ANNEX V: ANALYSIS OF THE PROPOSED EU-WIDE GREENHOUSE GAS EMISSIONS TRADING SCHEME

V.1 INTRODUCTION

Emissions trading is one of the three Kyoto flexible mechanisms[1], the purpose of which is to enable countries to reduce CO_2 emissions cost-effectively. Within an emissions trading scheme, countries can trade emission allowances. Such a scheme is flexible and cost-effective, because the emissions reductions are done in the country or installation with the lowest marginal reduction costs. With emissions trading across the European Union (EU) it would be possible to reduce abatement costs by an estimated 10 %. The Nordic Quota Trade Experiment shows that the aggregate costs for Denmark, Finland, Norway and Sweden can be reduced by almost 50 %. An emissions trading scheme with individual installations allowed to trade across the EU would be a powerful tool for lowering the costs of compliance and reducing adverse competitive impacts. (FIELD 2000, 15.)

[1] Kyoto flexible mechanisms are emissions trading (ET), joint implementation (JI) and clean development mechanism (CDM).

Within the EU, emissions trading is a relatively new instrument for environmental protection. In March 2000, the European Commission adopted "The Green Paper on Greenhouse Gas Emissions Trading within the European Union – COM (2000)87" that launched the debate on how the EU-wide trading scheme should be implemented. Emissions trading has received strong support both in the work on and discussions within the "European Climate Change Programme – COM (2000)87" and in consultation meetings with stakeholders, Member States and future Member States. It is considered an important part of the EU's Kyoto protocol implementation strategy. Recently, Member States have been developing national trading schemes and the European Commission presented the "Proposal for a Framework Directive for Greenhouse Gas Emissions Trading within the European Community – COM(2001)581" in October 2001. The EU-wide scheme would give experiences in emissions trading before the international trading scheme under the Kyoto Protocol is planned to begin in 2008. The proposed directive would establish a flexible trading scheme from 1 January 2005.

The details of how international trading will operate are being negotiated. The implementation schedule is quite strict, and determined actions to establish a legislative framework at both the EU and Member State level are needed. There are numerous implementation problems to be resolved, for example how such a system could be combined with Community legislation, domestic policies and measures, and the use of other Kyoto mechanisms, and how the scheme itself should be implemented. In this paper these questions and especially the linkage between the IPPC directive (Council Directive 96/61/EC) and the trading scheme will be analysed. This Annex represents the emissions trading situation during the spring 2002.

V.2 EMISSIONS TRADING AS AN ENVIRONMENTAL POLICY INSTRUMENT

V.2.1 Theoretical background

The theory of tradable emissions permits is based on environmental economics. The economic definition of pollution is dependent upon both the physical impact on the environment and the human reaction to this physical effect. The impact that human actions have on environmental quality is called external cost (externality). The external cost is the difference between the private and social costs, and it is not included in market prices. An actor suffering from an externality does not receive compensation for it. In order to internalise external costs to the market mechanism and prices, the authority can change the costs and benefits of the actions that have an impact on environmental quality by using economic instruments such as environmental taxes or emissions trading. In these circumstances, polluters benefit by changing their behaviour. (Pearce and Turner 1990, 61.) Another way to explain the nature of externalities is the common ownership of resources. This is called the tragedy of the commons, where the ownership of the resources is not defined and the exploitation continues until it is no longer profitable. The exploitation costs are common but the profits are private. Thus, the behaviour is individually rational but collectively undesirable. (Costanza 1991, 321–322.)

J. H. Dales first developed the theory of tradable permits in 1968. The idea is that the authority allows only a certain level of emissions by issuing only a certain number of allowances. In this way, the total amount of emissions is capped. (Pearce and Turner 1990, 110–111.) The system combines the certainty and effectiveness of an administrative standard with the efficiency of market alloca-

tion. The cost-effectiveness of emissions trading results from the trading that equalises the marginal control costs of the polluters included in the trading scheme (see Figure V.1).

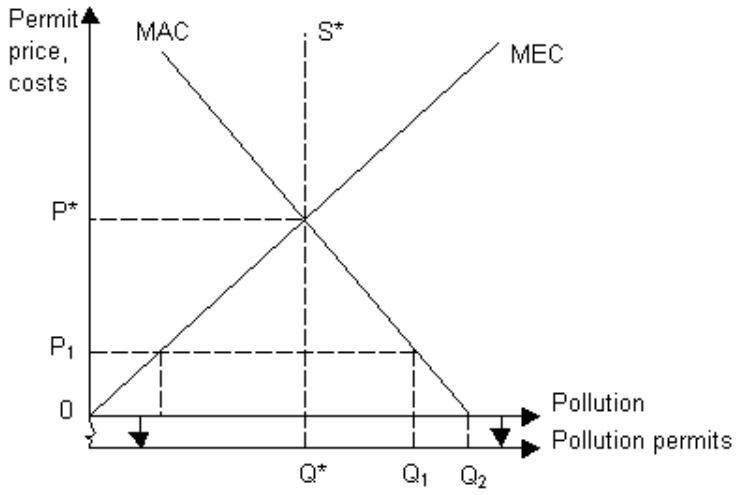

FIGURE V.1. Tradable emission permits (Pearce and Turner 1990, 110).

In Figure V.1 the emissions levels and the number of permits are on the horizontal axis. The easiest assumption is that one allowance equals one emission unit. The abatement costs and the allowance prices are on the vertical axis. The MAC curve shows the marginal abatement costs. It describes how much it costs to reduce emissions by one extra unit. The slope is negative, and thus, if the environmental goal is strict, the final reductions are very expensive. The MEC curve describes the marginal external costs of the emissions. This curve illustrates how harmful the last exposed emission unit is by assigning a monetary value to it. The slope is positive, and thus, the higher the total emissions level, the higher the marginal costs. (Pearce and Turner 1990, 110.)

For a social optimum, the allowance price is P*, and the emissions level and the number of allowances is Q*. This equalises marginal abatement and external costs and, therefore, the contamination is theoretically optimal. (Pearce and Turner 1990, 110.) Economic theory assumes that the environment has some level of assimilation capacity that can be defined. This is the number of allowances (Q*) that the government admits (S* curve). It can be assumed that the MAC curve is also the aggregate demand curve for the allowances, thus, it gives the number of allowances that is demanded at each price level. If the marginal emissions abatement costs for a single actor are P_1, the actor invests in abatement technology because the investment costs are lower than the allowance price P*. Similarly, if the costs are higher than P*, the actor buys allowances from another polluter, who has lower costs. Therefore, through trading, the total costs will be minimised. (Pearce and Turner 1990, 111.) The supply of allowances is regulated by the authority and does not respond to price. If the total emissions are higher than the total number of allowances, the emissions must be reduced to the level corresponding to the number of allowances. If environmental policy targets change, the authority can reduce or increase the supply of allowances to the desired emissions level.

V.2.2 Main features of the permit market

In the permit market the object of purchase is a quota, an allowance (permit/cap/credit) for a certain level of emissions. There are two kinds of quotas: emissions permits and ambient permits. The basis of the emissions permit is the level of emissions. With the ambient permit, the state of the environ-

ment is also observed. The quality standards of the ambient permits might vary according to the receptor point and the permits have to be obtained from the market at the receptor point. In an EU-wide CO_2 trading scheme, the allowances would be emissions permits, because the impacts of CO_2 emissions are global. The emissions would be expressed in tonnes of CO_2 equivalent.

The allowances can be allocated at the beginning by grandfathering, auction or a mixed system. In an auction, every participant has to buy allowances for every emission unit. In grandfathering, the allowances are given freely to the participants based on earlier emissions or the energy efficiency of the operations. Grandfathering gives cost savings to the participants compared with the auction, because the participant has to buy allowances only for the emissions exceeding earlier emissions.

