



The Centre For Business Relationships,
Accountability, Sustainability and Society

Emissions Trading in the UK

Draft report for the
Fujitsu Research Institute



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Background

Under the Kyoto Protocol (1997) developed countries agreed to limit or reduce their emissions of a basket of six greenhouse gases. The European Union agreed that its members would have a target of an 8% reduction on their 1990 emissions for the commitment period running from 2008-12. The UK's share of the EU target is a 12.5% cut on 1990 levels but in addition the UK also set its own goal of a 20% cut in carbon dioxide emissions from 1990 levels by 2010. Meeting these greenhouse gas emission targets has stimulated an enormous interest in different methods to better manage the emitting activities of industry (and to a lesser extent of government controlled activities). Central to the ongoing debates has been questions over the best way for government to regulate industry and of the regulatory stimuli to which industry will best respond.

The Kyoto Protocol allows countries to use 'flexible mechanisms', such as emissions trading, to meet their emissions targets. One of the most notable developments by a government has been that of the UK government's Emissions Trading Scheme (UKETS). This is an economy-wide scheme which organisations can volunteer to join. Companies, though, have also been active in the development of emissions trading schemes. BP, for example, have developed a trading scheme by which they self-regulate their own sites.

One difficulty in the UK taking early action to devise its own domestic scheme was the risk that it would not match eventual trading schemes devised at an international level to allow international trading between Annex 1 States under the Kyoto Protocol.¹ On the other hand early action by the UK places it in a leading position within Europe in any eventual international trading market. Moreover, the confidence exhibited by the UK that it can meet its Kyoto targets signals the possibility of significant earnings in the event of a developed international trading system (Ilex, 1999).

In international law, the UN General Assembly has declared global climate change to constitute a 'common concern of mankind' (UN 1998, Boyle, 1997). Kyoto gives this formal recognition by demanding that all of the (largely developed) countries listed in Annex 1 have a target for greenhouse gas reductions. It may be that the reductions can be achieved on a domestic basis, by setting domestic operators (of industrial or power facilities) or sectors (such as energy or transport) reduction targets. However, Kyoto allows, as one of its reduction mechanisms, cross border trading under which operators can sell or purchase credits or allowances in accordance with their own investment and compliance strategies.

The key assumption behind both country and company emissions trading schemes is that it allows for the more economically efficient reduction of pollution. This is because once the overall target has been set for participating organisations (or sites for a company-wide scheme) they can:

- Meet their target by reducing their own emissions; or

¹ Article 17 of the Kyoto Protocol permits the countries listed in Annex 1 of the Protocol to engage in emissions trading with each other.

- Go further and reduce their emissions below their target and then bank or sell their excess emissions; or
- Choose to keep their emissions above their target and buy in additional emissions allowances.

Whichever one of the three options an organisation selects it does so in an informed and economically rational manner. As the circumstances that an organisation faces can change over time so too can its approach to trading, for example, moving from a buyer to a seller of allowances. What is best for an organisation will depend on the price it has to pay to buy allowances compared to the cost of reducing emissions. An organisation's approach to its emissions allowance will be based on what it perceives to be its economic interests rather than the requirement to meet externally imposed targets arising from a command and control system of regulation. So, within a trading system, individual organisations benefit because those with lower cost emission reduction opportunities will tend to sell allowances to those who have higher costs. Overall, the economy benefits also, because environmental targets are being met in an efficient manner.

In this report we explore the basis of both company and government trading schemes and provide a fuller understanding of what they may achieve and the lessons that they offer for others. At this stage the information is inevitably subject to a number of caveats: the schemes are at an early stage of development and so little evaluatory evidence is available; there is also much commercial and political sensitivity surrounding the schemes; and therefore knowledge about the schemes and their impacts is often of a formative and tentative nature rather than being conclusive. The UK Government has agreed to submit a report on the implementation of UKETS to the European Commission in 2003.

The report is divided into the following sections:

- Methodology
- UK government strategy on emissions trading
- Key features of UKETS
- Development of a markets
- Administering the scheme
- Reporting, verification and the verifiers
- Penalties
- Evaluation of the scheme
- Internal emission trading schemes
- Future developments

Methodology

Data used in this report has been collected from the following sources:

- Government websites – these provide comprehensive background information on UKETS, including official reports on the rules, auction and promotion of the scheme. The first official evaluation of the scheme is also available on the web. Access to

these documents provides an invaluable insight into the development of the scheme but clearly much of the information, despite its neutral and objective tone, is concerned to promote UKETS in a rather uncritical manner. A list of website addresses can be found in Annex A.

