



EUROPEAN PARLIAMENT
DIRECTORATE-GENERAL
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RESEARCH AND DOCUMENTATION PAPERS

ECONOMIC AND FISCAL INCENTIVES AS A MEANS OF ACHIEVING ENVIRONMENTAL POLICY OBJECTIVES

Hearing of the Committee on the
Environment, Public Health and
Consumer Protection

21 / 22 June 1990 in Brussels

Series: Environment,
Public Health and
Consumer Protection No

16

October 1990

100

100



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ES	available
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IT	available
NL	available
PT	available

Cataloguing data can be found at the end of this publication.

Luxembourg: European Parliament

ISBN: 0

Catalogue number: 0

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Printed in Luxembourg

Foreword

A hearing was held in Brussels on 21 and 22 June 1990 on the subject of 'Tax and fiscal incentives to promote environmental policy objectives'.

This hearing, organized jointly by the Committee on the Environment, Public Health and Consumer Protection and STOA ('Scientific and Technological Options Assessment' of the European Parliament) and the Institute for European Environmental Policy in Bonn, was intended as preparation for a report on the subject.

In the run-up to the hearing, the Institute for European Environmental Policy was given the task of drawing up a study as a basis for discussion. The study was then revised in the light of the hearing and is now part of the current documentation.

The papers handed in by the experts do not necessarily contain the texts of the spoken contributions, but are, broadly speaking, a record of what was said.

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WELCOME SPEECH BY MR KEN COLLINS,
CHAIRMAN OF THE COMMITTEE ON THE ENVIRONMENT, PUBLIC HEALTH
AND CONSUMER PROTECTION

I would like to welcome everybody to this meeting today.

There is no question, and I think everyone might know, that environment is one of the crucial issues of the European Community and beyond. I think the days when environment was the concern of a few people in the fringes of politics have gone and it is now very much at a safer stage here in the Community and elsewhere in the world. I think it is true probably to say that there is no political leader in the whole western world who has not made a major speech about environment policy. Ten years ago that could not have been the case; five years ago it still wasn't the case, but it most certainly is now. I think that this Parliament and this Committee has done more than its fair share too to make this possible.

We are meeting today, one week before the Ministers will make a pronouncement on the environment next week and some of you may well be aware, and some of you may not, that there has passed into the hands of the Parliament in very recent hours a copy of the declaration that will be proposed to the Ministers next week on the 25 and 26 June. It makes fascinating reading. Because in that declaration that the Ministers are expected to make next week there are one or two interesting commitments which five years ago would have been quite incredible. It is now clear that the Ministers will be asked to agree a thirteen point Charter of Rights on environment and these rights are clearly quite far-reaching and I hope that we see them implemented. The principle is that every citizen of the Community should have basic rights which will benefit the Community and its Member States in the enactment of legislation and in administrative action relating to the environment and there are several points about environmental quality, environmental information and environmental participation. In making this declaration of course the Ministers are not doing anything new as far as this Committee is concerned, or anything revolutionary as far as this Committee is concerned, but it is clear to see that they are gradually beginning to follow us and that is very good. One of the things that we are being asked to agree next week is that in the Council of Ministers there will be majority voting on environmental issues and those of you who have followed the activities of this Committee over the last few years will know that this has been a recurrent theme of primary concern. The democratic deficit that exists in the Community must be filled and as far as we are concerned that means not just majority voting in the Council but it means an enlargement of cooperation procedure and a move towards eventual co-decision making. We hope therefore that when the Ministers do

meet next week that none of them will retreat from this very progressive declaration, but that they will accept it and if they do then they can be sure that they will have the support of the European Parliament.

So far as today is concerned, if we are going to have all this action on environment, if we are going to try and achieve environmental ends, clearly we must turn our minds to the means by which these ends are going to be achieved. And that is the purpose of this hearing. It is not of course a self examination by the Parliament, it is not a question of us preaching to anybody, it is just generally bringing into the open, into public the question of how we are to achieve environmental ends and to that extent therefore I am very happy that we have had the cooperation of so many experts and we have the cooperation of our rapporteur today in bringing together this group.

Now what I would like to do is to repeat my welcome to everybody and I hope that this will be a very successful two days and I'm going to hand over now to Dr Vohrer to introduce the hearing itself. Thank you very much.

Introduction to the subject by Mr Manfred Vohrer, rapporteur.

Ladies and Gentlemen, Colleagues,

First of all, as the rapporteur, I would like to say how pleased I am that a topic on which the European Parliament has taken the initiative has met with so much interest. It is not always the case that the European Parliament takes the initiative and all too often we are constrained merely to react. However, the discussion on economic and fiscal instruments within environmental policy is our own initiative and we are extremely optimistic that this time a reversal of the usual process will prove successful, that is that the Commission will respond to this initiative.

This hearing has to be seen in the context of the inadequacy of the legal instruments in EC environmental policy to date. The experts' contributions will indeed back up the view that the state of the environment in many respects is worse now than before the First Action Programme in 1973. The implementation of measures to protect the environment is inadequate throughout the EC and especially in countries with less effective administrative structures. The integration of environmental policy into other policy areas, as required by Article 130 r of the EEC Treaty, is still totally inadequate. We are still a long way from our primary environmental objective of 'sustainability', i.e. the transition to sustainable economic practices, and the legal instruments are static, expensive and cumbersome. Legal instruments, limit values, rules and bans, as well as flexibility are all lacking. The existing instruments are not responsive to new technological and economic developments. The introduction of the Single Market is an example of an economic development to which we need to find an environmental response.

In view of the prospects described in the report by Mr Ceccini¹, it was not surprising that there is a growing fear of the consequences of economic growth in Europe. The report describes scenarios linking economic growth with a considerable increase of environmental degradation and for this reason it is necessary to put forward an alternative strategy.

The Task Force Report was the Commission's first tentative response to the report by Mr Ceccini. It shows that responding with economic and fiscal measures is the right approach in the environmental sector. In this respect it is important that in Parliament today we are holding a discussion with experts on how to go about forming a more effective environmental policy by introducing economic and fiscal instruments. There is no intention to put forward pipe dreams or to hold an academic seminar. Practical action must result from this discussion and in this sense it is a question of our giving pointers on how to reverse the present trend. When we read that the price of oil has fallen to below \$15 a barrel, the market is giving the wrong signals. It is the task of economic and fiscal policy to make energy more expensive, thus providing incentives for energy saving and making renewable energy sources competitive. A transport system should be created which takes account of the environment and includes environmental costs alongside the traditional transportation costs to the individual carrier. A European transportation cost system should be established which leads to more goods being transported by rail rather than by road and the costs of environmental damage should be charged to the individual carrier throughout Europe.

¹ The Challenge of 1992, May 1988

I have picked out a few instruments as examples; I consider it vital that the amount of time for discussion of instruments should not be cut short. The hearing today is dealing specifically with economic and fiscal instruments because it is not just taxes, contributions, duties and tariffs which need to be discussed but also a broad range of measures, including licences for emissions, liability laws, deposits and the labelling of environmentally friendly products. We should make use of the opportunities and the creativity of our market economy and incorporate them into environmental policy. It is therefore important that Parliament is sending this particular signal to the Commission, i.e. that the Fifth Environmental Action Programme should be characterised to a considerable degree by the use of economic and fiscal instruments.

Finally, may I explain as a Liberal that in my view the market economy is the economic system with the most freedom of choice. However, it has become clear that the market is not capable of sorting everything out. For a century we have been trying to incorporate more social justice into the market economy. This led to us calling our system 'Social market economy' in order to make clear that this was our field of political action and our political priority. If I am supporting an ecological market economy today, it is because the political priority of the coming decades is to transform the market economy so as to provide a response to the ecological challenge. If we take 'sustainability' as our aim, that is an economy which no longer relies on the exploitation of non-renewable resources, but which limits itself to renewable resources, then we need to practise more environmental protection within the market economy as well as on the other hand, practising more market economy within environmental protection. In other words we should adapt all these options, initiatives and entrepreneurial efforts to find the best possible solution for the environment. Economic and fiscal instruments should be the driving force behind such a policy. This should not just be an abstract idea - it is too easy to agree that the 'external costs need to be internalized'.

If such demands are set out in abstract terms, they are more likely to find a consensus. Where they go into practical detail, they become more difficult to implement.

The Dutch government is split over the question of kilometre tax allowances, in other words whether the tax system should provide benefits for car drivers or whether we should change the tax system to give preferential treatment to environmentally friendly means of transport.

I am therefore concerned that this hearing should contribute to the discussion of how fiscal and economic instruments can be used in practice in various policy areas, especially in energy policy, transport, agriculture and waste management, so that we can go beyond general statements and tackle such questions as where action needs to be taken, what has to be done at European level, or indeed what can be achieved at national level, where national laws would damage Europe and where not, and where Europe needs to take action to make use of the advantages created by the Single Market. I was thus extremely pleased that the committee considered this topic to be important enough to make it the subject of a hearing.

