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**STRATEGIC GUIDELINES FOR THE DESIGN AND IMPLEMENTATION OF DOMESTIC
TRANSFERABLE PERMITS**

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FOREWORD

These guidelines for the implementation of domestic transferable permits have been elaborated in the context of Environment Policy Committee (EPOC) work on economic and environmental policy integration, under the supervision of the Working Party on Economic and Environmental Integration (WPEEPI). They are based on a background study: "Design and Use of Domestic Transferable Permits Systems" [ENV/EPOC/GEEI(99)12] which was reviewed by WPEEPI which recommended its publication under the responsibility of the Secretary General. The "Strategic Guidelines for the Design and Implementation of Domestic Transferable Permits", have been discussed at the 16th and 17th Session of WPEEPI (24-25 November 1999 and 16-17 May 2000). At the recommendation of EPOC, this document is published under the responsibility of the Secretary General. This report was prepared by Dr. Olivier Godard, Director of Research, CNRS, Paris.

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EXECUTIVE SUMMARY

There has been increasing interest in tradable/transferable permits (TPs) as a cost-effective instrument for environmental management, both for pollution control and natural resource management. The OECD “Strategic Guidelines for the Design and Implementation of Domestic Transferable Permits” (2001) summarise the main issues to be considered by policy makers when designing and introducing a TP scheme. The Guidelines are based on the recent publication, *Domestic Transferable Permits for Environmental Management: Design and Implementation* (OECD, 2001), which provides systematic analysis and full discussion on the various approaches, challenges, conditions and potential solutions relating to the design and implementation of TPs at the national level.

TPs can be environmentally effective, economically efficient, flexible, and designed so as to limit unwanted distributive effects. They can guarantee *environmental performance* as they are based on setting of quantified limits on emissions or natural resource use. A TP scheme can achieve *economic efficiency* by minimising the overall cost of compliance by encouraging those firms that can abate pollution and/or conserve resources more cheaply to do so first, while allowing those with higher costs to opt for buying additional permits or allowances. A TP scheme also grants firms *greater flexibility* in the choice of means for achieving the environmental objectives. Depending on its design, a TP scheme can also *better control the distributive effects* of the policies, achieving desired income distribution or transfers among different groups.

There are four main families of TPs with distinct ways of adjusting for flexibility in governments’ approaches to environmental policy. They include the following: (i) *quotas* (cap and trade or minimum limits and trade) – a quantified ceiling or floor assigned to firms for a given period, (ii) *credits* – acknowledgement at the end of the period of the achievement of an emission or abstraction level below the one which had been authorised for a given firm, (iii) *averaging* – the competent authority sets average limit values for an entire range of similar products manufactured by firms within the same industrial branch; and (iv) *transferable usage rights* – formally regulates access to resources that are freely available, or organising the regulation of the use of resources whose ownership is shared.

There are many important variables to be considered when designing a TP system, but they can largely be categorised into three types, those related to (i) objectives and basic characteristics of the system, (ii) design options, and (iii) means of application.

The first type includes basic elements such as the physical basis of permits depending on the environmental objective of the TP system, and the coverage of participants. The second type relates to design options such as the method of initial permit allocation (i.e. administratively allocated or through auctioning), the degree of temporal and spatial flexibility (i.e. whether banking, borrowing, or bubbles are allowed), and how to organise the transfer or trade itself (bilateral or through a trading platform). The third type is concerned with the means of implementation, such as monitoring, verification, and enforcement of penalties in cases of non-compliance.

There are a number of issues that policy-makers should keep in mind when deciding to opt for a TP scheme over other policy instruments, including;

- *Competitiveness* - TPs can have favourable impacts on competitiveness compared with regulatory approaches, but each case needs to be examined carefully, particularly the rules of initial permit allocation and fiscal redeployment, in order to determine the net impact on the competitiveness of firms.
- *Compatibility of the proposed TP system* with existing legal and institutional frameworks, regulatory regimes, and other instruments such as taxes or negotiated voluntary agreements.
- *Distributive effects* arising from the implicit sharing of property rights to the environment among the government, firms responsible for pollution and/or resource extraction, and residents of the concerned community.
- *Political and social acceptability* of the concept of the “right to pollute”.

The process of designing and successfully launching a TP system requires political will and often improving or even overhauling the existing regulatory and institutional frameworks. Some of the key elements in regulatory and institutional reform to facilitate introduction of a TP system include the following:

- A shift from regulations focused on technology choice to formulation of physical limits, such as ambient air/water quality standards, that are more in line with environmental objectives and offer greater flexibility in the choice of means to achieve compliance.
- A shift from environmental standards expressed in terms of unit and concentration values to those expressed as absolute/mass values (ceiling or quotas by period).
- Assignment of responsibility for verifying policy implementation to independent administrative authorities whose long-term mission would be to ensure compliance with regulations and to develop transfer activity and fair transactions.

Based on an assessment of existing experiences, the Guidelines provide advice on the consideration of these and other key conditions in the design and implementation of domestic TP schemes.

INTRODUCTION

The use of transferable permits for environmental protection is attracting growing interest not only from public administrators and policy-makers, but also from company managers and non-governmental organisations. These Guidelines indicate the potential for using transferable permit schemes at the local or national level to protect the environment or manage natural resources, and provide strategic advice for implementing such schemes.¹ The Guidelines are not meant to be normative, but instead to present in a systematic manner the conditions necessary for the implementation of a transferable permit system at the domestic level, and the issues that may arise regarding the permit system.

A range of environmental and natural resource management issues can be addressed through the use of transferable permits, for example:

- the control of air pollution from fixed sources in a local, regional or global context (e.g. controlling air pollutants to reduce acid rain at the regional level or to curb global warming);
- the standardisation of products which release polluting emissions either at the stage of consumer use (e.g. cars, engines) or at the stage of disposal (e.g. CFCs in end-of-use refrigerators);
- efforts to curb water pollution at the local level or within a given river basin;
- the management of natural resources in accordance with ecological or development constraints (e.g. irrigation water, sea fisheries, assignment of building rights); or
- the organisation of recycling systems for industrial and household wastes, particularly packaging wastes.

As such, transferable permits provide a useful policy tool in tackling many of the issues included in sustainable development goals. In particular, they can be powerful instruments for introducing significant changes in consumption and production patterns, as will be required to attain some of the more ambitious long run sustainable development objectives.

By their nature, transferable permits combine two essential elements:

- (a) the setting of quantified physical constraints in the forms of obligations, permits, or rights allocated to target groups (polluting firms, fishermen, land owners, etc.); and
- (b) the authorisation of such target groups -- under certain conditions specified by the administrative authority -- to transfer these obligations, permits or rights either from one activity to others controlled by the same agent, from one time period to another, from one geographical area to another, or from the initial agent to other agents.

These options can be combined in different ways. In some cases (e.g. schemes using *bubbles* or *averaging*), the approach may be limited to allowing actors a certain degree of internal flexibility in

1. Specific issues relating to the organisation of international mechanisms for transferable permits, such as those under the Kyoto Protocol (1997) to the Framework Convention on Climate Change, are not addressed in this document.

achieving given objectives; in other cases, the potential to make external transfers may lead to the organisation of commercial trading of the permits on a formal basis.

Transferable permits are attracting this interest for four main reasons. First, they are a means of improving environmental performance through a tool that can set environmental goals or constraints that are defined in the physical units relevant for environmental protection or resource management, thus ensuring attainment of specific environmental objectives. Second, transferable permits allow regulated agents greater flexibility in how they achieve the required environmental objective. As such, the measures they adopt to comply with the permit requirements can be better matched to their specific circumstances and strategies, allowing them to choose between complying with their existing permit specifications or purchasing additional permits. Thus the permits allow for the attainment of the specified environmental objective without hampering entrance to the market (new entrants can simply buy existing permits), and thus without impeding economic development in the region or sector of activity. Third, transferable permits are economically efficient instruments in that they allow the regulated agents the opportunity to choose, either directly or through a permit transfer, the least costly means of achieving the specified environmental objective. Finally, a range of choices is available for the initial allocation of the permits, both in terms of the allocation procedure used and the initial beneficiaries selected. Allocation systems can be adopted which minimise the distributive effects of the transferable permit scheme on the affected agents or certain groups of agents, increasing the acceptability of the scheme.²

These Guidelines are intended to facilitate the task of those who are considering the use of transferable permit schemes to address environmental issues. The Guidelines are strategic rather than technical, and do not attempt to provide a step-by-step handbook for the implementation of a transferable permit scheme. Instead, they are designed to provide a point of reference with respect to the main issues which inevitably arise in the design of transferable permit schemes. They are based on the analysis contained in the OECD synthesis report on transferable permits, *Transferable Permits for Environmental Management: Design and Implementation* (OECD, 2001), and *Implementing Domestic Tradable Permits for Environmental Protection* (OECD, 1999). Those reports provide more detailed discussion of the economic, legal and political issues involved in the use of transferable permit schemes.

The guidelines have been divided into four sections. Section 1 provides basic definitions and a description of the main components of a transferable permit system. Section 2 then examines the necessary conditions for a successful transferable permit scheme, both in terms of the type of environmental problems addressed and the institutional and economic context. Section 3 discusses the strategic choices to be made in designing transferable permit systems. Section 4 puts forward a number of suggestions to help in the process of designing and implementing transferable permits.

2. See OECD (2001), *Domestic Transferable Permits for Environmental Management: Design and Implementation* for a discussion of the differences between issues relating to economic efficiency and those relating to distribution for transferable permit schemes.

1. DEFINITIONS, BASIC CONCEPTS AND KEY VARIABLES FOR TRANSFERABLE PERMIT SCHEMES

This first section provides the definitions and basic concepts used to characterise transferable permit schemes. The main issues for designing such schemes are then reviewed in three stages: the first addresses the aims pursued and the general attributes of a transferable permit programme; the second deals with the different options for designing a permit system; and the third with how to implement it.

