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**Climate Protection through
Tradable Permits:
The EU Proposal for a
CO₂ Emissions Trading System in Europe**

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CLIMATE PROTECTION THROUGH TRADABLE PERMITS: THE EU PROPOSAL FOR A CO₂ EMISSIONS TRADING SYSTEM IN EUROPE

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Abstract:

On 23 October 2001 the European Commission adopted a proposal for a directive for trade in greenhouse gas emissions. Following the US experience of emissions trading systems, this marks the first large-scale attempt to deploy this instrument of environmental policy in Europe. The proposal places European climate protection policy on a completely new footing. The prospects of its implementation have increased since the climate change conference in Marrakech.

This paper introduces the draft directive and gives an initial economic appraisal. It concludes that the directive deliberately – and wisely - limits the scope of the first trading phase starting 2005. Consequently, there is still considerable scope for increasing its efficiency (resulting from gains from trading) in later phases, namely by extending both the number of participants and the gases included. The number of participants in the first phase and the institutional arrangements, however, appear sufficient to enable a liquid, functioning market. In this respect, also the – politically difficult – decision to start with a compulsory system is to be welcomed.

Important issues not yet sufficiently clarified include the concrete rules for defining the total permit quantity issued to participants by each Member State, and whether other economic sectors, which are to be treated by “other policies and measures”, will bear a comparable burden. Furthermore, the essential questions of primary allocation and treatment of newcomers – which are in principle left up to Member States – as well as the linkage of emissions trading with existing policies affecting the participating sectors must be solved before legal implementation is recommended.

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I. INTRODUCTION

On 23 October 2001, the European Commission adopted a proposal for a directive for an EU-wide greenhouse gas emissions trading (ET) system for private companies (European Commission, 2001). It provides for the introduction of binding, absolute emission limits in 2005 for about 4,000–5,000 power stations and industrial plants with high energy consumption, which are converted to emission allowances that can be traded between the companies involved. These plants are responsible for 46 % of the total CO₂ emissions in the EU (*ibid.*, p 10). This represents 38 % of all Kyoto gases. The idea is that these limits are gradually decreased over the years so as to contribute to meeting the international emission reduction targets of the EU and its Member States.

This first draft was preceded by a Green Paper in March 2000 (European Commission, 2000a), which raised core questions of a possible emissions trading scheme and invited proposals. In addition, the topic was intensively dealt with by a working group within the European Climate Change Programme comprising representatives of politics, industry, research and NGOs. Finally, in September 2001 the Commission invited the Member States and leading industrial associations to a consultation meeting to discuss an unpublished draft (Vis, 2001), which was followed by the publication of the draft directive on 23 October 2001.

Together with the draft, the Commission also tabled a proposal for the EU's ratification of the Kyoto Protocol. Both these steps were taken just a few days prior to the Marrakech climate change conference, and were meant to demonstrate the EU's firm intention of using emissions trading as one of the main instruments to achieve progress in climate protection. With Marrakech paving the way for the Kyoto Protocol to be ratified, CO₂ emissions trading in Europe is now within reach.

This article starts by describing the circumstances under which the Commission decided to come forward with an emissions trading proposal, and the related goals. Then it addresses five distinct areas which in any system of tradable emission rights must be tackled (see Fromm and Hansjuergens, 1996; Hansjuergens, 1998a). Firstly, the coverage of the trading system – i.e. the economic actors obliged to hold permits – must be defined. Secondly, the total level of permissible emissions has to be established. Thirdly, this total level of emissions must be broken down and assigned to the individual businesses concerned (a process known as the primary/initial allocation of emission rights). Fourthly, it must be ensured that sufficient trading activity among the companies can emerge, which also includes avoiding impeding influences of other regulations. And fifthly, an effective system of monitoring must be set up, complete with appropriate sanctions imposed to combat non-compliance.

Furthermore, the paper comments on the extent to which the EU emission allowances could, apart from enabling temporary (static) gains by way of trade, create (dynamic) incentives for technological change, and it addresses the expected effects on competition between the sectors concerned in Europe as well as the political acceptability.

II. WHY EMISSIONS TRADING IN THE EUROPEAN UNION?

Kyoto Commitments and recent trends in emissions

Under the Kyoto Protocol of 1997, for the first time the industrialised countries and those with economies in transition committed themselves internationally and in a legally binding way to limit their greenhouse gas emissions: by an average of 5.2 % by the years 2008–2012 compared to 1990 emission levels (see Article 3 and Annex B of the Kyoto Protocol). Annex B of the Kyoto Protocol lists the commitment of each state. The EU took on a special role: in addition to each EU Member State accepting an 8 % reduction target, the EU also assumed an 8 % target as a whole.¹

Article 4 of the Kyoto Protocol allows states to club together and to share their joint commitments differently from the targets stated in Annex B. The EU plans to make use of this provision. In 1998 the Member States reached an agreement ('burden sharing agreement') which contains much stricter reduction targets for some countries (over –20 % for Luxembourg, Germany and Denmark) and lower goals for others, and even allows increases of up to 27 % (for Portugal).

This strategy means, however, that all the Member States are jointly liable if some of them cause the EU to miss its overall Kyoto target. As the recent monitoring report by the European Environmental Agency (EEA, 2001) states and Table 1 illustrates, the recent trends indicate that this could well be the case:

Table 1: EU Member States' greenhouse gas (GHG) emissions

	GHG emissions			
	1990 ¹	1999	Change 1990-99	reduction target
Austria	76.9	79.2	2.6%	-13%
Belgium	136.7	140.4	2.8%	-7.5%
Denmark	70.0	73.0	4.0%	-21.0%
Finland	77.1	76.2	-1.1%	0.0%
France	545.7	544.5	-0.2%	0.0%
Germany	1206.5	982.4	-18.7%	-21.0%
Greece	105.3	123.2	16.9%	25.0%
Ireland	53.5	65.3	22.1%	13.0%
Italy	518.3	541.1	4.4%	-6.5%
Luxembourg	10.8	6.1	-43.3%	-28.0%
Netherlands	215.8	230.1	6.1%	-6.0%
Portugal	64.6	79.3	22.4%	27.0%
Spain	305.8	380.2	23.2%	15.0%
Sweden	69.5	70.7	1.5%	4.0%
United Kingdom	741.9	637.9	-14.0%	-12.5%
Total EU-15	4199	4030	-4.0%	-8.0%

Source: EEA (2001). NB: ¹ Regarding HFCs, PFCs and SF₆, countries are free to choose 1995 as the base year instead. This does, however, not significantly affect the total emissions (since these gases normally do not account for more than 1% of Member States' emissions).