I would like to thank everybody who helped with the preparations and all the colleagues who work as co-rapporteurs in the other committees making a broadly-based contribution so that the new environmental policy instruments meet with a consensus from Members of the European Parliament.

**ECONOMIC AND FISCAL INCENTIVES
AS A MEANS OF ACHIEVING
ENVIRONMENTAL POLICY OBJECTIVES**

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Bonn
August 1990

on behalf of the Directorate-General for Research
of the European Parliament

Background paper for the hearing
of the European Parliament
on 21 and 22 June 1990 in Brussels

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INTRODUCTION

The market economy has never enjoyed unlimited freedom in the sense that only the economic interests of individuals have shaped events within them. So-called Manchester liberalism was only ever a theoretical concept or rallying cry in the battle against the market economy.

State intervention in and regulation of, for example, commercial, economic and fiscal law as well as standards of employment protection date from a very early period, albeit in very rudimentary form in today's terms. The establishment of the infrastructure essential to the economy, such as road construction and the provision of education, is another aspect of that intervention. An additional factor, which developed towards the end of the last century, has been the concept of social policy as a responsibility of the modern State.

Within that framework, which has had constantly to adapt to meet its requirements, the economic process proved highly efficient but efficiency brought new problems, in particular serious pollution of the environment. There is therefore an urgent and unavoidable need to provide the market economy with an ecological basis. The main factors which have to be taken into account in establishing that basis form the subject of this paper.

I. ENVIRONMENTAL POLICY AND ECONOMIC DEVELOPMENT

1. The environment as a public asset

Basic facts of the market economy

The coordination of private sector planning and decisions relating to markets and prices has proved efficient in a way that had not been anticipated. Not least on that account, the European Community's policy is guided by fundamental principles of the market economy. It is based on the liberalization of markets, i.e., the free movement of persons, goods, services and capital between the Member States, the basis for which should be established by the end of 1992.

Markets are not omnipotent. However, they only regulate goods which may be acquired privately. The economic interests of all operators on the market are therefore directed almost exclusively towards overcoming shortages of private goods. Where social and regional injustices and public assets are concerned, the market is blind¹.

Central issues of environmental policy

The quality of the environment is largely a public asset. Markets cannot respond to the increasing shortage of this asset. In fact, they are responsible for it. Establishing the conditions which will enable a proportion of productive capacity to be used to maintain the environment as an asset is therefore a political responsibility, and one which cannot be delegated². If these conditions lead to more efficient use of scarce resources, this will also increase long-term economic performance (as well as the quality of the environment).

Four central questions arise here for environmental policy:

- . what environmental quality standards should be sought (defining the objective)?
- . what instruments should be used to achieve the quality objective (choice of methods)?

¹ The Commission's Task Force has been set up partly in response to this. Cf Task Force Report on the Environment and the Internal Market, Brussels 1989.

² This was clearly expressed as long ago as 1848 by the economist John Stuart Mill. In his 'Principles of Political Economy', he writes: 'But is there nothing recognized as property except what has been produced? Is there not the earth itself, its forests and waters, and all other natural riches, above and below the surface? These are all the inheritance of the human race and there must be regulations for the common enjoyment of it. What rights, and under what conditions, a person shall be allowed to exercise control over any portion of this common inheritance cannot be left undecided. No function of government is less optional than the regulation of these things, or more completely involved in the idea of civilized society'.

- . how powerful must the inducement be to achieve the objective (extent of intervention or incentives)?
- . what are the likely effects, on the economy as a whole and on social distribution (conflicting objectives)?

Sustainable development

The ultimate objective of the environmental policy is: 'sustainable development', i.e. a form of prosperity and economic activity which in the long term is in harmony with what planet earth has to 'offer' ecologically³. To achieve this will require a new economic approach and structure.

To do this properly, environmental policy must have some concept of the inherent dynamics of market economies which are not regulated by ecological concerns. On that basis, it must establish its role vis-à-vis the private sector, select its instruments and decide how far it is going to apply them. Basing environmental policy on the market economy therefore means learning from the process of economic development and then specifying the conditions for future development.

³ As proposed by the Brundland Report of the World Commission for the Environment and Development: 'Our Common Future', Greven 1987
W. Beckerman has rightly pointed out in his paper that this concept poses 'numerous difficult philosophical problems'. During the hearing it was stressed by F. Dorow in particular that a precise definition is not the necessary condition for recognizing the need for political action. In many areas the non-sustainability of current economic activity is self-evident.

2. CRITERIA FOR ESTABLISHING ENVIRONMENTAL POLICY OBJECTIVES

The avoidance technique

One of the least demanding methods of determining the qualitative objectives of environmental policy is to use known techniques for limiting emissions (generally accepted rules of technology, state of the art, 'best available technology'). Such methods are widely used. But it is hard to see how nature's tolerance threshold relates to emissions deemed to be technically unavailable. Technical methods can therefore be viewed only as intermediate objectives of environmental policy. (This will be discussed in greater detail below in connection with the policy of setting standards).

Estimating external costs

Another method of determining environmental policy objectives is 'internalizing external effects': calculating the cost of all damage to the environment and charging it to those causing the damage. The assumption today is that if the polluter has to bear all the costs directly, industry is subject to the perfect pricing system from the ecological point of view. The desire for profits would be in harmony with protection of the environment.

There are, however, three basic blemishes on this apparently ideal method. Firstly, it is not possible to put a price on all of nature's assets⁴. For example, it is not immediately apparent how to put a price on the loss of species or variety or of a 'pleasant climate'. And what some people would regard as a loss - for example, the extinction of certain species of snails or wasps, or global warming - may be regarded as a gain by others.

Secondly, although it is quite clearly possible to put a price on many ecological changes (for example, the most recent storm damage) it is not possible to establish a causal chain or the chain would stretch way back into the past.

⁴ F. Dorow provides some practical examples of this from the point of view of the environmental statistician, with particular reference to the development of the environment satellite system in Germany.

Thirdly, even the most conscientious form of internalization cannot guarantee economic behaviour which will prevent the destabilization of ecological systems. Internalization must always be measured in terms of its own successes and is no substitute for efforts to establish ecological objectives.

Analyses of willingness to pay

To go some way towards compensating for these shortcomings, peoples' preferences for quality of the environment compared with other assets are being investigated. Analyses of 'willingness to pay' are intended to assess the willingness of more or less representative sections of the population to pay a price for certain improvements to the environment. This is a means of establishing approximate monetary values for the damage which people suffer from a specific deterioration in the environment. This method has been used to estimate the annual damage caused by deterioration in the environment at approximately 5% of Germany's gross national product⁵.

This figure is roughly five times greater than the damage estimated on a cost basis and is therefore a greater challenge to internalization. However, given the subjective components and the methodological margin of error of this type of analysis, it is not possible to use it as a basis of a form of liability or for the payment of fines. In particular, it is not clear whether the quality objective for which people are prepared to pay is, in ecological terms, satisfactory. Frank Dorow is of the opinion that analyses of willingness to pay tend by their very nature to produce results which are too optimistic.

Sustainability

The weakness of the 'avoidance' philosophy and the shortcomings of the other ways of defining quality objectives call for an additional approach. This was the clear message of the Brundtland report. The report defines the objective of environmental policy as a standard to be applied to industry or industrial operators, namely the sustainability or durability of management of

⁵ Lutz Wicke, Die ökologischen Milliarden (the ecological billions), Munich (Kösel), 1986.

In his paper F. Dorow points to the 'defensive costs' estimated by Christian Leipert which amount to upwards of 10% of national product.

resources and economic development. This postulates a condition of the economic process which will have to be constantly monitored and redefined as part of an ecological and socio-economic process of finding new solutions.

Just as industry has previously adapted automatically and spontaneously to the laws of nature, to climate or supplies of raw materials, so it will now have to adapt to the conditions of sustainability on 'Spaceship Earth' (Boulding). And just as the existing restrictions have not prevented economic development, so the political restriction which now has to be introduced will not prevent social and economic development either.

These methods for determining environment policy objectives must in term satisfy the criterion of durability. The avoidance principle in line with the state of the art, the level of the external costs that are determined or even the quality of the environment resulting from the willingness to pay may only incidentally satisfy the criterion of durability. Nevertheless, internalization as a means of implementing quality objectives which are durable is an instrument adequate to the market system.