1.1 Definitions and basic concepts

Transferable permits can take the form of environmental quotas, permits, maximum rights or minimum obligations assigned to economic agents by a competent authority, or distributed between agents according to an administrative or economic procedure. Their legal status depends on how the permits are set up: they may consist of rights guaranteed by the rules safeguarding property rights, or may take the form of administrative authorisations. Once the initial allocation has been made, the permits may be transferred either from one source to another, from one geographical area to another, from one period to another, or from one agent to another. Transfers are made on the initiative of the permit holders, and are thus a decentralised policy instrument. If no transfers take place, however, the instrument works like a conventional regulatory instrument. In such a case – and assuming there are no serious obstacles to making such transfers – the initial allocation can be presumed to be close to the efficient state (otherwise transfers would occur).

Transfers may take place within an economic entity (for example between different factories owned by the same firm) or between different agents (firms, land owners). Transferable units may be expressed in absolute terms defined by physical units (e.g. x tonnes of a given substance), as a share of a total maximum level of output, polluting emissions, or abstraction rights to natural resources established by the competent authority for successive periods of time (e.g. rights to $y\%$ of an annual quota), or as unit emission limits or rates (e.g. z emission units per unit of input, output, raw discharge or time).

Transferable permits fall into four broad categories, depending on the benchmark used to determine the permits and the nature of the targeted problem:

- ***Emission reduction credits (baseline and credit for emission reduction)*** correspond to the acknowledgement of an emission or abstraction level by the agent *below* what they were authorised for the given period. The reference situation is often determined according to the pre-existing administrative permit system, but can also be determined by tightened standards or a scenario for expected future emissions by the agents. Since credits result from the difference between actual and allowed performance, they are generally granted *ex post* once the performance achieved has been confirmed; an *ex ante* acknowledgement can be given in situations where future performance can be accurately predicted.
- ***Quotas or allowances (cap and trade or minimum limits and trade)*** correspond to quantified maxima or minima assigned to agents over a given time period. Quotas can be transferred by agents as soon as they have been allocated. Compliance with the permit rules is checked at the end of each time period. An example of a quantified maximum is the maximum annual volume of sulphur dioxide emissions allowed from US power plants under the *Clean Air Act Amendments* of 1990. An example of minimum obligations is the minimum recycling rates

for packaging waste currently in force in the European Union (although these obligations are not transferable at the current time).

- **Averaging** corresponds to the competent authority setting average limit values for an entire range of similar products (e.g. cars or engines) manufactured by firms in the same industry. The firms then have the option to exceed these limit values for some of the products they sell on the market, provided that these overshoots are offset by lower than average levels for other products. Transfers can also be made externally, i.e. if the overall product performance of a firm is better than the average performance level prescribed, the firm can transfer its unused permits to another firm whose average performance is poorer than that prescribed. An approach of this kind was adopted in the CAFE programme designed to regulate the fuel consumption efficiency of vehicles sold by US automobile manufacturers.
- **Usage rights or rights to abstract natural resources (transferable rights)** aim to formally regulate access to resources that are freely available, to organise the regulation of the use of resources whose ownership is shared or, in the case of building and construction rights, to alleviate problems associated with private property rights from the standpoint of environmental protection and development objectives. Transferable fishing rights and transferable construction rights (separated from land ownership rights) are two examples of such an approach that are used in New Zealand.

The main attributes of these four types of transferable permits are summarised in Table 1.

Table 1. The four types of transferable permit schemes

	Credits	Quotas	Averaging	Usage or abstraction rights
Basic concept	Baseline and credit	Cap and trade or minimum limits and trade	Average product requirements	Individual property or user rights
Physical basis	Reductions below an agreed baseline	Total number of permits	The entire product range of a firm	Resource use on the basis of free access or common property
What can be transferred	Only the credits for reductions, defined in absolute terms, can be transferred.	Permits are transferable in full.	Internal compensation can be applied between different products for a single firm. External transfers can take place between firms that exceed the average limit value and those that fall below it.	Different components of rights can be transferred separately.
Allocation	Credits are created by the difference between actual performance and an agreed baseline. They can be observed <i>ex post</i> or assigned <i>ex ante</i> if they are perfectly predicted.	Quotas are allocated by a public authority in the form of quantified minima or maxima.	Average limit values are set by an administrative authority. The volume of transferable permits depends on the production level for each product in the range.	Rights are defined by a public authority or a local community.
Relationship with the regulatory regime	May be phased in as a way of introducing flexibility into an existing regulatory system.	Provision must be made for introducing the transferable quotas into the regulatory system from the outset.	May be phased in as a means of introducing flexibility into a product standardisation regime.	May be developed on the basis of traditional systems of resource use or as a substitute for them.

	Credits	Quotas	Averaging	Usage or abstraction rights
Conditions of participation	Voluntary: sources can simply comply with the baseline requirements without participating in the validation and trading of credits.	Mandatory in that the specified minima or maxima must be complied with even if there are no transfers. Possible provisions for voluntary opting-in or early programmes.	Mandatory: compliance with regulatory requirements depends on the average performance of products in the range. Participation in external transfers is voluntary.	Mandatory in that the new rights are binding on all parties.
Examples	The US federal offset programme to control local air pollution requires new sources to obtain credits from other existing sources.	The US Acid Rain programme sets an annual maximum emission level for the power generating sector, individual allowances, and a national perimeter within which quotas can be traded.	The mobile source emissions programme in the US. Since 1998 manufacturers of boat engines must reduce total hydrocarbon releases from new engines sold on the market by 75% over a 9 year period.	New Zealand uses transferable individual quota schemes for the management of 33 species of fish.

1.2 Aims and basic characteristics of transferable permit schemes

1.2.1 Aims

Empirically, it is possible to use transferable permits to achieve a variety of aims, including environmental, social and economic objectives (see Box 1). More generally, the purpose of TPs relates to environmental effectiveness, decentralised flexibility, economic efficiency, social equity, and encouraging technological innovation. The choice of a given instrument will thus depend to a large extent on the importance attached to the goals pursued. While this will depend on the context, there are generally two main goals, with the others being secondary objectives. Thus, if considerations relating to economic efficiency are of major importance for a given problem, and if explicitly addressing the distributive aspects is crucial, a transferable permit system will be appropriate, whatever the impact of secondary goals. It is also important to know from the outset if priority is to be given to economic efficiency or to redistribution. Redistribution of rights can be the main goal of a permit programme, and has been in some situations such as with transferable development rights.³

Box 1. Transferable permits and sustainable development

Transferable permit schemes can be used to tackle environmental problems in a manner consistent with sustainable development objectives, i.e. addressing the environmental, social and economic aspects of the identified problem. The objective of the scheme is to address the environmental problem. The transferability of the permits ensures that they will be allocated to, or eventually bought by, those who value them highest, resulting in an economically efficient distribution. Furthermore, the initial distribution of the rights can be used to address social concerns both through the method of allocation (i.e. whether the permits are distributed free or at a charge) and the agents identified as eligible for the permits. Thus, for example, transferable development permits can be used to control urban sprawl and preserve natural environments, while still upholding the right to land ownership and ensuring an equitable distribution of the returns from land development. Similarly, transferable fishing quotas or rights can limit over-fishing (by setting a maximum allowable catch and allocating transferable rights that add up to the total catch), while ensuring an equitable and economically valid distribution of the fishing rights.

3. While placing restrictions on building rights in a given area has a direct impact on land values, introducing a system of transferable rights may be an efficient way of redistributing the land rents generated by these restrictions and providing financial compensation to those who are most affected by the constraints.

The degree of certainty that the competent authority needs to achieve in terms of environmental improvements is particularly important in the design of the TP scheme. If for reasons of sensitivity or irreversibility it is essential to ensure absolute compliance with a given quantitative cap, while at the same time the economic costs of the programme are considered to be potentially high, then a TP scheme would seem to be particularly appropriate. On the other hand, if achieving a specific environmental result according to a rigorous timetable⁴ is not a priority, and if concern has been expressed mainly about the very rapid increase in the costs of abating pollution, it might perhaps be preferable to consider adopting a tax-based approach instead. Mixed contexts can be addressed through a combination of transferable permits and emission taxes, with the taxes effectively setting an upper limit on the price of the permits (see Section 1.3.4).

It is also important to determine whether the programme is aimed at phasing out a substance or a type of activity over the short or medium term, or whether the aim is to implement a long-term mitigating policy over a number of periods. Each of these situations poses specific problems in terms of ensuring the predictability of the rules of the game to be introduced:

- What will be the constraints (caps, limit values, etc.) that will be imposed at different dates?
- How many of the available permits will be allocated to each agent over the periods concerned?

If the future rules have not been properly defined by the time the programme is introduced, the choices made by the regulated agents in the first period may be less than optimal. Lacking knowledge of the rules of the game for the next stages, the regulated agents will not be able to determine the appropriate strategies in the first period to minimise their costs over the longer term. Further more, they may deliberately make choices in the first period for strategic rather than cost-effective purposes, essentially as a way to influence the regulators in their design of the rules for subsequent periods. These risks apply particularly to the initial allocation of permits. For example, if a firm feels that cutting its emissions significantly during the first period may well have a negative impact on its permit assignment for the second period, it would be in its interest to achieve only a modest reduction during the first period, which would subsequently lead to both an environmental and an economic loss for society as a whole.

Defining the objectives of a programme is clearly a responsibility of the public authorities. But experience has shown that implementation failures can arise when objectives are not clearly defined or lack credibility, or when they are not shared with stakeholders. These considerations are particularly relevant to the policy process, and will be discussed in Section 4.

1.2.2 Nature of transferable permits

Transferable permits confer specific rights and obligations on those who hold them. The contents of these rights and obligations must be very clearly specified, and particularly the physical activity covered by the permits.

Permits may be based on emissions, deposits, abstractions or capacities. They may be defined in absolute or relative values, as a share of an overall cap or asset, or as unit rates of pollutant emissions per volume of gross discharge or per tonne of output. In the latter case, transferable permits have to be determined as the product of a unit rate and the absolute volume of discharge or output achieved. TPs may

4. As in the case when the problem to be solved is dependent upon accumulation of a stock of pollutants, without being sensitive as such to the trend in flows.

be permanent or valid only for a specified period. Depending on the type of permit scheme chosen, the results in terms of environmental objectives will differ.