While the joint development of all the Member States seems to indicate that half the Kyoto commitment had been achieved by 1999 (- 4%), a closer look reveals that this development was mainly due to considerable reductions in two large countries, namely Germany and the

¹ Kraemer (2001) states that the 8 % commitment means a "real" reduction commitment – when taking autonomous economic growth into account – of 13–14%.

UK. The current performance of most other countries means they look set to fall far short of their targets. The European Commission (2000b) recognises that any potential further reductions in Germany and the UK will not be of the same extent². An initiative from the European Commission seems therefore necessary to assist those Member States which are likely to have problems in fulfilling their targets within the joint burden.

Here, emissions trading is seen as an inexpensive way of achieving emission reductions (European Commission, 2001, p 2). This is because in all emissions trading systems, a trade only takes place if both partners stand to gain from it, i.e. if it enables them both to cut their total costs of compliance. The buyer reduces his costs directly because purchasing is in his case cheaper than reducing emissions; the seller is over-compensated for reducing his emissions by more than the amount to which he is committed and thereby reduces his overall costs. In this way, emission reductions always take place wherever cheapest. It is thus important that the potential trades do in fact take place; this happens when cost differences between companies are large enough and the market works well in motivating trading. The bigger the market, the higher the efficiency gains, and an EU-wide system offers greater saving prospects than national systems would. As Kraemer (2001) notes, many small Member States would probably not establish an emissions trading system on their own.

In addition, one central aim of an emissions trading system is to introduce an instrument that ensures large industrial greenhouse gas emitters throughout the EU contribute to the national emission reductions necessary, albeit with as little distortion to international competition as possible (European Commission, 2001, p 2). In this respect, EU-wide emissions trading, even if it leaves some implementation issues to the Member States, is regarded as superior to national efforts in which the extent to which large emitters are affected will vary considerably. In fact, it is doubtful whether many Member States would demand considerable contributions from the large emitters without a co-ordinated initiative at EU level.

In general, intensifying the efforts to fulfil the EU Kyoto commitment improves the prospects of the EU and its economies being better able to adopt even stricter targets in the long-term – i.e. the commitments that look likely to be necessary in further international negotiation rounds. Furthermore, this strategy looks apt to improve the prospects for developers of for example energy-efficient technologies or technologies based on renewable energies as they compete on the world market.

The idea of international emissions trading with the inclusion of companies

The Kyoto Protocol also allows states with emission obligations to trade their commitments (or at least a part of them) among each other (Article 17 in conjunction with 3.10 and 3.11 of the Kyoto Protocol).³ As explained above, this trading may reduce compliance costs considerably.⁴ Although the Kyoto Protocol only mentions this trading for states (“Parties” to the Protocol), suggestions have been made to allow companies to take part in such trading.

² The emission reductions in Germany and the UK can to a considerable extent (roughly 50%, according to Eichhammer *et al.*, 2001) be assigned to rather exceptional circumstances, such as the reunification in Germany and the liberalisation of energy markets in the UK, both resulting in major fuel shifts, accompanied by certain improvements in energy efficiency.

³ These countries can also acquire the right to reduce domestic commitments if credits are earned from conducting emission-reducing projects in other committed countries (“Joint Implementation”, Article 6 in conjunction with 3.10 and 3.11, or in a country with no obligations (developing countries or emerging economies – “Clean Development Mechanism”, Article 12).

⁴ A 1997 comparison by Stanford Energy Modelling Forum which analysed the results of seven different models revealed estimated cost savings of 20–90% compared to mere national reduction strategies (cf. Dutschke and Michaelowa, 1998).

The international negotiations after Kyoto to clarify unresolved questions have picked up this option (see UNFCCC, 2001 and Butzengeiger *et al.*, 2001). In this connection, states have to authorise companies in their territory to trade “on their behalf” – since whatever the companies do, the states remain responsible in terms of the commitments under the Kyoto Protocol. The inclusion of companies is seen as reducing the costs of compliance for the states because government-level trading does not equate marginal abatement costs on an emission *source* level (FIELD, 2000, p 16), and including companies gives them much more flexibility in deciding on where best to abate emissions (Tietenberg *et al.*, 1998, p 22). This is based on the belief that the companies are far more familiar with the details, cost implications etc. of the range of emission reduction options and strategies available.⁵

Should an international market for emissions trading at the company level emerge as of 2008 – i.e. simultaneously with the first state level commitment period of the Kyoto Protocol – participation by European businesses will be important in order to exploit the cost savings (and the “rewards” for innovative behaviour) thus enabled, especially since all industrial sectors are likely to have to contribute to states’ efforts to fulfil their Kyoto Protocol commitments. Therefore, the European Commission aims to make learning effects possible both for companies and for states (on *how* to implement the integration of companies in international trading) *before* 2008. For this reason, an initial phase from 2005 with a comparatively limited scope but on a mandatory basis is suggested.

