TRADING OF POLLUTION DISCHARGE RIGHTS

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Summary

Emissions trading is a scheme whereby companies are allocated allowances for their emissions according to the overall environmental ambitions of their governments or authorities—allowances that the companies can subsequently trade with each other. These emission allowances are sometimes called quotas, credits, rights, permits or caps. The sum of all such allowances allocated to all the companies included in the scheme represents the overall limit on emissions allowed by the scheme. It is this overall limit that provides the environmental benefit of the scheme.

Trading of emission/discharge limits between polluting facilities is said to be beneficial to the environment, industrial facilities, and to the administration. The trading program

could achieve an overall reduction in the discharge of pollutants from the participating facilities, on condition that its implementation is combined with the reduction of Emission Limit Values (ELV), or the overall discharged/emitted quantities of pollutants as in the Kyoto Protocol.

For trading in a given area the following conditions must be met: the authorities must issue trading regulations even if there appears to be little demand for trade among the facilities at the time; the authorities should assist facilities in identifying suitable trading partners and in promoting and facilitating trade negotiations; and the facilities must be informed of the potential to use trading as an alternative approach to meeting the emission or discharge limits.

The benefits of the trading scheme are: it ensures that facilities in a given area will meet the environment emission/ discharge limits; it incorporates an overall reduction in the amount of pollutants discharged from the participating facilities; it provides greater flexibility to facilities in meeting local emission/ discharge limits; it encourages wider and more timely compliance with limits; and it saves money for those facilities that buy and sell credits.

1. Introduction: what is emissions or discharge trading?

This particular trading concept arose from the process of developing strategies to introduce flexibility in achieving environmental targets. It refers to the use of a 'trading' mechanism as a means for companies to meet the emission or discharge limits implemented by authorities for the level of polluting substances they discharge to the environment. Trading allows facilities to achieve the required overall reductions in pollutant levels more economically, as alternative controlling of those levels can be very expensive. However, as the targets to be achieved became more and more stringent, many of the developed countries have experienced increased pollution despite slower economic growth and higher energy prices, while pollution levels remained stable in others. The permit trading approach rewards companies that develop ways to reduce the pollution they cause down to the required limits.

The concept of 'permits' is well established in environmental policy, particularly in the application of technical standards to waste, water and air pollution. However, regulatory instruments cannot ensure a pre-determined environmental outcome, as the number of new plants—and so total emissions—can be greater than foreseen, even if they all used the best technical standards. Emissions trading allows individual companies to emit more than their allowance on condition that they can find another company that has emitted less than allowed and is willing to transfer its 'spare' allowances to them. The overall environmental outcome is the same as when both companies use their allowances exactly, but with the important difference that both buying and selling companies benefit from the flexibility offered by trading, without an overall disadvantage to the environment. Both companies involved incur lower compliance costs than they would have been able to do without the possibility of trading —the 'selling company' receiving payment for the allowances transferred, and the 'buying company' incurring lower costs than those implied by adhering to the pre-determined emissions allowance. A transparent price signal also enables other companies to judge better the business opportunities of trading as well as potential benefits they could receive from engaging in this market.

Different national emissions trading systems can cause serious difficulties concerning state aid and new companies entering the market, and both the authorities and firms can face uncertainty as a result. Moreover, these difficulties are likely to worsen as the number of industrial facilities increases. The strength and environmental integrity of any emissions trading scheme will largely depend on the robustness of its compliance and enforcement regime. An effective functioning of the regime requires a certain degree of harmonization of the rules of monitoring and reporting.

2. Advantages and disadvantages of emission and discharge trading

Trading of emission/discharge limits among polluting facilities is said to be beneficial to the environment, the administration and the facilities themselves. The trading program could achieve an overall reduction in the discharge of pollutants from participating facilities, on condition that its implementation is combined with the reduction of Emission Limit Values (ELV) or the overall discharged/emitted quantities of pollutants, as in the Kyoto Protocol.

Trading also seems to benefit the environment by encouraging wider compliance with emission/effluent limits among facilities whereby they would be less inclined to relocate in areas with less stringent limits, thus encouraging real pollution reduction. The greater flexibility in meeting limits afforded by trading can also lead to financial savings for industrial facilities that buy and sell effluent credits, thus helping to sustain local economies.

In the absence of a trading scheme, the first company is free to increase the quantity of its pollutants up to the limit at any time, as its control equipment becomes older and perhaps less effective, or as it changes or expands its operations. Under a trading agreement, on the other hand, the facility would be locked into a lower pollutant discharge level based on the quantity traded. The trade will offer an incentive to facilities to maintain the effectiveness of their control equipment, or, when they expand their operations, to incorporate pollution prevention or additional control measures to stay within the lower discharge limit.