There are two main classifications of trading schemes. The 'baseline or credit' system and the 'cap and trade' scheme. It is also possible to combine these. The baseline system (credit trading) is more project-based, because an emission profile, the "baseline", is specified for each participant. The baseline can be projected based on past emissions, expected technological changes, and an increase in emissions or abatement opportunities. At the end of an agreed period, emissions reductions below the baseline earn emissions credits. These credits can be traded to other participants. The actual reductions from the baseline should be measurable. There is no binding cap for emissions; therefore, the incentive to reduce emissions must be provided, for example by recognition of early action to trade (early crediting). Canada, for instance, uses this kind of scheme. If the scheme is voluntary and contains early crediting, it offers a practical starting point, because it allows companies to act without delay before the details of an internationally acceptable scheme are decided. These early credits should be fully compatible with future official schemes. With this type of scheme, the markets actually drive greenhouse gas (GHG) mitigation efforts. (Sonneborn 1999, 2–3, 6, 9.)

The cap and trade system (allowance trading) is more widely used than the baseline system. For example, Denmark has established a cap and trade system for electricity plants with capacity over 30 MW. The cap and trade scheme involves trading of emissions allowances, and the total number of allowances is limited, that is, "capped". Participants are free to buy and sell allowances, but must have sufficient allowances to cover their own emissions at the end of an agreed period. (Sonneborn 1999, 2.) The cap and trade model is a better way to implement an emissions trading scheme, because the total amount of emissions is limited; thus, it addresses more strongly the environmental benefit of the scheme. With rate-based credit trading, the environmental outcome is at risk due to output increases (Egenhofer 2001, 37).

A bubble means the implementation area in which the total amount of emissions is limited to the desired emission level by the control authority. All sources are required to have allowances that specify exactly how much the firm is allowed to emit. (Tietenberg 1996, 337.)

Banking means that the polluter can save the allowances for use or to be sold in the future. In the EU-wide scheme during the first three-year period, allowances can only be banked from one year to the next. Whether installations will be allowed to carry banked allowances to the second period from 2008 will be at the Member States' discretion. In subsequent five-year allocation cycles, they would have unrestricted rights to bank allowances. In an offset system a new firm has to prove that its activity in an area improves the state of the environment. The firm would buy allowances in an exchange ratio of 2:1, for example. This requires two allowances for an emission amount of one allowance. It can also be required that the firm has to decrease its emissions in another area (Solomon 1999, 373). Netting is internal trade between sources in the same plant or facility. In other words, allowances are transferred between the actor's own installations or factories.

V.2.3 Transfer of allowances and cost-effectiveness

The transfer of allowances results in cost-effectiveness (Figure V.2).

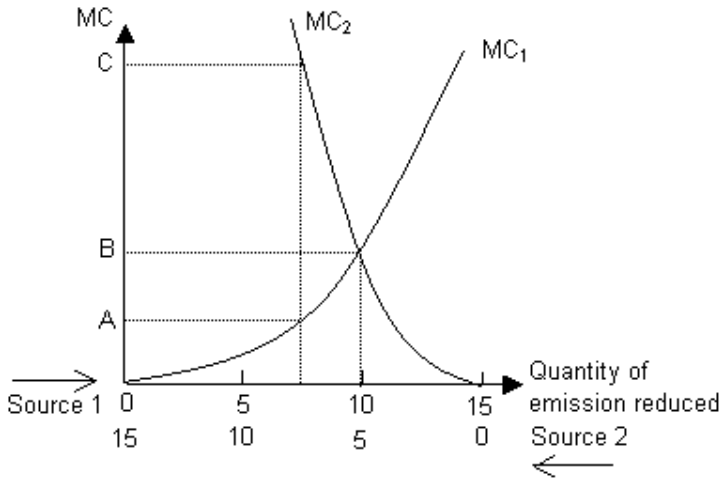

FIGURE V.2. Cost-effectiveness and the emission permit scheme (Tietenberg 1996, 338).

Figure V.2 has two sources of emissions: sources 1 and 2. The marginal abatement costs are on the vertical axis and the quantity of emission reductions is on the horizontal axis. There are 15 issued allowances and allowed emissions. With the traditional command and control –instrument, if the same 7.5 units of emission reductions are demanded from both sources, the total costs will be high, A+C. There is an incentive to trade emission allowances, because the control costs for the second source are substantially higher than for the first. The second source can reduce its costs by buying allowances from the first source at a price lower than C. At the same time, the first source will be better off by selling allowances at a price higher than A. This trading of allowances will continue until the quantity of the emission reductions for the first source is 10 units and for the second, 5 units. Accordingly, the number of allowances for the first source is 5 and for the second, 10. This optimum is at the intersection of the marginal cost curves, MC_1 and MC_2. At this point, the marginal cost for both actors is B, and the total abatement costs are minimised, because (A+C) > (B+B). (Tietenberg 1996, 338.) This is the situation in theory, but in practice there are several factors, for example high transaction costs, that prevent the markets from acting efficiently. In the emissions trading context these factors are information problems, which cause, for example, search costs, high negotiation costs resulting from market opportunism, and monitoring costs.

V.2.4 Criticism of emissions trading

The use of economic instruments in environmental policy has received much criticism, because the economic system incorporates a number of biases which operate against sustainable development.

The biases within the economic system are, for example, common ownership of resources, future discounting and the effects of uncertainty. The exploiters of common resources have little incentive to conserve the resources. A trading scheme can define the ownership of a resource. However, this does not resolve the problem of the future generations' rights and uncertainty. In a permit market

the uncertainty of future events and the asymmetrical distribution of information decrease the market activity and lead to market failures. By providing clear rules for the scheme and by announcing changes in environmental policy targets as early as possible, market failures can be prevented. (Sprenger 2000, 24.) The experiences of trading schemes in the United States show that market activity is not certain on the permit market and many U.S. schemes have failed because of high transaction costs (Solomon 1999, 372). Thereby, the cost-effectiveness, which is often said to be the good feature of a trading scheme, has not been reached.

The fixing of emission limits is also problematic. According to the economic model, polluting is optimal when marginal costs and benefits are equal. However, the marginal costs and benefits are difficult to define, especially when they concern abstract concepts that are difficult to describe in monetary terms, such as the value of species and landscapes, and health risks. This is why the economic models are often far from reality. (Hoffrén 1994, 62–63.) The economic model of emissions trading assumes that the marginal costs also describe the optimum for the environment, so it does not recognise that environmental damages threaten ecological sustainability. (Costanza et. al. 1997, 218.)

Under an emissions trading scheme an installation can technically buy a permit to pollute and cause environmental damage, even though it could be considered ethically wrong to do so. The trading scheme has been criticised because of this right 'to buy a permit to pollute', which, in effect, takes away the right of future generations to a clean environment. On the other hand, without a trading scheme installations can pollute for free (Costanza et al. 1997, 203). In addition, other economic instruments and traditional command and control instruments also give inadvertently a right to pollute. According to a report by the Organisation for Economic Co-operation and Development (OECD), the problem is no worse with an emissions trading scheme than with other instruments such as environmental taxes (OECD 1999, 10).

Another question is whether it is realistic to search for a solution to environmental problems by using an instrument that is based on the same market mechanism that has caused the problems. The Nobel Prize-winning economist, Friedrich von Hayek, has said that it is ironic that economists have been invited to solve problems they have been partly responsible for themselves. As Einstein said, "we cannot solve the problems that we have created with the same thinking that created them". (Söderbaum 1999, 106.)

