

**TRADING EMISSION PERMITS**  
**A BUSINESS OPPORTUNITY FOR THE CITY?**

**A REPORT FOR THE CORPORATION OF LONDON**  
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**Centre for the Study of Financial Innovation**  
18 Curzon Street, London W1Y 7AD  
Telephone: 0171 493 0171 Facsimile: 0171 493 0190

## FOREWORD

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**This report was written by David Lascelles**

# Trading emission permits

## An opportunity for the City?

### Executive Summary

The trading of emission permits is widely recognised as a potentially effective way of reducing greenhouse gases which cause climate change. With the signing of the 1997 Kyoto Protocol, the concept is built into international treaty, and much exploratory work is now going on at national and global levels to design markets.

Under the current timetable, the aim is to get an EU regional market going by 2005 and a global market by 2008. But considerable practical and political difficulties stand in the way of fully fledged markets, and much work will need to be done to stick to these timetables. In the UK, permit trading is only one of several options (along with taxation and regulation) being considered by the government to meet its reduction targets. This will not prevent private sector initiatives, but legislation would be needed to get a full UK market off the ground. Pressure is more likely to come from the bottom up than the top down

London is in a very strong position to provide markets for permit trading at both a local and global level. The UK's expertise in this area is as high as any country's except possibly the US'. The City has all the necessary exchanges and infrastructure, as well as back-up services such as regulation and verification. Several City-based institutions are actively engaged in research and experimentation with permit trading..

But the City will face competition in attracting international business, mainly from the US which already has live experience of sulphur permit trading. Other exchanges such as Sydney and Frankfurt have also expressed interest. London's position in the line-up would slip if competing exchanges managed to get schemes up and running first: because of the limited scope for this market, there will not be much room for late-comers. London should therefore aim to be among the first to begin actual trading, even with a small local scheme.

The market for permit trading would not be large by the standards of financial markets. Although the value of outstanding permits might run into the billions of dollars, only small proportion - as little as ten per cent - would need to be traded to iron out imbalances. This means that

creating sufficient liquidity could be one of the main challenges facing the market. If liquidity is a problem, trading might have to be channeled through a single exchange to concentrate volumes - a further reason for being ahead of the field. But trading itself could take place in a 24-hour electronic global market.

The direct benefits to the City of being the centre of a permit trading market would be modest. A UK-based market would generate a few dozen jobs plus commissions and fees running into the low millions of pounds. An expanded scheme with other countries would be commensurably larger, though not enormous because foreign traders would not have to relocate to London in a virtual world.

But there would be wider benefits, mainly acquisition of expertise which could be exported to new geographic regions or types of pollution control. On the intangible side, the presence of a market would reinforce the City's reputation for innovation, and create positive "green" associations.

However permit trading is controversial. Some people see it as a way for rich countries to export their pollution, others as an opportunity for the City to "cash in" on the world's environmental problems. On balance, though, permit trading seems to generate positive publicity.

In sum, permit trading does represent a worthwhile, though modest, business opportunity for the City, and the City is well placed to win that business. But the prospect of a large and active market is distant, and encouragement by the City and the Corporation may be needed to bring it about.

### **What can the City do?**

1. With its important international reputation, London could have a considerable influence on the speed at which the permit trading concept is adopted at regional or global levels. A successful early start in London could be the start of a virtuous circle.
2. Although the time scale for the full development of emissions trading markets is very long, the learning curve is steep. There is little to be lost from encouraging industry to research and experiment with permit trading systems at this stage - which industry is already showing an inclination to do.
3. Because emissions trading is controversial, there is always a danger that any promotional effort by the City could backfire. The City should stress the positive benefits, possibly by compiling an inventory of independent research and distilling the conclusions. It could also help

stimulate discussion of the many unresolved questions about practicalities.

4. Although the direct benefits in terms of jobs and revenues from the new market would be relatively small, the City should seek to promote the wider benefits: the acquisition of trading technology, the potential for further pollution-driven markets, and the City's concern for the environment.

## 1. Introduction

Protecting the environment is not all about controlling, regulating and taxing. It is also about business opportunity: opening up new markets, encouraging innovation, and harnessing competition to achieve new objectives.

Global warming is an excellent example of this. On the one hand it poses a possible threat to the world's climate. But on the other it creates an opportunity to experiment with ways of influencing business behaviour. Various "flexible mechanisms" are now being considered at a global level to encourage countries to curb their emissions of greenhouse gases in novel ways, among them a system of carbon emission permits which could be traded in a worldwide market.

This paper focuses on carbon emission permits not just as a mechanism for combating global warming, but also as a potential business opportunity for those who might trade them. More specifically it examines whether the City of London, one of the world's leading financial centres, could or should become the trading centre for such a market.

The issues are not just environmental. They are about the best way to tackle global warming: is permit trading more effective than taxes and regulation? They are about how markets work: in today's electronic world, is it even possible to locate a global market in one particular centre? They are also about seizing opportunity: is this an area where the early leaders will carry off the prize?

To those who view global warming as essentially an ethical problem, many of these issues will seem irrelevant: some people will even accuse the City of trying to "cash in" on global warming. But this paper makes no apology for being hard-nosed: that was our brief. The real question is whether trading emissions permits can make a difference, and if so whether the City's huge experience with financial markets can help bring it about.



## 2. Facing up to climate change

Climate change has become one of the largest issues on the world environmental agenda, and several top level initiatives are now underway to try and combat it by curbing emissions of greenhouses gases.

### 2.1. Global initiatives

The first was the Framework Convention on Climate Change at the 1992 Rio Earth Summit when developed countries set voluntary targets to bring emissions back to 1990 levels by the year 2000. This was followed by the 1997 Kyoto Protocol when those same countries went a stage further by agreeing binding commitments to cut emissions to 5.2 per cent below 1990 levels over the period 2008-2012.

Table 1

Quantified emission limitation commitments in the Kyoto Protocol <i>% change 1990/2008-2012</i>	
+ 10%	Iceland
+ 8%	Australia
+ 1%	Norway
0	Russia, Ukraine, New Zealand
-5%	Croatia
-6%	Canada, Japan, Hungary, Poland
-7%	US
-8%	EU*, Liechtenstein, Monaco, Switzerland, Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia.