III. HOW DOES THE EU PROPOSAL ADDRESS THE NECESSARY IMPLEMENTATION STEPS?

The sectors involved

The bulk of EU greenhouse gas emissions (more than 80%⁶) is made up of CO₂ from the combustion of fossil fuels – coal, mineral oil and natural gas – to use the energy released in industry, transport, private households, and power generation. Since there is a comparatively stable ratio between the amount of fuel burned (when the fuel type is known) and the resulting CO₂ emissions, a permit system can be applied to either the inputs (the fuels) or the outputs (the emissions).

If the actual emissions are to be addressed, the target group has to be the emitters themselves. This approach is called “downstream“. If inputs are to be targeted, the ideal approach from an economic perspective would be to oblige the producers and importers of fossil fuels to hold a volume of permits which equals the volume of emissions caused by the fuels they sell on the domestic market.⁷ This approach, known as the „upstream“ approach, would lead to fuel producers and importers raising prices if fuel demand outstrips the permits available – which ought to occur since the aim of climate policy is to reduce the emissions compared to a “business-as-usual“ development. The effect on the fuel users’ side is similar to that of a carbon tax: both prompt the fuel consumers to think about fuel-saving options or switching to renewables (or from coal and oil to gas), which then reduces CO₂ emissions (Hargrave, 1999,

⁵ Hahn and Stavins (1999), despite these aspects, question the belief that emissions trading will widely replace other national policies in the participating countries. They conclude that the gains from international emissions trading will be far less than predicted in much of the literature.

⁶ Excluding CFCs, which although greenhouse gases are not covered by the Kyoto Protocol, since they were already addressed by the Montreal Protocol of 1988.

⁷ Since the various types of fossil fuels cause different amounts of CO₂ when burned (in relation to the energy transformed), an energy unit of lignite sold would accordingly need more permits than a unit of hard coal, still more than a unit of fuel oil, and much more than a unit of natural gas.

p 10).⁸ This approach would be superior to one of fuel input permits for each fuel user, because it involves far lower administrative costs for the state.

The major advantage of an upstream system is that it would allow sectors such as transport, private households and service companies to be included, which would be too expensive – and possibly too unreliable – to monitor in a downstream system (Hargrave, 1999, p 23). The same applies to industrial sectors which are excluded in a downstream system or small firms in sectors in which only the bigger companies are covered. Their inclusion in an upstream system would enhance both the environmental effectiveness and the economic efficiency, because the market would resolve “how big a share of the fuel cake“ each sector would receive and how much each actor within the sectors would obtain.

On the other hand, an upstream approach would only achieve the claimed efficiency if firstly the fuel producers and importers were able to pass on the price increases resulting from allowance scarcity completely (e.g., if hard coal prices rose to the same extent relative to gas prices to which their emission effects differ, and that this would be the case for every coal and gas producer and customer), and secondly emitting companies reacted in the same way under an upstream system as they do under a downstream regime. Regarding the first condition, Heister, Michaelis *et al.* (1991, p 61) argue that prices are not passed on proportionally if a) relative market power leads to parts of the additional burden being born by players in the supply chain rather than the fuel users (it has to be born in mind that especially for industry customers there is often no uniform fuel price, instead individual contracts exist which depend partly on market power), and b) fuel suppliers can react by cross-subsidising fuel sales more than they have possibly done before, e.g. to retain certain market shares. If this is true, it would still lead to the overall emissions target being met, since the amount of emission rights is fixed, but it would imply some fuel savings being done where it is not cheapest, resulting in allocational efficiency losses. Regarding the second aspect of fuel consumer elasticity, Hargrave (1999, p 24) states that while there is continuing debate on the scope, some energy consumers do not react to price signals to the extent predicted by neoclassical economic thinking due to high transaction costs, high discount rates and imperfect information. Under a downstream system, emissions have to be monitored by the emitter so it is possible that learning effects involved in quantifying the emissions facilitate the search for emission reduction options. As stated above, the idea behind many of the proposals for including companies into international emissions trading under the Kyoto Protocol was precisely to make use of their expertise on emission reduction options and their cost implications. This is a strong argument in favour of a downstream approach, which has to be weighted against the greater outreach of an upstream approach.

More important even, the rising fuel prices in an upstream system imply higher total costs for the emitters compared to a downstream system in which the permits are allocated without charge (see section “Primary allocation of allowances”). Although the extent of the cost increases depends on the ability of the fuel sellers to raise prices on the market, it is still certain that costs for the fuel users will be higher, because under a downstream system a purchaser only has to pay only for the emission amount he lacks for compliance, while under an upstream he has to pay for his entire fuel purchase, resembling his total emissions. This argument is likely to mean that only a downstream system can be politically accepted (Kraemer, 2001, p 20).

⁸ The advantage compared to separate taxes for different sectors such as industry and transport – and also compared to sectoral permit systems for fuel inputs – is that the upstream approach also equalises marginal costs across the sectors, and so the fuels are used in those sectors where their productivity or benefits are highest. Compared to a tax, the system also has the advantages that the total quantity of emissions defined by the regulator will automatically be achieved and does not have to be reached by a “trial and error process”.

Since a downstream system requires a considerable effort to quantify emissions and verify these measurements, the Commission aims to restrict the sectors covered in the first (“learning”) phase to those that include the biggest spot emitters. The draft directive envisages a uniform procedure within the EU regarding the sectors to be included. No provision is made for voluntary participation or opt-outs. In accordance with the sectors listed in the Green Paper, Annex I of the draft proposes plants from the following industrial sectors:

- Power and heat generation (in plants with a thermal input capacity exceeding 20 MW)
- Mineral oil processing
- Coke ovens
- Metal processing
- Cement and lime production
- Other building material and ceramics
- Glass and glass fibres
- Paper and cellulose.⁹

Minimum sizes (for energy capacity and/or production capacity, which are related to emissions) apply before companies become involved. Initially, only CO₂ emissions will be included, i.e. emissions from both the combustion of fossil fuel and process-related emissions (e.g., in the iron and steel industry). Other Kyoto gases and industrial sectors are to be included at a later date (possibly as of 2008), provided emissions can be quantified with sufficient reliability and that the costs of monitoring and measuring emissions are acceptable.