A trading program may also allow companies to realize economies of scale associated with installing larger treatment systems at a single facility rather than smaller ones at two or more facilities. These economies of scale can have a positive effect on the environment resulting from reduced use of chemicals and correspondingly smaller quantity of hazardous wastes they generate. Consumption of both electricity and water may also be reduced.

There are many other benefits of trading, too, for the buyer of specific pollutant credits. For example, by increasing the level of compliance with limits the buyer benefits from avoiding fines and lower monitoring costs. Of course, a facility will choose to purchase credits when they can be bought at a price that is lower than the cost of developing and installing its own pre-treatment upgrade. This may be particularly true when a facility is close to meeting the effluent limit values and only occasionally exceeds them due to fluctuations in its processes or production levels. The incremental cost of reducing its discharge or restricting production to meet local limits may be greater than the cost of purchasing a 'cushion' that would allow it to operate comfortably within the local discharge limits.

Trading seems also to be beneficial for the authorities and the community in a number of ways. First, allowing trading as an approach to meeting limits can improve relations between the authorities and industrial facilities. Second, trading can boost the community's economy by alleviating constraints that pollutant limits may impose on operations at existing or new facilities. This may be especially true when an authority needs to revise limits necessitated by changes in its industrial base or to meet more stringent criteria. An existing facility may already have made substantial financial investment to meet the limits, but it may be unable to afford the additional cost of complying with the revised limits (e.g. installing additional pre-treatment equipment) and remain competitive. Similarly, a new facility may not be able to afford the level of pre-treatment needed to meet the emission or discharge limits In either case, reduced compliance costs associated with trading could help to increase, or at least maintain, the economic base of the community. Thus, it may be beneficial to the community if the authority were to incorporate effluent trading into its regulations.

Effluent trading also enhances the public image of discharge-treating installations as proactive and effective regulatory entities. By incorporating trading into their local regulations, the authorities ensure that the facilities meet effluent limits designed to protect the environment, while at the same time alleviating any potential negative impacts of regulations on the local economy by allowing them to pursue innovative compliance approaches.

Studies show that emission trading among energy-intensive sectors in the EU reduces compliance costs. Typically, emissions allowance is estimated at about 33 Euro per ton of carbon dioxide, which is well within the range of 5-58 Euro estimated by other emission trading models.

3. The process of developing a trade

Pollution trading allows a group of facilities within a specific area (at the national or international level) to achieve required reductions in pollutant levels more economically than when the facilities make individual efforts in the absence of trading. Controlling certain pollutants, and reducing them to the limits set by legislation, can be very expensive. Yet, when control measures are installed under a trading scheme, a facility may be able to reduce the levels of its pollutants (e.g. heavy metals in effluent) more than it is required to do under legislation.

The development of emissions trading, while making an important contribution to the protection of the environment by limiting emissions, must nevertheless avoid creating barriers to trade, restrictions to the right to form new companies, and distortions of competition that would damage the internal market. Emissions trading should therefore form part of a coherent framework of common and co-ordinated policies and measures for reducing greenhouse gas emissions and waste effluents. Furthermore, in developing an emissions/effluents trading scheme between states, one must respect the rules of fair competition within internal markets. Maximum simplicity of rules, with which companies have to comply, is also a desirable objective. Simplicity would facilitate effective and efficient administration and enforcement of any emissions trading scheme.

An example of pollution trading may be found in the case of an industrial area with major industrial plants and a common installation for treating both industrial effluents and municipal waste waters. In order to meet the set pollutants limits (e.g. pH or heavy metals limits), these facilities need to pre-treat their effluent prior to discharge to sea, river, or a drainage system. Some of those plants can easily meet such requirements mainly because they have better technology, while others cannot. At this point the competent authority, which has information on all polluting facilities and their activities, steps in to facilitate the trading process by identifying the potential trading partners and by actively participating in negotiations. Interested companies are invited to meetings in which the trading framework is described, discussed, revised if necessary, and finally agreed.

3.1 Need for regulations authorising trading

The establishment of a trading scheme is contingent upon the existence of appropriate rules and regulations. These rules must be in place prior to trading, even when there appears to be little demand for it among the facilities at the time. For this will streamline the process, should trading become a desirable compliance tool and allow facilities to engage in trading in order to meet local pre-treatment requirements quickly and efficiently.

3.2 Allocation

Another important issue concerning trading is the method of allocation. There are basically two methods: auctioning, and allocation free of charge. In the context of emissions trading, the second is often referred to as 'grand-fathering'. It is possible to combine the two methods, and there are several ways in which to do so.