- Company websites – these provide information on the approach of companies to climate change and emissions trading. Moreover, two companies have developed their own internal emissions trading schemes (BP and Shell) and information on these is available on their websites. Again, though, whilst helpful such information is invariably partial.
- Key person interviews – these were conducted with a cross-section of participants in UKETS to ascertain their views on their organisations approach to the scheme and their early evaluation of the scheme. Interviews were conducted in-person and by phone. All interviewees were promised anonymity and a note of the interview to check for misunderstanding. This was for two reasons. First many of the interviewees worked for high profile organisations and are sensitive to divulging information that may cast their organisation in a bad light. Second organisational sensitivity was compounded by the controversy that has embroiled UKETS surrounding the so-called selling of ‘hot air’ emissions. Interviews lasted between half an hour and one hour. A set of common themes were identified that were asked in each in each interview, for example, on the management of greenhouse gas emissions within the organisation. Each interviewee was also asked specific questions relating to the circumstances of their own organisation. Nine interviews were conducted. The interviews provided an invaluable source of information that was not available from other sources.
- Commentaries on UKETS and emissions trading – the ENDS report and the work of Steve Sorrell at the Science Policy Research Unit (SPRU) at Sussex University has provided valuable and informed commentaries.

UK government strategy on emissions trading

The UK Emissions Trading Scheme (UKETS) was launched in April 2002. It claims to be the world’s first economy-wide greenhouse gas trading scheme in that it is potentially open to all sectors and sizes of company. The UK approach to emissions trading is experimental in nature but there is no question that the framework in the UK drew heavily upon the experience of the USA in relation to emissions trading. In the USA trading developed under the auspices of environmental regulators faced with concerns about acid rain and a system of absolute caps on certain types of emissions such as sulphur dioxide. Trading allowed the introduction of new facilities where strategic environmental management allowed for reductions in the target gases. The system was slow to develop not least because of the uncertain nature of the property rights that emerged.² By 1990, however, an amendment to the Clean Air Act allowed trading of emissions of gases within the acid rain programme by electricity producers. The base for this programme was the average fuel consumption over a three-year period of 1985-87, but operators could emit a higher figure either by purchasing in the market or buying

² The Clean Air Act 1990 now specifically states that allowances allocated under the acid rain programme do not constitute property rights (Title IV, section 765(1)(b)).

allowances held by the Government in an annual auction. There was a 30-day sunset period at the year-end in which allowances could be purchased to ensure compliance with targets. The system is backed by automatic penalties levied on each excess ton of gas emitted above the target figure and not backed by additional purchased allowances.

One important issue to grasp is that once there is a clear commodity, as in the US emissions trading system, such as an allowance to emit one ton of gas, then it may be freely traded. In other words one can expect persons other than electricity producers to enter the market, whether as brokers, investors or speculators. Another point to note about the US system is that it is an 'upstream' system, by which is meant that the participants are producers and not consumers of power ('downstream' users) and all are in the same sector, producing a relatively coherent and simple system.

In contrast, although the UK system was devised in no small part by business working alongside Government (UK Emissions Trading Group (UKETG) 2000) a more complex trading system has emerged. It may be that the (industry) participants hoped that a workable emissions trading system might lessen the Government's enthusiasm for the Climate Change Levy, a tax on energy use that forms another mechanism to meet British compliance with Kyoto targets. Certainly, the participants came from very different sectors and it was clear from an early stage that the scheme would apply to energy users in a downstream system.³ Both the breadth of the UK scheme and its application to energy consumers mark it out as a novel approach to emissions trading.

The objectives of UKETS are to:

- achieve emission reductions at reasonable cost;
 - enable UK-based firms to gain practical experience of emissions trading before the introduction of a European and international system; and
 - help the City of London to establish itself as a global centre for emissions trading.
- (DEFRA, October 2002, p3)

The scheme is voluntary as companies choose to participate in the scheme and it will run for five years: from 2002 until the end of 2006. The voluntary nature of the scheme sat nicely alongside the recommendations of a task force on the use of economic instruments to regulate commercial energy use, since this recommended a form of energy tax but was more agnostic about the prospects for an emissions trading system, suggesting a pilot scheme (Marshall 1998). The voluntary approach also allowed for a relatively simple process for introducing the scheme. New legislation has hardly been needed, as in effect the organisations in question have agreed to trade on the basis of rules promulgated by the Government to underpin the scheme.

There are four ways in which companies can become involved in the scheme:

³ Although the five main electricity generators formed part of the group that became UKETG (ENDS 1999). The reason for avoiding a scheme based on upstream production seems to concern about the impact on domestic energy users given problems within the UK of 'fuel poverty' (Sorrell, 2001).

1. **Direct Participants:** these organisations received a financial incentive for agreeing to voluntarily make reductions in their emissions against a 1998-2000 baseline. The Direct Participants and how UKETS operates for them are the subject of the report;
2. **Climate Change Agreement (CCA) Participants:** these companies already have emission or energy targets set through Climate Change Agreements and they are able to use the trading scheme either to help meet their target or to sell any over-achievement;
3. **Project Participants:** organisations that undertake emission reduction projects will be able to sell the resulting credits to the scheme; and
4. **Trading Participants:** any organisation is free to enter the market and trade allowances on a speculative basis.