All relevant installations will need a “permit”, which in the language of the draft directive means a general authorisation to trade their emission allowances¹⁰. The permit must in particular state how the emissions data are to be quantified and monitored (Articles 4–6 of the EC draft directive). Even participants with no reduction obligations will be able to participate in trade (Article 12 in conjunction with Article 3h). This means for instance that speculators and NGOs (who may be interested in purchasing allowances in order to retire them) will also be allowed to take part in trade.

The integration of the two project-related Kyoto mechanisms known as Joint Implementation (projects mainly in transformation countries in Central and Eastern Europe) and Clean Development Mechanism (projects in developing countries) is not yet decided. This is because their “ecological integrity”¹¹ is considered uncertain and because several Member States see the danger of “real” domestic emission avoidance measures being ousted. Alongside the emissions trading proposal and the ratification proposal the Commission has also adopted a Communication on the first phase of the ECCP (COM(2001) 580), in which a further Commission proposal about linking emissions trading with project mechanisms is

⁹ Contrary to the original plan (European Commission, 2000a, p 15) the chemical industry was not included as it comprises a large number of very different plants, the inclusion of which would have greatly increased the administrative burden. Moreover, direct emissions by the chemical industry only represent about 1 % of the total CO₂ emissions in the EU. Refuse incineration was not included either, because the carbon content of the incinerated refuse and thus the emissions cannot be correctly established, introducing a significant element of uncertainty into the system.

¹⁰ Thus, in the wording of the draft directive, “allowances“ are the papers which state the authorisation to emit a certain amount, while the permit is the general authorisation to take part in trading allowances. This is in contrast to much of the economic literature, where permits are the tradable rights themselves.

¹¹ I.e., it is uncertain whether they would result in the desired emission reductions or carbon sequestration effects not only “on paper”, but in reality.

announced for 2003 and the Commission would like to see this instrument in force by 2005, in parallel with the emissions trading directive.

In an attempt to ensure easy application and to generate confidence in the system, it was therefore deliberately decided to refrain from including other gases or sectors as well as small companies which are below the threshold during the initial phase, despite the fact that this might have increased the range of emissions trading and thus its allocational efficiency, and may also have counteracted certain reservations related to competition (see below). Consequently, the proposal covers, in the initial phase, just 46 % of CO₂ emissions and 38 % of the total Kyoto gas emissions (for all sectors including private households and transport).

Setting total emissions

The EC's draft directive proposes a compulsory system covering absolute emissions comprising the total emissions of the companies concerned. This is a traditional cap-and-trade system in which all market participants are given permits to produce certain absolute levels of emissions, and which allows for full trading from the very start (see Tietenberg *et al.*, 1998). (These emission rights are, as noted above, called "allowances").¹²

The upper limits (the caps for the total permissible emissions) have not yet been fixed. The total share within the Member States' reduction targets that has to be brought about by the sectors participating in emissions trading has not been decided in the draft directive and is, in principle, up to each Member State to decide. In other words, one of the most important conditions for the concrete implementation of the emissions trading scheme is not yet – and will probably not be – clearly defined by the European Commission. The only relevant stipulations contained in the draft directive are to be found in its Annex III: for example that the amounts allocated to private companies must be in line with the Kyoto Protocol and its breakdown within the EU under the burden sharing agreement, as well as with the perceptible emissions trend; that no installation shall receive more allowances than it is likely to need, and in general that no undertakings or activities shall be unduly favoured (for details see section "Primary allocation of allowances").

The Member States have to draw up "national allocation plans" disclosing the total national allowance amount and the allocation procedures. These plans are to be submitted to the Commission and can be rejected by it. Apart from the criteria listed in Annex III, the Commission may raise objections in the event that EU state aid rules are violated.¹³ In order to ensure that things go off smoothly, the Member States are to be directly involved in the decision (Article 9, para. 2 and Article 23).

It will have to be seen how strict the Commission will be about demanding comparable treatment in the various Member States. The possibilities to use a generous allocation of emission rights to companies as a tool of "industrial policy" (in the sense of subsidising domestic industries) are certainly reduced by the provisions stated above – whether they can be eliminated remains to be seen. Hence, although the boundaries are known through the

¹² Another approach is "credit trading systems", in which not all emissions are changed into tradable rights, but only the *overfulfillment* of certain target values. In this case, rights are only traded after the actual emissions have been established and the excesses determined have been transformed into credits. The British government has already introduced such a system as part of its national emissions trading in the flexibility given to parties signing up to Climate Change Levy agreements. One important reason for the introduction of this ex-post provision was the fact that only relative targets, i.e. emissions per amount produced of certain products, are fixed in the present agreements, and that these can only subsequently be made tradable between the sectors – by converting them into absolute emission amounts.

¹³ In addition, any company in Europe can introduce a complaint at the Competition DG ex-post.

burden sharing agreement, one of the basic questions of the whole emission rights system remains partly unresolved, at least for the time being. In this respect it seems also worth noting that the European Commission has recently received the results of a project on Sectoral Emission Reduction Objectives, which state, on the basis of estimations on the technological potential, how many total reductions should be made by the various economic sectors (industry, transport, households etc.) at the EU level when taking cost-effectiveness into account (Blok *et al.*, 2001). Possibly, this could serve as an indication for the Commission to harmonise Member States' actions as well as possible.

Primary allocation of allowances

There are various options when it comes to the primary allocation of emission allowances. While from the perspective of environmental economics, auctioning is recommended in order to ensure allocation based on economic urgency and to contribute to a functioning market, political reasons probably demand a free allocation of allowances ("grandfathering").¹⁴ Therefore it is by no means surprising that in the projected CO₂ emissions trading scheme, too, the free allocation has been planned for the first phase starting in 2005. The emissions trading programme does not explicitly demand free allocation in later stages; it merely emphasises the need for a *standard* allocation procedure to prevent distortions of competition among the companies from different Member States. However, it can be assumed that in future stages, too, grandfathering will be the only feasible approach. The efficiency gains from emissions trading will therefore only take effect when the emission allowances issued are subsequently traded.

