyoto parties, there has yet to be any public sign that the EU will alter its view that granting such credits would be tantamount to renegotiating the Protocol, and therefore unacceptable. Canada plans to

⁵ Information in this section draws strongly from Natsource (2002a).

continue to push for cleaner energy credits at the upcoming 16th session of the Subsidiary Body on Scientific and Technology Advice (SBSTA), from June 5th to 14th. Environment Minister David Anderson recently said, "We will discover the extent of support or opposition to the clean energy exports [at COP 8 in October 2002]. I would expect it would only be at that time that we probably would be in a position to make the decision on ratification." In light of such suggestive statements, the EU's opposition to cleaner energy credits, and strong opposition to the Protocol in such emissions-intensive provinces as Alberta, some observers believe that the government will ultimately abandon the Protocol. However, to date, the Canadian government has not stated definitively whether cleaner energy credits are a prerequisite for ratification.

At the Ministerial meeting, Alberta asked for its alternative GHG reduction plan to be included with the 4 policy options in future consultations. Alberta's proposal is comparable to the "emissions intensity" approach proposed in the U.S. by President Bush, and would reduce GHG emissions per dollar generated in Alberta by 50% between 1990 and 2020, although absolute GHG emissions level reportedly would increase by 22% to 37%. This plan responds to concerns that the competitiveness of Canadian industry would suffer relative to U.S. firms if it faced stringent emission reduction targets under the Protocol. Although Alberta's request was refused, the province plans to continue pushing for support in discussions with other provinces.

The four policy options described in the Discussion Paper include:

- A "broad as practical" domestic emissions trading system. Under this option, both "upstream" fossil fuel suppliers and "down-stream" emitters of non-combustion process emissions would need to purchase allowances for CO₂ emissions embodied in fuel or emitted. Revenue from the auction of allowances would be recycled into the economy. This option would be the lowest-cost approach, but would have the greatest impacts on fuel and electricity prices.
- Targets and measures. Emission reductions would be achieved through the implementation of best technologies and practices, which would be facilitated or required using such policy instruments as incentives, covenants, regulations, and "possibly, fiscal measures." Because this option imposes high administrative costs and does not use market forces to select and incentivize emissions reductions, it is the most expensive option.

- “Mixed approach.” Emissions trading would be limited to major industrial emitters accounting for about 40% of Canada's emissions, and allowances would be allocated according to output, rather than auctioned. Targeted measures costing up to \$50/metric ton CO₂e reduced would be imposed on sectors not participating in trading.
- “Adjusted mixed approach.” The method of allowance allocation in Option 3 would be adjusted to provide more allowances to firms that are growing and that have limited cost-effective reduction options. As part of this approach, the government might consider measures to facilitate the transition to less emissions-intensive technologies. Based on the Environment Minister's recent statements in the press, these measures could include subsidies aimed at gaining Alberta's approval. The Discussion Paper stated that “this option would appear to have the potential to reduce Canada's GHG emissions in a reasonably cost-effective way,” and that the government seeks “input on whether this option provides the basis for a workable approach to meeting Canada's Kyoto target.”

V.C. New Zealand's compliance strategies

New Zealand has recently introduced its preferred climate change policy designed to reduce greenhouse gases and meet Kyoto Protocol commitments. The package centers around a tax on carbon emissions capped at \$25 per metric ton, subsidies for renewable energy, and negotiated agreements under which sectors at risk from “carbon leakage” and loss of exports are exempted from the tax provided they implement best practice in emissions management. The agricultural sector has also been asked to invest around \$15 million NZD a year on researching agricultural emissions. (Farming makes the largest single contribution to the country's total greenhouse gas emissions). The tax will be directed at all businesses, households, institutions and organizations for which energy is a cost, but not the major cost of their operations. Revenue from the tax is to be re-injected into the New Zealand economy by cutting taxes elsewhere.

According to Natsource (2002b), downstream price increases resulting from the tax are estimated to be modest. Starting in 2007, households may pay an extra \$5 a week on vehicle fuel, electricity and natural gas; and energy costs for businesses are expected to rise by up to 9 percent. Coupled with improvements in certain power generation technologies, such as gas-fired electricity and wind, the ultimate power generation mix of NZ is hard to predict.

Interestingly, emissions trading is not explicitly covered in the policy documents. However, the paper argues that New Zealand will enter an international trading system that is operating efficiently and provides 'commercial opportunity and the promotion of innovative responses'. In an interesting move, the government decided to retain ownership of credits obtained from carbon sinks. The government outlined that distortions within the forestry industry between plantings before and after 1990, and forestry investment risks and liabilities made it necessary for the NZ government to retain ownership of sink rights. Forestry groups have strongly disagreed and warned this seriously erodes the incentives behind Article 3.3 of the Kyoto Protocol. Business and union groups are apprehensive about 'carbon leakage' and lost jobs and have opposed early ratification. Prime Minister Helen Clark has however decided in-principle to ratify the Protocol and stated her keenness to ratify before September.

VI. Appendix: The Emissions Marketing Association (EMA)

The EMA is the major association of emission traders, industry experts and regulators in the US. According to its mission statement, the mission of the Emissions Marketing Association is to promote market-based trading solutions for environmental management and to serve its membership. The Emissions Marketing Association pursues this mission through the following objectives:

Promote the advancement and application of policy and regulation relevant to market-based emission trading systems.

Encourage and facilitate information exchange among members, and other professional and technical groups, and the public.

Provide programs in education and training to improve knowledge and skills of members and the understanding and acceptance by the public.

While the number of members appears relatively small at first sight (around 300), the association provides an important glue between many parties involved in the development of emissions trading programs. So far, the EMA has mainly focused on the US. It plans, however, to extend its operations internationally as well.

More information can be found at www.emissions.org.

VII. References

For detailed references on emission permit trading in the international context, we refer to Schneider and Wagner (2002b).

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