\*The EU took advantage of the "bubble" provisions of the Protocol to make a joint commitment on behalf of the 15 member states (see below)

Source: Kyoto Protocol

One of the key sections of the Protocol provides for three "flexible mechanisms" to enable countries to deliver part of their commitment by helping to reduce emissions in other countries. The first, joint implementation (JI), allows developed countries to work together to cut their emissions. The second, the clean development mechanism (CDM), enables developed countries to gain credits by helping developing countries to reduce emissions by transferring technology etc. The third provides for a system of international permits to emit greenhouse gases which could be traded among companies and countries. The Protocol

sees such a system coming into existence in the year 2008, in time for the 2008-2012 target period.

All these mechanisms would require international structures to set the rules, ensure fair play, and keep a tally of each country's position. However it will be some time before these are agreed. A meeting in Buenos Aires in late 1998 which was supposed to address the practical arrangements, failed to make much headway, and the parties agreed to postpone work until a later conference scheduled in Jordan for the year 2000. In the meantime the UN Secretariat will compile a list of issues for discussion.

There were several stumbling blocks at Buenos Aires. One was continuing disagreement between the US and the European Union over the seriousness of the global warming problem and the best way to combat it, including the role that might be played by emissions trading. Several groups of countries also had reservations about aspects of the mechanisms: that rich countries could use them to "shuffle off" their environmental problems onto poorer countries, or get out of more direct forms of aid.

Although progress towards a global emission trading scheme could therefore be slow, individual countries are still legally bound to pursue their targets at a national level (and, in the EU's case, at regional level), so trading schemes of a more local kind may still be possible.

Table 2

<b>The EU bubble</b>	
<i>% changes in emissions agreed at Kyoto</i>	
Austria	-13
Belgium	-7.5
Denmark	-21
Finland	0
France	0
Germany	-21
Greece	+25
Ireland	+13
Italy	-6.5
Luxembourg	-28
Netherlands	-6
Portugal	+27

Spain	+ 15	
Sweden		+ 4
UK	-12.5	
<b>Total EU</b>	<b>-8</b>	

## 2.2. The EU position

The EU took advantage of the "bubble" provisions at Kyoto to agree an 8 per cent reduction for the Union as a whole over the Protocol period. This includes the national targets given in Table 2, many of which actually show increases.

According to Ritt Bjerregaard, EU environment commissioner, the EU will place the main responsibility for achieving reduction targets on domestic action by member states rather than Brussels-led initiatives. The EU sees only a secondary role for emissions trading as "a supplement to domestic action on condition that their use is subject to strict rules on monitoring, accountability and compliance." She also said that limits should be placed on emissions trading to prevent members using the scheme to export their environmental problems. Although she did not mention a ceiling, EU officials have talked of a maximum 50 per cent.

## 2.3. The UK position

The UK is well placed to set ambitious targets for reducing greenhouse gas emissions because of the big shift in electricity generation away from coal to natural gas. The difficulty for the UK is a political one: choosing the best way to do it.

Table 3

<b>Reductions in UK greenhouse gas emissions by economic sector (MtC)</b>			
<b>Sector</b>	<b>Projections including planned policies and actions for 2010</b>	<b>Possible measures<sup>1</sup></b>	<b>Further possible measures<sup>2</sup></b>
<i>Energy sector<sup>3</sup></i>	59	0	5
<i>Business</i>	75	3	7
<i>Transport</i>	42	4	2
<i>Domestic</i>	41	3	4
<i>Agriculture, forestry and land use</i>	22	0.5	0
<i>Public</i>	9.4	0.5	0.6
<i>Total</i>	194	11	18
<i>Change from 1990 levels (6- gas basket)</i>	-10%	-15%	-24%
<i>Change from</i>	-3%	-9%	-20%

1990 levels  
(CO<sub>2</sub> only)

1. Made up of planned and lower-cost measures.
2. Made up of higher cost measures, where information is available.
3. Includes 54.3MtC of emissions that are also included in the table under the sector that is the end-user of the energy supplied.

Source: DETR

In the run-up to the 1997 election, the Labour party promised to cut greenhouse gases by 20 per cent between 1990 and 2010. But since then the threat of job losses in the coal mining industry forced it to declare a moratorium on new-gas-fired power stations. As result, the UK adopted a more modest target of 12.5 per cent at Kyoto, though 20 per cent remains an informal goal.

The government is now trying to formulate a policy to meet these targets. In a mid-1998 consultation paper, the Department of the Environment, Transport and the Regions published Table 3 indicating that greenhouse gases might be reduced by around 10 per cent between 1990 and 2010 using current policies and techniques. But the Department warned that these were delivering progressively fewer gains, and that further measures might be needed.

These additional measures would include some or all of:

- voluntary action by industry
- information, advice and best practice,
- regulation, e.g. integrated pollution control, tougher building regulations;
- fiscal measures, and
- emissions trading.

The DETR estimated that these measures could bump reductions up to between 15 and 24 per cent from the 1990 base.

The paper also indicated that some of the greatest reductions would come from greenhouse gases other than CO<sub>2</sub>. (see Table 4)

Table 4

**Reductions in UK greenhouse gas emissions  
by type of gas (MtC equivalent)**

	<b>1990</b>	<b>2000</b>	<b>2010</b>
<i>Carbon dioxide</i>	168	157	163
<i>Methane</i>	25	19	16
<i>Nitrous Oxide</i>	18	11	12
<i>Hydrofluorocarbons</i>	4.2 *	1.2	1.6
<i>Perfluorocarbons</i>	0.2 *	0.1	0.2
<i>Sulphur hexafluoride</i>	0.2 *	0.3	0.3

<i>Total greenhouse gas emissions</i>	<i>216</i>	<i>189</i>	<i>194</i>
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Note: Forecasts for 2000 and 2010 are based on the adoption of "possible measures" listed in Table 3

Source: DETR

The paper was studiously non-committal in its analysis of these options. The best it could say about emissions trading was: "We believe that there may be benefits in a domestic trading scheme to deliver carbon savings cost-effectively in the UK". The lack of clear preferences in the document echoes the divisions within UK industry over the best way forward. The Advisory Committee on Business and the Environment, a government panel of top businessmen, after spending a year examining the issue, came out with a recommendation in mid-1998 for a mix of measures, including tax, regulation and market instruments. Similarly, the Treasury's Task Force on the Industrial Use of Energy headed by Lord Marshall was unable to come down clearly in favour of any single course of action. Its main recommendations, published in November 1998, were:

- that the government should provide "clear long-term signals to reduce emissions"; and
- that there should be "a mixed approach, using a number of different measures."