The government's purpose in widening the base of participants in UKETS beyond the Direct Participants appears to be twofold. One is to increase the liquidity of the market so that it operates as a market. The other is to encourage as many organisations as possible to gain experience of emissions trading so that they are prepared for the launch of the proposed EU emissions trading scheme in January 2005.

An understanding of the UKETS is aided by some knowledge of the workings of the Climate Change Levy, since this relates closely to some elements of emissions trading. The £1bn levy applies to consumption of coal, gas and electricity, though not oil. It is intended to work in a revenue neutral manner, since its introduction was accompanied by a reduction of 0.3% in National Insurance payments from employers. Firms in energy intensive sectors⁴ may gain up to an 80% rebate on the levy by entering into Climate Levy Change Agreements. These are negotiated with representatives from the relevant industrial sectors and seek to work towards energy efficiencies by 2010 with interim two-yearly targets. Failure to meet targets results in the loss of the rebate. Since companies in these sectors already are fixed with targets under the Climate Change Levy Agreements, participation in the emissions trading system is open to them to either meet their targets or sell excess capacity. However, as is explained later [BOB THIS HAS NOT BEEN INCLUDED IN THE REPORT], this is subject to a gateway mechanism that control trading between those firms with agreements and other participants in the voluntary scheme.

Key features of UKETS

The key elements of UKETS are:

- Preparing organisations for UKETS
- The auction
- Prices and emissions reductions
- Organisations and emissions reductions

⁴ Governed essentially but not exclusively by the Pollution Prevention and Control (PPC) regime, see the Pollution Prevention Control Act 1999, implementing the EU Directive on Integrated Pollution Prevention and Control (Directive 96/61) and the Pollution, Prevention and Control (England) Regulations 2000 (2000/1973).

- Scope of the scheme

We now turn to consider each of these features in turn.

Preparing organisations for UKETS

The Government's intention to launch UKETS was announced as part of the *UK Climate Change Programme* published in 2000. Prior to publication of the *Programme* there had, however, been operating since March 1999 an industry-led Emissions Trading Working Group that helped to develop the UK Emissions Trading Scheme initiative. Rodney Chase, BP's deputy chief executive, chaired the emissions trading working group.

Key business interests were involved in these discussions (Defra 2002, para 32) and would therefore have been well prepared for the consultation document "A Greenhouse Gas Emissions Trading Scheme for the UK" issued by the government in November 2000. The consultation period ended in January 2001 and 89 responses were received. Many of the responses were from the business community. Every response to the consultation document endorsed the development of UKETS (Defra 2002, para 32). Following the consultation period a Draft Framework was prepared in May 2001 and a Final Framework in August 2001 (Defra 2001a).

Detailed documentation was also made available to potential participants in UKETS relating to particular aspects of the scheme, notably the auction, measuring emissions and the likely budget. Where relevant these documents are referred to in appropriate sections below.

The auction

Following the publication of the Framework document (Defra 2001a), the period from August to December 2001 was set aside for organisations to pre-register for the auction and prepare their bids. To do this they had to ensure that any emission sources they wished to include in the scheme complied with the Government's Framework document and that they had baseline data for the period 1998-2000. They could then begin to calculate the cost of emission reductions below their baseline to inform their bid strategy. A guide, *Auction guidance*, covering the rules of the auction was made available for potential participants.

To prepare organisations for the real auction DEFRA ran briefings and a mock auction. The briefings covered the auction rules and how to bid. The mock auction was held shortly before the real one. It went through four rounds and allowed organisations to familiarise themselves with the auction software (the auction took place over the internet) and bidding strategies.

The operation of the auction acts in a rather different way from a conventional auction. In the latter a good is sold to the highest bidder. In the case of UKETS the government structured the rules by allocating a sum of money as an incentive for organisations to

participate. In other words, it provided the winning bid. It then asked: what level of emissions reductions (i.e. the good that it wished to purchase) are organisations prepared to offer for that sum?

There were two further variations on a conventional auction. One was that bidding rounds had a time limit placed on them. Second, within these time frames intra-round bidding was possible. What this means is that at the start of each round the auctioneer announced a start price and an end price. This is very different from a normal auction where the auctioneer issues a single price and the bidder submits a single quantity. Here, the auctioneer issues a price spread – the highest price is the start price and the lowest price is the end price - and the bidders must submit a minimum of one and maximum of five prices between the start and the end price. In making a bid bidders are stating the quantity of emission reductions that they are willing to make and at what price (though their bid or bids must fall within the price range). Each round of bidding has a successively lower price range and bidders must either maintain or lower their quantities of emissions reductions to remain in the auction. The auction was held on 11-12 March 2002 and went through nine rounds before clearing occurred. This is the point at which the auction ends and arises when the total amount of emission reductions bid falls to, or below, the budget that the government has allocated (i.e. the intersection between the supply curve (total quantity bid) and the demand curve (budget/price)). The Government allocated up to £215million of incentive monies to distribute to participants in the auction.