Since the transferable permits are primarily aimed at achieving an environmental or resource management goal, the specification of permits must meet four requirements:

- (a) it should be related as directly as possible to the environmental or resource management goal in order to avoid unwanted side-effects or uncertainty about its achievement;
- (b) the physical basis of the permit should be homogeneous or incorporate accepted equivalences between heterogeneous elements⁵;
- (c) it should be able to be measured or estimated precisely and verifiably, not only by the permit-holder but also by a supervisory authority or a third party; and
- (d) it should have a geographical and time coverage that ensures flexibility in the transfers between parties, economic security for the permit holders, adaptability of policies, and observance of the environmental objective.

Permit specification usually requires choosing a balance between environmental and economic uncertainties, and deciding how to spread the burden of economic uncertainty between the regulated agents and the competent authority. The allocation of this burden becomes clear when considering schemes in which regulatory requirements are based on unit values (see Box 2).

Box 2. The nature of TP schemes based on unit values

Permit specification often requires a division by the regulating authority of the burden of economic uncertainty between the regulated agents and the competent authority, particularly with respect to systems based on unit values (e.g. x kilos of SO₂ per tonne of output). Under such an approach, the higher the permit holder's level of activity, the greater the emissions or abstractions he is allowed, while still complying with the same unit value. Consequently the agent has no need to seek additional permits to cover his rising emissions so long as these are linked to increasing output. It is as if his initial allocation increased or decreased according to his level of activity. This approach limits the economic burden on companies whose activities fluctuate or which plan to expand. On the other hand, if an overall cap must be complied with at the level of a sector or country for environmental reasons, the effect will be to pass on the adjustment constraint to other parties or other sectors so that total emissions or abstractions remain below the specified cap. Compared with approaches in which absolute quotas are assigned, this unit value approach simply transfers the uncertainty from firms to the State or to other agents, who should be ready to take part through the market by buying back permits to achieve the cap.

Despite these drawbacks, the unit value approach may be useful in cases where the authorities want to avoid placing any constraint on the development of established activities inasmuch as they make use of efficient technologies. This is because the number of permits held by firms will decline naturally in proportion to the decrease in activity at their installations, and will cease altogether in the event of closure. The unit value approach can be seen as a credible way to avoid further incentives to close down a facility because of environmental policy.

1.2.3 Sectoral, geographic and temporal scope of application

The scope of application specifies which regulated agents must or can take part in the programme, and which transfers are allowed. This is a decisive issue in practical terms and must take account of various considerations:

5. The latter can be aimed at in order to facilitate transfer and increase the potential scope for transfer.

- the patterns of pollutant circulation in the environment from the sources to the sites of deposition where damage is apparent, and the patterns of ecological interaction that result from resource abstractions at a given location;
- the acceptable equivalences between emissions or abstractions occurring at different geographic sites or different times;
- the economic advantages that may suggest a large scope of application not only in terms of the sectors involved, but also geographically and temporally;⁶
- the economic effects of introducing environmental constraints as far upstream as possible on the primary goods producer side, or as far downstream as possible on the final consumers side -- the degree of economic coverage then obtained and issues relating to competitiveness and transaction costs can be used to strike the necessary balance.⁷

It might be advisable to set time limits for the programme (a limited number of annual periods, for example) and to distinguish between different administrative areas within which transfers may be made freely but between which transfers must comply with other rules, or to restrict the programme to units of a minimum size. In such cases, the aim would be to secure the best compromise between potential reductions in abatement costs, economic impacts at the sectoral level, increased risks of pollution concentration at certain points (hot spots) or at certain times (peaks) and, more generally, the level of *ex ante* uncertainty about the spatial and temporal distribution of pollution.

1.2.4 *The participants*

Three categories of participants need to be identified before transfers can be organised: those who will receive an initial allocation of permits from the authorities, or are allowed to purchase them from the authorities; those who are authorised to take part in permit transactions on the secondary market (buying and selling); and those who are obliged to use permits to cover their emissions or abstractions. Some restrictions on participants may be considered for environmental or economic reasons. For example, in order to limit potential barriers to entry, restrictions may be put in place such that only new sources may be allowed to use permits bought on the secondary market. Another example is to limit transactions to agents directly responsible for emissions or abstractions once the overall level has been set by the authorities (i.e. to exclude permit brokers).

The choice of permit receivers is important for determining the distributive effects of the TP scheme. The authority may wish to grant permits only to those who will be users of the permits so that they can enjoy the most favourable economic conditions. In other situations, the authority may wish instead to distribute the scarcity rent generated by the scheme among a larger population than just the permit users. This would be the case, for example, where permits are allocated to citizens who can directly express their preferences through their behaviour in reselling permits to end users.

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6. If the same pollutant is generated by activities in several sectors, it is economically advantageous to set up a common TP system for all the relevant sectors since this will increase the scope for lowering costs and reduce the risk of market power which can occur with too narrow markets. In terms of geographical and temporal extension, of course, these have to be compatible with the environmental objectives pursued.
 7. For instance, an upstream introduction where there are big industrial firms may reduce transaction costs but at the same time increase unwanted competitiveness impacts; a downstream introduction will avoid competitiveness impacts but lose incentives on industrial activities and generate higher transaction costs; and a production structure based on numerous small business units would lead to yet another configuration.

Beyond defining those who are obliged to have TPs for their emissions, some schemes may include provisions to allow other agents to voluntarily opt-in. As a general rule, opting-in by new participants should be encouraged. But care must be taken about the conditions of such entry: they should be fair to initial participants and not jeopardise the economic validity of their choices. Thus, the possibility of opting-in should not be an additional source of uncertainty that might be detrimental to the efficiency of the instrument. Rules for opting-in should be clearly specified at the start of the transferable permit scheme.

Participants, whether private operators or public organisations, should be encouraged as much as possible to conduct their transfer dealings on a competitive basis which ensures equitable and transparent access for all parties; the rules of allocation and transfer should not give rise to favouritism with regard to certain interest groups.

1.3 Design options

There is a wide range of TP scheme design options, depending on the type of permits being considered: quotas, credits, averaging, usage or abstraction rights. But this diversity exists mainly with respect to the initial allocation of permits.

1.3.1 Initial allocation of permits

Quotas

The initial quota allocation raises general problems associated with the explicit creation and distribution of new assets. A number of factors may be relevant for consideration in initial allocating TP quotas:

- recognition of possible moral rights acquired through past use of natural resources or environmental functions;
- concern with not endangering the financial soundness of operators;
- concern instead to ensure the environmental scarcity rent is made available to the community, or at least is spread widely among consumers and citizens;
- desire to make use of an equitable, non-discretionary allocation procedure;
- desire to use the initial allocation to introduce an economic mechanism for revealing the value of the permits (e.g. auction); and/or
- desire to provide incentives for technical innovation.

Two main types of solutions are possible: administrative allocation or a market-based allocation. The first can be undertaken on the basis of set criteria, free of charge or at a regulated price that can be likened to a tax. If they are distributed at a regulated price, some agents may not want to receive the whole quota they could claim on the basis of the criteria in use; public authorities may then hold a reserve of unallocated quotas. The second potential solution – market based allocation – gives free rein to a demand for permits relative to the supply on public offer; the price that ensues can be the result of matching demand and supply, as in the auction system, or it can again be fixed administratively. If it is fixed

administratively, it loses its economic significance as an index of value, and the demand for permits may be in excess of supply, such that the allocation rule will have to be supplemented to reach the appropriate balance.

In most cases, the possibility of using a priced allocation system, has to be weighed against the fact that introducing transferable permits already implies a toughening of environmental requirements, and thus an increase in the direct costs for the economic agents concerned. It may therefore be advisable to gradually introduce the changes through three stages, namely: the introduction of transferable permits; the tightening of the environmental constraint; and the substitution of sold permits for free-of-charge ones. Several sequences could be imagined, but for all of them the three changes would, of course, need to be programmed from the outset. Such an approach would stagger the reform's financial impact on enterprises. It would also be possible to use a system of auction right from the start, with a phased decreasing refund of part of the proceeds to the agents participating. There would then be three variables to be determined in chronological order: the share of permits to be allocated by auction (or the share to allocate free of charge); the share of auction proceeds to be refunded; the criterion used to redistribute this share among participants.

1. If free allocation of the permits is chosen, certain criteria have to be applied. Each agent asks that just and fair rules be applied and at the same time that his particular circumstances be taken into account through special provisions. It is by keeping these two demands in mind that acceptable solutions can be found. First it is necessary to define basic principles and a ground rule, then to negotiate on the application of that rule, allowing for certain particular circumstances deemed to be legitimate. In so doing, the most important thing is to preserve the incentive features of the instrument, which will not be the case if exemptions are made for instance. A range of different equity criteria can be used in the design of TP schemes (see Box 3).

Box 3. Equity criteria and TP schemes

There are several equity criteria that can be used in the design of a TP scheme:

- strict equality (e.g. equalisation of the "emission quota/value added" ratio);
- equality of effort (ratio of pollution abatement expenditure to value added);
- allocation proportionate to future needs;
- allocation in inverse ratio to abatement capacities;
- allocation in inverse ratio to previous pollutant emission; or
- allocation proportionate to indicators of production activity, emissions and abstractions during a recent baseline period (grandfathering).

It is the last criterion that has been used most often in TP schemes because it enhances the acceptability of the scheme for its potential opponents. An allocation based only on past emissions clearly favours the dirtiest sources though, often raising strong objections from third parties (NGOs) regarding the equity of the rule. In order to take account of unequal past care for environmental issues among firms and to acknowledge early efforts by some agents towards environmental improvement, some schemes may choose a multi-year reference period in the past (e.g. 10 years); and/or define rights on the basis of an economic activity indicator, not on individual emissions.

For quota systems based on the setting of overall maxima or minima (which are then divided between regulated agents), specific problems arise regarding the conditions of access to the permits by new investors. Since the total quota is initially divided between existing units, permits needed by new units must be sought on the market, and thus must be bought. This may introduce a bias into competition to the disadvantage of newcomers when existing sources receive their TPs free of charge, and can slow the penetration of technical innovation that often accompanies new investment. This problem can be avoided to some extent by adjusting the basic rule in two ways:

- the authorities can set up a small reserve of non-distributed permits for sale to new investors at a capped price in order to prevent firms which have benefited from a free initial allocation of permits from holding on to them to protect their position; or
- an auctioning procedure can be used for the initial allocation (open to all participants) to create a level playing field for both existing and new firms.