These problems make it important that implementation options, enforcement and monitoring are applied when using market-based instruments. With an emission-trading scheme, it is not guaranteed that the market mechanism will automatically work efficiently. Rather, monitoring must be done to ensure that the conditions for market efficiency really exist.

V.2.5 Implementation in practice: a new instrument

The theory of tradable permits has been shown to be theoretically effective, but its implementation in practice necessitates the increased involvement of professionals in many fields besides economics. Economic models ignore several factors that have an impact on implementation. For example, institutional features and political parameters of trading systems interact in complex ways, and these factors (transaction costs, institutional experience, implementation costs, etc.) will determine the success of a trading scheme in practice. (Solomon 1999, 385.)

According to Sprenger (2000, 7, 24), it is necessary to have empirical evidence of implementing instruments in practice. The applicability of an instrument cannot be determined by theoretical arguments. When the instrument is new the implementation and administrative costs can be high and the costs of establishing a trading scheme can outweigh the expected savings. There is no practical experience in implementing emissions trading in the international context, but in the EU the concept of tradable emission allowances is not totally unfamiliar. National pilot schemes are a useful way to get learn-by-doing experience. Canada, New Zealand, Australia, the United States, the United Kingdom, Denmark and Norway have recently set up or decided to set up a national trading scheme. These pilot systems help to mitigate the economic risks of inaction and offer information about transaction costs, which present obstacles to efficient levels of emissions trading, the impacts that the scheme has had on the price of allowances, and companies involved. (Sonneborn 1999, 2, 9.) Other practical examples of allowances with some degree of transferability are the quotas for ozone depleting substances under the Montreal Protocol, the fish catch quotas under the European Union's Common Fisheries Policy, and the milk quotas under the European Union's Common Agricultural Policy. (Commission… 2000, 8.)

One way to evaluate the usefulness of a trading scheme is to investigate whether it creates enforcement problems that would not be present without trading. This can be done, for example, by considering what additional information regulators in a trading scheme require. If the gains to firms from trading exceed the cost of those resources, then a trading programme can still be justified on efficiency grounds. (Hahn and Hester 1989, 388.)

Almost all practical experiences of trading schemes are from the United States. There is little information about national trading schemes in EU countries because these schemes are only in the early stages. Thus, most of the studies that suggest how a trading scheme should be implemented are based on the U.S. experiences, which show that there are many problems in implementing a trading scheme in practice. The implementation options concern issues like scope, market failures, monitoring and the allocation of the allowances. However, these U.S. experiences cannot be generalised to European circumstances and the CO_2 trading scheme. Studies of the SO_2 trading scheme, for example, suggest that this scheme is also a good way to reduce GHG emissions, especially to deliver cost-effective emission reductions. Nevertheless, there are significant differences between GHG and SO_2 trading. For example, SO_2 has mainly regional impacts, but CO_2 emissions cause global impacts. Moreover, the CO_2 trading scheme has a much larger number of participants and more diverse processes and activities. Therefore, the CO_2 trading scheme requires features unique to these circumstances. (Sonneborn 1999, 2.) The U.S. experiences do, however, give some understanding about the implementation options of a trading scheme. The United Kingdom's and Denmark's schemes, although still in their early stages, are used in this report to give a picture of climate policy and emissions trading schemes in the EU countries.

V.3 PRACTICAL EXPERIENCES OF TRADING SCHEMES

V.3.1 U.S. Acid Rain Program

The Acid Rain Program was established under the Clean Air Amendments of 1990 for SO_2 emissions from fossil-fuelled electric power plants. It is thought to be the most successful trading scheme in the United States. In 1985, total SO_2 emissions were around 23 million U.S tons and electric utilities emitted 16 million U.S. tons. The Acid Rain Program set a national cap of 8.95 million U.S. tons per year on the total emissions from all utilities.

The cap was to be implemented in two phases. The intent of Phase I of the program from 1995 to 2000 was to reduce total power plant emissions by 50 % from the baseline emissions. The baseline was calculated from the average emissions in 1985–1987 in the eastern and mid-western regions of the United States. These regions are the sources of the acid depositions in upper New York State, New England and south-eastern Canada. By 1 January 1995, each of the 110 highest-emitting plants had to hold allowances equal to its total annual emissions. At the same time, those emissions had to be no more than 50 % of the plant's baseline emissions, unless allowances for any excess emissions were acquired from other plants or through the annual auction of the U.S. Environmental Protection Agency (EPA). This meant that the utilities had to meet an interim ceiling of 5.7 million U.S. tons. In Phase II (2000–2009) the total amount of emissions is capped, and the number of allowances is based on the national cap of 8.95 million U.S. tons of SO_2. In addition, Phase II includes smaller, cleaner plants throughout United States. (Howe 1994, 154–155; Klaassen 1996, 145–146; Määttä 2000, 54–59.)

Each allowance gives its holder the right to emit one U.S. ton of SO_2 in a specific year. Allowances are allocated for each year beginning in 1995 and are based on average fossil fuel consumption from 1985 to 1987 and an emission rate. Allowances can be purchased from other plants, from a stockpile of allowances withheld (or "reserved") from issuance each year by the EPA, or from an annual auction conducted by the Chicago Board of Trade under contract to the EPA. The allowances sold by auction consist of ones that are offered by individual plants and the EPA's "reserved" allowances not previously sold directly to the polluters at the fixed price of USD 1 500 per U.S. ton. The EPA created the reserve by taking away 2.8 % of the annual allowances from every plant that obtained its allowances under the initial, free distribution. The main object of the direct sales is to guarantee that new firms always have a way to buy permits. This prevents existing firms from withholding allowances and thereby blocking the entry of new firms on the market and reducing the competitiveness of the market. Allowances are for sale to any party, including environmental groups that may want to hold them to ensure improvements in air quality. Allowances can also be banked, which means that unutilised annual allowances can be held for future use or selling. (Howe 1994, 154–155; Klaassen 1996, 146; Määttä 2000, 54–59.)

If a polluter does not have enough allowances at the end of the year equal to its total emissions, the penalty is USD 2 454 per excess SO_2 U.S. ton (1996). This is 20 times higher than the allowance price of USD 140 (March 1998). The penalty is so high that it has never been imposed. In addition to this penalty fee, the EPA deducts one allowance from the polluter's entitlement for the following year for each U.S. ton over the emission limit. (Määttä 2000, 54–59.)

During Phase I, SO_2 emission reductions have been significant. In 1995 the average emissions per polluter taking part in the program were 4.5 U.S. tons, which is more than 50 % less than in 1990 and more than 39 % less than in 1994. In contrast, the emissions of firms outside the Acid Rain Program increased from 1990 by approximately 12 % and from 1994 by 5 % by 1995. The allowance price was estimated at the beginning of the program to be USD 600. This is much higher than the actual price of USD 140 (March 1998). (Howe 1994, 154-155; Määttä 2000, 54-59.) Most of the market activities have been shifts and redistributions of allowances within one utility. Approximately 20 % of the private transfers to date have occurred between economically distinct installations. Extensive trading has not been necessary and the price of allowances has been lower than expected because of the following:

- Initial allocation of allowances was based on historical production levels (grandfathering) and the limits reflected normal electricity production levels, although at reduced emission levels. The overall emission limit for Phase I was consequently not too difficult to meet.

- There was an unexpected supply of low-cost compliance options available to utilities, such as the increased availability of cheaper low sulphur coal due to de-regulation of railways.
- Trading reduced the need for spare SO_2 scrubber capacity to cover periods of maintenance and unplanned outage. Trading also provided an incentive for development of more efficient scrubbers and increased competition between suppliers, which has reduced the cost of scrubbers. (Mullins 1998, 9.)