The report acknowledged that tradable emissions permits might play a part, but was cautious about the practical problems of implementing a national scheme which, it said, "will require a robust system of monitoring and verification." Lord Marshall added: "Practical considerations lead me to the conclusion that it may not be sensible for government to introduce a fully-fledged, statutory scheme domestically in the UK at this stage." However Lord Marshall urged the government to step up consultations with interested parties, with several aims:

- to secure strong business input into the design,
- to inform the UK's international negotiating position, and
- to develop local expertise to ensure that UK companies and financial markets were ready to take the lead. This would include encouragement for pilot schemes.

Delay is always an option open to government. Compared to other countries, the UK's problems are not that urgent and could even be solved without introducing radical measures – just by trying a bit harder. So government could be tempted to put untried schemes like permit trading on hold, or at least wait until some wider regional or global scheme emerges, and the crunch period of 2008-2012 moves closer.

The UK position will be clarified in the autumn of 1999 when the DETR intends to publish its climate change strategy document. This will probably propose a mix of measures, but is unlikely to urge rapid movement towards a national permit trading scheme. Instead, the government may express support for pilot schemes, and offer some inducement such as the promise of legislation at an appropriate point in the future.

#### **2.4. The US position**

The US agreed to reduce greenhouse gases by 7 per cent in the Kyoto Protocol. But the US is a reluctant participant in the initiative, partly out of scepticism about global warming, partly because the Administration faces strong resistance from the business lobby. As a result, there is doubt that the Senate will ratify the Protocol and make it law. The only measure for which the US has shown any enthusiasm is emissions trading because it believes this to be the most efficient way to cut emissions. Its Chicago-based commodity market already trades sulphur permits and is therefore well placed to host any market that might evolve in CO<sub>2</sub>. But a national scheme seems unlikely so long as the Protocol remains unratified, so the question is how far the private sector will be ready to move ahead with initiatives of its own in the absence of a legal framework.

#### **2.5. Political outlook**

The political timetable for the creation of permit trading schemes at national and global levels is extended and uncertain. Although the EU has mentioned 2005, this seems very ambitious given the low priority attached to emissions trading by Brussels. A global scheme by 2008 seems even more ambitious given the large number of countries which would have to be up and running by then. The uncertainty surrounding the US position is a further factor. We believe that the strongest prospects for permit trading lie at individual country and even individual industry and company level, and that progress will come up from the bottom up rather than from the top down. This is the focus for much of the remainder of this report.

### **3. Tradable permits**

#### **3.1. How would they work?**

Permit schemes could operate at the global or the local level, or both.

##### 3.1.1. A global scheme

The Kyoto Protocol specifically provides for a global permit trading scheme, but the details have still to be fleshed out.

The most likely path would be for an international agency to create a finite number of permits which would confer the right on the owner to emit a given amount of greenhouse gas. These would be allocated to individual countries, and those with a surplus would be able to sell them to those in deficit. The rights contained in each permit would steadily be reduced so as to force a global reduction in greenhouse gas output. The sanctions for the scheme would be based in a country's treaty obligations.

##### 3.1.2. Local schemes

At national or regional level, governments or groups of countries could run local schemes which would be aimed at bringing emissions down to a point where global permits could be sold off. Instead of being issued to countries, the permits would be issued to companies for trading among each other. These schemes would be based on local legislation, and would be monitored and enforced through national or regional agencies.

##### 3.1.3. Hybrid schemes

However it should be possible to combine global and local schemes into a single worldwide scheme. At its most sophisticated, a global scheme would allow company-level permits to be traded internationally, as a form of globally recognised currency in emission rights.

#### **3.2. Pros and cons of tradable permits**

The proponents of permits claim they are much the most efficient way of controlling pollution, a claim which is supported by experimental work which has been conducted over the last decade or two. Typically, a tradable permit system might halve the cost of compliance compared to other ways of cutting greenhouse gases, such as abatement or switching energy sources. This is because the flexibility of trading allows economic preferences to come through, and gives companies or countries an incentive to seek out the lowest cost solution. Permit trading is also attractive to business because it gives companies a way to hedge their risks, and can itself be a source of profit through speculation.

But tradable permits also have their drawbacks. They are politically sensitive because they provide a "business" solution to what many people see as an ethical problem. Furthermore, rich countries can afford to have

more of them than poor countries. Permit schemes are also untried on anything but a very limited scale, and the practical and political obstacles to setting them up will be considerable.

Tradable permits should also be viewed in the context of other means of achieving emission reductions, particularly taxes. These can be designed to create similar economic incentives, and are much less trouble to set up. They can also be modified quite quickly to meet changing circumstances. Since taxes and tradable permits are both "economic instruments", they may be seen either as competing or as complementary solutions. The European tendency is to view them as complementary, the US as competing with permits - and the distinct favourite. One advantage of permits over taxes, from a government's point of view, is that they can ensure that targets are met; taxes can only steer people's behaviour in a chosen direction.

### **3.3. Designing a scheme**

Much the greatest obstacle facing tradable permits is the large number of unanswered questions about how they would work, at either the global or the local level.

#### **3.3.1. A global scheme**

The main questions are:

Who should run a global scheme? The World Bank, the World Trade Organisation and UNCTAD have been mooted. The selected organisation would need the credibility and resources to oversee a market in which assets of real commercial value were being transferred. Its role would include monitoring, enforcement, verification and registration of permit ownership.

Which gases should be traded? Only CO<sub>2</sub> (which accounts for three quarters of the total), or the other five main gases as well?

Would the market be big enough to sustain genuine two-way trading?