In general, free distribution of permits to *new* investors under a quota system cannot be recommended since it can jeopardise compliance with the total ceiling established on the basis of the environmental objective, undermine the economic rationale for transfers, and promote an economic environment in which activities do not bear the financial burden of the external environmental costs they generate for the community. It is thus counter to the Polluter and User Pays Principles. In order to create and maintain a permit market where the initial allocation has been free of charge, it may be useful to have a procedure whereby a limited share of the total quota is supplied through auction. This procedure would be economically beneficial both for the programme's introductory phase and could help to generate a public price for the permits where there is no trading exchange or alternative institution for revealing price information on a regular basis to the public.

Credits

The general approach of credits is to acknowledge additional efforts that go beyond what is required by the regulations in place or another reference point agreed between agents and the authorities as the baseline against which to compare actual performance. Different baselines may be considered, including:

- previously authorised emission or abstraction limits;
- newly agreed emission limits in line with the general abatement objectives of a programme (e.g. corresponding to x% abatement of previous emissions limits);
- emission limits achievable with the use of some category of technologies (e.g. BAT); or
- average past emissions or abstractions over a given reference period.

Whatever the baseline used, it can be defined in absolute terms or in unit values or rates. In the latter case, the calculation of credits will need to take into account some index of activity. In some cases, such as forest management and sinks, there may be problems related to determining the admissible parameters taken into account for determining the baseline, as direct and indirect effects may not lead in the same direction.⁸

The different baselines for credits have different practical implications. If the pre-existing regulation focuses on the use of specific technologies actual emissions may not be monitored, making it difficult to find an agreement for crediting purposes. If the regulation is defined in absolute terms, emission or abstraction caps imposed on individual sources aim to address an activity corresponding to the full use of productive capacities. But ordinary business generally implies a level of activity well below full

8. For instance, should reforestation programmes be credited where deforestation is achieved by substitution in the neighbourhood? Would it not be necessary to consider the net impact of a programme on forestation in the whole zone?

capacity, so actual emissions are often below the maximum limits. However, these differences are not the result of specific environmental efforts, and authorities may be reluctant to give credits for them. In such a case, the baseline could be set as an allowed cap reduced by a percentage reflecting the average activity level.

Finally, authorities can decide to fix the baseline at the time when the crediting programme is introduced, and change it only if there is a change in the regulation or a technological change which has regulatory consequences. Alternatively, the baseline may be revisable during the course of activity, for example to reflect the general evolution of technological or economic variables (e.g. level of activity). In both cases, it will be necessary to define *ex ante* the crediting lifetime, i.e. the terminal date of crediting activities or the events which could lead to a change in environmental requirements.

1.3.2 *Organising geographic and temporal flexibility*

Geographic flexibility

The geographic flexibility of transferable permits should be set to achieve the optimal balance between avoiding problems of local concentration of pollution or abstractions and ensuring maximum flexibility in transfers in order to extend the scope of means to achieve the environmental objective. Three variables should be taken into account in this respect:

- the division of the area covered into different zones;
- the definition of rules for intra-zone transfers and for inter-zone transfers; and
- the severity of the programme's environmental goals for different time periods.

Decisions regarding these variables have to be considered together. If inter-zone transfers are prohibited, each zone will have to be large enough to accommodate a sufficient variety of opportunities. If inter-zone transfers are allowed under certain conditions (e.g. prior authorisation, impact modelling, use of predefined offset ratios, etc.), the individual zones can be smaller. To address environmental problems where it is not possible for environmental reasons to consider a system of zones for organising transfers of permits, it is generally not advisable to use TPs as the policy instrument.

Box 4. Geographical zoning for TP systems

Two types of geographical zoning are possible depending upon the type of problem: the first defines spatial units within which emission permits may be transferred, while the second defines spatial units within which permits for pollutant deposition or resource abstraction may be transferred. In both cases, acceptable equivalences between the damage occurring at different locations is important, but in the first case the damage concerned may occur outside the permit transfer zone.

While the territory under the scheme may initially be divided into large spatial units, over time it may evolve into the division of smaller units defined by ecological characteristics with the aim, for example, of respecting the carrying capacity of ecosystems with regard to pollutant deposits. In such cases, transferable permits may serve as an economically efficient means of ensuring transition over a period of several decades. It is important that agents are informed in advance of how spatial units are expected to evolve, so they can direct investments accordingly.

Temporal flexibility

Flexibility over time can be organised in four ways:

- setting a compliance period (quarterly, annual, multi-annual) during which any transfer can take place freely;
- permit “banking” whereby permits can be transferred from one compliance period to a later one;
- permit “borrowing” whereby permits from a future compliance period can be borrowed for use in an earlier one⁹; and
- differentiating between the “long” periods of normal operation and “short” periods of peak pollution management, which bring different adjustment variables and constraints into play.¹⁰

At the end of each compliance period it may be advisable to allow the participants a grace period during which they can make the transfers necessary to adjust the number of permits held to the performance actually achieved, as this usually cannot be determined with absolute certainty until the end of the period. Furthermore, in order to maintain a stable market, and to avoid transfer peaks at the end of the compliance period, it may be useful to separate programme participants into two groups with overlapping periods (i.e. with the end-period for one group being mid-period for the other). Regardless of the staggered compliance periods, all participants should still be allowed to transfer permits with all others.

1.3.3 Organising transfers

Transfers may take a variety of forms. They can be internal (between different units of the same company) or external (bilateral market transactions, trading on an exchange, transactions arranged by a broker or other intermediary, or operations organised by an administrative authority). Transfer contracts can be established to take immediate effect or deferred until a later date, as in the case of forwards or futures. They may be firm contracts, contingent contracts dependent on specific occurrences, or more open option contracts. Finally, transfers may be made freely on the initiative of permit holders or they may require prior authorisation.

Permit trading exchanges may be useful for the efficient organisation of external transfers, both in terms of ensuring fairness of access for all potential participants and avoiding strategic biases of bilateral transactions when they are not supported by a larger market. In some cases it may be advisable to allocate the monopoly of organising transfers to one unique exchange mechanism. This may be the case in order to generate sufficiently wide competition to match the volumes of supply and demand. Trading can also be limited to short, periodic time sequences (e.g. quarterly, yearly) for the same basic reasons: to establish the conditions of a competitive market. In some situations, particularly in the early years of programme implementation, market volume may not be sufficient to make an organised exchange commercially profitable, and some intermittent mechanism may need to be established. The possibility of making forward transactions (under a contract specifying that a transfer will be made at a future specified date) has

9. This is seldom used since it may jeopardise the environmental benefits or the credibility of the programme.

10. Transfers relating specifically to these exceptional periods of peak pollution management may make a useful contribution to cost minimisation, but need to be made almost instantaneously. This is only possible with a system based on electronic communications and transactional procedures, and without prior authorisation.

the advantage of providing security for permit holders who want to maintain certain operating conditions for their facilities, set the stage for new projects, protect themselves against undue market power or price fluctuation, and have a clear knowledge of the price they will have to pay in order to meet the abatement constraint. They should therefore be encouraged, even though they depend on private initiative.

1.3.4 Combining transferable permits and taxes

Where uncertainties about cost and damage functions exist, and when the authorities want to have both a guarantee of improved environmental performance and to avoid imposing excessive economic costs, it may be advisable to combine a transferable permit system with a taxation system. Thus, for example, a full-discharge tax can be applied to permit overruns. As it is not a penalty, the level of tax should be set to reflect the estimated maximum unit cost the authority considers reasonable to charge agents to obtain a given decrease in emissions or abstractions. The amount of the tax would give an upper limit on the price to be paid for reductions, and should logically be higher than the expected average market value for the permits. A tax of this type should not be confused with a penalty or sanction designed to prevent or punish a reprehensible act. In the same vein, a tax approach could be applied not to the entire physical basis chosen (emissions, energy inputs, abstractions) but to an upper part of it, such that quotas are free for the other part. In that case, the untaxed quota could be made transferable.

A tax on the permits held by the regulated agents could also be introduced to avoid strategic retention of permits and to induce holders to sell unused entitlements. As with any tax on asset ownership, it could help in the creation of a well-functioning market and facilitate an efficient allocation of permits among participants.

Another way of combining taxes and permits is to use permits only for some groups of agents and taxes for the others. This differentiated treatment can be justified if transaction, monitoring and enforcement costs are expected to be excessively high if permits were used by some groups of agents (e.g. car owners). However, care should be given to deliver coherent economic signals through the different instruments, and the distributive consequences of a joint use of TPs and taxes should also be considered. For instance, a system which taxes final consumers while giving free allocation of permits to business firms is tantamount to organising an income transfer from consumers to shareholders. This may or may not be defensible on equity grounds. In order to facilitate comparisons of the two types of instruments, it may be advisable to define their physical basis in the same way.

1.3.5 Combining transferable permits and voluntary (negotiated) agreements

Useful synergies can be developed if transferable permits are added on to voluntary agreements. In a period when government and business are interested in negotiated agreements – in part because they are a faster-acting policy instrument than those necessitating a change in legislation (e.g. fiscal reforms) – this mix has the advantage of eliminating the economic inefficiencies usually generated by voluntary agreements when they are used on their own.¹¹ Two constraints must be observed, however:

- the voluntary agreements must all relate to homogeneous variables relevant for organising transfers; and
- agreed targets must be monitored and enforced by public authorities with the same vigour as for standard TP schemes.

11. See OECD (1999), *Voluntary Approaches for Environmental Policy: An Assessment*.

In a scenario of this kind, the credit approach is the most suitable although it does not guarantee a containment of emissions or abstractions within an overall cap. Under such a system, a company can obtain transferable credits if its performance is better than required under the agreement, while if its performance falls short of the requirements it has to make up the shortfall by purchasing credits. This combination can help to solve the problem of developing sanctions for failing to meet performance objectives in voluntary agreements, at least with respect to commitments expressed in homogeneous quantities (e.g. the emission of different gases).