In the CO₂ emissions trading scheme, primary allocation will have to be done by 2005 and may be based on past emission levels. The exact procedure (determination of the base year, possible consideration of expected increases in production etc.) will be up to each Member State. Member States may also opt to base allocations on the voluntary agreements already practised in some of them. The relative emission reduction targets fixed in the voluntary agreement could then be multiplied by the expected output to form the basis for the allocated (absolute) emission allowances. The companies of one industrial sector may also act jointly (for instance through their industrial association) on the allowance market. However, this leaves the question of whether the existing voluntary commitments will still allow internal compensation among very efficient and less efficient participants or if they will have to be amended with this in mind.

As the primary allocation of allowances in particular is a decisive criterion for equal competition among companies in the European Union (CCAP, 1999), Annex III of the draft directive introduces allocation criteria such as the consideration of emissions reductions achieved in the past ("early action") and technical possibilities to reduce emissions. Furthermore, as noted above, every Member State has to present the planned allocation procedure in a national allocation plan which may be rejected by the Commission and is also considered by the other Member States.

Special mention should be made of two other criteria in Annex III:

- Pursuant to Annex III, no. 5, no plant is to be granted more emission allowances than it will probably need. If this criterion is interpreted very strictly and related to individual plants, this may provoke conflict with the target "early action", for taking into

¹⁴ Resistance results from the fact that auctioning would bring about a completely new distribution of emissions rights. See Hansjuergens (1998b).

consideration early action would normally result in some companies being allocated more allowances than they need. Both targets are only compatible if the allocated allowances for industry as a whole or for individual sectors are less than the total amount of required allowances in 2005. Early action could then be rewarded by granting the companies in question as many allowances as they need while other companies receive fewer than they need.

- Nevertheless, this criterion of Annex III, no. 5 may sharply restrict emissions trading, for a functioning market presupposes that some companies have surplus emission allowances resulting either from the cost-efficient avoidance of CO₂ or from being granted more allowances than they need at the very beginning.
- In a system of the free allocation of allowances, new sources, too, play a particular role. New emitters are plants which are newly erected (or expanded) after the initial allowance allocation. Under the grandfathering approach, they are always at risk of being disadvantaged compared to existing emitters. The directive proposal (Article 11, para. 3) states that the Member States must grant new emitters access to the emission allowances, but does not say in detail how this is to be done – a major issue that remains to be solved.

All in all, it must be assumed that the criteria of the primary allocation of emission allowances will be the most controversial aspect of CO₂ emissions trading in the Member States.¹⁵

Safeguarding market functions

If emissions trading is to succeed, it is vital that emissions actually are traded on the market. After all, trade is the “heart” of an emissions rights system. However, trade will only take place if individual businesses start offering their superfluous allowances for sale in order to earn a profit, and companies needing additional allowances are willing to buy them. This should result in emissions being avoided wherever it is the least expensive, while the allowances will migrate to the emitter who needs them most urgently. From an economic viewpoint, this is the root of the cost effectiveness of emissions trading systems.

In CO₂ emissions trading, the obligations of the companies participating will apply for the years 2005–07, and then for periods lasting five years each (Article 11). As of 2008, this will correspond to the obligation periods for states laid down in the Kyoto protocol. There is no restriction on “banking” within the initial period (2005–07) and each subsequent period, and amounts can also be carried forward from one five-year period to the next (Article 13, paras. 1 and 3). Limitations may only be imposed by Member States during the transition from the initial to the second period (para. 2).

One important condition for participants’ confidence in the market is sufficient market liquidity. This means that a sufficient number of allowances must always be available at any one time so that potential buyers can find sellers and vice versa. It can be assumed that the process of increasing liquidity will often be self-reinforcing: Once liquidity increases, the costs for market services such as brokerage or exchanges will fall (as a result of economies of scale), and the reduced costs for each transaction further increase the trading activity.

¹⁵ On March 8, 2002, the Commission has published a report on „Evaluation of Alternative Initial Allocation Mechanisms...“ (Harrison/Radow, 2002) which contains a general comparison of different allocation approaches and an analysis of the potential consequences for three sectors covered by the emissions trading proposal – electric power and heat generation, paper and pulp, and cement. This study could assist Member States in choosing an allocation method and also be used in the political debates over the allocation plans.

The EC does not intend to set up intermediaries; this will be left to the markets. Auctions by the environmental authorities such as those held in the USA under the acid rain programme to set price signals (among other aims) are not intended in CO₂ emissions trading. Indeed, auctions of this nature seem unnecessary, since emissions trading in greenhouse gases has been under discussion for a long time and experience can be gained on different existing markets. In addition, price forecasts by brokers are already being published – including on the basis of the national systems in the United Kingdom and Denmark.