There is no accurate information about cost savings, but studies give some approximations that range between 1 and 3 billion dollars per year. The total SO_2 abatement costs are approximately 4 billion dollars per year. The program has been administratively efficient. The administrative costs of the trading scheme have been 2 billion dollars. The EPA had estimated the cost at 4 billion dollars. With command and control instruments, the administrative costs were estimated to be 5 billion dollars. There are about 1000 persons working on the administration of the trading scheme at the EPA, State and local levels. This is not much compared to enforcement of the Clean Air Act, which has 15 000 people working on it. The administrative costs have also been low because a trade within the trading scheme does not require the authority's approval. Additionally, the transaction costs have been low. The program has also encouraged technical and market innovations. (Määttä 2000, 54-59.)

The success of the Acid Rain Program offers a model for planning a trading scheme. According to the EPA, the following options should be considered in the preparation of emissions trading legislation:

"Lessons learned:
- Market-based instruments are tools: define the problem, set goals, and design an appropriate program:
  - Keep the system as simple as possible
  - Set an emissions budget for an entire source category (avoid partial participation)
  - Assure accountability before allowing flexibility"

"Government should focus on:
- Setting the goals
- Establishing the rules, including initial allocation of emission-reduction responsibilities
- Collecting and verifying emissions data
- Recording compliance transfers
- Enforcing the rules; assuring consequences for non-compliance"

"Government should refrain from:
- Assuring market functions
- Reviewing or approving individual allowance transfers
- Reallocating allowances frequently
- Requiring specific technologies or measures" (Määttä 2000, 59)

V.3.2 Danish CO_2 Emissions Trading Scheme

In the EU burden-sharing agreement Denmark committed itself to a 21 % reduction of GHG emissions. In order to fulfil this commitment the Danish Parliament in 1999 adopted a trading scheme for the period 2000–2003. This cap and trade scheme started in January 2000. The scheme sets total

quotas for CO_2 emissions for the electricity producers and issues emission allowances for the individual power companies. (Pedersen 2000.)

The total CO_2 quota is 23 million tonnes in 2000. This will be reduced by 1 million tonnes per year, to reach a quota of 20 million tonnes in 2003. The allowances are issued per company, not per unit or per plant. The scheme covers all electricity producers in Denmark, except producers relying entirely on renewable energy and small producers, with historical CO_2 emission less than 100 000 tonnes, but only if electricity is produced as combined heat and power (CHP). As a result, the scheme covers around 15 producers and 90 % of the total CO_2 emissions. The exemption reduces the transaction costs for a number of small producers who have already – through the establishment of an efficient CHP plant – contributed to the CO_2 reductions and have only limited scope for further CO_2 reductions. These small CHP producers do not receive an emission allowance and they do not have to pay the penalty in case of non-compliance. The CO_2 emissions from the small producers (1.9 million tonnes) is taken into account in determining of the total number of allowances to be distributed to the installations participating in the scheme, to ensure that the total emission allowances and the contribution from the exempted small producers do not exceed the total quota. (Pedersen 2000.)

The grandfathering principle was applied to the initial allocation of allowances, which was based on emissions in the period 1994–1998. This principle was chosen because the existing electricity producers had already invested in their power plants under the old system without anticipation of CO_2 quotas; some of these investments might not even have been made under the trading scheme. Furthermore, the principle introduces only a small distortion into the initial competitiveness of electricity companies; therefore, the companies find it more acceptable. The Commission's view is that grandfathering is state aid, because a new producer in Denmark, who has no allowances and will have to buy them from the market, will be discriminated against compared to the existing producers, who have received free emission allowances through the grandfathering principle. As a consequence, the Commission's approval of the Danish Quota Act, given in April 2000, presupposes that new producers will be provided with emission allowances according to objective and non-discriminatory conditions, if such producers should come on stream before the end of 2003. (Pedersen 2000.)

The monitoring is based on continuous monitoring of the fuel consumption of each electricity and heat producing plant in Denmark. The CO_2 emissions are calculated by multiplying fuel consumption with a standard value for CO_2 content. The emissions are reported annually to the Danish Energy Agency. A continuous and online reporting system, like the one under the U.S. Acid Rain Program, is not required. The trading is done by the producers without government interference and registered with the Danish Energy Agency. The Danish Energy Agency has to be informed no later than four weeks after any trade. The allowances can also be banked for future use or trade. In 2001 three trades were reported under the Act with a total volume of 160 000 tonnes of CO_2. (Pedersen 2000 and 2001.) The low market activity is the result of the allocation of allowances, because in the Danish permit market, two participants (Energi E2 A/S and Elsam A/S) hold allowances that cover over 80 % of the total emissions. The Table V.1 below shows the final allocations for 2001 and 2002 and the preliminary allocations for 2003, before trading. For comparison, the historical average annual CO_2 emissions in the "grandfathering period", 1994–1998, were 30.3 million tonnes.

TABLE V.1. Allocation of allowances 2001–2003; million tonnes of CO_2 (Pedersen 2001).

Producer	**Final allocation**	**Final allocation**	**Preliminary allocation**
	2001	**2002**	**2003**
Energi E2 A/S	8.221	7.577	7.135
Elsam A/S	10.533	9.873	9.420
EON/PreussenElektra	0.965	0.838	0.751
I/S Avedøreværket 2	0.094	0.527	0.510
Østkraft Produktion A/ S	0.062	0.060	0.058
Energi Randers Prod. A/S	0.198	0.198	0.198
Dansk Shell A/S	0.102	0.102	0.102
NRGI Amba (Anholt)	0.001	0.001	0.001
Without permits	1.825	1.825	1.825
Total cap	**22.000**	**21.000**	**20.000**

If an electricity producer exceeds the emission allowance, taking into account traded and banked CO_2 emission allowances he must pay a fixed penalty of DKK 40 (about USD 5) per tonne of CO_2 emitted in excess of the allowance to the government. The revenues from the penalties are to be used for investments in energy savings. (Pedersen 2000.)

V.3.3 UK Emissions Trading Scheme

Under the Kyoto Protocol and the EU burden-sharing agreement, the United Kingdom needs to reduce GHG emissions by 12.5 % below the 1990 levels by 2010. The United Kingdom's Climate Change Programme sets out policies to reduce GHG emissions from business and other sectors. The voluntary trading scheme is a key element of this policy. The Government published the Draft Framework Document in May 2001. The proposed design is quite complex, resulting from the need to maintain consistency with other elements of UK climate change policy. It contains two, but partially linked, emissions trading markets: "baseline and credit", made possible under Climate Change Levy (CCL) Agreements, and "cap and trade", originally proposed by the industry-led UK Emission Trading Group. Thus, companies can become eligible to trade either by agreeing targets for reducing emissions with the government or by participating in an auction of allowances. The revised formal start-up date is April 2002. (Kitamori 2001, 12.)

The CCL is a new energy tax that has been introduced as of April 2001 on energy consumption by industry and business. Energy-intensive industrial sectors may be eligible for a discount of 80 % on the CCL if they enter into CCL Agreements (CCLAs), which are the voluntary agreements for committing to certain "challenging" emission reduction targets. Only those sectors that are covered by the IPPC directive are eligible to negotiate CCLAs. Under the CCLAs, a firm can choose either of two emission reduction targets: an absolute target for CO_2 emissions, or a unit target, that is, an energy efficiency target per unit of output. With a baseline target, a firm will be credited for the portion above and beyond the agreed baseline, and these credits can be traded. Absolute targets under the CCLAs are also eligible to be used in an Emission Trading Scheme (ETS) discussed below, while firms choosing unit targets can only trade credits among themselves. The "relative sector" with unit targets can purchase permits from the ETS without limit, but credits from unit targets can only be traded with the "absolute sector", the ETS, if there has been a previous purchase of allowances from the ETS by another unit sector. (Kitamori 2001, 13–14.)