Coupling transferable permits and voluntary agreements can also help to overcome the difficulties of the initial allocation of permits in quota systems and the determination of credits. If voluntary agreements are negotiated in a framework common to all companies -- thus avoiding arbitrary discrimination and observing the principle of equality before the law -- they can facilitate acceptance of the division of efforts between concerned parties. Rules specifying environmental requirements and quota allotment would still have to be provided for companies not wishing or unable to enter into such agreements.

1.4 Means of application

Box 5. Availability and access to information

Transferable permits presuppose the formulation of quantified objectives, limits or constraints and the possibility of transferring these from one point in space or time to another. One prerequisite for TP systems to function properly is that the permit holders and the administrative authority in charge should both have reliable and precise information about the environmental performances obtained and the permits held by each agent. At least three types of operation may be needed to ensure this:

- systems of direct monitoring or the collection of performance data have to be organised, with responsibility being assigned either to the permit users (self-monitoring) or to third parties. An intermediate solution might be to combine self-monitoring with certification of data authenticity by approved agencies.
- information about actual performance (emissions or abstractions) and the permit transfers that are made should be sent in an appropriate form to a supervisory authority or policing body.
- accounts of actual performance, as well as permit flows and stocks, have to be kept and updated. It is important that the information contained in these accounts be kept in the public domain to ensure that the programme has credibility in the eyes of both participants and the general public.

1.4.1 Compliance monitoring and enforcement

If the information systems are efficient, checking that the quantities that are emitted or abstracted comply with permit authorisations is a formality. However, it still requires a reliable system for recording transfers. Monitoring TPs which have a baseline defined in unit values presents an additional information requirement, as the authorities need information not only about actual emission rates, but also more generally about the level of activity of the source (as final emission or abstraction rights are calculated on the basis of unit values and an indicator of economic activity).

Like any other policy instrument, a system of transferable permits has to be credible to work. It is credible only if non-complying parties are liable for sanctions that will deter them from deliberately breaking compliance. A variety of sanctions can be imposed: automatic reduction of the permits allocated for the next period; payment of penalties; forbidding future participation in transfers; obligation to finance rehabilitation activities; temporary cessation of activity; or legal proceedings with parties found guilty liable to fines or terms of imprisonment. These sanctions may be applied separately or in combination with one another. Since the rationale of a permit transfer programme is usually economic, sanctions should be

primarily of a financial rather than a penal nature; the former are much more flexible and easy to apply by an administrative authority than the latter. However, the application of sanctions must be credible and must therefore take place automatically, without a need to begin legal proceedings beforehand and without allowing for discretionary implementation by an administrative authority.

The level of penalties to be set will depend on the scheme's objectives. Where strict compliance is required, the penalties have to be dissuasive and scaled according to the probability of non-attainment detection. Where the authorities are also anxious to ensure that excessive costs are not imposed on companies, the penalties can be more economic in thrust, as described in Section 1.3.4.

1.4.2 Encouraging participation and ensuring transferable permit schemes run smoothly

Agents will only be willing to participate in transfers if they have confidence in the transaction rules, and believe that they will not be placed at a disadvantage because they are participating and thus making their potential actions publicly known. It is thus essential to ensure observance of the rules by all agents, including the government, and stability of the rules so that the system can function properly.

Predictability of permit allocation is also essential. In programmes where allocations are periodically adjusted, it is vital that future permits are not determined on the basis of criteria dependent on previous abatement performance. Otherwise, sources may be tempted to distort their current abatement levels in order to maximise their future allocation of permits.

In order to ensure the smooth functioning of transfers, to monitor the risks of undue market power, identify possible obstacles to transfers, oversee the operations of trading exchanges, etc., the permit transfer programme should be supervised by an independent administrative authority.

2. ASSESSING THE RELEVANCE OF USING TRANSFERABLE PERMITS

To assess the relevance of choosing a transferable permit system designed to achieve environmental goals, consideration must be given to a number of questions regarding the:

- nature of the environmental or resource management problem to be addressed;
- objectives pursued by those formulating the public policy;
- institutional context in which the programme will be set; and
- the economic circumstances that might either prevent the successful deployment of the programme or enhance its effectiveness as an instrument.

2.1 The nature of the problem

The assessment can be based on questions about the quantifiable attributes of the objective and the regulatory framework affecting the agents (polluting firms, fishermen, etc.), as well as the environmental acceptability of the spatial and temporal flexibility of the system. It is generally only the environmental problems that can be expressed clearly in quantifiable terms, and related directly to quantifiable variables under the control of economic agents (e.g. quantities of emissions, abstractions of resources or inputs used in production), that will be suitable for addressing under a transferable permit scheme. This raises the following questions:

- Is the problem caused by quantitative imbalances?
- Is it possible to identify quantitative thresholds which can be measured or reliably estimated and which, if complied with, would ensure an improvement in environmental quality?
- Are the quantitative variables in question directly and specifically related to the variables under the control of economic agents?

In the case of multiple pollutants or simultaneous abstraction of different resources, it is important to determine whether environmentally valid equivalences can be defined between the core components (e.g. between different fish species, or different airborne acidic compounds or different greenhouse gases). If so, it will be easier to establish a system that allocates permits on the basis of an aggregated pressure index and that offers greater possibilities for transfers by avoiding separate management systems for the different components.

It is only environmental problems where the impacts depend loosely, if at all, on the spatial location or the time frame of emissions or abstractions that can be properly addressed under a TP system. To allow transfers to be made freely within a given geographical area, the environmental impacts at different locations must be considered to be at least equivalent if not identical. The following questions should therefore be raised in deciding whether a TP scheme is suitable given the nature of the problem:

- Is the environmental damage or the resource to be managed specific to a given location?
- On what time-scale does the problem present itself?
- Are the causes (emissions, abstractions, uses) and harmful impacts concentrated in the same area and the same period, or are there delayed, cumulative effects, with the damage occurring in different areas from where the harmful activities are performed?
- If it is not possible to accept that the impacts at different locations are treated as directly equivalent, are there any viable practical solutions such as:
 - breaking down the area covered into individual zones within which transfers can be made freely and between which transfers can be made based on offset coefficients;¹² or
 - combining the TP system with other policy instruments aimed at meeting the public health objectives or avoiding local concentration of pollutants?¹³

Given these considerations, transferable permits are generally seen as particularly appropriate for addressing problems of cumulative air pollution dispersed over a large area. TPs can be far less readily used to address problems such as water pollution or noise abatement which are more heavily dependent on local circumstances and which have a marked tendency to be concentrated. There are however still some applications that are possible in both of these areas, e.g. aircraft noise and the distribution of maximum abstraction authorisations for water tables.

2.2 The existing institutional context

The main question to be answered is whether the institutional context already in place is capable of accommodating a transferable permit programme (i.e. by allowing the latter to deploy its intrinsic rationale of flexibility without major restrictions), or whether that context is fundamentally unsuited to the use of TP schemes. In the former case, the transferable permit system could be seen as simply an extension of the existing framework, without fundamentally changing its nature, but still increasing its economic performance. In the latter, the decision would have to be taken whether to put in place a special and entirely new regime for the problem to be addressed through transferable permits, or whether to completely reform the existing system to adapt it to the new requirements. The relative attractiveness of these options will depend on whether the authorities are addressing an environmental problem that has already been addressed in the current administrative and regulatory framework, or whether the problem is a new one from a public policy standpoint. The various options available are summarised in the table below and illustrated by examples, some of which are genuine and others virtual:

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12. With such coefficients, for instance 1 to 1.5, it is necessary for an agent to buy a permit of emitting 1.5 in area *i* to be allowed an additional emission of 1 in area *j*.
 13. For instance, TPs addressing long distance, diffused pollution can be combined with a classic command and control regulation aiming at protecting local populations against health hazards and local environmental impacts. In that case the flexibility brought by TPs can be used only when local requirements are met.

Table 2. Options for the introduction of transferable permits

<i>Environmental Problem</i> <i>Institutional Framework</i>	Already covered	New
Extension of existing framework and/or allowing for greater flexibility	<i>Examples:</i> 'bubbles' for air pollution from an industrial complex; 'averaging' of energy consumption requirements over a range of products	<i>Example:</i> extension of the application of BATs and the Integrated Pollution Prevention and Control (IPPC) EU directive to the regulation of greenhouse gases, which may leave only limited margin for the use of TPs
New and separate programme for transferable permits, retaining existing framework	<i>Example:</i> introduction of the Acid Rain programme in the US in addition to local regulations designed to curb SO ₂ emissions	<i>Example:</i> Introduction of a separate programme of transferable quotas for carbon emissions not covered by the EU directive on IPPC
General regulatory reform to adjust the institutional framework to accommodate TP schemes	<i>Example:</i> Replacement of a standard regulatory control policy by the RECLAIM programme of transferable permits in the Los Angeles district	<i>Example:</i> General policy of developing transferable permit systems in various areas of environmental protection, like the policy of the EPA in the US

The established institutional and regulatory systems for environmental problems have been built on concepts which are far removed from those underlying transferable permit schemes. As such, it will often be preferable for efficiency reasons to consider a separate system where possible for the TPs, rather than trying to fit the new instrument into the existing regulations and procedures. Even where separate systems are developed, the resources and opportunities embedded in general public law, fiscal rules and information resources already provided by existing public bodies should be drawn upon where possible. At the same time, the introduction of some TP schemes can also be used to improve the economic efficiency of existing regulatory approaches by introducing a degree of flexibility even if, by doing so, the compromises that must be made do not allow the instrument to achieve its full potential. Transferable permits can thus be used to improve existing arrangements by making them more flexible, or to put in place a new system to promote the more widespread use of transfers of permits.

2.3 The economic circumstances

From an economic standpoint, transferable permits are particularly suited to certain types of circumstances. The appropriate economic circumstances are discussed below.