3. CHOICE OF INSTRUMENTS

Reducing the burden on the environment and using the market to regulate shortages

If they are not attributable to natural causes, ecological problems are the result of emissions, the using up of resources, changes to the landscape and other interventions by man in natural ecosystems. The objective of environmental policy should be to reduce as far as possible the total volume of harmful interventions. Cumulative interventions (eg. the emissions of persistent harmful substances) and irreversible damage (eg. the eradication of species of flora and fauna) should be reduced to zero.

Given the undisputed efficiency of markets in adjusting to, and coping with, various types of shortages, it is quite natural that environmental policy should make use of market control instruments. Not only are such instruments likely to result in improved achievement of objectives but they will also introduce the principle of economic efficiency.

Limits to the regulatory approach

At this stage, we need to recognize the weakness of all instruments based on plant-specific emission levels or which directly prescribe techniques for the avoidance of emissions. This is all the more necessary if the concept of sustainability is given its proper flexible interpretation, that is to say that environmental policy objectives are viewed as the product of advances in our understanding of threats to the environment and the capacity of markets to adapt progressively to them. It will then become clear that, because there is bound to be a delay in recognizing the problem, in finding a political and administrative solution and in actually applying that solution, a policy of standards relating to particular plant will, of necessity, be inefficient, quite apart from the fact that it requires a considerable level of state control and is therefore expensive for all concerned. This type of environmental policy is usually only reactive, intervening after the event, and is suitable only as a means of repairing clearly identifiable acute damage. A system of static regulations is particularly useless where irreversible processes are at work⁶.

Directing economic interests towards ecological objectives

An environmental policy able to encompass the dynamic capacity of the market economy to find new solutions as well as 'competition as a process of discovery' (Hayek) must mobilize market forces for its own objectives. It must direct economic interests towards ecological objectives. This implies creating conditions which force industry to move of itself towards sustainable development in the same way as, in a market economy unregulated by environmental policy, it manoeuvred itself into the destruction of the natural bases of life with no thought for the future.

Lasting forms of resource management can never be devised and applied by the political and administrative system. Where there is an attempt to do so, it inevitably results in the stifling of all progress as a result of central administration of the economy. This is the real and valid main reason for

⁶ See in particular the detailed review of the shortcomings of this instrument by Hans Bressers based on experience in the Netherlands.

private sector opposition to state-controlled environmental policy. However, it must not lead to a watering down of environmental policy objectives. The private sector is intelligent enough not to resist the increasingly reliable evidence of the internationalization of external harmful effects on the environment.

4. EXTENT OF ECONOMIC INCENTIVES REQUIRED

The time factor in environmental policy

Establishing environmental policy objectives is not just a matter of setting quantitative or qualitative goals: the time factor is also decisive. Because damage is often irreversible, the time factor is an autonomous criterion of efficiency. Perceptions of the capacity of industry to adjust in terms of time are therefore just as important as those concerning its 'resistance' to environmental policy measures. An analogy with the processes of adjustment imposed by the market, technological progress or the vagaries of fashion itself is therefore useful and necessary in this connection, too.

Overburdening industry?

The latent concern of many politicians that too great a burden is being placed on industry reveals a selective and foreshortened perception of economic development. In particular, they overlook the ruthless way in which enterprise has always thrust beyond conventional economic structures, assets, market shares and jobs. Economic theory has long recognized the 'dynamic entrepreneur' who uses a process of 'creative destruction' to restructure competition⁷. This is the source of much of technological progress and our prosperity but also, because of the absence of constraints, of the increasing number of ecologically damaging developments in past decades. Thus, industry produces from within itself far more pressure to adapt than has ever emanated from environmental policy.

⁷ These concepts developed by Joseph Schumpeter are central to an understanding of his theory of economic development which is a standard work even today. Cf J A Schumpeter (1911) 'Theory of economic development', Berlin 1964.

The example of the dynamic enterprise

Environmental policy involves nothing more nor less than directing the dynamic development process towards lasting management of resources. This can be successful a priori only if environmental policy activates forces equal to the private sector's inherent development capacity. Any other policy which, in case of doubt, hesitates and slavishly respects existing structures is doomed to fail. Even the very best range of environmental policy instruments cannot compensate for inadequate incentives. To this extent, limiting the environmental policy debate to the choice of instruments is not enough.

5. CONSEQUENCES FOR THE ECONOMY AS A WHOLE

The supposed conflict of objectives

Closely related to the latent fear of overburdening industry's structural capacity to adapt is concern at the possible negative effects of environmental policy on the economy as a whole. This concern is justified inasmuch as any inappropriate policy in any given field can, of course, produce friction and instability throughout the economy. It is, however, untenable and groundless if interpreted as a characteristic peculiar to environmental policy, allegedly distinguishing that policy from all others.

There is no denying, however, that the first twenty years of modern environmental policy - characterized by a shallow, transient approach, considerable bureaucracy and an overemphasis on costly emission monitoring methods - encourage the prejudiced view of inevitable conflicts of objectives.

The conflict we are discussing here is not concerned with the problem of what private and public goods should be produced or spared. That is a question of preferences and environmental quality objectives. It concerns the everyday conflict between our wishes and the scarce resources and/or limited purchasing power (cf. No. I.2 above), which Beckerman has stressed.

Nor do we mean that conflict involving any policy which changes the conditions for the economic activities of private individuals. What we are concerned with is the conflict that is often stressed in text books on environmental economics between greater protection of the environment and the macro-economic

objectives of employment and stable prices. Behind this conflict is the practical and theoretically very significant concept whereby a preference for the environment as an asset can have a detrimental effect on the functioning of a market economy system. It is this concept which has always posed quite considerable restraints on freedom of manoeuvre in environmental politics.

The traditional concept of income

The reason for this incorrect viewpoint is principally to be found among established economic concepts. For example, the current debate on how to define prosperity and growth is merely the continuation of a subject long discussed by economists. Adam Smith and many others understood national income, for example, in terms of the accounting concept of net return, that is to say turnover less all costs including wages. Consequently, only those activities which increased the net return (the national income) could be described as productive. Smith's view has been criticized by, among others, Friedrich List (circa 1840, i.e. over a hundred years before the beginning of academic economics) as follows: 'According to that view, a person who raises pigs is a productive member of society, but a person who educates people is not!'

However, even in the days of Adam Smith there were economists, mainly in Italy, who categorized all work which produced something useful, whether or not material, as productive⁸. To this extent, it cannot be denied that protecting the environment is a productive activity which increases prosperity. Negative effects of environmental policy on the economy as a whole can therefore be straightaway dismissed, as they influence only the structure of demand and not the level of activity of an economy⁹. However,

⁸ Notably Adam Smith's contemporary, Fernando Galiani.

⁹ Cf. H. Flassbeck/G. Maier-Rigaud, 'Umwelt und Wirtschaft Zur Diskriminierung des Umweltschutzes in der ökonomischen Analyse' (Environment and Economy. Protection of the environment as a factor in economic analysis), Tübingen (Mohr/Siebeck) 1982 and W. Koll, 'Geldmenge, Lohn und Beschäftigung. Gesamtwirtschaftliche Bedingungen für mehr Beschäftigung bei Stabilität', (The money supply, wages and employment. Conditions for increasing employment without impairing stability), Tübingen (Mohr/Siebeck) 1988.

the continuing debate on this issue is due principally to the definitions used in our national accounts¹⁰.

The environment as a factor in national accounting

The accounting systems developed in the thirties and forties are designed to cover market processes and the goods traded on the markets (finished products)¹¹. Within these systems, production of environmental quality is generally treated as intermediate input. Increased protection of the environment does not mean increased national income but increased production costs for finished products. According to the rationale of national accounting, environmental policy appears to be pushing up prices, decreasing productivity and, since resources used for protection of the environment are not available for other purposes, forcing down growth rates.

All these effects are, however, merely a consequence of the definitions applied and not at all real. They disappear if protection of the environment is properly regarded as an asset. The widely feared consequences of environmental policy for the economy as a whole do not therefore exist in the real world or only in so far as they are held to be real by economic policy and thereby elicit a response.

A policy of reorganizing the structure of the economy towards sustainable management of resources need not therefore arouse fears of negative effects on price levels, productivity trends and employment. Production of the 'environment', like the production of any other commodity, involves sacrificing certain goods but not overall economic stability and employment. Were this not the case, the objective of sustainability would in fact make it necessary to call into question the market economy system itself.

¹⁰ In this connection there is a running debate today on whether the measured social products has any sense as an indicator of prosperity. Professional economists have long denied this. Cf. Beckerman's paper with his reference to Pigou's work of 1920.

¹¹ cf. P. Studenski's fundamental study of this whole problem: 'The Income of Nations, Theory, Measurements and Analysis, Past and Present, . A Study in Applied Economics and Statistics', New York (University Press) 1958.