The form that the auction took was chosen because its advocates claimed it was simple for bidders, was fairly quick and enhanced the precision with which bidders can bid (Hartridge). In theory, organisations could make decisions that were sensitive to their emission reduction and cost circumstances, although this does assume that organisations have a fairly sophisticated understanding of the costs of their abatement strategies. There were also advantages for the government as the auction model allowed the auctioneer to rapidly make larger price decrements between rounds – the intra-round bids – without overshooting the clearing price (DEFRA 2002c, p4).

The auctioneers and bidders were able to adopt what is termed a descending clock auction as the result of the following factors:

- The auction took place in real time
- The auction was held over the internet. Bidders were based in their workplace and used their own computers. They also had ready access to any data that they might need.
- During the auction bidders only had access to their own bid quantities and the total quantity of emissions that was bid for in each round of the auction.

Bidders did not know the number or the identity of other bidders.

A key decision for the government when making its rules for the auction was over the timescale within which it wished to measure emission reductions. Whilst the scheme was to run for five years did the government wish to have organisations deliver on their target

in final year? To do so might have been beneficial for organisations in planning their investment and production strategies as longer time horizons presumably aid business efficiency. For government, though, it would have been a highly risky venture as it was pioneering a novel policy tool and would have had to wait and trust that business would deliver on its side of the agreement five years into the future. Alternatively the government could seek to tightly manage the process and have regular reporting and payment arrangements. It is the latter approach that government appears to favour and it has important implications for the auction. This is because “[o]rganisations successfully bidding in the auction will then have to deliver five equal annual emission reductions to qualify for their incentive payments” (DEFRA 2001, p2). The implication here is that government knows with considerable certainty its annual budget on UKETS and can carefully monitor emission reductions. But does an annual equally stepped emission reduction programme make economic sense for public or private sectors? The answer is clearly no. The nature of emission reduction programmes, whether they arise as the result of investments, changes in process and technology or of techniques is that they will be ‘lumpy’. In other words, they will not deliver reductions in equal amounts over a five-year period and it is highly unrealistic to expect them to do so. In reality there are much more likely to be greater gains in emission reductions in some years than in others. So within the scheme the government manages the tension between its need for policy delivery and that of organisations for flexibility in how they manage the ‘lumpy’ nature of emission reduction by offering the possibility of organisations banking or selling any excess allowances that they may accrue. A key issue for the future will, therefore, be the extent to which organisations seek to overperform on their annual targets to bank or sell allowances or act (or at least report) more conservatively to simply meet their annual targets.

Prices and emissions reductions

At the start of the auction the price for CO₂e was set at £100/tonne by the government, a generous sum but one that was designed to encourage participation from realistic bidders (i.e. organisations). Round one successfully generated an interest from bidders: at the price of £100/tCO₂e bids totalling 4.9mt CO₂e were received and would have cost the government £490m. However, the budget was set at £215m and so went through nine rounds before it came within the budget at a clearing price of £53.37/tCO₂e.

In an analysis of UKETS carried out by DEFRA, the government Department responsible for the scheme, it has been pointed out that the Government could potentially have driven the clearing price lower, perhaps, below £50/tCO₂e, but chose not to do so because it wished to balance three objectives (Defra, October 2002, 8). These were:

1. achieving a high level of emission reduction. The Government had anticipated that the UKETS auction would deliver 0.8mtC in annual emissions reductions by 2006, so for organisations to agree to a total target of 1.1mtC marks a considerable policy success;
2. encouraging the development of a liquid trading market through sufficient participation by organisations; and
3. achieving value for money for the initiative.

Organisations and their emission reductions

Organisations were able to participate in UKETS either in their own right or by forming a joint organisation (e.g. the Battle McCarthy Carbon Club). Organisations entered into the UKETS auction for a number of reasons (Defra, October 2002, p22). Some will have been motivated by the potential financial incentives on offer. Others may have wished to gain experience of trading systems. A further group may have wanted to show that trading is a viable alternative to the more traditional command and control form of emission regulation. A final group may have wished to show that they were environmental innovators. Inevitably, different approaches to UKETS will have led organisations to develop different strategies for the auction. For example, firms that are motivated largely by financial incentives are likely to bid for more emission allowances than those who wish to experiment and learn about trading.

There were 38 participants at the start of the auction though four dropped out before the allocation of allowances. Thirty four Direct Participants agreed annual emission reductions reaching 4mtCO₂e (1.1mtC) from 1998-2000 levels by 2006. On average it is estimated that participants have agreed to reductions of approximately 12% from their 1998-2000 baseline (Defra, October 2002, p3, p13). Whilst such reductions may seem like a strong endorsement of the UKETS approach, there is likely to be some concern that those who participated were in any case likely to be experiencing declining emissions and were simply receiving payment for following their conventional business practices. So, according to such a perspective, rather than forcing change in the management of emissions UKETS rewards a business as usual approach. Naturally such concerns are highly sensitive both for government and for the participating organisations. In its report on the scheme Defra (Defra, October 2002, p13-4) recognises that organisations may have been claiming allowances for emission reductions that would have happened anyway but claims that following interviews that “[m]ost of the Direct Participants questioned stated that they had improved upon their internal targets upon entering the scheme” (Defra, October 2002, p14). However, there is no further information on the extent to which organisations may have improved upon their internal targets or of the types of organisations which may have been most able to improve on their internal targets or faced most difficulty in doing so.