- **Transaction and administrative costs.** These consist of all the costs entailed in operating the system, both for the administration and for agents: application processing and authorisation, partner searches, negotiating, monitoring and recording information, inspection, policing and fraud control. In order to develop commercial trading, or even the creation of a genuine market for permits, care must be taken to ensure that there is a sufficient number of potential participants to generate competition, reduce transaction costs and enable normal market institutions, such as brokers, to emerge. At the same time, sharing permits between a large number of small-size participants who individually would only be allocated a small number of permits could result in excessively high transaction costs, including

monitoring and enforcement costs, compared with the expected benefits of the transfers.¹⁴ In such a case, it might be preferable to use another instrument, such as taxes. When the main objective is to carry out internal transfers, the central issue is that of the minimum size of activities of the agents concerned, with a size that must be large enough to have prospects for securing flexibility in the transfer of permits between different sources controlled by the same firm.

- ***Data availability regarding the sensitivity of environmental damage costs and pollution abatement costs relative to the stringency of the desired goal.*** If there is great uncertainty about abatement costs, the fear of imposing excessive costs on agents may lead policy-makers to use taxation or another instrument rather than a quantitative rationing (e.g. transferable permits), or at least a combination of the two, as explained in Section 1.3.4.
- ***The diversity of the technological or economic conditions experienced by the agents.*** The greater the disparity of conditions experienced by agents, the greater the potential gains from using an economic instrument like a transferable permits. It is therefore extremely helpful to be able to determine beforehand the main parameters regarding the agents who are likely to participate in the programme: the vintages of companies' plant and equipment, corporate size and financial standing, sensitivity to site-specific conditions, variety and possibilities for expansion of means of reducing emissions or resource abstractions, and cost differentials if these can be estimated.
- ***The risks of undue market power.*** In contexts where the potential supply of permits will be very restricted or concentrated in the hands of a limited number of agents, the effects of market power may start to become apparent, particularly where the product market itself is oligopolistic. Instruments such as taxes or non-transferable quotas may be preferable in some such cases to avoid strategic abuse through holding of transferable permits. However, there are also other ways to reduce this problem, for example by ensuring that the initial allocation guarantees access by all participants to a normal supply of permits and, furthermore, by endeavouring to put in place a system of transferable permits which cuts across sectoral boundaries. Brokers and exchanges may then play a key role in overcoming the mistrust of agents from one sector towards unfamiliar trade partners coming from other sectors.
- ***The impact on competitiveness.*** The impact on competition depends both on the stringency of the environmental objective and the rule for initial allocation, with both variables having a large impact on the income of participants and their financial means for future development. The situation is also different when looking at competition between participants and non-participants to the programme, or competition among participants. As regards competition among participants, auctioning may be the most straightforward equitable approach, but it can severely alter competition with non-participants. Of all policy instruments, transferable permits allocated free of charge offer the least risk of creating problems with regard to the competitiveness of firms exposed to competition from other firms not covered by the same environmental objectives and the same instruments. TPs allow the agents with the highest abatement costs to benefit, through transfers, from the lower costs enjoyed by other agents, while permits with a free initial allocation minimise the financial burden on them. This does not necessarily mean that other rules of initial allocation will generate huge economic distortions. It depends on the rules of access to permits for new entrants and new investments. Whatever the initial allocation (auctioning or free distribution), the equilibrium on the product market should not be altered in competitive conditions, since using permits to cover emissions involves an opportunity cost that is the same for every firm. If the rules imposed on new entrants or investors are similar from one sector or country to another, and if the capital market runs with liquidity, the initial allocation rule will not distort investment flows either. Thus even for domestic regimes addressing local and regional issues that are encountered in a number of countries, a problem of harmonisation of national rules of

14. Sharing permits between mobile sources such as cars may be an illustration of such a situation.

the game will be raised with respect to the treatment of new investment. Nevertheless, unequal stringency of environmental objectives across competing sectors or types of firms may generate more distortion for competition than the choice of instruments to meet a given objective that is applied across contexts.

2.4 Incentive taxes, financial mechanisms or tradable permits?

Economic instruments embrace different sorts of instruments all based on changing the economic context (price of relative opportunities) of the regulated agents. Economic instruments used for environmental protection include subsidies, effluent charges, eco-taxes on products, abstraction duties, deposit-refund systems and transferable permits.

Box 6. Three options for using economic instruments for environmental protection and natural resource management

There are three main possibilities for the use of economic instruments in environmental protection and the management of natural resources:

- **Incentive taxes** which, by correcting prices, are designed to modify the use of certain inputs or the emission of certain pollutants. To be effective, the tax basis must be as close as possible to the behaviour responsible for the environmental damage (e.g. a tax on pollutant emissions that are rigorously monitored will be better than a flat-rate tax or a tax on inputs).
- A **financial mechanism that combines taxes or charges that will be paid into a special fund** designed to finance all or part of the investment and operating costs of an environmental improvement or resource management programme. As with regulatory instruments, the economic efficiency of this mechanism will mainly depend on the criteria used to choose projects for financing and the quality of the technical and economic information available to the organisation (agency, administration, consortium) managing the system.*
- A **transferable permit system** based on the introduction of quantified constraints and the development of a new market. In this case, the economic efficiency is derived from the regulated agents taking the initiative to choose between abatement actions or transfers in order to minimise their costs.

* The water agencies in France and the DSD waste recycling system in Germany are examples of how such mechanisms work. A distinction must be made between charges (requited payment for a service) and taxes (unrequited payments). Earmarking taxes is a well-debated issue [see OECD (1997), *Environmental Taxes and Green Tax Reform*].

From an economic perspective, there are three main options for the use of economic instruments: incentive taxes, financial mechanisms that combine taxes or charges with payments into a fund for environmental improvement, and transferable permit schemes (see Box 6). What criteria might be used to choose between these three options? In economic terms, the best choice depends on information structure, incentives, organisational costs and redistribution. The criteria and arguments to be considered in such a choice are as follows:

- **Minimising the welfare costs of a poor calibration of quantified limits and incentive taxes under uncertainty.** If there is uncertainty about the cost of pollution abatement, it may be advisable to minimise the overall cost to the community of a potentially wrong assessment of the values used by the authorities to calibrate the instrument. The optimum choice of instrument therefore depends on estimates which, despite uncertainty, can be made by experts and the parties involved with regard to the two types of cost (damage and abatement) based on the level of effort. If it is expected that the costs of pollution abatement will increase faster than the environmental damage costs, it would be better to use an incentive tax which sets a maximum value that agents would have to pay for abating their emissions or abstractions. In cases where the environmental damage rises steeply in relation to the level of pollution

emitted, or if there are major step increases or thresholds in the severity of the damage caused, it is best to minimise the risk of surpassing the targeted environmental quality. In such cases, it may be best to introduce a quantity limit on the activities or effects that contribute to the environmental damage, which could work well with the introduction of transferable permits.

- ***Securing environmental performance.*** If the authorities have a poor understanding of how agents will respond to prices, but have a clearer idea of the physical performance required, the regulatory system should be built around the safest component, namely the physical performance targeted. Again, this can pave the way towards use of a transferable permit scheme. The nature of the environmental or resource problem will also matter. Thus, it may be difficult to address specific local problems with national taxes, while regional or local TP systems may be more relevant.
- ***Assessing the ability to use existing services and capabilities.*** In terms of minimising organisational and transaction costs, it is important to determine whether existing departments (e.g. the tax authorities) would be able to assist in implementing the chosen instrument, or whether a new administration would have to be put in place. The same applies to the monitoring of the instrument, as the technical basis for the instrument (emissions, inputs, equipment, etc.) must be able to be measured or estimated reliably.
- ***Taking into account the sensitivity of the agents to different (price versus quantity) signals.*** The competitive structure in the regulated sector should also have an impact on the instrument choice. Taxes are recommended particularly if agents are sensitive to prices; while, if the industry has an oligopolistic structure and the demand elasticity for products relative to price is low, it might be better to use non-transferable administrative constraints (e.g. a requirement to reduce emissions by $x\%$) to avoid strategic distortions.
- ***Taking into account the likelihood of agents developing market transactions in the regulated field.*** For various reasons (cultural, traditional, public image, etc.), external market transactions are not always accepted as an appropriate regulatory tool for all types of environmental problems. As such, there is no point setting up a transferable permit scheme in a context where the regulated agents will not make use of transaction opportunities, even if such a scheme would be economically efficient under proper use.
- ***Considering the potential for achieving ecological tax reform.*** Both auctioned transferable permits and environmental taxes allow for fiscal reforms. The revenues from these schemes can be recycled in such a way as to reduce economic distortions and social unbalances, or to pursue particular distributive goals. This potential should be considered before deciding which type of instrument to use. It is the net economic impact of the instruments – with or without fiscal adjustments – that should be compared.

- *Assessing the distributive impacts.* Although theoretically the two instruments (taxes and transferable permits) are both compatible with a full range of distributive options, there are implicit links between each instrument and particular distributive strategies. First, under a standard incentive tax arrangement, the financial levy on agents can both have the desired incentive effect and generate a new resource that can improve the finances of the State or local authorities (see above). By contrast, in a standard transferable permit arrangement, emission reduction credits or individual permit quotas are often given to agents free of charge. It is for this reason that firms often perceive transferable permits as a means of avoiding taxes, while administrations may see them as an instrument that will deny them revenue from a potential fiscal source. Secondly, according to the structure of markets and price elasticities of demand for upstream and downstream goods, agents participating in TP schemes may or may not be able to pass on the additional costs of the scheme to other agents (i.e. suppliers or consumers). A complementary tax approach can allow public authorities to take these potential income effects into account by offering compensation to agents who will heavily bear the cost of the environmental policy in order to avoid unwanted income transfers from one category of agent to another.

3. STRATEGIC DIRECTIONS FOR THE DESIGN OF TRANSFERABLE PERMIT SCHEMES

Once the decision has been taken to use a transferable permit scheme, the precise design of the instrument should consider several key strategic issues, as outlined in this section.