II ECONOMIC INSTRUMENTS AND FISCAL INCENTIVES

I PRINCIPLES OF ENVIRONMENTAL POLICY CONTROL

No central economic management of the asset 'environment'

Despite the deficiencies of centrally planned economies which have now become particularly evident, the market economies continue to apply planned economy-type models in the case of environmental policy. There is a sort of two-tier system of regulation: the supply and demand for private goods is generally subject to the competitive market system. Supplies of the public asset of environmental quality, however, are administered by law, regulation and administrative provision, which frequently refer directly to a specific source of emission. This policy is not fully capable of pushing developments in the direction of sustainable management of resources. Indeed, it provokes widespread opposition to the transformation that is needed.

Analogies with market economy controls

An environmental policy adequate to the objective of sustainable management of resources must take as an example the way in which the market economy looks for new solutions. There are three factors here:

- . the economic interests of individual operators on the market
- . competitive organization of the way in which the individual operators on the market interact
- . what is essentially a framework economic policy which creates the same conditions for all operators on the market¹².

The following criteria or requirements should therefore be used in selecting the instruments for environmental policy:

¹² The theoretical basis is Jevons' 'law of indifference'

- . The reduction in emissions and use of resources must of itself be an economically profitable strategy and therefore a factor in competition. At the same time this ensures that the environmental policy objective will be achieved in accordance with the principle of economic efficiency.
- . The details of where and how those objectives are achieved must remain fully in the hands of the individual (subject to ethical and legal constraints).
- . Objectives of environmental quality laid down in terms of cost or volume should (ideally) be *generally* applicable to prevent structural rejection. The costs of emissions or of a resource unit (with the same potential for damage) must be the same everywhere. (It follows, for example, that 1 kilowatt hour hydroelectricity produced by comparatively 'clean' methods in Norway will cost less than the same unit produced in Spain where substantial damage is done to the countryside).

A clear distribution of roles

In the case of individual measures, it is often demanded of those responsible for environmental policy that they should take into account specific sectors, regions and size of enterprise or aspects of the fairness of distribution. Such considerations always result in a diminution of environmental policy objectives and unnecessary complication of the instruments of environmental protection policy and cannot be justified, ecologically speaking, simply because the supreme objective of economic activity must be to secure the natural bases of life.

As a rule, then, environmental policy must reject such demands. It is incumbent upon the politicians with particular responsibility for such matters to check or alleviate any undesirable secondary effects of environmental policy. Above all, environmental policy must not be frustrated by social considerations and structural economic objectives. It is not possible to look for new structures and forms of sustainable management of resources while at the same time seeking to retain the existing structures.

Social compatibility

This problem is an important factor in discussions of environmental policy. It revolves around the concern, expressed at the hearing, that an enhanced quality of the environment may in principle - particularly with regard to certain instruments - be possible only at the price of greater inequality and purchasing power or incomes. To what extent is this concern justified? Three aspects need to be examined.

Firstly there are the costs of adaptation to a given objective; in particular costs of investments and additional operating costs.

Secondly, the costs resulting from a comparatively inefficient use of production factors to achieve the objective. They are a specific consequence of the use in particular of ad hoc bureaucratic measures in protection of the environment. In many areas these additional costs, which go no way towards improving the quality of the environment, can be almost as high as the costs of an optimal, real adjustment - ie. they can double the total costs.

Thirdly, we need to ask who in the final instance bears the total costs (problems of passing on costs), which income groups are particularly affected and which ones tend to benefit more from an enhanced quality of the environment.

For a given environmental policy objective, social compatibility can in general be increased at minimal costs. Economic influences are most likely to satisfy the profitability principle. Using such instruments therefore minimizes the problem of social compatibility. Costs not incurred are social advantages.

However, since in general economic instruments act via prices, there will nevertheless be additional charges, although these can be used for specific social purposes, particularly in the case of environmental taxes.

Quite clearly, the funds used for economic adjustments cannot be used for compensation. On the other hand, however, there is an enhanced quality of the environment. The people who benefit most from this are usually the low income

groups and those in receipt of transfer payments. It is they who pay the highest price for an unhealthy, unwelcoming environment. To understand the force of this argument it is necessary merely to look at the quality of the environment in the areas where the poor and where the well-to-do live.

To conclude, even considered from the point of view of social compatibility economic instruments are superior to a command economy.

2. CHARACTERISTICS AND LIMITATIONS OF THE POLICY OF STANDARDS

Concept of administration

The policy of standards and prohibitions directly transposes to environmental policy traditional management concepts and processes. In accordance with that policy, individual permits standards with reference to the applicable state of the art and subsequent directives determine the environmental policy landscape. The notion prevails that use of the environment to accommodate certain harmful substances and as a production factor can be regulated in the same way, for instance, as legislation is provided in the Civil Code. In point of fact, it is possible to do that in the same way as it is possible to have a planned economy. In that case, however, sustainable management of resources means neither positive adjustment but direct restriction of economic activity, nor overcoming shortages by means of an imaginative, decentralized search for solutions, but the management and allocation of rights to environmental resources.

It is not possible here to list the shortcomings of the policy of standards in the individual problem areas. The comments below should, however, provide an idea of the general approach of this policy and the related problems.

The philosophy of a plant-specific policy of standards is that emission should be avoided as far as is technically possible. According to the advocates of that policy, it is simply not possible to limit emissions further. That is not true in so far as the technique to be applied is the product not of the establishment by engineers of what is technically possible but of a process of calculation and assessment on the part of the authorities and plant operators. Economic factors play a large part here. The operational costs of limiting

emissions have therefore to be 'reasonable' in relation to the economic situation of the plant operator.

The avoidance technique as instrument and objective

Gearing the policy of standards to technical and economic factors in this way means that the technical basis of the objective of avoiding emissions derives directly from the capacity for emission limitation as defined in advance. This circular linking of objective and instrument in practice guarantees from the outset that the objective will be achieved. The policy of standards thus protects itself against internal criticism. Objectives can fail to be met only if the requisite technique for limiting emissions is not universally available. Criticism is thus limited to shortcomings in implementation.

But even where there are no shortcomings, the volume of total emissions is not determined by the technical standards. The vulnerability of a plant-specific policy of standards resides in the number of plants and their operating times. Environmental deterioration cannot therefore be prevented by environmental policy at a time when there is an upturn in the economy. All in all, therefore, where this policy is applied, the position regarding emissions remains dependent on cyclical as well as structural economic trends. It can therefore be argued that in this process the environmental policy objective is, in large areas, heteronomous.

This does not, however, apply to those (few) pollutants for which emission limits have been established. In principle, it is possible here to make ecological factors hold sway¹³. However, limits set below the true nuisance level cause considerable difficulty for the policy of standards, since all those who produce emissions hold permits. All that can be done is to refuse permits to new plants and hope that there will be medium and long term advances in techniques for limiting emissions or that some plants producing emissions will shut down as a result of structural changes in the economy.

¹³ In practice, however, environmental policy sometimes follows different paths here too. In order to avoid immediately putting pressure on activities by setting the limits on nuisance below current levels, there is a tendency to set high limits hitherto rarely achieved.

It should be emphasized that the criticism made of the policy of standards by environmental economists relates principally to its cost-efficiency. As a result of the differing marginal costs of emission limitation techniques for the different polluters, that method in fact means that a given objective of environmental quality (for example a limit on nuisance), costs dear. In this economic sense, excessive prevention of emissions is required of some polluters and too little of others. In other words, there is unexploited potential for emission limitation which, in cost terms, could be made full use of relatively advantageously.

End of pipe approach

The most significant criticism of the instrument of standards relates to the objective of further developing the structure of the economy towards sustainability. That instrument is not automatically in a position to do this, and where a modest incentive exists, it will be directed mainly towards techniques linked to the production process (end-of-pipe technology). Only the manufacturers of such techniques have an economic interest in new procedures, for which demand will then be created by the policy of standards. There will be no wide-ranging search for new technical solutions, starting with input factors and going on to cover production and recycling. That type of dynamic is, however, vital if forms of sustainable resource management are to be found.

3. VARIETY OF INSTRUMENTS

Avoiding dogmatism

Given the complex nature of the ecological system on the one hand and the market economy process on the other, it would be a mistake to look for the ideal instrument of environmental policy. An effective range of environmental policy instruments is therefore always going to have to form a complex whole and at the same time be receptive to new approaches. In the individual case, that can certainly mean making it compulsory to do or not do certain things on the basis of prohibition or requirement. Standards too can be ecologically advantageous in the form of temporary measures, where what is needed is rapidly to implement a tried and tested technique. The choice of instruments to be used must therefore be carefully considered in any given case.

It was also stressed at the hearing that in many areas environmental policy must also provide the appropriate institutional framework. Nor can the state delegate to private industry responsibility for infrastructural measures.