The ETS is a voluntary programme, with four main ways to enter:

- From outside the scope of the CCLAs, with voluntary and absolute targets ("direct participants").
- Through the "gateway" with relative, or in some cases with absolute, targets under the CCLAs.
- By emission-reduction projects (credit trading).
- By opening an account in the registry to buy and sell allowances.

Thereby, the UK scheme, in theory, covers the whole economy because it is open to any installation wishing to participate and able to comply with the rules of the scheme concerning monitoring and reporting. The scheme also covers all six greenhouse gases controlled under the Kyoto Protocol, but the participating firm can choose either a cap on CO_2 only or on all the Kyoto greenhouse gases. As the ETS is voluntary and the participants have to also pay the CCL on their energy consumption, the government has allocated £30 million (available from 2003–2004) for incentive payments for participants who agree to voluntary binding and challenging reduction targets in the auctions. However, those participants that are already covered under the CCLAs and therefore eligible to receive the 80 % discount on the CCL would not be able to receive the incentive payments. (DEFRA 2001, 2–4.) The structure of the UK Emission Trading Scheme is illustrated in Figure V.3.

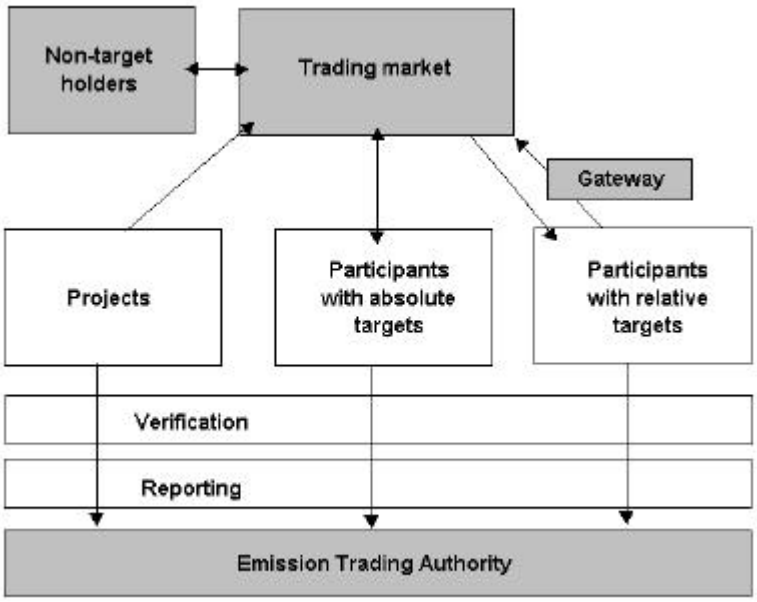

FIGURE V.3. Structure of the UK emission trading scheme (DEFRA 2001, 4).

The first auction for the direct participants was completed on 11–12 March 2002 and was, according to the UK environment ministry, an enormous success. Thirty-four firms have pledged to cut annual CO_2 emissions by over 4 million tonnes over the next five years. This is over 5 % of the planned reduction in the United Kingdom's annual emissions by 2010. (ENDS Daily 13.3.2002.) Organisations that receive the incentive payment have a cap for emissions and the allowances will be grandfathered to these organisations. Organisations under the CCLAs will receive allowances only if they beat their targets and will have to buy extra allowances if they do not achieve their targets. Thus, the UK scheme includes both 'cap and trade' and 'baseline and credit' trading. (DEFRA 2001, 5.)

Allowances are recorded on a computerised registry. The "direct participants" have to be in compliance in order to get the incentive payment and a full allocation of allowances next year (DEFRA 2001, 6). If a firm under the CCLA with a binding reduction target does not meet this target, it is subject to a penalty. The firm will lose its eligibility for the 80 % discount on the CCL in the next period and will also be required to repay the discount it received in the previous period. (Kitamori 2001, 14.)

Banking is allowed without restrictions up to the end of 2007. Moreover, participants with absolute targets will be able to bank surplus allowances into the First Commitment Period (2008–2012) under the international trading scheme. The UK trading scheme is also envisioned to recognise credits from joint implementation (JI) and clean development mechanism (CDM), once clear rules have been established. (DEFRA 2001, 6; Kitamori 2001, 13–15.)

Even though the scheme will formally be launched in April 2002, the credit system has been boosted by the announcement of a first inter-company deal. The chemical firm DuPont has sold 10 000 tonnes of CO_2 equivalent allowances for 2002 to Mieco of Japan. DuPont and Mieco are both seeking to gain through the deal early experiences in emissions trading, according to the broker, Natsource. Natsource has identified about 60 inter-company trades around the world in a recent study for the World Bank, but the DuPont-Mieco deal is unique because it takes place in anticipation of gaining credits under a government-backed trading scheme. (ENDS Daily 24.9.2001.)

The government will carry out a thorough review of the scheme in 2005, according to the draft proposals released on 3 May 2001. Any necessary changes to the scheme could then be implemented in 2007, when the first round of participants will be expected to have achieved their emission reduction targets. Further consideration also must be given to how the scheme has to be changed to be compatible with the EU-wide scheme, because the UK scheme is based on use, unlike the EU's.

V.4 IMPLEMENTATION OPTIONS OF A TRADING SCHEME

V.4.1 Defining the tradable unit

In order to reach economic efficiency, all allowances traded under the EU trading system are interchangeable, regardless of their origin or who is selling them. Thus, a single definition of an allowance is important. (Design of… 1999, 9.)

In the EU-wide scheme there will be a difference between "a permit" and "an allowance". The GHG permit will be required by all installations covered by the scheme. The permit will set obligations to hold allowances equal to the amount of actual emissions, and to monitor and report emissions. The allowances will be transferable, but the permits will be attached to a specific installation. According to the proposal, each allowance would represent one tonne of CO_2-equivalent. (Commission… 2001, 3.)

In the preliminary phase, allowances will have validity not extending beyond the end of the phase, and after that not beyond the subsequent five-year period in which they are issued. This also makes banking within periods possible. To increase temporal flexibility and to encourage early reductions beyond the Kyoto target, the same number of allowances that a participant has banked for a previous period will be issued to that participant at the beginning of each period. Even if a Member State

is not in compliance with its commitments, the holders of extra allowances will not lose the benefit of obtaining the surplus. (Boemare and Quirion 2001, 11; Commission… 2001, 12–13.)

V.4.2 'Baseline' and 'cap and trade' systems

In the EU, the focus is on the cap and trade programme. A strict environmental goal can be achieved better under a cap and trade system, as the total amount of emissions is limited to the desired level and there is a rather strong certainty about the environmental outcome. (Solomon 1999, 384–385.) In addition, the cap and trade scheme tends to have lower transaction costs (Egenhofer 2001, 36). However, in the preliminary phase, 2005–2007, there will be no binding targets limiting the emissions of the Member States. The penalty for non-compliance will also be lower and the allowances will be allocated free of charge. (Commission… 2001, 3.) After the preliminary phase, a new five-year period commences that coincides with the commitment period of the Kyoto Protocol.