3.1 Ensure the legal and economic security of transferable permits

Guaranteeing a high degree of security for transferable permits encourages agents to take part in transfers and helps to secure the expected gains in terms of economic efficiency. Two main points can be stressed:

- enforcement systems should include penalties for non-compliance such that non-compliance is a higher cost option than complying through the purchase of permits; and
- foresight and stability about the rules can help to facilitate market development and achievement of the economic potential of the instrument (i.e. reducing the costs of environmental policy).

It is important to avoid sudden changes in administrative rules, especially when they might jeopardise the investments made previously or challenge the value of the permits. It is therefore recommended that a stable framework and rules of the game be maintained to prevent temporal inconsistencies in the choices made by regulated agents.

Likewise, efforts should be made to avoid creating a rigid system of transferable permits at a time when new scientific information, new technological options, or unforeseen development policies might prompt the competent authorities to seek to adapt the programme.¹⁵ It is thus important to provide periodic revisions of the ground rules. However, in order to allay fears that these revisions might lead to arbitrary changes, the timetable, procedures and criteria for revisions should be set out in advance.

A satisfactory compromise that reconciles permit security with programme adaptability may be secured as follows:

- ***Build up the means of measuring or estimating the physical phenomena*** targeted by the permits (e.g. SO₂ emissions from point sources, fish catches by fishing vessels, etc.) using, for example, sensors, input or equipment accounting, tables of values for technical processes, etc.
- ***Set an appropriate legal status for the transferable permits***, which otherwise might be purely administrative authorisations that could be unilaterally revised by the competent authority without ever attaining the status of property rights for the regulated agents. Their

15. For example, by establishing new objectives, shortening the timetable for its introduction, revising the levels of caps or minima or extending the sectoral or geographical scope of the permits.

status should be clarified from the outset, particularly regarding the rules applicable to firm accounts and fiscal and tariff regulations.

- *Establish credible financial penalties and sanctions* applicable to different levels of non-attainment. These should be based on economic and legal analysis of the effects of non-attainment on the environmental problem in question. The system of penalties and sanctions should distinguish between outright fraud or deliberate violation of the rules, and moderate or accidental overshooting of permit limits. The former should carry penalties scaled according to the degree of likelihood of detection. The latter should be subject to sanctions scaled according to the maximum acceptable costs of achieving the policy goals, as judged by the competent authority. This balance will be determined by the sensitivity of the environment to overshooting the limit values or quotas, and will need to be defined differently for different environmental problems.
- *Guarantee stable rules for the initial allocation of permits and for system operation, at least over the medium term.* In the case of environmental problems exposed to erratic fluctuations, an approach should be used whereby agents are allocated shares in a total cap, rather than absolute quotas, with the shares valid for a given annual or multi-annual period.
- *Specify beforehand the conditions under which the rules of the game may be changed* in terms of the timetable, caps and baselines, rules for the allocation of individual quotas, and the extension of the programme to new categories of agents or pollutants.

3.2 Limit transaction costs, avoid obstacles to transfers and set up institutions to encourage transfers

If one of the aims is to facilitate transfers between individual economic agents, a system should be put in place which allows a wide variety of opportunities for trades and which operates in a fluid and competitive way. Intermediaries such as brokers can play a positive role in some markets from this standpoint, although brokers will only play a regular role if there are a sufficient volume of transfers. The authorities should also monitor the relationship between the average price of a transfer and average transaction costs, in that too many small transactions could generate costs that exceed the efficiency gains secured by the scheme, even if use is made of modern electronic facilities.¹⁶ A system that would involve several hundred operators at a regional or national level might be appropriate, but even schemes involving a smaller number of large participants can yield good results.

If possible, a system requiring prior authorisation for each transfer should be avoided as experience indicates that this type of procedure can be a strong deterrent to transfers. As such, the principle of prior authorisation should only be applied when it is particularly needed to secure the environmental goals (e.g. approaches that make use of models that simulate flows of pollutant emission dispersal and final impacts at the local level in determining the environmental acceptability of transfers). For credits systems, the acknowledgement of credits will of course require involvement by regulatory bodies as credits cannot be determined in a mechanical manner from a clear-cut, previously defined baseline and straightforward criteria. But once credits are assigned, additional authorisation procedures should be avoided unless there are specific reasons to introduce them.

16. Some transaction costs are not paid directly by those undertaking the transaction, but instead by the competent authorities (except in cases where the administrative costs are passed on in the form of administrative charges).

The creation or involvement of trading exchanges should be encouraged to facilitate fair access to the market by all participants, ensure the broadest possible interaction between supply and demand, and to thereby overcome any asymmetries in information held by the agents. Exchanges and other market intermediaries can also reduce search and trading costs and allow information to be made public on the market price of permits. The availability of public information on prices is an essential element of the co-ordination performance expected of the market. When the volume of transactions is too small to justify the fixed costs of a regular exchange, exchange-type mechanisms can still be used to generate transactions with the efficiency benefits of a market. In some cases¹⁷, authorities may choose to grant a monopoly on transactions to a single mechanism for matching supply and demand, or to concentrate the negotiation of transfers within limited periods of time, in order to maintain the economic effectiveness of the system. In most cases, however, it will be better to allow for the existence of several transfer mechanisms, in order to ensure continuous possibilities for transfers, provided that they can be made in competitive and transparent conditions.

When determining the size of the area to be covered by the TP system, it is important to ensure that it will include a sufficient number of potential participants. If the environmental impact depends on the specific location of pollutant emissions or resource abstractions, there will generally be a trade-off between seeking to reduce total abatement costs and ensuring certainty regarding the environmental performance achieved in each location. As such, defining geographical limits of possible transfers should be based on a balance between the economic and the ecological considerations. In a multi-goods context (different types of pollutant, different species of fish), authorities should try to find equivalences that will enable these different elements to be incorporated into a single transfer scheme. This will increase transfer opportunities and extend the range of solutions available to agents, while reducing transaction costs. If suitable equivalences cannot be defined, parallel TP markets can be used.

3.3 Correct distortions

It is the potential for transferring permits that makes it possible for parties involved in the TP scheme to reduce their costs of compliance. Transferable permits also bring benefits to the community, so long as the cost reductions do not have the effect of increasing environmental damage or, alternatively, the costs to third parties (i.e. local populations, consumers, taxpayers, or other producers) through distortions (see Box 7). Policy-makers should thus be certain that a TP scheme will not have these negative repercussions before introducing the scheme and, if need be, make the necessary adjustments. If the distortions are significant, there are two potential remedies that can be used: the harmonisation of tax regimes and the review of arbitrary exemptions enjoyed by certain agents; or the introduction of territorial or sectoral restrictions on transfers with regard to the sources of distortion which have been identified.

17. For example when environmental constraints are such that transfers envisaged at one time will depend on earlier transfers. Optimising transfers in such a case would need the widest possible simultaneous confrontation between supply and demand.

Box 7. Potential distortions generated by transferable permit schemes

In general, there are two types of potential distortions that should be avoided in designing TP schemes:

- **An increase in total environmental damage** due to the fact that the impacts of emissions or abstractions at different locations are not equivalent. This type of mismatch can be avoided either by establishing geographical limits to transfers, and/or through the use of offset ratios for inter-area transfers.
- **An unwanted direction in the transfers** because all the parties involved will not necessarily receive the same tax treatment for goods (e.g. excise taxes on energy inputs). The differences in tax treatment may relate to the status of operators in the same sector (large-scale company-operated versus small-scale owner-operated fishing, for example) or in different sectors (water use by agriculture, industry or local communities; energy tax exemptions for some activities and not for others). In situations where some agents receive a more favourable tax treatment, but have higher abatement costs, transfers may spontaneously go in a direction opposite to that which would lead to increased collective efficiency – i.e. agents with higher abatement costs (but lower taxes) may sell their permits to those with lower abatement costs. In such a case, the financial cost savings obtained by the parties concerned through the transfers will result in a loss of tax revenue for the State, which will eventually be borne by the general population or taxpayers. Furthermore, consumers will have to pay more for the products concerned than if the transfers had gone the right way. The risk of distortion will be greater with interregional transfers between parties under

3.4 Encourage temporal flexibility where appropriate

The quantitative constraints applied to transferable permits are generally introduced in increasingly stringent stages several years apart. Without temporal flexibility, this approach can cause arbitrary and costly jolts to the economy. The possibility of carrying forward permits valid for a given time period to a later period in which more severe constraints will apply (banking) in effect encourages early cutbacks in emissions and enables operators to optimise their efforts over the various periods. The outcome may be a more rapid environmental improvement than that actually dictated by the constraints, as well as a minimisation of total costs. Obviously, this type of flexibility should be allowed only in situations where there is sufficient confidence that there will be no threat to the environmental and resource management goals due to temporal peaks in pollution or abstraction. The particular circumstances will be essential here: it is clearly more difficult to have this confidence when regulating the population dynamics of harvested living species than for reducing long-range air pollution. In the latter case, the necessary guarantees can be ensured through the appropriate setting of successive constraints.

The main recommendations regarding time management of transferable permits are:

- ensure predictability of the time path of constraints over a sufficient number of years -- in many cases, at least ten years foresight must be allowed, although the appropriate time frame will depend on the type of activity being controlled (i.e. the importance of investments and sunk costs) and the pace of change in relevant technology;
- facilitate forward transactions, or at least do not prevent operators from doing so;
- authorise permit banking when there are no major threats to environmental and natural resource management goals; and
- when activities proceed in multi-annual business cycles, choose emission budgets valid for a period which allows operators the widest margin of timing flexibility.

3.5 Adopt procedures and rules to encourage dynamic efficiency and innovation

The dynamic efficiency of a policy instrument lies in its ability to stimulate technical and organisational innovation to further the goals of the programme, while still maintaining the conditions for efficient resource allocation across the economy. For quota systems, the initial allocation procedure may have an influence in this regard. For credit systems, it is the technological frame of reference that counts.

3.5.1 Quota systems

There are two issues to be considered with respect to the dynamic efficiency of quota systems: the rules of initial allocation to existing facilities, and differences in treatment between existing facilities and new facilities.