Over the past 10 to 15 year the debate on an effective range of instruments for the protection of the environment has made no headway for three main reasons:

False perception of the problems

First, because the scale and nature of the ecological challenge was not understood or was underestimated. In the early days of environmental policy, it was in fact believed that it could be regulated on the same basis as road traffic, that is by erecting signs to say what you must or must not do or by laying down certain technical requirements for vehicles. Consequently, environmental policy has been placed exclusively in the hands of administrators and technicians who have so far been successful in maintaining their dominant position.

Failings of environmental economists

Second, because economists have, from the outset, viewed the question of instruments too rigidly. Their starting point has been (and in many cases remains) the problem of how a particular environmental policy objective can be achieved most favourably in cost terms¹⁴. As a result of that and of the fact that the economists frequently placed limits on themselves, by requiring that the instruments 'conform with market condition' the discussion was narrowed down to models of dubious practical use, and not only in countries with a

¹⁴ Thus, for example, the advantages of flexible instruments for US clean air policy are viewed exclusively in terms of cost savings. R. Hahn writes, for example: 'Because marketable permit approaches have been shown to have a demonstrable effect on cost savings without sacrificing environmental policy, this instrument can be expected to receive more widespread use. (R. Hahn, 'Economic Prescriptions For Environmental Problems: How the Patient Followed the Doctor's Orders', in Journal of Economic Perspectives (1989), Vol 3, No 2, p. 112. Cf. also R. Hahn and G. Hoster, 'The Market for Bads' in Regulations (1987), No 3/4. Unfortunately the figures in dollars quoted there are not very conclusive because there is no reference to overall investment costs.

patchy administrative system¹⁵. Moreover, it failed to reach those to whom it was addressed, principally the administrators and practitioners, because of the extremely abstract nature of the proposals. Economists failed above all to make the analogy with the theory of economic development. That would have prompted relegation of the perception of costs, viewed fundamentally in accounting terms, to its proper position among secondary concerns.

Instruments must also be effective

Third, because in recent years an ideological or party-political dispute has erupted, and this would appear detrimental to open discussion on the instruments appropriate at any one time. The fact that victory for one side or the other does not of itself mean progress in environmental policy may well be being lost sight of here. The real test, in political terms, takes place at the level of the environmental policy objectives and the extent of the incentives. The best conceivable economic instrument is of no use if the incentive it offers is too weak and does not influence the relevant decisions of the private sector.

4. CLASSIFYING THE INSTRUMENTS

Many different criteria can, of course, be used to categorize the wide variety of instruments available. In line with the view being advocated here, it is fundamentally a question of identifying the instruments likely to generate development towards sustainable resource management. A distinction has therefore to be made between instruments that are highly effective in providing such impetus and those able to put into effect only familiar solutions or processes. A further distinction has to be made according to whether the instruments are designed to enforce actions laid down in law or provide clear data for economic purposes or whether their effect is rather to provide psychological support.

¹⁵ This restriction which is to be found principally in German literature on the subject, is indicative of a not very helpful approach, limited in terms of the models it uses.

Instruments which have an effect on behaviour

The particular characteristics of the instruments which fall into this category mean that they have only limited effect. They may, nonetheless, be significant by 'setting a tone'. They can be subsumed under the headings of 'moral suasion' and information.

An open information policy, that is to say transparency, is vital if environment policy measures are to be accepted and citizens' initiatives and environmental groups given further support. A policy of this kind can influence the conduct of consumers and industry even before specific measures have been taken. This applies, for instance, where particularly 'environment-friendly' products are labelled as such. A high degree of awareness of environmental issues also enables industry to use individual decisions on environmental improvement as a competitive advantage to promote its image. Voluntary agreements (sectoral agreements) fall into this category¹⁶.

Instruments which have an indirect effect on behaviour include inter alia:

- . An open information policy for problems of ecology
- . A deliberate strategy of making available environmental data, including data on individual firms (cf. the EC directive on freedom of access to environmental information).
- . Labelling of products (environment symbol)
- . Environmentally-friendly public procurement, e.g. on the basis of the environment symbol
- . Voluntary agreements between polluters and the state and between individual polluters

¹⁶ Such agreements are all the more effective where they are clearly the precursors of specific measures. In extreme cases their effect may be comparable to the latter. They may, however, be abused in order to partition off the market or further other sectoral interests.

- . Prompt discussion of measures in the media with the various interest groups and experts

- . Appeals to industry and consumers

It has, by and large, to be borne in mind that these instruments cease to be effective where it is the economic calculation, economic interests and competition which determine activity. An environmental policy which seeks to restructure the economy should not therefore expect too much of these instruments and use them only as supporting measures¹⁷.

Instruments which are essentially static in their effect

All instruments which apply only familiar technical and economic solutions are static. They include the whole of the policy of plant-specific standards. Economic incentives used only to implement that policy, such as, for example, the German system of a levy on effluent as well as certain types of compensation in clean air policy fall into that category. This demonstrates that cost controls do not in every case provide new impetus, that is to say generate new solution, while prohibitions for example, which have traditionally been included under the policy of standards, may in fact prove dynamic¹⁸.

The static instruments include:

¹⁷ Hans Bressers also makes this quite clear (p.8 ff. 'Communicative Instruments'.

¹⁸ Subsidies represent a particular problem. They may be very effective for a period but, where applied in the long term, can, in certain circumstances, cause considerable distortion because they result in false relative costs and thus false processes of adjustment. In line with the principle that the polluter pays, what is needed is to make environmentally damaging behaviour cost more and not to make environmentally-benign behaviour cost less. (The 'Wasserpennig' [penny on water] levied by one of the Federal Länder in the FRG is in that sense inappropriate in the long term and has also to be deemed part of agricultural income policy rather than environmental policy. The 'Wasserpennig' is levied on consumers and goes to those farmers who have suffered a drop in earnings by taking fields out of intensive cultivation).

- . Conditions governing technical standards and procedures for production processes and, above all, end-of-pipe techniques (filters) in new and old installations.
- . Levies designed directly and exclusively to ensure that previously defined avoidance techniques are applied.
- . Compensation, provided it is intended only to enable a specific objective to be achieved at less cost than is possible on the basis of the policy of standards alone.
- . Solutions in the form of funds can also be described as static where they are being used only to implement a particular objective, which could equally be achieved on the basis of administrative measures.
- . Deposit systems which may involve an unnecessarily high cost to the economy to achieve a given objective.
- . Charges. The level of charges basically reflects the costs of the relevant consideration. There is thus little scope available when determining them in detail. Nonetheless, there may be increased use of charges in line with the principle that the polluter pays. Their effect is then similar to that of levies. An example of this would be aircraft landing charges which are based on noise and the emission of pollutants. Processes of adjustment might result, particularly when new charges are being introduced.
- . Criminal law in relation to the environment because it can refer only to administrative legislation, which is static.

It should be noted that the fact that instruments are described as static does not mean that they should be rejected as being inefficient. They have an important role within the range of instruments available to environmental policy.

Dynamic instruments

These include all instruments which increase the cost of resources, emissions or other undesirable forms of intervention in the environment by means of

levies and taxes (i.e. controlling through a price mechanism) as well as those which lay down target quotas generally, leaving it to industry to decide the details of how and where they will be met (tradable permits); quantitative controls.

These instruments will prompt a search for the best solutions guided by business interests. They are therefore essential to the establishment of forms of sustainable resource management and should be the focal point of environmental policy. In his paper Hans Bressers points out that 'charges and related instruments such as tax differentiation have made the most visible contribution to the success stories within Dutch environmental policy' p. 17).

In principle, this covers all measures which affect prices, tariffs and charges (transforming fixed into variable costs, for instance, assessment of car tax on the basis of fuel consumption or linear tariffs for electricity consumption).

This category also includes measures concerning the law on liability, particularly where the extent of liability is widely defined (e.g. product liability). Prohibitions too (which represent the infinite price) can trigger dynamic adjustment processes, in relation to the use of individual substances for example.

Examples of this type of instrument are given below:

. Taxes

The following may be the subject of taxation: use of resources (land, raw materials, fossil and/or renewable energy), emission of pollutants and waste. The great advantage of this instrument is that the total amount can easily rise to 5 to 10% of GNP. Taxes do not involve the obligation to prove the cause of damage; and because in principle taxes are not for specific purposes, the full amount of the revenue from environmental taxes can be returned to the taxpayer in the form of tax cuts or social compensation payments. In this case, even very high environmental taxes are neither a fiscal burden on the private sector nor a form of disadvantaging any particular social stratum. However, environmental taxes have to be phased in in order not to overburden the adaptability of technology,

infrastructure and patterns of behaviour. Annual increases in rates will also solve a possible 'conflict of interests' between the yield and the control function of environmental taxes, at least in the 20-30 year phase of raising the rates¹⁹.