However, market intermediaries can only arise if there is a sufficient number of active participants. As mentioned above, the EC assumes that some 4,000–5,000 plants will be covered by CO₂ emissions trading. Since companies will only be selling those emission rights which they no longer need, only a certain portion of all the emission rights allocated will become available on the market. It should also be taken into account that companies usually own more than one plant. Therefore, many emission rights will be exchanged internally, resulting in cost savings being achieved without inter-company trade taking place.¹⁶ The number of companies participating in external trade (i.e. among different companies or between brokers and companies) will therefore be less than 4,000–5,000. In actual fact the EC expects company-internal trade to dominate during the first phase starting in 2005. Furthermore, it should be taken into account that companies can act jointly on the emissions market. If this option is taken, the number of “genuine” external transactions will be even lower. Yet despite these limitations, the EU CO₂ emissions trading can still be expected to achieve a sufficiently high market volume. Indications of this are provided not only by experience of the acid rain programme in the USA, where a fully functioning market emerged in the first phase involving just a few hundred plants, but also (and much more convincingly) by the experience of the RECLAIM programme in southern California, where despite the very low number of participants a liquid market arose.¹⁷

The plan to allow trading in absolute emissions should also have a positive impact on market liquidity. It is questionable whether using relative emissions (i.e. emissions per unit of production) as a basis of trade instead would be suitable for a cap-and-trade approach. After all, in this case, all relative emissions would have to be multiplied by the actual production quantity in order to enable trading between different sectors. This could either be done as a formal trade based on *expected* production quantities (in which the “real” number of allowances allocated to each participant would be adapted ex-post according to actual production-figures and so the actual total amount of emission rights on the market could only be subsequently determined), or – as in the British system – the actual amounts could only be formally bought and sold after being calculated ex post, i.e., after the expiry of each period. In this system, beforehand, merely informal futures deals would be possible. It seems unlikely that the minimum liquidity needed for a functioning market could be achieved with such a system.

Judging by the experience of the US systems and according to the industries concerned, simple and transparent rules are vital; market restrictions would hamstring trading. The EC’s draft makes provision for the complete fungibility of emission rights. For example, no geographical or temporal limitations are planned within the first two periods (2005–07 and 2008–12). Nor are they necessary, since greenhouse gases do not usually harbour the threat of regional or temporal hot spots. Moreover, the EC stipulates that Member States may not introduce their own restrictions on trading (Article 12, para. 1).

¹⁶ Regarding the same effect on the US permit market for sulphur dioxide emissions, see Burtraw (1996).

¹⁷ For very comprehensive and up-to-date discussions of the US emissions trading experiences, see for example Ellerman *et al.* (2000) and Kosobud (2000).

Avoiding impeding regulations

A successful emission rights market needs more than just an institutional framework. It must also be ensured that no other legal regulations exist which impair the function of the market. Such restrictions include certain laws related to the Kyoto gases or the use of energy.

With a few exceptions, the sectors proposed by the emissions trading directive are identical with those contained in the EU-IPPC directive (European Commission, Council Directive 96/61/EC), which contains standards mainly based on the “best available technology (BAT)”. Since this also includes energy efficiency and greenhouse gas emissions, the directive is in potential conflict with CO₂ emissions trading: the latter would explicitly aim to allow installations not to fulfil BAT standards, in order to make use of gains from trading, while the IPPC BAT requirement inhibits exactly this element (Rehbinder and Schmalholz, 2002, p 8). Therefore, according to Art. 25 of the draft directive on emissions trading, all corresponding paragraphs of the IPPC directive are to be amended in favour of free emissions trading unless regional emission concentrations necessitate their retention. However, the draft directive also contains, in Art. 2.2, a provision that energy efficiency is excepted from Art. 25 provisions, and must therefore still be treated according to the IPPC rule.

This can be justified on the one hand since Koch/Wienecke (2001) rightly point out that energy efficiency is a goal which goes beyond saving CO₂ emissions, not least because of its role for pursuing the precautionary principle (which involves saving natural energy resources as well as reducing the risks of potential new, so far unknown environmental problems which CO₂ emissions also once were). Furthermore, the Commission aims at ensuring that the manufacturing companies covered by the proposal – such as paper and pulp or iron and steel – will not only reduce their direct emissions but also use electric power efficiently (personal information Zapfel, March 4, 2002), which is only indirectly motivated by the proposed emissions trading based on direct emissions – namely via increased electricity prices.

On the other hand, keeping the energy efficiency requirement for both the generation and the consumption of power would clearly limit the potential for emissions trading. For example, measures for fuel conversion would be disadvantaged compared to energy efficient power generation techniques. Such a restriction would be detrimental since it would limit the function of the emission rights market. This problem can be alleviated to a certain degree by adapting administrative practice (being less stringent in forming minimum standards, where necessary (information Zapfel, March 4, 2002)). Nevertheless, weighing the arguments, the authors believe that the final version of the directive should in any case lift the energy efficiency requirement for power production. It might, if practicable, retain it for power consumption, but only with minimum standards. In general, whenever in doubt, it should grant clear priority to the “free play of market forces”.

Other national and EU policies may result in similar obstacles. Regarding renewable energy sources (RES) in electricity production, the draft directive therefore excludes the possibility of counting within emissions trading those RES which are promoted by Member States in pursuing their targets according to Community RES legislation (Annex III, no. 4). Potential conflicts with policies such as the EU energy taxation directive under discussion also need to be resolved.

Controls and sanctions

Controls and sanctions play an important part in the functioning of the market. Without sufficient controls, an emission rights market would be doomed to failure. After all, it could no longer be ensured that the emission rights listed on allowances correspond to actual emissions. This would result in not only the violation of ecological goals, but also in a considerable loss of confidence on the part of market participants – and in the worst case in the complete collapse of the emission rights market. Against this background, accurate measurements of emissions and the comparison of actual emissions with emission rights as stated on allowances is imperative for the entire system to function.

In CO₂ emissions trading, the quantification of emissions from the combustion of fossil fuels is normally based on calculation of the fuel input amounts using average emission factors. By contrast, process-related emissions are to be calculated using either direct measurement or calculation based on the amount produced or the quantities of fuel used. Annex IV contains guidelines which are to be further particularised by a regulatory committee. Above all, generally valid emission factors are to be specified. The emission volumes will then be verified by an independent institution (which may be state-run or private; this is up to each Member State). If a company violates the monitoring or verification requirements, its permit may be withdrawn until the situation has been rectified (Article 15).

It is also vital that the state keeps tabs on sales and purchasing activities to ensure that the same emission rights are not sold several times over. Therefore, in the emissions trading systems in the USA, a register (Allowance Tracking System) is used to keep records of participants' emission total rights and their trading activities. Such a system is also to be adopted in the planned EU system.