Information on organisations, their targets and the financial allowances that they will receive is provided in the Table below.

Target holders, targets, baseline, initial allowance allocation and annual payments

Target Holders	Overall Target (tCO₂e)	Annual Target for year 1 (tCO₂e)	Verified Baseline	Year 1 allocation of allowances	Annual Incentive Payment £
Asda Stores Ltd	80,000	16,000			853,920.00
Barclays Bank plc	10,000	2,000	83,859		106,740.00
Battle McCarthy Carbon Club	11,528	2,306			123,049.87
British Airways plc	125,000	25,000	1,011,785		1,334,250.00

British Petroleum plc	353,500	70,700	6,757,799	6,687,099	3,773,259.00
British Sugar plc	100,000	20,000	579,367		1,067,400.00
Budweiser Stag Brewing Co. Ltd	4,303	861			45,930.22
Dalkia Energy plc	10,000	2,000			106,740.00
Dalkia Utilities Services plc	22,400	4,480			239,097.60
Dana UK Holdings Ltd	12,247	2,449			130,724.48
Dupont (U.K.) Ltd	500,000	100,000	2,626,226	2,526,226	5,337,000.00
EGNI (Wales) Ltd	111	22			1,184.81
First Hydro Company	285,000	57,000	1,370,410	1,313,410	3,042,090.00
Ford Motor Company Ltd	12,500	2,500	250,257	247,757	133,425.00
General Domestic Appliances Ltd	4,525	905			48,299.85
GKN (U.K.) plc	10,000	2,000			106,740.00
Imerys Minerals Ltd	37,000	7,400			394,938.00
Ineos Fluor Ltd	805,635	161,127	1,861,863	1,700,736	8,599,374.99
Kirklees Metropolitan Council	1,000	200			10,674.00
Lafarge Cement UK	250,000	50,000			2,668,500.00
Land Securities plc	1,381	276			14,740.79
Lend Lease Real Estate Investment Services Ltd	977	195			10,428.50
Marks & Spencer plc	2,060	412			21,988.44
Mitsubishi Corporation UK plc	250	50	1,134	1,084	2,668.50
Motorola GTSS	5,000	1,000			53,370.00
Quantum Gas Management	1,500	300			16,011.00
Rhodia Organique Fine Ltd	430,000	86,000	2,012,275		4,589,820.00
Rolls -Royce plc	27,000	5,400			288,198.00
Royal Ordinance plc	5,500	1,100			58,707.00
Shell UK Ltd	438,750	87,750	3,877,906		4,683,217.50
Somerfield Stores Ltd	6,000	1,200			64,044.00
Tesco Stores Ltd	74,000	14,800			789,876.00
The Natural History Museum	1,000	200			10,674.00
UK Coal Mining Ltd	400,000	80,000	4,922,175		4,269,600.00
Wates Group	9	2			96.07

Source: http://etr.defra.gov.uk/reports/Targets_Baselines_and_allowances.htm and Defra, October 2002, p24-5

Two things are immediately apparent about the above Table. First, there is a considerable breadth of organisations involved in UKETS. This breadth is demonstrated in two ways. One is the range of sectors, stretching from the extractive industries (e.g. mining with UK Coal Mining Ltd), through the manufacturing sector (e.g. Ford Motor

Company Ltd) and into the service sector (e.g. Tesco Stores Ltd and the Natural History Museum). The other aspect of breadth is the varying size of the organisations that are involved from major international manufacturing and processing companies (e.g. Shell UK Ltd) to nationally based organisations (e.g. Somerfield Stores Ltd). Second, reflecting the diversity of organisations involved in UKETS, there is an enormous range in the targets that organisations have to achieve and the financial benefits that they will receive. At one end there is Ineos Fluor Ltd who have an overall target of 805,635tCO₂e and an annual incentive payment of over £8.5m and at the other the Wates Group with an over target of 9tCO₂e and an annual incentive payment of £96.

Scope of the scheme

UKETS covers a participant's direct emissions, such as those from fossil fuel combustion or other industrial process, and indirect emissions associated with energy usage. So, all measures that reduce energy use or emissions will contribute towards delivering the target reductions. More specifically UKETS focuses on the greenhouse gas emissions made up of a basket of six gases identified by the Kyoto Protocol as being central to the process of climate change. In addition to CO₂, these are methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). These are collectively measured in terms of their climate change potential compared with (1 tonne of) carbon dioxide – 't CO₂e' for ease of comparison.