V.4.3 Allocation and issuance of allowances

Grandfathering has been considered an advantageous practice to allocate allowances, as it theoretically enables dynamic efficiency. However, there is no guarantee that the participants will use the savings resulting from the free allocation to develop new technology. On the other hand, grandfathering means a capital transfer to the polluters. This is not in accordance with the polluter pays principle. (Koutstaal 1997, 10.) In addition, grandfathering does not encourage firms to invest in abatement technology, if the allowances are allocated based on earlier emissions, as those firms that have not made early investments in cleaner technology will get more allowances. This effect can be avoided by basing the allocation on energy efficiency so that efficient firms get more allowances. Grandfathering also creates a bias against new firms entering the market, if established firms get their permits free while the new ones have to buy them unless some allowances are put aside. (Boemare and Quirion 2001, 8). However, it has to be taken into account that no matter what the initial allocation, efficiency can be achieved.

On one hand, the auction may be problematic as firms are often opposed to it because they think it weakens their international competitiveness, and the implementation of the trading scheme can be entirely impeded. On the other hand, the auction is preferred as the auction revenues can be recycled in the society. However, the purpose of the auction should not be for the benefit of the government, because this could obscure the meaning of the trading scheme. In addition, the auction allocates the allowances efficiently right from the starting point and there is no need to trade at the beginning of the scheme and there are no additional transaction costs. (Koutstaal 1997, 10.)

In the EU-wide trading scheme each Member State will allocate its allowances taking into account the requirements of the emissions trading directive, the EU Burden Sharing Agreement and the Kyoto Protocol. Although, according to studies, grandfathering is a second-best solution and at the installation level, allowances must be auctioned and revenues recycled (FIELD 2000, 5), the proposed directive requires that in the preliminary phase of 2005–2007 the Member States allocate allowances for free. To ensure fairness and protect the internal market this should be done based on objective and transparent criteria. Member States are required to ensure that new entrants have adequate access to allowances. Member States would also have to communicate to the Commission their allocation plan in advance. The plan will be rejected if the common criteria are not fulfilled. The allocation issue is considered in further detail in the study for Directorate-General for the Environment (NERA 2002). The plans give relevant information on how Member States are planning to

meet their commitments and thus improve the quality of and access to information. The experiences from the preliminary period will be reviewed by 30 June 2006 to determine the method that should be used in future. (Commission… 2001, 11, 15)

The number of allowances issued will be left to the Member States to decide and will not necessarily be less than past emissions. But the Member States will still not be allowed to issue extra allowances to a sector or installation and they will have to take into account the technological potential to reduce CO_2 emissions. This last aspect is interesting as it resembles the best available technology (BAT) approach of the IPPC directive. (Commission… 2001, 7.)

V.4.4 Scope: sectors to include in trading

A trading scheme covering all Member States would provide the best guarantee for a smooth-functioning internal emissions market as compared to a set of uncoordinated national emissions trading schemes (Commission… 2000, 4). In the EU-wide scheme, trading by governments is not the most efficient form of trading. It equates only national marginal costs but not costs across sources within each country, and prevents some cost-effective domestic reduction opportunities from being available on the world market. (Center… 1999, 20; FIELD 2000, 16.) The potential savings from a trading scheme increase with the coverage of the scheme, because the market efficiency requires a sufficient number of actors in the permit market. Only then can marginal costs between actors become equal. Therefore, the EU-wide scheme is to be implemented with trading at the installation (firm) level. The EU-wide scheme would also lead to one single price for allowances traded by companies, thereby ensuring a level playing field for all.

One of the key issues in developing an EU-wide trading scheme is the sectors and sources that should be included. In making this decision a number of criteria need to be considered, including (Center… 1999, 23–24):

- Environmental effectiveness. It is desirable to include as many sources as possible in the trading scheme, because a cap and trade system imposes an absolute emission limit and therefore offers greater certainty of desired environmental outcome than non-trading policies and measures.
- Economic efficiency. Capturing more sources and a higher percentage of total emissions in the trading scheme will reduce the overall cost of CO_2 control, especially when the marginal costs of mitigation differ widely among sources and industries (Center… 1999, 23–24). If each country implements its target under the Burden Sharing Agreement individually, the total annual cost for the EU to reach the Kyoto target will be € 9.0 billion. If only energy suppliers participate in the emissions trading scheme the annual cost will be € 7.2 billion. If energy intensive industries (iron and steel, non-ferrous metals, construction materials, chemicals and paper and pulp industries) are also included the cost would be € 6.9 billion. If all sectors were included, the cost would be only € 6.0 billion (see Figure V.4). (Capros and Mantzos 2000, 1.)

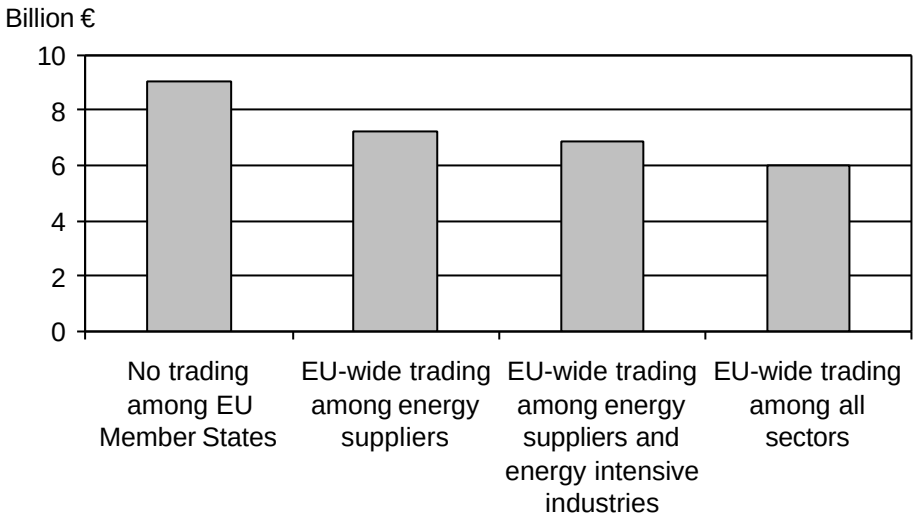

FIGURE V.4. Costs of reaching the Kyoto target to EU Member States in 2010 (billion €) (Capros and Mantzos 2000, 1).

- Effects on competition. Ideally, the competing firms and industries face the same marginal cost of control. This can be achieved by designing such an overall control strategy that firms and industries which compete with one another are either both included or excluded from trading.
- Administrative burden. The scheme should be designed so that the costs to government of administering the scheme are manageable. Tasks include maintenance of a registry, verification of emissions reports, distribution of allowances and enforcing penalties for non-compliance. Also, the monitoring and reporting burden placed on the sources should be manageable.
- Relationship to other policies and measures (PAMs). From strictly an environmental perspective, the trading scheme need not cover sectors already regulated through PAMs. From an economic perspective, the relationship between trading and PAMs is important because PAMs reduce the efficiency of trading by forcing reductions in particular sectors.

According to the proposed directive, the EU trading scheme would initially cover only CO_2 emissions and would be restricted to the most significant CO_2-emitting installations under the IPPC legislation, and to combustion and power plants with thermal capacity over 20 MW but under 50 MW. These installations are included as they are major sources of CO_2 emissions and their number is likely to increase in the future. (Environment DG 2002.) This would result in coverage of approximately 46 % of the EU's estimated CO_2 emissions in 2010, and of 4 000 to 5 000 installations. Chemical plants and waste incinerators would be excluded. The chemical plants would not be included because to do so would increase the administrative complexity of the scheme. The CO_2 emissions of chemical plants are insignificant (less than 1 % of the total emissions of EU) and the number of plants is high (34 000). Waste incinerators are excluded because of the complexities in measuring the carbon content of the waste material. The Member States would be able to propose other sectors for inclusion in the scheme. (Commission… 2001, 10.)