The World Bank has estimated that the value of outstanding permits could be

\$150bn by the year 2020. That sounds a lot but it is relatively small by the standard of world markets (active capital markets run into several trillion dollars). It is also an indication of the total amount of permits held, not the amount that would be traded, which would be smaller because trading would only occur at the margin (see below).

Furthermore, since the aim of the market would be to reduce emissions, its size would steadily dwindle over time.



How much would permits cost? The price determinants would be the size of penalties for violations, and the cost of abatement or alternative energy sources. If permits are to work, their price has to be lower than both of these. Estimates range from as little as £8 per tonne of CO<sub>2</sub> emitted, to as much as £60.

#### BOX 1

### UNCTAD proposals

Much of the groundwork on globally tradable permits has been done by the United Nations Conference on Trade and Development (UNCTAD), which has come out strongly in favour of them, largely on grounds of cost effectiveness. UNCTAD's view is that the system should initially be based on CO<sub>2</sub> with each permit representing a unit, such as one tonne of CO<sub>2</sub>. Permits would be dated in terms of individual years and could be designed either for trading between governments, between companies, or a mix of the two. UNCTAD does not believe that the system would need to be controlled at the domestic level, but there would have to be an international organisation to oversee it. Other institutional requirements would be for a central clearing house to record transactions.

One of UNCTAD's key findings is that, while there would have to be financial markets for trading to take place, these would not need to be centralised. UNCTAD uses the analogy of the foreign exchange market which has no obvious home, but operates globally over the electronic media.

As for getting the market going, UNCTAD sees a need for "market leaders" who, it suggests, should be the major gas emitters since they would have the most to gain from the lower costs associated with permit trading. UNCTAD is helping to set up the International Emissions Trading Association, a group of some 60 multinational companies and environmental organisations who are keen to explore the idea. These include, from the UK, British Petroleum, Shell, Eastern Power and Energy Trading, Pilkington, the International Petroleum Exchange, Lloyd's Register and the Uranium Institute. (The full list of potential members is given in Appendix I.) One purpose of the organisation would be to promote pilot schemes at both the national and global levels. The association is considering setting up its operating headquarters in London.

How would permits actually be traded? Through an exchange, through a network of brokers, or bilaterally between buyers and sellers?

Should permits be bankable? Should owners be allowed to hold them from one year to the next to anticipate a change in the market or in their requirements?

### **3.3.2. Local schemes**

Some of the questions are the same, i.e. which gases should be included, how would permits actually be traded? But there are some specific ones as well:

Who would be covered? All greenhouse gas emitters, or just the big ones? If so, would such a scheme be equitable? Should the scheme cover upstream industries (producers of gas-emitting products) or downstream consumers (power generators, industrial companies, transport systems)?

How would a scheme be monitored and enforced? By a global agency, or at national level?

How would permits be allocated? Would they be distributed free, or sold, and if so at a fixed price or by auction? In other words, who owns the rights to the carbon? Auctioning rights would be seen by business as a form of energy tax.

Could a single country sustain a viable permit market?

If a country were to go ahead with a national scheme ahead of the global scheme, would the permits acquired by companies be creditable against some future global scheme?

It is not the purpose of this report to offer answers to these questions, only to point up the scale of the challenge that faces the architects of any scheme.

### **3.4. Groundwork**

Daunting though the challenge may be, this has not discouraged a considerable amount of groundwork and experimentation. A few examples:

3.4.1. British Petroleum has set up an in-house emissions trading system in which rights to emit CO<sub>2</sub> are being bought and sold among a number of its business units. (See box) Shell is setting up a similar scheme.

3.4.2. Nordic shadow market: In 1996, the governments of Denmark, Finland, Norway and Sweden ran a hypothetical market in which they

traded permits with the aim of achieving their Rio commitments by the year 2000. Finland and Denmark turned out to be the sellers and Norway and Sweden the buyers. The main conclusion was that trading permits was 50 per cent cheaper for the group as a whole than going the abatement route.

3.4.3. Costa Rica has created a system of Certified Tradable Offsets, each of which represents one tonne of carbon locked in its trees. Other countries can buy these CTOs for \$10 each, and the proceeds go towards developing Costa Rica's forests. The benefit for other countries comes if and when a global system of tradable permits is set up, and the CTOs are recognised as valid units to be set against the purchasing country's emissions.

BOX 2

### **The BP scheme**

BP launched an in-house permit trading scheme in September 1998 as part of its wider interest in environmental control. The framework for the scheme is the company's internal target to reduce group-wide emissions by three per cent between 1995 and 2003.

Twelve of the company's 90 business units worldwide are participating on a voluntary basis, and two more have joined as observers. Each unit has been allocated a quantity of annual permits, fitting the profile of BP's overall reduction target, which they can trade among themselves. Units may only emit CO<sub>2</sub> within their permit limits, or risk being fined. Trading is being brokered through the company's oil trading unit. The profits or losses from trading go into each unit's accounts.

The first trade took place in mid-November – for 10,000 tonnes of CO<sub>2</sub> at \$17 a tonne. This was a purchase by Foinavon, BP's new offshore oil development west of Shetlands, from the Forties field in the North Sea. As a growing project, Foinavon needed more permits than the more mature Forties facility.

BP says that the scheme will be externally audited, and the results will be published each year.

3.4.4. Sulphur trading. The only market of any importance that has been created for pollution permits is the US' sulphur trading scheme. Permits to emit sulphur dioxide are auctioned annually on behalf of the Environment Protection Agency by the Chicago Board of Trade. These permits can be used, banked or traded, though there is no organised or futures market. The proponents of the scheme estimate that it has reduced the cost of sulphur abatement from as much as \$1000 a tonne to around \$100. In 2000, the scheme will be extended from the 110

largest emitters to all power generating units over 25MW. However sulphur is not a perfect model for CO<sub>2</sub> trading because its impact is localised; CO<sub>2</sub>'s impact can be measured at a global level, which creates possibilities for a much wider market.

## 4. A market for the UK

The UK is one of the most active countries exploring the emissions trading concept, for several reasons. Market-driven solutions are fashionable and politically acceptable, all the relevant industries are now in the private sector (oil, gas, electricity, heavy industry, transport), and the City has wide experience of creating and managing new markets.