. Tradable emission rights

The assumption here is that the environmental policy creates the conditions under which markets can develop properly. Possible examples are tradable rights for the consumption of resources and other interventions including emissions. One socio-political problem is that the state receives no revenue from tradable rights from certain systems, with the result that it will need to finance from other sources the compensation amounts deemed necessary for socio-political reasons for the increase in the cost of living. It also needs to be borne in mind, however, that industry must not be deprived of any liquid funds. However, this is not absolutely necessary. The emission rights can also be sold by the state, thereby constituting a source of revenue.

. Levies

In principle, these cover the same range as taxes and tradable permits. But unlike taxes, the size of the levy must be related to the extent of environmental damage and the cost of repair. In contrast to taxes, therefore, levies provoke far less in the way of forward-looking dynamic adjustment processes²⁰.

¹⁹ A résumé of the arguments for and against regulation by taxation is to be found in E.U. von Weizsäcker, 'Erddpolitik, Ökologische Realpolitik an der Schwelle zum Jahrhundert der Umwelt' (A policy for the earth: a practical environmental policy as the century for the environment approaches), Darmstadt (Wissenschaftliche Buchgesellschaft) 1989, p. 159 ff.

²⁰ The current level of environmental levies in 14 OECD countries is the modest figure of less than 0.1% of GNP. Opschoor, J.B. and H.B. Vos (Free University of Amsterdam). The Application of Economic Instruments for Environmental Protection in OECD Member Countries, OECD Publications Paris, 1989.

. Merit pricing systems

These consist fundamentally in levies, the revenue from which is used specifically as an incentive to promote, for example, technical progress. As a control function these systems are therefore superior to levies. However, this increased effectiveness has generally to be paid for in the form of high administrative costs for the redistribution of the resources raised.

. Compensation and solutions based on funds

These can also have a dynamic effect, but they have to be designed for objectives requiring more than the application of familiar solutions. The boundaries between these and tradable permits and levies are fluid.

. Provisions under the law on liability

These can also have a dynamic effect. This is true of a broad interpretation of absolute liability and reversal of the burden of proof. However, the cost to the economy of multiple court cases and frustrated industry may be considerable.

. Subsidies

These are quite contrary to the principle that the polluter pays as established in the EEC Treaty. They should not therefore be used as an instrument of environmental protection policy even if they could stimulate dynamic processes in certain areas. Most importantly, the fixing of criteria for subsidy could constrict from the outset the open search for new solutions (cf. also note 11).

5. TAXATION VERSUS TRADABLE PERMITS

Two sides of the coin

Where there is a specific objective of environmental policy and full information as to the response of those affected (price elasticity for the use

of environmental assets) control of volume is exactly the same as control of cost. In this (hypothetical) case, environmental policy can determine the number of tradable permits and leave it to the market to determine their cost or fix the cost by way of a tax and allow the market to determine the number of tradable permits. In this situation, cost and volume are just two aspects of the same problem. The right cost will produce the desired volume or the right volume the cost, which will otherwise have to be established on a policy basis. A shared advantage of these two instruments is that the internalization of external effects can be made to extend far beyond establishing a causal chain of environmental damage. They would therefore go a long way towards creating a harmony of interests between creative industry and protection of the environment. (cf. W. Beckmann's paper).

Differences

Practical environmental policy has in many cases to contend with the problem of finding it difficult or not wishing to quantify its objective. The latter applies, for instance, where pressure is generally being exerted to protect resources. The risk of this approach is that the impetus provided by taxation will prove to be too weak. This is almost inevitably the case with taxes which are introduced in a single stage - a stage which, to relieve industry and society, should not be too great.

As an environmental measure, the concept of fixing the number of permits is more appropriate to the objective. The uncertainty here really relates to the establishment of markets able to operate on these lines (transaction costs). We have as yet no experience of markets in tradable permits, and the instruments used in the US can be considered only as the forerunners of such markets²¹.

²¹ There is a tendency in international discussions on measures to limit emissions of CO₂ to set national targets which could be made tradable. In theory this could lead to a semi-automatic North-South transfer of resources which would be politically acceptable to most OECD countries, since the North would undoubtedly have to buy CO₂ emission permits in the South. However, neither the USA nor the countries of Eastern Europe would be prepared to take up this proposal at present. Furthermore, *an international* CO₂ trade in licences does not in any way prejudice what happens in the individual states. The choice between levies and licences will be made on a practical rather than a theoretical basis. (cf. Grubb, Michael, *The Greenhouse Effect: Negotiating Targets*, Royal Institute of

6. ADMINISTRATIVE PERFECTIONISM AND THE DYNAMIC SEARCH FOR SOLUTIONS

The advocates of the inherited policy of standards consider that flexible economic instruments present considerable disadvantages. Their most significant objection probably relates to what is called the hot-spot problem, that is where there is a heavy concentration of pollutants at one site. This argument can be refuted as follows:

A false reference system

It is in practice impossible for taxes on emissions or input to produce the same results as a plant-specific policy of standards. Were that not the case, it would not be necessary to argue over instruments for the protection of the environment from the ecological point of view. Unlike the policy of standards, a uniform rate of taxation for emissions or input naturally has the effect of changing the structure of emissions and input from place to place. In certain cases, the result is not improvement but in fact deterioration in the quality of the local environment. The same would result in the event of a shift from economic instruments to the policy of standards.

If existing standards and emission limit values are retained in problem areas, local deteriorations can be avoided without any significant impairment of dynamic efficiency. Seen from a dynamic point of view, the objections of those who favour a policy of standards rapidly loses significance; the processes of adjustment render them obsolete²².

International Affairs, London, 1989). Despite the technological successes in fuel economy in cars, average consumption of fuel has not fallen in the last 20 years. This is mainly because cars have become heavier, bigger and faster.

²² Thus, for example, the limits on emissions from power stations in Japan have in practice become completely meaningless following the introduction of the sulphur dioxide levy. No power stations operator considered using the limits to the full because that would have been much more expensive than the sulphur dioxide duty payable at the time. See J. Jesinghaus, 'Instruments of environmental protection policy: a comparison between Japan and the Federal Republic', in 'Spektrum der Wissenschaft', February 1988, p. 44.

Economic instruments free from bureaucracy

It must be borne in mind when considering the choice of instruments of environmental policy that administrative regulation cannot be effective once the issue ceases to be one of administratively perfecting the implementation of familiar approaches but of discovering fresh approaches. In this respect, administrative regulations, which are largely static, cannot provide an alternative to economic instruments. Nor is there any point in requiring the same detailed perfection from economic instruments as from the policy of standards. The tendency in favour of the latter appears to be one of the main obstacles to the use of economic instruments. In point of fact, as a result of such requirements, those instruments no longer provide the same level of impetus, become complicated and involve excessive bureaucracy, so that, in the final analysis, they actually appear subordinate to the process of administrative regulation.

III. ENVIRONMENTAL POLICY IN INDIVIDUAL AREAS

1. PRINCIPLES

For a long time now, environmental policy has been extremely one-sided, not only in its choice of instruments for environmental protection but in the areas in which it took effect. There was an obsession with the problem of emissions of harmful substances and with industry's contribution to pollution. This is now seen as too restrictive an approach. It is clear that the restructuring of the economy on an ecological basis can be successful only if its whole structure is influenced by environmental policy. The objective must be to create a framework of environmental policy, while leaving the appropriate structures to the system of competition.

It has, however, to be borne in mind that in areas where there are ecological problems, such as transport, agriculture or energy, it is by no means exclusively market factors that are at issue. The state has, in part traditionally, intervened more or less directly in those sectors and thereby

itself created not an insubstantial number of the current problems²³. Environmental policy has therefore by and large to provide an analysis of policy direction in those areas. We should remember Article 30r of the Treaty which states: 'Environmental protection requirements shall be a component of the Community's other policies'.

A number of problems relating to four selected policy areas are described below. They were discussed in greater detail by the experts at the hearing on 21 and 22 June 1990.

2. ENERGY POLICY

The supply of energy - a state responsibility?

The guaranteed supply of reasonably priced energy has long been a self-evident objective of state policy. The energy sector was considered a key area for economic development. Consequently, energy policy was for the most part energy supply policy. Today, the energy sector is seen as crucial to a change of course, ecologically speaking, towards sustainable management of resources.

However, the view that energy must be available to meet anticipated or potential demand has still not been surmounted. Only the points of emphasis have changed. Many states take the view that it is their primary responsibility to find new sources of energy, to subsidize energy saving or increase the potential for energy saving on the basis of technological incentives and regulations on efficiency. This policy is often backed up by appeals to save energy, that is to say, by asking consumers in effect to act uneconomically, in many cases at least. Not only does a policy of this kind reveal the limits of the inadequate measures, it also shows how little understanding there is in many cases of the constraints of competition and market rationale.