V.4.5 Monitoring, reporting and compliance

A trading scheme could be organised with varying degrees of Community intervention. A scheme requires a certain level of regulation and it would appear to go beyond the minimum level of Community intervention as many of the adverse competition effects and barriers to trade can be avoided through implementation of a somewhat centralised trading scheme for selected sectors. The European Commission believes that a Community approach is necessary to ensure that competition is not distorted within the internal market. Two important questions are: How important are the Community's fair competition rules in the context of implementation of the Kyoto Protocol? Do these threats to competition justify giving the Community a major role in trading and allocation decisions? (Center… 1999, 22; Commission… 2000, 5.)

The intensity and environmental effectiveness of any trading scheme will largely depend upon its compliance provisions and enforcement regime. To be effective, a trading scheme necessitates a certain degree of harmonisation of the rules of monitoring, reporting and verification at the EU level, and a strong role for the European Commission. The elements that would benefit most from Community harmonisation are: the common unit of trade; criteria for the participation of installations; and a framework for the distribution of emissions allowances to prevent distortions of competition, and for monitoring, compliance (verification) and enforcement. Without these factors the attractive features of emission trading cannot be realised in practice. (FIELD 2000, 20–21; Center 2001, 2.) For example, in the United States many trading schemes have failed because of weak monitoring systems, even for uniformly mixed pollutants like volatile organic compounds (VOCs). On the other hand, the success of the U.S. SO_2 trading scheme results largely from the strictness of the enforcement regime, including stiff penalties for non-compliance. (Commission… 2000, 9, 25; Solomon 1999, 372.)

The Member States have agreed to fulfil the Kyoto commitments jointly. This strengthens the proactive, supervisory and assessment role of the Community. On the other hand, the lack of binding commitments for the pre-2008 period could provide a justification for a weaker Community role. Currently, the Community's role in assessing the Member State compliance with their obligations is based on the Monitoring Decision (Council Decision 93/389/EEC; FIELD 2000, 20–21.) The proposed directive takes into account the principle of subsidiarity and, where appropriate, the decisions are left to the Member States. The directive contains only basic principles for monitoring, reporting and compliance criteria.

The justifiability of a trading scheme depends partly on the set of available technologies for monitoring and enforcement. Questions about the ability to monitor emissions have played an important role in the design of emissions trading schemes. Continuous monitoring is often infeasible due to technological and economic constraints. Regulators usually estimate emissions based on assumptions about the typical parameters of a manufacturing process, operating hours, and the effectiveness of pollution control equipment. Absent trading, the difficulty of monitoring emissions creates uncertainty about the allowance limits necessary to attain standards. When trading is introduced into the regulatory system, the difficulty of monitoring emissions creates ambiguities about property rights to which firms are entitled and whether those property rights are "in use" or available for trading. (Hahn and Hester 1989, 403.)

The main Community instrument for the monitoring of GHG emissions by the Member States is the Monitoring Mechanism (Council Decision 93/389/EEC). The mechanism is designed to monitor all anthropogenic greenhouse gases in the Member States not controlled by the Montreal Protocol and to ensure compliance with the Community's commitments concerning climate change. It contains a

number of elements that may be important for the operation of the trading scheme, including national programmes, annual reports and annual evaluation reports. The linked national registries are a crucial part of the Monitoring Mechanism. (Center… 1999, 34.)

The draft directive does not propose a central body to organise carbon exchange and it allows direct bilateral trade without administrative approval but with mandatory registration. A central administration will be established to act as a "policeman" for the national registries to assess whether a country is in compliance with the Kyoto commitment. The detailed rules for national registries are not yet determined, as they will be adopted by a separate European Commission regulation. (Commission… 2001, 13, 17.)

At the national level companies would have to monitor and report to national authorities their emission monitoring results and emissions trading activities. The monitoring results should be communicated to the European Commission. The reporting requirements ensure that the transparency requirements are fulfilled and the Commission is able to control anti-competitive behaviour, abuse of dominant position and restrictions to market access (Commission… 2001, 6). The European Council and the European Parliament adopted on 4 April 2001 a Recommendation providing for minimum criteria for environmental inspections in the Member States (Official Journal… 2001). It is not clear if this recommendation could serve as a basis for a verification regime for a trading scheme. (Center… 1999, 34.)

The reporting requirements and national registries will ensure transparency. This improves the Commission's capacity to control the operation of the scheme in respect of State Aid, competitiveness of the permit market and restrictions to market access. Additionally, the public should have access to information concerning the results of the monitoring, reporting and compliance and information on national registries. This should be in accordance with directive 90/313/EEC on the freedom of access to information on the environment. Transparency requirements and access to information should be consistent with the Aarhus Convention and with the proposal for the directive concerning public participation in certain plans and programmes relating to the environment (COM(2002)839). (Commission… 2001, 5, 15.)

The IPPC directive can be used as a basis for developing basic monitoring and measurement guidelines. Another alternative would be to elaborate minimum monitoring requirements through the Large Combustion Plant Directive (LCPD). (Center… 1999, 31–35; Commission… 2000, 25; Center… 2001, 3.) The European Pollutant Emissions Register (EPER)[2] can also be used in monitoring and reporting. The Commission would be required to report annually the operation of the scheme, nine months after every commitment period. The Commission will also organise the exchange of information between the competent authorities of the Member States. (Commission… 2001, 15.) According to Boemare and Quirion (2001, 2) further guidance at the EU level is still needed.

The draft directive suggests that the penalty fee would be € 100 per excess tonne or twice the market value of an allowance in a predetermined period, whichever is higher, if a firm would not keep its emissions within its allowances. In the preliminary period the penalty fee would be € 50 or twice the market price, whichever is higher. (Commission… 2001, 14.) The penalty fee seems to be so high that it makes no sense for an operator to release emissions without allowances to cover those emissions (Boemare and Quirion 2001, 2).

[2] Commission Decision of 17 July 2000 on the implementation of a European pollutant emission register (EPER) according to Article 15 of Council Directive 96/91/EC concerning integrated pollution prevention and control (IPPC).

V.4.6 Integration with other policies and measures: the IPPC directive

Emissions trading is a relatively new policy tool compared to other economic instruments, traditional command-and-control measures and voluntary approaches in general, and in particular compared to domestic climate change policy tools in most countries. By packaging multiple policy tools, it could mean undermining the potential efficiency of them individually, and even the wasteful use of instruments and higher administrative costs. Mixing emissions trading and other instruments could also cause a problem of equity between the firms covered by a trading scheme and the firms that are outside it, as different instruments would most likely create differing marginal costs. (Kitamori 2001, 23.) Instruments can be incompatible also when they impose double burdens on emissions from particular sources. However, they can be particularly compatible when there are legislative or administrative elements that might be used for emissions trading. (Center… 1999, 43.) If a single instrument can not achieve the given environmental outcome more effectively, and if instruments supplement each other in a predictable way, it is possible to combine a trading scheme with other instruments in a cost-effective way. (Kitamori 2001, 23.)

The EU-wide emissions trading scheme needs to be integrated with a number of other policies and measures which have been developed over time and which form the current Community strategy on climate change. The EU-wide trading scheme should also be compatible with international and national emissions trading schemes. This requires an agreement between Member States to mutually recognise the allowances under each scheme. (Commission… 2001, 16.) The proposed directive takes into account possible synergies with existing legislation. In this report the key issue is the linkage to the IPPC directive, which has also been studied in the non-paper of the Environment DG (D(02)610019).