### 4.1. Promoters

The main promoters of emissions trading are:

4.1.1. The electricity industry. The Association of Electricity Producers, the power generators' trade group, has facilitated the creation of working groups representing industry and government to explore the practical aspects of permit trading in the UK. The groups explored four areas:

- credit and permit-related issues;
- rules for making a system work positively;
- hurdles that might prevent a system working positively; and
- setting up a trial.

The thrust of the discussions is that while there could be obstacles to successful permit trading (e.g. lack of liquidity, absence of sound permit allocation and trading arrangements, poor verification, high trading costs), these are not insurmountable, and a well-designed scheme would be advantageous, particularly on grounds of efficiency. The groups favoured a pilot scheme involving "real trades for real money".

4.1.2. The oil and gas industry. The UK Offshore Operators Association has also set up a working group to examine how trading might be established between operators of offshore oil facilities in the North Sea. A report commissioned from Oxford Economic Research Associates concluded that a tradable permit scheme for offshore installations might be feasible, but that many issues to do with permit allocation and trading rules needed to be clarified.

4.1.3. The City. The International Petroleum Exchange (IPE), London's commodity exchange for oil and gas trading, has prepared outline proposals for a market. The IPE's view is that a market would initially be established in the UK, and later expanded to include other European countries. The IPE itself has the facilities to set up and run such a market, including price dissemination, registering permits and collating emissions data. The London International Financial Futures Exchange (LIFFE) which, since its merger with the London Commodity Exchange, trades non-financial commodities as well, is also interested. Lloyd's Register has explored the requirements and would be able to supply the

independent certification and verification services needed to make the market work.

#### **4.2. How would a market in the UK actually work?**

The experience gained from pioneering schemes suggests that a successful permit market needs to be highly organised and, preferably, backed by government regulation to create confidence and provide the sanctions. Tradable permits must have commercial value, which means that the issuer has to be credible, and the number of permits in circulation has to be regulated. The initial participants in a market would be large greenhouse gas emitters such as power generators, oil and gas companies, transport companies and industrial concerns not in a position to shift their facilities to a cheaper environment. Many of these companies are already large traders in commodities and financial instruments. An active market would also attract speculative trading by investment banks and private individuals.

4.2.1. Government. Legislation would be needed to enshrine emission reduction in law so as to create the economic imperative and endow tradable permits with property rights. The law would have to define the pollutant to be traded, the value of the permit in terms of the amount of emission it allowed, the duration of the permit, the allocation procedure, and the sanctions for non-compliance - though much of this could be contained in secondary legislation. The government would also have to create sufficient certainty to get the market established, for example by stating a clear policy on environmental taxation and regulation.

4.2.2. Independent market. Although the market would be created by statute, the market itself would be independent of government. It could operate in one of two ways.

a)- As a bilateral over-the-counter market in which buyers and sellers traded directly with each other, without the intermediation of an organised market. This would be cheaper and simpler, but also less transparent and therefore less liquid, and traders would be exposed to the risk of the failure of a trade or a counterparty;

b)- Alternatively, and more likely, it would work through an organised exchange which would guarantee trades and provide price dissemination and clearing services. Although it would be more expensive, this market would be more liquid and produce better prices. The existence of an exchange would not imply the need for a trading floor. Trading would almost certainly be "virtual": that is, participants would trade through

screens or over the telephone. Although the market would have official opening hours, this would not preclude after hours trading.

The market would have to exist at three levels.

The primary level where government would issue new permits to emitters and speculators.

The secondary level where existing permits would be traded among buyers and sellers. The requirements for a successful market would be good price and volume information (transparency), and sufficient turnover to generate trading interest (liquidity).

### BOX 3

#### Permits to emit milk

A close analogy to emissions permit trading is the EU's system of milk quotas which was set up in 1984 to reduce the amount of milk being produced by European farmers. The quotas are, effectively, permits to emit a set quantity of milk over a given period. At the outset they were allocated to farmers based on their milk production over a preceding base period, but since then an active market has evolved at the secondary level.

Trading is possible because quotas are not attached to particular pieces of land or herds of cows. Instead, they belong to farmers who can trade them depending on whether they want to emit more milk or less. Although there is no centralised market, several brokers have emerged to create prices and trade quotas in an over-the-counter market. The market is continuous and at times very busy, particularly towards the end of the quota year. One feature that has emerged is a market for temporary transfers of quotas through sales of leases.

Like a potential CO<sub>2</sub> market, trading occurs mainly through changes in marginal demand, plus a small amount of speculative activity. The main difference between a milk and a CO<sub>2</sub> market is that the first has many more active players, - about 25,000 in the UK alone - while a fully fledged CO<sub>2</sub> market in the UK is unlikely to have many more than 1000. The UK Intervention Board estimates that about 10-15 per cent of the outstanding quota total is traded each year.

Although the quota scheme is EU wide and therefore has the makings of a milk trading "bubble", the allocations are country specific, and there is no cross-border trading. Countries which exceed their quotas have to pay a levy to Brussels and the proceeds are used to fund intervention costs. Countries recover the levy costs by penalising farmers who overproduce.

The first of these could be readily supplied by existing exchanges. The second is more problematic. It is far from certain that trading volumes

would be large enough to sustain a good market, at least in the early stages. Unlike traded goods which are passed along a supply chain or bonds which can be traded in for alternative investments – all of which is good for turnover - emission permits would only be traded at the margin. That is, trades would only occur when there was an imbalance and one market player had too many permits and another too few. This could arise in a number of ways:

- through incorrect allocation in the primary market,
- through changing structures among users,
- because of changes in the cost of alternatives,
- from the arrival of new entrants to the market, and
- from changes in the regulations or official targets.

But since all these are incidental, they do not guarantee a steady flow of business. There would, of course, be speculative trading as well, but this could only thrive if there was an active underlying market.

In order to generate higher trading volumes it might be necessary to issue permits with a very short life, as little as three months, so that emitters were forced to trade more actively, though this would be unpopular with business. It would also help to have a wide variety of trading interest to generate those unexpected trade-offs that make markets work. For example, the price of permits could become an indicator of the level of economic activity in the UK. As such, permits could be used as a hedge against the ups and downs of the economic cycle.