Ensuring suitable incentive systems through quota allocation to existing facilities

The free allocation of permits to firms with existing facilities or equipment (e.g. fishing vessels, refineries) will impact on those firms financially only in terms of financing the abatement costs required by their permits. Such an allocation will allow them to make modernisation investments, but is unlikely to give them further incentives to do so. There are several reasons for this limitation. First, if the innovations can eventually be widely disseminated as public goods in their sector of activity, thus reducing the costs of meeting environmental requirements for all agents, their dissemination would lower the value of the permits that the agent owns. The agent's main interest thus lies in innovations from which they alone would benefit. A similar negative feedback might take place if, through innovation, regulated agents contribute to reducing their future assignment of permits. An allocation by auction, on the other hand, would give them a very direct incentive to innovate in order to reduce their per permit held. Yet auction procedures impose a financial outlay that may limit their ability to finance investment in new technologies if the capital market is tight.

Assuming the most favourable context for innovation is a combination of incentives to innovate and ensuring the financial capacity to do so, compromise solutions may be the answer. One potential compromise would be to have a free allocation of a share of the quota allowance (say 50%), with an allocation by auction for the remainder. Another would be to have the all the quotas allocated by auction, but to refund a share of the auction proceeds to the firms according to a criterion that does not affect the incentives for environmental management (e.g. based on the firm's value added).

Preventing negative effects of discrepancies between existing and new facilities

Traditionally, the regulatory requirements for new facilities are more stringent than those for existing facilities. This asymmetry in terms of stringency will be apparent in transferable permit systems governed by a BAT type procedure, and may be exacerbated by requirements for new facilities to purchase on the market all the permits they need to carry out their activity, while existing facilities received a free allocation of permits in the initial allocation. Yet, new facilities using up-to-date technology will generally be less polluting on a unit emissions rate than existing ones, and so will need less permits for any given output. Herein lies a trade-off that needs to be carefully addressed to avoid strongly asymmetrical conditions of competition between the two types of facility. These asymmetric conditions may discourage certain types of investment, and delay the renewal of equipment in the sector. If the market conditions in the sector are considered to be seriously at risk, the danger can be allayed by reducing the differences in conditions between the two types of facility, for example by limiting the share of permits allocated free of charge to existing facilities.

3.5.2 *Credit systems*

The potential to earn transferable credits is a strong incentive to reduce emissions, and hence to seek and use techniques that will allow this. Credit systems therefore encourage dynamic efficiency. However, when the benchmark is defined in absolute terms at the plant level and credits for emission reductions are judged against the theoretical maximum authorised at the time of the programme's introduction, credits will be given for partly fictitious reductions as firms rarely operate at their theoretical maximum production capacity. There will thus be a systematic discrepancy between the average level of actual emissions and the theoretical maximum that is authorised.

A windfall of this kind would have the effect of putting too many emission permits into circulation without encouraging any accompanying innovation. It may therefore be wise to adopt a more restrictive benchmark when allocating credits than the theoretical maximum authorised by the regulations in force. This is a very delicate point, however, in that firms will emphasise that it is only because of their past vigilance and innovation that they have succeeded in polluting less than they were authorised to.

4. DESIGNING AND IMPLEMENTING A TRANSFERABLE PERMIT SCHEME

It is generally easier to get agreement on the design and implementation of policy instruments when there is broad support for the need to tackle the environmental problem. Nevertheless, proposed transferable permit schemes have foundered in several cases before reaching the implementation stage, not necessarily because of intrinsic weaknesses in the proposals, but rather because of difficulties encountered in drawing up the programmes. As such, attention needs to be focussed on the process required to achieve the desired objective, and on the effects on the key balances and trade-offs with regard to programme design. The existence of trade-offs on critical issues may lead to two obstacles: they may meet with the refusal of certain key actors and thus lead to a stalemate; or they may significantly erode the very attributes that make transferable permits attractive for efficiency and distributive motives. Although these considerations are not specific to transferable permits, the following guidelines take them into account.

4.1 Using a transferable permit system as a response to unresolved problems?

In the environmental field, economic efficiency¹⁸ is not a major concern for most of the actors involved in the process of designing policies. These actors pursue a variety of objectives, which are not necessarily compatible, but which will nonetheless determine whether a new policy can be successfully implemented. As a result, formally demonstrating the economic effectiveness of transferable permits will usually not be sufficient on its own to persuade the majority of actors to support the introduction of a TP scheme.

In order to find practical solutions, the parties responsible for the design and introduction of policies need to prepare the groundwork for acceptance of the instrument. While the policy-making process will vary by country, policy-makers should generally consider the way in which transferable permits can help to meet the main expectations of the actors involved in the policy-making process. In other words, they may view the design of a new programme of transferable permits both as a means of solving some of the problems faced by actors and also achieving the general aims of the environmental programme. From this standpoint, the policy process requires both a positive impulse (a need, a will, a project) and to ensure that constraints and obstacles are maintained at a reasonable level in order to succeed. Those responsible for setting up the new programme may wish to act either directly or indirectly on both types of conditions, or at least take them into account in their assessment of the situation. Thus, they should consider:

1. *What is the level of awareness among policy-makers of the existence of problems which are not solved by the regulatory system in place, or are involuntarily caused by it?*
2. *Who are the key actors in the existing system that should become aware that they are already suffering or will suffer from the existence of these unresolved problems?*

18. In practice, the concept of economic efficiency boils down to two ideas: to act in such a way that total expenditure (not only that of government and industry) remains proportionate to the advantages it procures; to seek instruments that minimise the total cost to society (producers, consumers, government) in achieving a given environmental objective.

3. *Are there realistic opportunities for solving these problems by way of minor amendments and accommodations to the regulatory system in place?*
4. *To what extent can transferable permits contribute to solving the problems?*
5. *What coalitions are emerging in favour of or against different policy changes? For example, is a multiparty (e.g. business, environmental NGOs) coalition emerging in favour of transferable permits?*
6. *Which design of the TP system is most likely to prevent the formation of a blocking coalition or to neutralise it?*
7. *What are the existing principles, concepts and pre-established institutional forms or arrangements that could be regarded as background or precedents for introducing transferable permits?*
8. *To what extent is the new instrument in line with general trends in social evolution, particularly in terms of relations between the State and civil society and the manner of approaching environmental issues?*

4.2 Tailoring the approach to the implementation strategy

There are two very different strategies available for the introduction of transferable permits:

- (a) to improve the economic efficiency of existing policies without disrupting the institutional framework in place; or
- (b) to design a framework specifically tailored to the operation of the TP scheme either by developing a programme that is separate from the routine activities of the environment administration, or by reforming the entire regulatory framework and its conceptual basis.

These strategies call for approaches to the institutional framework that are diametrically opposed. Strategy (a) will first require the determination of which components of the framework could be used to support instruments to increase flexibility, such as:

- measurement and information networks for the emissions or abstractions in question;
- definition of limit-values that are related to measurable performance (i.e. that are not technology-specific);
- an autonomous regulatory agency, and well-equipped and efficient enforcement services;
- legal principles or forms that could serve as useful precedents for managing the introduction of permit transfers, notably regarding the legal status of the permits;¹⁹
- the existence of an administrative organisation which could provide a suitable geographical framework for the introduction of flexibility in transfers; and

19. Particular attention should be paid to recent legal and administrative innovations, not only in environmental policy but also relating to public regulation in general (e.g. challenging public service monopolies; creation of new independent authorities to regulate new markets, etc.).

- the existence of arrangements that to some extent already reflect the rationale of transferable permits, such as comprehensive environmental requirements for an economic sector or an industrial site (bubbles), or arrangements based on the transfer of obligations (e.g. the schemes introduced in France and Germany for recycling packaging waste).

Strategy (b), on the other hand, should above all seek to identify the elements (e.g. rules, procedures and concepts) in the existing arrangements that ought to be avoided in the new system. It should be understood in the context that it is important to avoid both making the new system subject to existing -- but inappropriate -- rules and procedures; and introducing defects into the new system that are similar to those observed in the current administrative system.²⁰

4.3 Facilitating an experimental approach

For many countries, transferable permits remain an instrument of intellectual curiosity unenlightened by any practical experience with them. As such, various actors will need to gain some practical experience with them, and programmes at the regional or local level designed to encourage this should be facilitated. One solution would be to allow, or even encourage, the deployment of programmes of limited size that are nonetheless valid applications of the instrument at either a local level (industrial basin, fishing zone, etc.) or a sectoral level (oil refining, etc.). These programmes could aim at acquiring initial experience and testing various design principles with a view to launching more ambitious programmes later. To do so, however, a number of regulatory or institutional obstacles will have to be removed, usually by making provision for exemptions in the general regulatory system. The design of such experimental programmes would have to be such that they could provide information on the applicability of the schemes.²¹

On the basis of these experiments, the competent authorities could establish a general institutional framework prescribing the basic rules and procedures for transferable permit programmes and a range of approved schemes.²² These general guidance would benefit from periodic revision based on experience and increasing familiarity of the regulated agents with the schemes.

Even if such programmes are deemed premature in some countries, the authorities might nonetheless wish to prepare for the future by introducing changes to bring existing regulations more in line with the type of regulatory system needed for transferable permits. Three steps would be of critical importance in this respect:

- a shift from regulations focused on technical processes (BAT, etc.) to the formulation of physical limits on flows (emissions, abstractions, deposits) that are more closely tied to the environmental objectives *per se* and that offer greater flexibility in the choice of means of achieving these objectives;
- a shift from individual environmental requirements expressed in terms of *concentrations* and *unit values* to requirements expressed as *absolute values* (ceilings or quotas by period); and

20. For example, stringent regulations focussed on technologies and that are based on a system of prior authorisation are not well suited to the widespread use of transferable permits.

21. Thus, it may be more difficult to launch a significant experimental approach to cap and trade systems because of the minimum scale required.

22. Such as those devised by the US Environmental Protection Agency in the late 1980s (bubbles, offset, netting, banking) and more recently for the Acid Rain Programme (SO₂ allowances trading) or the NOx Budget Program (NOx allowances trading).

- a shift from the management of pollution abatement by administrative departments attached to a central or local administration towards regulation by an independent administrative authority whose long-term mission would not only be to ensure compliance with regulations but also to keep an eye on the development of transfer activity in order to get the greatest benefit from the instrument and ensure fair transactions.