Payments to Ineos Fluor and two other chemical companies, DuPont and Rhodia, have become mired in controversy. The ENDS report has consistently alleged that these companies "appear to have already met their emission reduction targets because of IPPC regulatory requirements" (ENDS report, December 2002, Issue No 335; November 2002, Issue No 334). ENDS claims that these companies, which account for nearly half of the emissions reductions claimed for the scheme, have been able to exploit ambiguities between UKETS and IPPC to their own benefit.

Development of a market

If UKETS is to be successful in developing organisations competence in trading and the efficient management of their emissions then it needs to develop a liquid market (i.e. one that has a sufficient number of bidders for emissions allocations and offers of allocations so that an average trade does not significantly move the market price). Direct Participants are only able to trade when they have completed their baseline verification and by the early autumn of 2002 (some six months after the auction) only 12 of the 34 organisations had done so. This would seem to suggest that either the verification process was taking rather longer than might have been anticipated, or that some organisations did not intend to become early traders on UKETS (or even trade at all) and so could be rather more relaxed about the timing of the verification of their emissions. For the latter verification would simply be the means of securing their annual financial payment from government. Nevertheless, analysts were confident that a viable market was developing (DEFRA, October 2002, p15-6).

The price of carbon did, however, slump at the end of 2002 (ENDS report December 2002, Issue No 335). In October 2002 prices had peaked at £12.40/tCO₂e but since then prices have fallen to about £4.50-5.00/tCO₂e. The fall in price has been caused by the relatively limited demand for greenhouse gas allowances. Our interviews have indicated that very few UKETS participants anticipated needing to buy allowances and so demand comes very largely from buyers under climate change levy agreements (CCLAs). Most of the CCLA organisations are now thought to have bought sufficient allowances to meet their targets. Indeed, there is the potential for considerable over supply of allowances, and the ENDS report has estimated that one UKETS participant, Ineos Fluor, has a surplus of 1mtCO₂e for 1992 (ENDS report December 2002, Issue No 335). So, a key factor in stopping the price of allowances dropping still further is that major sellers have no interest in depressing the market further. Instead they wish to bank most of their emissions surplus in the hope that they will be able to sell it into a future EU trading scheme.

Administering the scheme

Following their successful bid in the auction, organisations agree to a cap on their emissions (i.e. levels up to which they will emit and beyond which they will need to purchase additional allowances or incur a financial penalty). So, for each annual compliance period organisations are allocated emissions allowances equal to their baseline minus their accumulated targets. At the end of each compliance period, organisations will have a three month reconciliation period (ending on 31st March) to submit a verification report confirming their annual emissions and to undertake any further trading necessary to meet their target (so-called “cap and trade” emissions trading). Thus, each organisation must be able to demonstrate to the Government that it holds sufficient allowances to cover all of its emissions (Defra, October 2002, p5).

The allowance holdings are recorded on a computerised registry. Anyone who holds an account in the registry can buy and sell allowances. Participants in UKETS can trade directly between themselves or through third party brokers. At the end of a compliance period the Government will retire all allowances needed to cover emissions over the preceding year. Any allowances that remain can be sold or banked for future use.

The registry can be found at www.defra.gov.uk/etr (and can be accessed via <http://www.defra.gov.uk/>) and will become the UK’s international trading registry. It is internet based and so can be accessed from anywhere in the world. It works in real time and is available 24 hours a day every day of the year. The registry has been “praised by participants for its speed, simplicity and user-friendliness” (Defra, October 2002, p21).

The Emissions Trading Registry, as part of the Emissions Trading Scheme, is currently administered by the Department for Environment, Food and Rural Affairs (DEFRA). (They can be contacted directly at ets.registry@defra.gsi.gov.uk or by phone on 020 7944 8808). Designing and building the registry has cost £690,000. Maintenance of the registry has a budget of a further £120,00.

The Government has produced a number of documents to administer UKETS. At its heart is *Rules for the UK Emissions Trading Scheme* (updated 14 October 2002). These are supplemented by individual agreements that bind direct, group and trading participants into the scheme. Details of the application of these rules can be found in the following documents: *Direct Participant Agreement for the UK Emissions Trading Scheme*, *Group Participant Agreement for the UK Emissions Trading Scheme*, and *Trading Participant Agreement for the UK Emissions Trading Scheme*.

Reporting, verification and the verifiers

To be included in UKETS organisations must have management control over a facility and verifiable data for the baseline period (1998-2000). Verification of emissions is central to the credibility of the scheme. (Detailed guidance on measurement can be found in the following key documents: *Guidelines for the Measurement and Reporting of Emissions by Direct Participants in the UK Emissions Trading Scheme*; *Estimating Statistical Uncertainties in the Greenhouse Gas Emissions Measurement and Reporting Protocols for the UK Trading Scheme*; and *Guidance on Source List Errors*). Each Direct Participant must have their baseline emissions and their annual emissions during each compliance period verified by an independent third part accredited verifier.

Verification of organisations emissions has taken longer than anticipated as a set of unforeseen problems have emerged. These have included: the need to set up reliable data management systems and the discovery of emissions sources that should have been included or excluded from the scheme.