An alternative way of improving liquidity would be to concentrate trading into periodic auctions, rather than run a continuous market.

#### BOX 4

#### Possible emissions permit specification

<b>Commodity</b>	CO <sub>2</sub>
<b>Unit</b>	Metric Tonne
<b>Contract size</b>	100 Metric Tonnes
<b>Trading period</b>	Rolling 36 months
<b>Allocation period</b>	Permits valid for one month
<b>Quotation</b>	Sterling, pence per metric tonne
<b>Expiration</b>	Permits expire two days before commencement of permit month
<b>Delivery</b>	Transfer of title
<b>Trading times</b>	10:00 to 16:30 hours inclusive
<b>Min. price fluctuation</b>	20p increments
<b>Position limits</b>	No limits

Source: IPE



By IPE estimates, it takes trading turnover of a minimum 2,000 lots a day to make a good market. For comparison, the Brent crude contract for North Sea oil trades an average 60,000 lots a day with several hundred participants, but the new North Sea natural gas contract trades only 1,500, with 30.

A simple calculation of the UK market's trading value might run as follows. It has been estimated (see below) that permits for about 250m tonnes a year might initially be issued. At £20 a tonne, the outstanding would be worth £5bn. If 10 per cent of this was traded each year, the market's annual turnover would amount to £500m. With a 2 per cent transaction cost, earnings for the market operator and brokers would be £10m a year.

#### Derivative level.

As to the form of trading, there would probably have to be two markets:

- a cash market for direct buying and selling of permits, and
- a derivative market of futures and options to permit speculation and hedging. This would only emerge once the cash market was firmly established. But the opportunity for speculation and hedging would be one of the market's strongest appeals.

4.2.3. Independent verification and certification. Since the integrity of the market and the value of permits would depend on participants sticking to their emission commitments, the performance of greenhouse gas emitters would have to be independently audited, and certificates issued as evidence of compliance.

4.2.4. Enforcement. An official agency would have to police the market to enforce the regulations and penalise violators. Similarly, the market itself would have to be subject to financial regulation.

## 5. Could a market get off the ground in the UK?

The short answer is yes. Many of the main components of a market already exist, or could be assembled fairly quickly.

5.1. A market exists. As Europe's largest oil and gas producer, and one of its largest consumers of coal, the UK has a strong natural constituency for permit trading, and many of its members have already shown an active interest in the idea. According to calculations by the IPE, over 150 large companies involved in energy, transformation (e.g. power generation) and industry would be required to reduce their emissions under the scheme. These would represent at least 53 per cent of the UK's total CO<sub>2</sub> emissions, which amounted to 572Mt in 1995. In the IPE's view, this would be enough to get the market started. However, as indicated in 4.2.2, trading volumes might have to be artificially stimulated to generate enough liquidity. The market could later be extended to cover more than 1000 smaller UK players.

5.2. The infrastructure exists. In the IPE and LIFFE, the UK has two of the world's leading commodity and futures exchanges. Both markets have the membership, the technical expertise and the infrastructure to provide a platform for permit trading. By the IPE's estimate, a market could be up and running within a year. The London Clearing House, now part of LIFFE, also offers clearing facilities which would guarantee trades and remove counterparty risk from traders. Through organisations like Lloyd's Register, the City can supply the independent auditing services needed to back the market up. The City also has a plentiful supply of professional services to serve the market: lawyers, accountants, systems specialists.

5.3. Regulation. Although a specific regulatory body might have to be created to oversee the market, the existence of the Financial Services Authority and the Environment Agency is a good start. One of the FSA's remits is to promote the international competitiveness of the UK financial sector, and to encourage innovation.

5.4. Experience. The experience gained from research and experimentation is already considerable. Although something as novel as permit trading would be bound to throw up surprises, the level of knowledge and technical expertise is as high in the UK as anywhere, except possibly the US.

5.5. Pilot schemes. In schemes like BP's and Shell's, the UK has the seeds of a local market. It is a question of whether such schemes can be linked, for example on a sectoral basis, to create bigger schemes. The BP scheme was designed to be extendible to other companies: all that would be needed is a contractual agreement and independent verification.

But it might be difficult to extend schemes into different business sectors without an official framework. The IPE is also exploring the possibility of creating an experimental market with interested players

## **6. The business opportunity**

Permit trading represents a clear business opportunity for the City, which can legitimately aspire to become the centre for any global scheme. But London would face two types of competition.

### **6.1. Competition from virtual markets**

As markets become more electronic, their physical location becomes less important. A distinction increasingly has to be made between the market operation function (setting the rules, recording trades, collecting prices, settling transactions etc.) which can be done virtually anywhere, and the trading community which can be dispersed all round the globe, or, more likely, concentrated in a few key centres. Ideally, London should aim to have both. But it is possible that the location of the market operator for a global scheme could be politically dictated, which means it could end up in an unlikely destination. In this case, London should aim to attract the trading community, as it has successfully done with other "virtual" markets like foreign exchange and Eurobonds.

### **6.2. Competition from other centres.**

Other established exchanges will be competing with London for the business. In North America, the Chicago Board of Trade, home of the sulphur permit market, is a strong contender, as is the New York Mercantile Exchange (NYMEX) which trades commodities such as electricity (and has a close working relationship with the IPE). In Canada, the Toronto Stock Exchange has also expressed an interest.

In Europe, the Frankfurt-based Deutsche Terminbörse has said it is watching developments, as are the MATIF in Paris and the Amsterdam exchange because of the Netherlands' interest in natural gas. However none of these markets have the depth or experience of London.

In the Pacific area, the leading contender is the Sydney Futures Exchange which is planning to launch a domestic scheme by the end of 1999 based on a new NSW law recognising carbon rights in forestry and energy.

In our view, London has a very strong position in the line-up. But it would slip if other exchanges managed to get going first. Because of the limited scope for this market, there will not be much room for late-comers. London should therefore aim to be among the first to begin actual trading, even if only with a limited local scheme.