Once the actual emissions have been determined at the end of the year, companies have three months to make up for any excess emissions compared to their allowed limits (Article 12). If after this three-month period the actual emissions still exceed those stated in the emissions allowances, sanctions are due. To generate the deterrence required for the emission rights market to function, the sanctions must be sufficiently severe and must also be automatically applied when necessary, without scope for negotiations. Furthermore, the level of sanctions can be used to reduce cheating. The proposal in the draft directive is for the sanctions to be twice the average allowance price of the previous year, albeit no less than €50 (as of 2005) or €100 (as of 2008) per tonne of CO₂ (Article 16). This level appears to be more than sufficient. Furthermore, the fact that excess emissions must in addition be completely avoided in the following period is also to be welcomed. It is furthermore important that sanctions be equal within the whole trading area – in this case, across Member States - to make sure that emission rights are not systematically sold abroad by companies in the country with the lowest level of sanctions. This, too, is specifically laid down in the directive.

In addition to institutional measures to secure implementation, the temporary limitation to CO₂ emissions and to sources which can be quantified sufficiently reliably can be regarded as another advantage contributing to a functioning market. This is why it was decided not to make the allocation efficiency as high as it could have been.

IV. COST SAVINGS, INNOVATION, AND COMPETITION

Cost savings and innovations

In addition to the profits achieved by trading in *existing* differences between allowed and actual emissions (static efficiency), the prospect of transforming future emissions savings into additional revenue from the sale of emission rights and avoiding purchases could also lead to major changes in the manner of production as well as the usage of technical innovations (dynamic efficiency). One crucial factor is just how far ahead companies can plan their emission rights trading. Particularly in the sectors covered by the system, this is an especially significant aspect, for the investments involved are often of a long-term nature. Also, they are often related to other production processes and so need to be co-ordinated with them. This causes problems if the other production processes are subject to different investment cycles. The following aspects are especially important for long-term planning certainty:

- *Market transparency:* Initial price information is already being provided by brokers. It is being calculated on the basis of simulations and in the meantime also in the first “genuine” deals being executed in anticipation of companies’ imminent obligations.
- *Constancy of price development:* Market liquidity and control mechanisms are the basic essentials needed for a functioning market. They also affect the constancy of price development – i.e. the absence of high and erratic price fluctuations.
- *Markets for derivatives:* “Hedging” transactions like forwards and options open up information on prices expected by other participants, and also enable yields or revenue to be secured in the future. These markets develop, too, as long as the permit market is large enough. However, not even a forward market extends infinitely into the future, and so participants will have to act strategically by themselves for periods stretching far ahead.
- *Clear long-term political environment:* Businesses depend on clear, long-term political strategies, especially for longer periods. It may be disadvantageous that some conditions of trade for the later phases (as of 2008) – such as allocation procedures, the extent to which project-related schemes can be counted, the inclusion of other Kyoto gases – will not have been fixed when the first period starts in 2005.

The latter factors are especially likely to increase uncertainty during the first phase. This may to some extent reduce the emergence and market penetration of promising technologies as of 2005.

Two other factors seem to indicate that allowance prices will be little more than modest as of 2005, curtailing the innovation incentive. Firstly, despite the above-mentioned clause that companies should not be granted more emission rights than they need, in the uncertain initial phase as of 2005 there will be an incentive for the Member States to generously calculate the quantities of allowances to be allocated. Secondly, the inclusion of the EU accession candidates in emissions trading could open up a whole new can of worms. By setting an early base year – and this would be consistent with the above-mentioned consideration of early action – emissions reductions achieved in the early 1990s as a result of economic transformation could lead to a significant additional supply of emission rights – although this potential appears to be reduced thanks to EU state aid rules.

On the other hand, merely the political signal generated by emissions trading and the anticipated intensification of the aims in the following periods could create a major, long-term incentive, which would overshadow the short-term limitations.

Competition among the sectors concerned

As stated above, the rule of allocating allowances free of charge (“grandfathering”) has to be applied by all Member States in the initial period in order to allow free competition among the various sectors concerned. Nevertheless, we will have to wait and see exactly how (according to which criteria) this allocation procedure is organised by the Member States. Only then can the extent to which a level playing field has emerged be assessed. Creating a compatible initial situation is of enormous importance – not least on the electricity market, which is characterised by a homogeneous product and intense competition. However, if this equal treatment is achieved, emissions trading may be vastly superior to an uncoordinated approach by the Member States with respect to the effects of competition – and may also greatly reduce the compliance costs of all companies, which will be advantageous in competition with non-European companies.¹⁸ Another very important factor is how companies below the minimum threshold size and in other sectors are subject to “compatible” national policies as called for in the draft directive. This is an area in which the EC’s influence is limited (Kraemer, 2001).

As mentioned above, the draft does not specify in detail how allocation to new emitters in each Member State should take place. Judging by the procedures applied in the USA, it is almost inevitable that new emitters will be at a disadvantage for a while if the ecological effectiveness is not to be reduced. More important, different treatment in each Member State may even result in greater inequalities. On the other hand, Article 11, para. 4 of the draft envisages the issue of new allowances annually, and so equal allocation for new emitters is possible no later than a year after new plants have been built.

V. POLITICAL CONSENSUS ACHIEVABLE

Following the conclusion of the consultations, the EC perceives general acceptance to prevail regarding the full introduction of EU-wide emissions trading in the near future (Vis, 2001, p 2). However, whether it will actually be implemented in the form envisaged is difficult to predict at the moment. Factors indicating that implementation will not be as smooth as desired include the provision of companies’ compulsory participation as of 2005, the reference to absolute obligations, and the question of conformity with existing national climate policies (especially national emissions trading):

- One of the key topics of discussion is whether emissions trading should be compulsory for companies before 2008 – i.e. before EU Member States become subject to international obligations. Industry fears this will place unnecessary restrictions on commercial decisions, and even the German government is in favour of a voluntary pilot phase lasting three years. By contrast, the EC would like to implement trade which is as realistic as possible before 2008 in order to put Member States on the right track for 2008/2012, and to give politicians and the companies involved the time needed to acquire the necessary experience (ibid., p 2). For this purpose, *all* companies listed in Annex I are to be involved from the very start. The reduction and learning effects resulting from voluntary trading could indeed be limited, partly because of the risk that mainly only companies interested in selling would take part (ibid., p 2).