According to the Environment DG (2002), the trading scheme will affect the implementation of the IPPC directive, as the emissions trading would apply to most of the significant greenhouse gas-emitting activities, which are already covered by the IPPC directive. In addition to the activities covered by the directive, combustion and power plants with thermal capacity over 20 MW but under 50 MW will also be included (see Section V.4.4). The linkage between the EU-wide trading scheme and the IPPC directive is highly complex, but there are also some synergies like a possibility to use the directive as a legislative basis for introducing trading. For example, the definitions of "operator" and "installation" used in the emissions trading proposal are based on those in the IPPC directive. (Environment DG 2002.) Additionally, Member States' competent authorities that grant the GHG permits could be the same as those implementing the IPPC directive. Thus, for activities covered under the IPPC directive, the GHG permit could be issued through a single procedure in accordance with the IPPC permit procedure. (Commission… 2001, 10.) National permit authorities should already have most of the resources and skills required to manage the issuing, monitoring, verification and compliance assessment. However, the proposed directive does not oblige the Member States to combine these procedures, but only requires them to co-ordinate the conditions of, and procedures for the issuing of GHG and IPPC permits. The GHG permits need not be issued at the same time as an IPPC permit, but the competent authorities for the IPPC permit must be consulted, as "…the information required for an IPPC permit will tend to include the information required for an emission trading permit, and it would be useful for the relevant authorities to be able to check the consistency of the application." (Environment DG 2002.)

The IPPC directive obliges particular industrial activities to obtain permits that include emission limit values (ELVs). The IPPC directive does not explicitly list any of the greenhouse gases, but the list of substances is only indicative, requiring the permit to include emission limit values for pollutants "likely to be emitted from the installation concerned in significant quantities". The Member

States may thus include GHG emissions in their implementation of the directive, and are even forced to do so if the emissions are significant. According to the non-paper of the Environment DG (2002), "CO_2 falls within the IPPC Directive's broad definition of pollution" [3].

The IPPC directive mentions energy efficiency but does not define it explicitly, although the directive states "requires competent authorities to take into account the basic obligation of the operator to use energy efficiently when determining the conditions of the IPPC permit." (Environment DG 2002.) It is thus difficult to determine if the installation is using energy efficiently enough to credits or allowances beyond a baseline or a cap (Center… 1999, 43–44). But according to the Environment DG (2002) this common level of effort for energy efficiency is not expected to be problematic.

The Member States are obligated under the IPPC directive to ensure that installations are implementing best available techniques (BATs) in preventing pollution. The competent authorities must set the emission limit values (ELVs) based on BATs. (Environment DG 2002.) The ELVs of the IPPC directive can also be considered a basis for the allocation (grandfathering) of allowances (Center… 43–45). In the proposed trading scheme directive it is said that the Member States should take into account the technological potential of installations to reduce their greenhouse gas emissions. (Commission… 2001, 11.)

If the installation was covered by both the IPPC directive and the trading scheme, the ELVs for greenhouse gases would reduce the cost-effectiveness of an emissions trading scheme through requiring specific levels of reduction at some plants. To ensure flexibility through the option of trading the proposed directive adds a paragraph to the IPPC directive that says that when an installation covered by trading scheme releases a greenhouse gas "…the IPPC permit should not include an emission limit value for direct emissions of that gas unless it is necessary to ensure that no significant local pollution is caused. Where necessary, the competent authorities shall amend the permit to remove the emission limit value." (Commission… 2001, 29.)

Monitoring, verification and enforcement requirements should be harmonised between the trading scheme and the IPPC directive. As said in the previous section the IPPC directive could be used as a basis for developing basic monitoring and measurement guidelines. However, allowances should be defined differently from IPPC emission limits because GHG emissions cannot be included in an integrated permit if the allowance is to remain tradable. (Center… 1999, 43–45, 52.)

V.5 CONCLUSIONS

This chapter presents options that could be taken into account in the design of an EU-wide trading scheme. Not only the key features concerning such a trading scheme, but also the integration of the scheme with other policies and measures, especially the IPPC directive, have been studied. The key features concerning the implementation of an EU-wide trading scheme, as outlined here, are as follows.

In order to create an efficient and competitive market:

[3] The IPPC directive, Article 2(2) defines pollution as "the direct or indirect introduction as a result of human activity of substances, vibrations, heat or noise into the air, water or land which may be harmful to human health or the quality of the environment, result damage to material property, or impair or interfere with amenities and other legitimate uses of the environment".

- Single definition of tradable unit is necessary.
- Trading should be organised by emissions sources rather than governments. Therefore, the scheme provides broad coverage of the installations that are the main sources of CO_2 emissions and also a sufficient number of installations in order to maintain market efficiency.

Scope of the scheme:

- The scope of the EU-wide scheme will be determined through the IPPC directive and the Kyoto Protocol.
- The scope would be initially restricted to installations under the IPPC legislation (chemical and waste incinerators would be excluded) emitting significant levels of CO_2, and in addition to combustion and power plants with thermal capacity over 20 MW but under 50 MW. In 2004 the Commission may make a proposal to amend Annex I of the proposed directive to include other activities.
- The proposal for the scheme initially covers only CO_2 emissions. In 2004 the Commission may make a proposal to include other gases listed in Annex II of the proposed directive.

Allocation of allowances:

- The number of allowances to be allocated in the trading scheme in aggregate is based on the Kyoto commitment and the number of allowances allocated to the Member States is based on the Burden Sharing Agreement.
- The Member States should control the distribution of allowances to emission sources taking into account certain additional requirements of the emissions trading directive.
- In the preliminary phase, 2005–2007, the allowances are allocated for free according to the Commission's proposal. The method to be used in future will be determined later based on the experiences of the preliminary phase.

To ensure the compliance of Member States and installations:

- Both trading and the holding of allowances will be recorded in national registries.
- Monitoring, reporting and compliance requirements will be harmonised at some level. The scheme should oblige Member States to monitor and verify reported emissions based on common rules (Community guidelines or use of existing Community policies to establish these rules).
- Financial penalties for non-compliance are necessary.

To ensure transparency and access to information:

- Transparency and access to information should be consistent with the Aarhus Convention and the proposal for the directive concerning public participation in certain plans and programmes relating to the environment (COM(2002)839).
- Allocation methods should be transparent, because they give relevant information about actions that Member States are taking to meet the Kyoto commitments.
- The public should have access to information concerning reporting, monitoring and compliance.
- National registries and information on holdings in these registries should be open to the public.

Compatibility with other policies and measures

The EU-wide trading scheme has to be combined with other instruments and legislation, without undermining the efficiency of a single instrument. Wasteful and overlapping use of instruments creates higher administrative costs and thus decreases the efficiency of the instruments.

The linkage between the EU-wide trading scheme and the IPPC directive is highly complex, and it has not been widely studied. The main conclusion is that the approaches in permitting and emissions trading are somewhat incompatible, and thus, in some cases, the IPPC directive should be amended to remove the emissions limit values of gases covered by the trading scheme. It is also possible to use the IPPC directive and the ELVs as the legislative basis for implementing the trading scheme. These viewpoints and revisions make these two instruments work more smoothly together as a compatible and efficient policy mix.

Nevertheless, there are several questions to be resolved before the final emissions trading directive is implemented in practice. These questions become even more difficult as the implementation schedule is quite stringent and the scheme should be implemented from the beginning of 2005. These questions and the fact that the implementation necessitates not only the practical solutions but also an approval of them by Member States, sectoral interest groups and the Commission make determined actions essential both at the EU and the Member State levels. These complexities create challenging questions for the future considerations of the implementation of trading schemes, both in the international and national contexts, for policy mixes and for the linkage between permitting and emissions trading.

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