### **6.3. How quickly could the market grow?**

Under its current timetable, the EU aims to have a market going by 2005, though there does not seem to be much steam behind the idea at the moment. But if any group of countries is to set up a market, the EU is among the best placed with its common policies and single trading area. A further factor could be growing opposition by Continental business to alternatives such as higher taxes: viz. the recent outcry in Germany against the proposed energy tax.

Among bilateral partners for the UK, one of the most promising is Norway, another large oil and gas producer. In mid-1998, the Storting set up a commission to explore emissions trading, following which plans are being circulated for a scheme starting in 2003. Other partners that have been mentioned include Ireland, Switzerland and the Netherlands, and, at a supra-national level, Nordpool, the Nordic electricity exchange.

At the global level, the prospects are less clear. UNCTAD foresees a series of regional markets spanning the three major time zones, which we suppose might be Chicago, London and Sydney. But it seems likely to us that trading would have to be channeled through a single market to achieve sufficient liquidity. In this case, London's main competitor would be Chicago which has the strongest claim of all, though its prospects are clouded by the political uncertainty over US ratification of the Kyoto Protocol.

#### **6.4. The benefits**

Taking it in stages: a UK-based permit trading would open up a new source of business for the City, but the direct benefits should not be exaggerated. A scheme limited to the UK would be one of the smallest markets in the Square Mile: trading volumes and price movements would be low, and interest would be narrowly based. There would be some gains in terms of employment: small numbers of staff to run the exchange, and a few traders and analysts for whom the market would probably be an adjunct to some other activity like oil or gas trading. These numbers might amount to a few dozen. There would also be fees and commissions amounting to the small millions of pounds each year.

One of the greatest benefits of launching such a market would be to strengthen the City's claim to be the centre for world trading. In this case, the business advantages would obviously be commensurably larger. But we doubt that they would deliver the huge benefits forecast by some permit trading enthusiasts because we do not expect to see a high level of trading activity, nor a physical migration of CO<sub>2</sub> traders to the "centre" of the market, wherever that may be in a virtual world. However there would be prospects for diversifying the market: if carbon trading is a success, the permit concept could be extended to other areas of pollution control such as waste water and acid rain.

There would also be less tangible but nonetheless worthwhile benefits. One would be to establish the City as the architect of permit markets with a salable expertise and technology. Another would be to reinforce the City's reputation for innovation. A third would be to associate the City with green issues, something for which it is not yet famous. The City is increasingly being targeted by environmentalist groups for its low environmental awareness, and this would help improve its image.

#### **6.5. The downside**

However emissions trading is controversial, and the business benefits should be balanced against a number of risks.

Because the business sector tends to favour permit trading over other forms of pollution control, any venture in this direction could be portrayed as "the bosses" solution to the climate change problem, rather than "the people's". The City's involvement might create the perception that "fat cats" were "cashing in" on global warming. One tabloid newspaper has already used the headline "City to trade filth". There is the further concern that emissions trading could be seen as a way for rich countries to dump their environmental problems onto poor ones.

Clearly, these are risks of perception rather than business risks, and the City is accustomed to accusations of this kind. But since creation of the business opportunity will include persuading government of the public interest case for emissions trading, it would be well to be forearmed against them. Having said that, the general tone of Press comment about emissions trading has been quite positive.

## 7. Conclusions

Our main conclusions are as follows.

7.1. Permit trading is likely to happen because it is enshrined in international treaties, and because it provides a cost-effective way to cut greenhouse gas emissions.

7.2. But the prospect for any sizable permit trading scheme is very distant. At a global level, none is likely to materialise before the second half of the next decade because of political and practical obstacles. At the EU level, a scheme may get going earlier, but EU policy assigns only a secondary role to permit trading, so the scope may be limited..

7.3. In the UK, the government is in the process of formulating its climate change strategy, and will lay out its plans in late 1999. Permit trading is only one of many options being considered, and it seems unlikely that the UK will move quickly to adopt a national scheme. However the government is likely to encourage pilot schemes.

7.4. Several pilot schemes are either underway or being considered in the UK. These will help develop know-how, and could form the basis for a national UK scheme if they could be linked up. This is an initiative that is more likely to get going from the bottom up than the top down

7.5. Permit trading represents a clear business opportunity for the City. But at this preliminary stage the City should focus on encouraging pilot schemes, laying the basis for a national scheme, and developing the expertise and infrastructure to move on to a global scheme.

7.6. The City is in a strong position to bid for permit trading business. London is well equipped to handle the markets: it has the necessary exchanges and trading infrastructure, as well as ancillary services such as regulation and verification. The level of expertise in this area is as high as any country's except possibly the US.

7.7. The City would face competition in attracting this business, mainly from the US which already has live experience of sulphur permit trading. Other exchanges such as Sydney and Frankfurt have also expressed interest.

7.8. London's position in the line-up would slip if other exchanges managed to get schemes up and running first. Because of the limited scope for this market, there will not be much room for late-comers. London should therefore aim to be among the first to begin actual trading, even with a small local scheme.

7.9. A permit trading market would operate at three levels: a primary market through which governments issued permits, a secondary market where existing permits were traded, and a derivatives market for speculation and hedging. The City would be able to handle all three levels, though the main interest would lie in the second and third.

7.10. The market for permit trading would not be large by the standards of financial markets. Although the value of outstanding permits might run into the billions of dollars, only small proportion - as little as ten per cent - would be traded to iron out imbalances. This means that creating sufficient liquidity could be one of the main challenges facing the market.

7.11. If liquidity is a problem, trading might have to be channeled through a single exchange to concentrate volumes. But trading itself could take place in a 24-hour electronic market all round the world.

7.12. The direct benefits to the City of being the centre of a permit trading market would be modest. A UK-based market would generate a few dozen jobs plus commissions and fees running into the low millions of pounds. An expanded scheme involving other countries would be commensurably larger, though not enormous because foreign traders would not have to relocate to London in a virtual world.

7.13. But there would be wider benefits, mainly acquisition of technology and expertise which could be exported to new geographic regions or types of pollution control. On the intangible side, the presence of a market would reinforce the City's reputation for innovation, and create positive "green" associations.