²³ The state has, in many cases, been the generator or catalyst here of external effects which were not produced to the same extent by the market system. For example: agriculture, investment in infrastructure in the transport sector or subsidies for nuclear power. In this sense the state shares responsibility for pollution. Cf. G. Maier-Rigaud, 'Environmental policy in an open society' Opladen 1988, p. 85 et seq and 126 et seq.

Current energy policy amounts to an attempt to stimulate the mechanics of market development by programmes of incentives, obligations and 'moral suasion'. Despite the progress that has undoubtedly been made in individual instances, overall this strategy is economically inefficient and ecologically inadequate. Not even intelligent administrative measures are able to regulate or provide incentives in the same way as costs, nor can they disguise false cost signals.

False price signals on the energy market

Import costs for coal and crude oil as well as petroleum products are currently nominally below their 1974 levels. Only in the case of the relatively environmentally benign natural gas is the cost a little higher than it was at that time. In real terms, that is after deduction of the general increases in cost levels, not only the import cost but the cost to the consumer of the most important fuels, including electricity, is markedly below the levels reached at the end of the sixties. Industry and the consumer are therefore being given signals which largely contradict the policy objective. This is why the latent technical potential for energy saving has so far been tapped only marginally in relation to what could, presumably be achieved.

To make greater savings, the immediate aim should be to harmonize all rates of taxation and duty on energy within the highest current rate and to abolish all existing degressive electricity tariffs and electricity price differentials between consumer groups. At the same time, subsidies and exemptions in taxation of energy should be systematically phased out.

In addition, a tax on carbon dioxide or system of tradable permits with the appropriate reductions in permitted quantities (in accordance with an international convention) should be introduced throughout the European Community. Care must be taken to ensure that nuclear power does not gain a competitive advantage because of the resultant change in energy costs or in costs for fossil fuels. Special incentive programmes for energy technology and the subsidizing of demonstration projects would then become superfluous.

The problem of international competitiveness

High, rising energy prices influence the level and structure of all prices for goods and services in the economy. This triggers off changes in behaviour (a shift in purchasing power) and investments as a means of avoiding additional energy costs. Resources are used which are no longer available for other purposes. This is the price for the social ideal of fuel economy, particularly of fossil fuels.

As a general condition of maintaining the competitiveness of a firm or an economy, the development in prices of export goods must match the trend on the relevant foreign markets (constant terms of trade). What this means is that if there is not a clear intention to do without specific national or Community-wide preferences, reflected in higher prices than abroad, domestic costs must rise at a slower rate to maintain international competitiveness. There are two ways of doing this. Firstly, slowing the rise in wages (all other costs such as raw materials or capital costs are fixed by the world market) and, secondly, an additional increase in productivity.

There is no alternative to this necessary and adequate condition for preserving international competitiveness. All measures to compensate for energy prices higher than those abroad, for example through energy taxes, merely cause a shift in the distribution of real domestic adjustment costs. The advantage lies in the possible enhanced political acceptance of scarcity prices for energy which are higher than abroad²⁴; the disadvantage lies in lower environmental efficiency as energy taxes are shifted more from producers to energy consumers.

3. TRANSPORT

Economies are becoming more transport-intensive

Over the past two decades, two developments have stood out in the transport sector: first, the decline in the carriage of passengers and goods by rail

²⁴ Cf. the strategies to change tax structures discussed by T.G. Potma in his paper (p. 10 ff.). See also the comments on 'social compatibility' above.

and, second, the constant and rapid growth in road traffic. In the Federal Republic of Germany, for example, all forecasts of increases in road traffic from the fifties onwards have fallen far short of the actual increases. Long distance haulage of goods by road (transport performance in t/km) has generally risen faster than industrial production.

The internal market and opening up of frontiers in Eastern Europe will further promote road haulage. The rise in air traffic is particularly pronounced, although quantitatively speaking not yet crucial. Demand for transport is increasing in the national economies, and in many countries energy consumption is rising merely because of the transport sector²⁵. Transport must therefore be central to a policy of reducing carbon dioxide emissions. Furthermore, transport bears a large responsibility for NO_x and CO₂ emissions and the destruction of the countryside and biotopes. It pollutes groundwater through tyre abrasion and oil consumption. It is a major cause of the water problem; and air transport is having a serious impact on the atmosphere.

Ecologically subsidized prices

Developments thus far come as no surprise if it is clearly understood that, bearing in mind its external effects, road transport is one of the most highly 'subsidized' sectors. End-of-pipe solutions (catalytic converters) do not provide an adequate response in the light of the many negative effects of transport on the ecosystems. What is really needed is a fundamental rethink of the role of transport in terms of the division of activity between sectors and a strategy involving a change of emphasis in favour of the more environmentally compatible rail network and shipping and the avoidance of (road) traffic.

The immediate aim should be to harmonize taxes on petrol and motor vehicles in the Community in line with the highest rates of tax applicable. Harmonization below that level would result in counterproductive cost signals in some of the Member States. It is most probable that mere harmonization will be far from

²⁵ Despite the technical savings achieved in motor cars, average fuel consumption has not fallen over the past twenty years. The prime cause of that is that cars have become heavier, larger and faster.

enough to achieve a reduction in carbon dioxide emissions, for example. Greater tax incentives are required, for example in the form of an annual increase in rates over a longer period. The extent to which rates of taxation will have to be raised depends on general energy pricing policy. At the same time, considerably more resources must be made available for investment in the construction and modernization of rail transport and local transport systems. If an ecologically appropriate price structure prevails here, too, private industry will become more attracted. There is no reason why the railways and buses should remain the preserve of the state.

John Whitelegg has presented a proposal to the hearing which has so far not been discussed in great depth in Europe. The proposal is concerned mainly with long-distance goods transport by road and it involves a weight-distance tax. Taxes of this nature are already in force in ten states of the USA, in Sweden and in New Zealand. In France and Portugal, too, there are similar taxes. The advantage of this sort of tax is that it has an immediate effect on the cost of long-distance transport and the only way of avoiding paying the tax is by cutting back on road transport. One important aspect of this is that energy consumption is correctly identified as only one problem of the transport of goods by road.

4. AGRICULTURAL POLICY

Reducing intensification

Agriculture is one of the sectors in the economy which has experienced the highest increase in productivity. The main reasons for this are mechanization and a massive increase in the use of fertilizers and pesticides. Since agricultural policy is also conceived in terms of an income policy for the agricultural community, increased productivity was not able to effect a drop in market prices but has led - quite rationally as far as the individual farmer is concerned - to increased production quantities with serious economic consequences. Examples of this are the decline in the number of species, the pollution of water by nutrients, particularly nitrates from liquid manure and chemical fertilizers, and land erosion and compression as a result of the use of agricultural machinery.

The objective of an agricultural policy geared towards protection of the environment must primarily be to reduce over-intensive agricultural production. With that in mind, as a first step, all regulations should be examined and, if necessary, amended if they encourage intensive farming. In addition to set-aside, the objective should be extensification.

Seeking sustainability

This objective should not be regulated, implemented and monitored down to the last detail but should be achieved, as far as possible, by establishing the appropriate framework conditions for European agriculture. This clearly requires the application of economic instruments and fiscal incentives. A tax on nitrogen should be introduced as a priority, and this would gradually make production based on extensification profitable in accounting terms, too. Only by establishing standards of this kind will it be possible not only to introduce a greater degree of market economy into agriculture but also to instigate, on this basis, efforts at local level to establish methods of sustainable resource management.

The scope for nitrogen and pesticide taxes is discussed by Alex Dubgaard in his paper. On the basis of experience in Denmark and theoretical considerations, he proposes levies on fertilizers and pesticides and, as an alternative, tradable quotas as a means of regulating quantities. The advantage of the latter is that it has less effect than taxes on farmers' incomes. The overall objective is to transform existing support programmes into environmental incentives. This relieves the problem of surpluses which are becoming increasingly important in connection with international trade agreements.

5. WASTE MANAGEMENT

About 2.2 billion tonnes of waste are currently produced in the Community and waste incineration can shift the problem into air pollution. There is limited capacity for its proper disposal. Harmless incineration is by no means a certainty. There is also a great danger that the way in which we dispose of waste today could result in an inherited problem for future generations. The priority here must therefore be to avoid producing waste.

What is waste?

Waste is not a concept that can be immutably defined once and for all. In economic terms, waste is fundamentally a question of relative costs and production techniques, each of which influences the other. That is to say that the production techniques which are prevalent today and the related use particularly of raw materials, are inextricably linked with current costs. Higher relative costs for raw materials and energy will therefore produce new solutions throughout the economy. Waste will then be defined differently in economic terms.