Verifiers are accredited by the UK Accreditation Service (UKAS). UKAS is the sole national accreditation body recognised by government to assess, against internationally agreed standards, organisations that provide certification, testing, inspection and calibration services. Accreditation by UKAS demonstrates the competence, impartiality and performance capability of these evaluators. Currently the following bodies have accreditation by UKAS to verify emissions:

- DNV Certification Ltd
- ERM Certification and Verification Services Ltd
- KPMG Certification Services
- Lloyd's Register Quality Assurance Ltd
- SGS YICS Ltd
- Price Waterhouse Coopers Certification BV
- British Standards Institute

Penalties

In the documentation on UKETS the Government had made it clear that it would introduce legislation to provide a statutory base for the financial penalties that Direct Participants might incur. This is to be provided in the Waste and Emissions Trading Bill that was introduced into the House of Lords on 14 November 2002. The second part of the Bill places on a statutory footing civil financial penalties for organisations that miss

their annual emissions targets in UKETS. The penalties only apply to Direct Participants in UKETS. The Bill also amends the Pollution Prevention and Control Act to provide for the application of penalties within future emissions trading schemes.

The UKETS Rules set the financial penalty for organisations that miss their annual target at £30tCO₂e. This figure is regarded as one that is sufficiently high that it will provide additional encouragement for organisations to meet their targets but not so high that it would deter organisations from participating in UKETS. If it is to work effectively and have credibility the overall emissions target for UKETS – its cap - must be met. Moreover, should organisations be seen to breach their targets without incurring penalties the value of allowances would be adversely affected and the system would be undermined. A fixed financial penalty provides a deterrent to non-compliance and encourages people to buy additional allowances to meet their target, rather than pay a penalty (Defra 2002, paras 6-9). The system of penalties may still not work if the gap between the price at which a tCo₂e is traded and the penalty is too wide: in this case it may be economically rational for a company to pay the penalty rather than to buy additional allowances (though other risks come into play for those who are non-compliant as explained below).

A fixed penalty that is levied for each tCO₂e by which an organisation exceeds its target is a very transparent penalty, and one that has clear parallels to the American trading system. There is no right of appeal against the imposition of these automatic penalties and neither can the Secretary of State intervene to exercise any discretionary powers. Both participants in UKETS and external observers must have faith in a rigorous and independent verification process whereby those who are non-compliant pay a penalty and those who are compliant do not. So how might those who are non-compliant suffer?

1. They pay a fixed fee of £30tCO₂e for each tonne for which they do not hold an allowance
2. Non-payment of the financial incentive
3. Reduction in the number of allowances allocated in respect of the next compliance period that is equivalent to the shortfall of the previous year's target
4. Non-compliance will be noted on a list made public (Defra 2002, para 15).

If an organisation fails to meet its emission targets it must pay the financial penalty to the government. Responsibility for enforcing the penalties will lie with the Department for Environment, Food and Rural Affairs (DEFRA) (Defra 2002, para 34).

Evaluation of the scheme

Environment

In the auction Direct Participants had committed themselves to annual reductions that would total 4 mtCO₂e or 1.1 mtC by the end of 2006. Based upon an estimate of the 'social cost of carbon' which takes account of the global damage of carbon emissions, DEFRA have argued that the *avoided* emissions of UKETS is 3.3mtC on an *accumulative* basis for the period 2002-6 (compared to the 1.1mtC organisations agreed to by 2006). In

monetary terms this is equivalent to £117m to £469m between 2002 and 2006 (the wide variation in the figures is due to the variation in the potential costs of global damage costs for carbon emissions of £35/tC to £140/tC) (DEFRA, October 2002, p9-10).

Administrative costs

A very large proportion of the costs of UKETS has been borne by government. The major costs incurred by government are detailed in the table below.

Key Government Costs in Establishing UKETS

Activity	Cost (£)
Incentive money	215,000,000
Consultancy work	1,255,000
Government staff hours	560,000

Source: DEFRA, October 2002, 10-11

It is more difficult to gather data on Direct Participants costs but in interviews conducted by DEFRA it is claimed that “the costs involved in preparing for the auction and participating in the auction itself were not significant” (Defra, October 2002, p11). A set of post-auction costs are also identified in the report and these are:

- The costs of purchasing and installing abatement technology, or changing operational practices
- Verification costs
- Staff hours associated with trading
- Legal costs

Although the DEFRA report notes that it is not possible to estimate the costs that participants have and will incur “they are assumed to be less than or equal to the incentive money received” (DEFRA, October 2002, p11). Whilst this assumption may be true overall for Direct Participants, given the variation in allowances allocated it may well not apply to individual organisations. For example, at the lower end of the scale of targets and financial allocations are the Mitsubishi Corporation UK plc, EGNI (Wales) Ltd and the Wates Group receiving respectively annual payments of £2,668.50, £1,184.81 and £96.07. It is likely that these three organisations, and perhaps others, will be incurring costs greater than the financial benefits that they will receive from the scheme. It may be that such organisations miscalculated in the final round of bidding, or that there is a set of non-financial, or longer-term financial, benefits that they hope to gain from participation in UKETS.