7.14. However permit trading is also controversial. Some see it as a way for rich countries to export their pollution, others as an opportunity for the City to cash in on the world's environmental problems. On balance, though, permit trading seems to generate positive publicity.

7.15. Our final conclusion is that permit trading does represent a worthwhile, though modest, business opportunity for the City, and that the City is well placed to win that business. But the prospect of a large and active market is distant, and encouragement on the part of the City and the Corporation may be needed to bring it about.

## **8. Recommendations**

There are four questions which the Corporation could address in formulating a position on emissions trading:

### **1. Is it a good thing?**

The case for emissions trading is not clear cut; indeed, it is controversial. However we believe it is positive for several reasons.

- First: much of the research in both the public and private sectors suggests that trading is both feasible and effective. By harnessing market forces, it provides a greater likelihood that the most efficient means will be used to combat global warming – at a fraction of the cost of alternative methods.
- Second: industry's willing cooperation will be needed to mount an effective campaign against global warming. Market solutions are more in keeping with the times than piling on regulation and taxes.
- Third, controversial aspects, such as the "shuffling off" problem, need not be a concern in the early stages when trading is confined to national or regional markets. The experience gained at this stage could be used by the architects of a global scheme to minimise the possibilities for abuse.

### **2. Will it happen?**

The earliest emissions trading will happen at the global level is in 2008, and at the EU level in 2005. But these dates are very iffy, given the large amount of political coordination and groundwork that needs to be done. From the City's point of view, a more practical question is whether a national trading scheme will be introduced in the UK. We would venture a probability of 50 per cent over the next five years, taking account of positive pressure from industry, the ambivalence of government, and popular opinion which is probably evenly divided.

### **3. Does it represent a business opportunity for the City?**

A domestic scheme would represent a business opportunity for the City because trading would be routed through one or other of London's exchanges. However the real opportunity for the City lies in establishing itself as a potential centre for regional or global trading further down the line. This is a market where the learning curve is steep, so the early leaders will gain extra advantage.

The City would face competition from other centres and exchanges for this market. There is also a possibility that a global market could exist entirely in an electronic world, needing only a processing centre which



could be located anywhere, though it would probably gain credibility by being associated with a well-known financial centre like London.

On balance, it seems likely that a global permit scheme would be based on an established exchange for practical reasons – notably to concentrate liquidity in what is likely to be a small market.

Were London to secure the business, the practical benefits in terms of employment and revenues would probably not be large. However London's reputation for innovation would benefit, and it might also gain some mileage from the association with "greenness".

#### **4. If so, what can the City do?**

Since our conclusion is that emissions trading represents a business opportunity for the City, but that much groundwork needs to be done, and progress is likely to be slow, we would propose the following points for consideration.

1. Given that the UK government is still in two minds about the relative merits of emissions trading, a clear statement of support from the City would weigh heavily in the balance. Emissions trading is not just about combating greenhouse gases: it is also about creating markets and developing new business opportunities.
2. A successful emissions trading market in London would serve the government's policy objectives of strengthening the international competitiveness of the UK financial sector, and stimulating innovation.
3. With its important international reputation, London could have a considerable influence on the speed at which the permit trading concept is adopted at regional or global levels. A successful early start in London could be the start of a virtuous circle.
4. Although the time scale for the full development of emissions trading markets is long, the learning curve is steep and the early leaders will gain. The City should encourage industry's readiness to research and experiment with permit trading systems. Several of the key players (BP, IPE, Lloyd's) are physically located in the City. The benefit for London will lie in securing the business and teaching others how to do it.
5. Although the direct benefits in terms of jobs and revenues from the new market would be relatively small, the City should seek to promote the wider benefits: the acquisition of trading technology, the potential for further pollution-driven markets, and the City's concern for the environment.

6. Because emissions trading is controversial, there is always a danger that any promotional effort by the City could backfire. The City should stress the positive benefits, possibly by compiling an inventory of independent research and distilling the conclusions. It could also help stimulate discussion of the many unresolved questions about practicalities.

## Appendix I

### International Emissions Trading Association

A proposal to set up an International Emissions Trading Association to promote permit trading was aired at the Buenos Aires Conference in November 1998. Some 60 companies and organisations attended a meeting held under the auspices of the Earth Council and UNCTAD. The participants agreed to set up a steering committee to define a mission statement and create terms of reference.

#### Steering Committee

Latin American Trading Association	Brazil
World Business Council for Sustainable Development Switzerland	
Shell International	UK/Netherlands

#### Organisations that indicated an interest in membership

ARM	UK
Arnold & Porter	US
Banco Nacional de Desenvolvimento Economico e Social	Brazil
Bolivian Government	Bolivia
Boral Energy	Australia
British Petroleum	UK
CH2M Hill	US
Chevron	US
Companhia Vale do Rio Doce	Brazil
Danish Energy Agency	Denmark
Earth Council Institute	Canada
Eastern Power and Energy Trading	UK
Electricité de France	France
Emissions International	UK
Emissions Trading Association	Australia
Euro Brokers	US
Eyre Associates	UK
Eyre Mundy	UK
FORATOM	Belgium
Ford Motor Company	US
GCSI	Canada
General Motors	US
Green Power Corporation	Australia
Greenpeace	Netherlands
International Automobile Federation	Belgium
International Petroleum Exchange	UK

KPMG International	Australia
Lloyd's Register	UK
Marathon Ashland Petroleum	US
Margaree Consultants	US
Mitsubishi Corp	Japan
Mobil Corp.	US
Mount Isa Mines	Australia
Natsource	
New York Mercantile Exchange	US
Patrimonium	Brazil
Pilkington	UK
Sparber & Associates	US
Statoil	Norway
Storebrand	Norway
Sydney Futures Exchange	Australia
Texaco	US
Tokyo Electric Power	Japan
Toronto Stock Exchange	Canada
Transalta Corp	Canada
UBS	Switzerland
UNCTAD	Geneva
UNDP	New York
UNEP	Kenya
UNIDO	Austria
UNOG	Panama
Uranium Institute	UK
Vattenfall	Sweden
Warburg Dillon Read (UBS)	Argentina
White House Climate Change Task Force	US
World Resources Institute	US