¹⁸ However, this cannot answer the question of whether the greater involvement of industry in the reduction of greenhouse gases in the EU (be it through emissions trading or other stricter measures compared to the status quo) would place it at a disadvantage compared to non-European competitors. This answer depends on the activities taken by other states to achieve national climate protection aims.

- Reference to absolute emissions is regarded by industry as a possible obstacle to economic growth if the growth rates are so high that advances in efficiency are “overcompensated for” by increases in quantity, causing allowance prices to rise. But even if the favourable production situation only affected individual companies or sectors and allowances could be bought cheaply, their purchase would still mean an additional burden for the companies and sectors concerned. This problem does not affect the system of voluntary obligations currently in force in Germany. As a result, many industrial associations continue to call for emissions trading on the basis of relative emissions, i.e. emissions per unit of production quantity or – if possible – the retention of voluntary agreements.
- Another problem is the linking of CO₂ emissions trading with existing national emissions trading systems, especially with the system currently being implemented in the UK. One main difference between the two concepts is the way in which emissions caused by power generation are counted. Whereas the EU’s draft directive envisages power producers being included in trading as a greenhouse gas emitting sector, in the British system power producers are to be excluded (see DEFRA 2001). Instead, (industrial) power consumers are to be included with the emissions they cause *indirectly* on the part of power producers. In addition to certain advantages of the indirect approach, which are however also beset by a number of disadvantages,¹⁹ one reason why this decision was taken was that it could be better reconciled with the “Negotiated Agreements” recently reached with industry. The British government is unlikely to want the political concept only just politically agreed and due to take effect in 2002 to be completely reorganised as of 2005.²⁰

One important factor which may smooth the introduction of CO₂ emissions trading is the free initial award of emission allowances. The proposal establishes a number of basic principles, even though the exact allocation method in the Member States is still likely to be the subject of political argument. Free initial award is designed to make emissions trading an acceptable instrument compared to taxation solutions because in the case of environmental taxes, emitters always have to pay for the entire volume of emissions left over (Hansjuergens 1998b).

The fact that emissions trading is viewed critically by parts of German industry can probably be attributed to comparisons being drawn with German environmental taxes in their current form (with lower tax rates and rebates for industry) rather than comparing the general merits and disadvantages of the respective instruments. Higher environmental taxes or emissions trading would not be necessary if industry’s contributions to reducing emissions could be met with the existing policies, such as the current voluntary agreements in several EU countries. Not least in Germany, which looks on track to meet its target under the EU burden sharing agreement with the existing efforts, this argument is often stated. However, one also has to

¹⁹ The main advantage of directly integrating power producers is the much simpler administration required. Indirect emissions pose thorny problems such as the source of electricity purchased, the dates of purchase, and the emission factors used in calculation, etc. Directly involving electricity producers provides a direct incentive to reduce emissions during generation. On the other hand, there is only a direct incentive for electricity customers to save power if a procedure considering indirect emissions is applied. If power producers are obliged to reduce emissions, the incentive to save energy among power consumers depends on the extent to which permit costs are actually reflected in electricity prices, and whether consumers regard these additional costs in the same way as if they themselves were involved in emissions trading. Furthermore, as long as the EU accession states are not integrated, electricity imports from these countries will cause a ‘leakage’ effect. Ultimately, directly involving power producers will result in cogeneration (combined heat and power) plants being placed at a certain disadvantage (Vis, 2001, p 5). Furthermore, the indirect approach would result in distortions in a fully liberalised EU power market.

²⁰ Another problem may also arise from the British government already planning to integrate project-related measures (including Joint Implementation and Clean Development Mechanism) as of 2005 (See DEFRA (2001) - namely if the EU emissions trading would indeed start without their integration.

view potentially stricter international goals in the long-term, i.e. after 2012. Assuming that significant reductions going beyond “business-as-usual” developments cannot be achieved solely by the current voluntary system and industrial co-operation (for Germany there is reason to follow this suggestion), gaining experience from emissions trading as soon as possible would appear logical. It must of course be admitted that the question of how emissions trading is to be combined with the other existing and planned instruments of climate protection (in Germany, next to the voluntary agreements and the “ecological tax reform”, co-generation support policies and the Renewable Energy Act (which grants grid access for RES at fixed tariffs), at EU level the harmonisation of mineral oil taxes and the proposed energy taxation directive) provokes a degree of uncertainty and scepticism.

VI. FINAL REMARKS

It can be seen from the draft directive just how much store those behind it set by producing a solution which is as stringent as it is clear. For this purpose, they developed an extensive yet not overly complex system of commitments based on absolute and direct emissions. It was also the main reason why project-related measures and other gases apart from CO₂ were left out. Only a few regulations limit the system’s fungibility, and the number of participants as well as the controls and sanctions envisaged hold out the promise of both a functioning market and high ecological effectiveness.

On the other hand, to compensate for the binding, absolute targets, the strictness of these targets may be somewhat reduced by Member States through generous allowance allocation, hampering to a certain extent the attainment of the Commission’s goals. Therefore one crucial aspect is whether Annex III can bring about an effective policy. The planned systematic reduction in permissible emissions over time mentioned by Commissioner Wallstroem at the press conference to present the draft directive is not explicitly contained in the draft. It should, however, be assumed that the Member States will all continuously reduce the emission allowances issued in order to slowly but surely reach their national reduction targets.

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