Efficiency

The UKETS strategy assumes that companies have a good knowledge of how their emissions will be affected by a) their markets and how those markets will develop and (and thus what that will mean for their production strategies), b) their medium term investment strategy (i.e. the five year period of the auction), and c) that they can draw

links between a) and b) to identify their greenhouse gas emission costs at different levels of production and with some confidence in their investment plans. If a), b) and c) hold reasonably true then organisations can make informed bids at the auction based upon a knowledge of what is best for that organisation's efficiency. Whilst organisations might be able to act with reasonable confidence with regard to a) and b), in general their knowledge of their costs of emissions seems much less certain. In the one published analysis of UKETS based on interviews with participants the Defra report in dealing with the auction (Defra, October 2002, p6-7) notes that

“many Direct Participants appear not to have used a sophisticated bidding strategy – for example, deciding on a specific amount of emissions reductions that were achievable through a particular project, the average cost of each tonne of emission reduction and therefore the price at which they would drop out of the auction. As a result, they did not make any adjustments to their bids as the price fell. ... Therefore, the observed bidding strategies from the auction suggest that many Direct Participants had not yet developed a thorough analysis of their abatement costs and calculated something approximating a marginal abatement cost curve.”

It therefore seems plausible to suggest that, at least to begin with, not all organisations participating in UKETS are doing so in an economically efficient manner. From a broader perspective, though, there is a strong expectation that using market-based instruments, such as UKETS will promote abatement amongst those firms which can reduce pollution at least cost (DEFRA, October 2002, p15). For organisations to be able to act in a least cost manner they need to be able to trade emissions in a liquid market so that they can sell emissions from any efficiency gains or should they need to, to purchase emissions allowances. Prior to the auction it was estimated that 15-20 Direct Participants would be needed to generate the potential for a liquid market (DEFRA, October 2002, p15), so the involvement of 34 organisations in UKETS should ensure that a liquid market develops.

Internal emissions trading schemes

This section is to be completed when the transcripts from Shell and BP are available.

Future developments

Commission directive

At the EU Council meeting in December, European ministers agreed to start trading in greenhouse gases emissions from 2005. The next stage of the EU legislative process is for the proposal to secure the approval of the European Parliament. The proposal is divided into two stages. It is intended that in the first phase trading will be solely with carbon dioxide, and will only cover large emitters in the steel, cement, glass, tile, paper and cardboard production industries. Companies will be allocated CO₂ quotas with permits to emit according to their allowance, and will be able to buy and sell quotas of emissions. Penalties will be imposed on those who exceed their quotas, from €40 for

each excess tonne of CO₂ emitted from 2005 to €100 per tonne from 2008. For the second phase of the scheme, starting in 2008, trading will be extended to other sectors and other greenhouse gases (Edie 13/12/2002).

The EU's proposals bear all the hallmarks of the negotiations that must have taken place amongst member states and commercial interests as it is riddled with compromises. For example, in the first phase of trading some companies may be exempted if they can show that they are achieving the same level of reductions as those involved in trading. The scheme is also quite modest. For instance, the decision in the first phase of trading to only include CO₂ and a limited number of sectors considerably narrows the remit of the scheme until 2008. Moreover, quotas will be allocated free of charge and only 10 per cent of allowances will be auctioned from 2008 onwards. At best only a partial market in greenhouse gases is likely to emerge at the European level by the end of this decade.

The implications of the proposed Directive for UKETS (and indeed for climate policy more generally within the UK) have been explored in detail by Sorrell (1993). He argues that the Directive potentially has significant implications for UKETS. In particular he argues that UKETS allocates emission ownership to electricity consumers (downstream), while the EU ETS allocates ownership to electricity generators (upstream) and that this tension between the two schemes will involve considerable effort to resolve.

References

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Department for the Environment, Food and Rural Affairs (Defra) (2002c), UK Emissions Trading Scheme Auction Guidance, ETS(02)02

Hartridge, Olivia Entering the UK emissions trading scheme: auction rules (presentation)

Sorrell, Steve (2003) Back to the Drawing Board? Implications of the EU Emissions Trading Directive for UK Climate Policy, SPRU, University of Sussex, January.

UK Government documents referred to in the report can be accessed via the following website: [http://www.defra.gov.uk/environment/climate change/trading/](http://www.defra.gov.uk/environment/climate%20change/trading/)

Annex A

Key government emissions trading website addresses

http://www.defra.gov.uk/environment/climatechange/trading/pdf/trading-auction_slides1.pdf

http://www.defra.gov.uk/environment/climatechange/trading/pdf/trading-auction_slides2.pdf

http://www.defra.gov.uk/environment/climatechange/trading/pdf/trading-auction_guidance.pdf

<http://www.defra.gov.uk/environment/climatechange/trading/pdf/trading-progress.pdf>

<http://www.defra.gov.uk/environment/waste/wetbill/index.htm>

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