However, once the overall allocation for the trading sectors has been fixed, the method of allocation does not affect the environmental outcome which is determined by overall allocation and robustness of the monitoring and enforcement regime. Periodic auctioning is technically preferable, as it offers an equal and fair opportunity to all companies to acquire the allowances they want in a transparent manner.

The 'polluter pays' principle is applied in auctioning. Revenues generated by governments from auctioning can be recycled in a variety of ways, even when the overall revenue effect is kept neutral or zero or by using the revenues to promote energy efficiency, research and development, or public investment in other greenhouse gas abatement efforts. Auctioning avoids the need to take difficult and politically delicate decisions on how much to give to each company under trading arrangements.

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Biographical Sketches

Mr. Alexendros Karavanas received his Diploma in Chemical Engineering from the National Technical University of Athens, Greece, in 1977, followed by a degree in Pharmacology from the University of Athens in 1991.

Currently Mr. Karavanas is working for the Ministry of Environment, Physical Planning & Public Works, Athens, where he is responsible for Environmental Permitting. This involves environmental impact study of industries, granting environmental conditions and permits, corresponding EU legislation, as well as European Community’s Support Framework for the Environment. His main duties and tasks include environmental impact assessment of industrial facilities (examination, authorization, setting of environmental conditions especially for the food, pharmaceutical and pesticide industries, tanneries, textile industries, chemical industries etc.).

He has represented the Greek Ministry of Environment (1997-2001) on the European Community's Committee on article 19 of Directive 96/61, “Integrated Pollution Prevention and Control (IPPC)”, concerning the inventory of the IPPC industries, as well as on the European IPPC Bureau's Technical Working Group for Food and Milk, Seville, Spain. To date he has participated in several projects of the Greek Ministry of Environment concerning emission inventory of industrial sources in Greece, and implementation of the IPPC system and Best Available Techniques for industry. He has addressed several seminars organized by, among others, the National Technical University of Athens and the University of Athens on environmental issues including environmental impact statement, treatment of waste water effluents, air emissions, pollution control equipment, and impacts from the operation of the food, textile, and chemical industries.

Dr. Michael Christolis is a Civil Engineer specializing in environmental science and technology. Currently he is working as a research collaborator at the National Technical University of Athens (NTUA), Greece, on the mathematical modeling of environmental problems. He has so far accumulated twenty years of experience in air quality monitoring, pollutant dispersion modeling, assessment of the impacts of industrial accidents, design of emergency systems, and implementation of the Seveso Directive in Greece.

During 1983-1988 he was the Head of the Laboratory for the Air Quality Monitoring Network for the City of Athens. In 1988 he joined the Computational Fluid Dynamics Unit (CFDU) of the Chemical Engineering Department of the NTUA, working on research projects on the computational modeling of various applications focusing on environmental issues and problems.

Professor Nicholas C. Markatos obtained his Diploma in Chemical Engineering from the National Technical University of Athens, Greece, in 1967, followed by M.Sc, DIC and Ph.D degrees from the Imperial College of Science, Technology & Medicine, University of London, UK, during 1970 to 1974.

In 1983 Professor Markatos was appointed Director of the Centre for Mathematical Modeling and Process Analysis at the school of Mathematics and Scientific Computing of the University of Greenwich, London, England. At that time he was also a visiting lecturer to the Computational Fluid Dynamics Unit of Imperial College as well as working for CHAM Ltd, (Concentration Heat and Momentum, Limited), London, England. At CHAM he worked first as leader of the Aerospace Group (1976) and then, from 1977 until 1984, as Manager of the Applications Team working on various Fluid Mechanical, Thermodynamic and Transport problems.

Since 1974 he has served as technical consultant to many Research Centres, state institutions and industries.

In June 1980 he was awarded the "Certificate of Recognition" by the Inventions Council of NASA.

In 1985 Professor Markatos was elected Professor of Chemical Engineering at the National Technical University of Athens, and in 1990 he was elected Head of the Chemical Engineering Department. In 1991 he was elected Rector of that University.

Professor Markatos' main scientific interest is in the mathematical modeling of Transport Phenomena, Fluid Mechanics, Thermodynamics and Physical Processes like Fluid Flow (Laminar and especially Turbulent), Heat and Mass Transfer, Environmental Flows, Combustion, etc.

He is referee of scientific papers, reviewer of new books, as well as member of the Editorial Board of several international Scientific Journals.

He has published over 100 original scientific papers in international journals and participated and organized many international conferences, seminars and meetings all over the world. Author of two books, he has also published many articles in the popular press on Engineering Higher Education.