The path to an economy based on recycling

The basis for a market economy strategy of waste avoidance has to be production input costs. It should not be forgotten that current raw material costs reflect little more than the costs of extraction. They provide no indication either of scarcity in the medium or long term, or of the costs of 'disposing' of them as waste. It is therefore proposed that the costs of the most important non-renewable raw materials should be increased by taxation, gradually and in a way that can be anticipated by all market operators. A strategy of this kind must be supplemented by regulation of the remaining 'residual materials', and here again costs - namely the costs of long-term disposal and the full costs of incineration plant - should be emphasized to encourage the avoidance of waste. Werner Schenkel discusses these costs in more detail (e.g. including the groundwater risks of disposal). The cost of disposal of domestic waste should be 20 times higher and those of disposal of special waste 100 times higher. A disposal levy of this nature would concentrate the economic tension of everyone on the objective of waste avoidance. This objective can also be achieved by making it incumbent on producers to take back their products after they have been used. This will compel them to take recycling into account in the design of their products.

These strategies will act as a spur which will bring our modern economies closer to the objective of sustainable management of resources. The throw-away economy will become a recycling economy which takes care of its resources, and which does so without the State becoming involved in details, but on the basis of the economic interests of industry as a whole.

CONCLUSION

In terms of a social objective, methods of sustainable economic development place special demands on environmental policy instruments. The old dispute of economic and fiscal incentives versus detailed administrative rules appears in a new light. While previously it was characterized by legitimate concern at over-regulation of the economy, dynamic factors are now, additionally, coming to the fore.

It is now clear that the traditional procedure for administering the scarce resource of the environment, on the basis of mainly technical standards as well as an environmental policy objective founded on the technically feasible, is no longer sufficient.

Environmental policy must now open itself up to the principles of the market economy, not only for reasons of economic efficiency but also in order to achieve sustainable resource management. Its objective must be to mobilize the whole range of economic interests in the search for new ecological solutions and to use competition, too, as a tried and tested means of establishing such solutions. General economic incentives must therefore be at the centre of environmental policy. Only a pricing system will make it possible to avoid the otherwise inevitable subsequent imposition of a controlled economy in terms of environmental policy.

ECONOMIC INCENTIVES AND ENVIRONMENTAL POLICY

by Wilfred BECKERMAN, Fellow of Balliol College, Oxford.

(Talk to Committee on the Environment, Public Health and Consumer Protection of the European Parliament, Brussels, 21 June 1990)

Since I have very little time at my disposal and I would like to concentrate almost exclusively on the role of economic incentives on achieving environmental objectives I shall say very little about the other topics that, according to the programme of this session, I am expected to talk about. As far as sustainable economic development is concerned I shall limit myself to one or two very brief introductory remarks. Since I shall confine myself to criticisms of the value of this concept the brevity of my remarks may mean that I fail to do justice to its merits.

First, I have seen several different interpretations of the concept of 'sustainable' development but have yet to see one that can be of much guidance in the formulation of practical environmental policy - or that even looks like a promising starting point for helping in the formulation of environmental policy. Most interpretations and definitions of 'sustainable economic development' emphasise the goal of ensuring that future generations are able to satisfy their 'needs'. But the concept of 'needs' is one that raises innumerable difficult philosophical questions.

It seems to me that the introduction of the concept of sustainable development will not advance us at all in the search for socially desirable environmental policy until some answers are given to questions such as:-

- (i) how to distinguish between 'needs', 'wants' and 'desires'?
 - (ii) which 'needs' have to be satisfied? Without some precise answer to this question the concept of sustainable development does not help us define how far society current generations ought to make sacrifices in the interests of satisfying the environmental needs of future generations;
- and
- (iii) how does one trade off one component of the environment against another, not to mention how does one trade-off some environmental assets against man-made assets, many of which may be the source, directly or indirectly, of equally desirable enhancements in the quality of life?

And, as far as I can see, much of the publicity given to the concept of sustainable development does not even begin to ask these questions, let alone answer them.

Closely related to this is the fashionable attack on the concept of national income, or GNP. It is widely asserted that economists are largely

responsible for disseminating the view that the only valid objective of policy is to maximise national income - or, in some versions, its rate of growth. Of course, nothing could be further from the truth. It was the great British economist, Pigou, in his book The economics of welfare (1st edition, Macmillan, 1920) who first emphasised the distinction between economic and non-economic welfare. According to Pigou, economic welfare was that part of total welfare that "... could be brought into relation with the measuring rod of money". It is this alone that national income attempts to measure, and the literature of national income -including a textbook on the subject that I published in 1968 - emphasises this point and the numerous crucial value judgements involved in the concept of national income.

Pigou also went on to emphasise, with a degree of learning, wisdom and insight that is rarely matched in most of the critical literature, that there might sometimes be a conflict between economic and non-economic welfare. All economists, therefore, at least all well-educated economists, are well aware that economic welfare is only one component of welfare and that it may often conflict with other components of welfare that are often more important. These do not merely include the environment, they include also conditions of work, international peace and security, absence of violence domestically, and social harmony and mutual tolerance in all fields of human activity and relations.

So much for the fashionable concerns of many environmental movements. What the economist tries to do is to see how far perfectly legitimate environmental concerns can be handled in terms of economic analysis with a view to arriving at clear principles for policy guidance. The starting point is not too difficult. For it boils down to the simple proposition that the environment is a resource, like any other resource, and that since access to it forms part of peoples' welfare it should only be used up up to the point where the loss of welfare to society from using it up is matched by the gain to society from using it up.

At this point many people are immediately offended by the notion that there can be any gain to society from using up the environment. But a little reflection will, I hope, convince them that this is not the case. In the first place, Mankind has always used his environment. The first homo sapiens sapiens were forced to live a nomadic existence and to be limited to fairly small communities since their means of livelihood were restricted to hunting and eating certain locally available grasses. As they exhausted these sources of nourishment in their local environments they then moved on. When they learnt how to cultivate grasses they were able to become more settled and to live in large communities. At the same time this still involved using the environment in one way or the other, either for food or for heat or dwellings.

In modern industrial economies the use of the environment is, of course, on an incomparably greater scale, which is why we are far more concerned with it. But the basic principle is the same. For clean air or clean water, for example, are environmental assets and insofar as modern industrial and agricultural activities pollute the air or the water they are using up these components of the environment. This did not matter so much when clean air or clean water were so abundant that nobody suffered from the loss of it, but in many parts of the world this is no longer the case, and certain forms of pollution, such as the 'greenhouse' gases, threaten to have effects on the environment which will be felt by the population of the whole world.

Today probably all modern industrial and agricultural activities make use of the environment as an input into their productive activities one way or the other. The environment is a factor of production for them. Hence, if they were induced, by one means or another, to reduce their use of the environment they would have to try to replace it by substituting other factors of production - such as labour, capital goods, or raw materials. As I shall explain in due course, this may well increase overall welfare, since the cost to society of using more of the other factors of production to achieve its output may be less, up to a point, than the loss of welfare that society may incur from the destruction of the environment. But this does not detract from the proposition that insofar as they have to replace use of the environment in their productive activities by the use of more labour or capital or raw materials these other factors of production will not be available to society for other purposes. In short, other things being equal, society will be able to produce less of other goods and services - whether they be clothes or food or schools or hospitals or housing or Hi-Fi equipment or whatever it is that contributes to society's economic welfare. Some people may pretend to despise these other uses of resources but most people in the world, particularly those living in poverty, happen to want a lot more of the basic goods that have to be provided with the aid of labour and capital.

Of course, other things will not remain equal and the gradual growth of productivity and technical progress will usually ensure that economic output of the conventional kind will continue to rise. Nevertheless, it remains true that, for a given level of technological knowledge and a given supply of all factors of production, the less use is made of the environment and the more it is replaced as an input into the productive process by labour and capital, the less labour and capital is available for other goods which would also have added to overall welfare one way or another.

Hence, let there be no mistake about it. Reducing environmental pollution has a social cost. This is the same as saying that pollution has a social benefit - much as this proposition may shock some environmentalists. Consequently, it is unfortunate that there is a widespread tendency in public debate to refer to polluters as if they were engaged on some wicked activity and to those who suffer from pollution as innocent victims of this wicked activity. Using up the environment releases resources for other uses, which will add to welfare. But, of course, as I indicated above, using the environment also has a social cost. The whole problem is to find the right balance. At this point social welfare is maximised. It is conceivable that some people may not regard the maximisation of social welfare as a desirable objective to start with. But if - as I suspect almost everybody does - you subscribe to the objective of maximising social welfare, defined as widely as you like, then you should want to use the environment up to the point where the contribution to welfare through economising in other resources made by a further unit of pollution would be just outweighed by the damage to social welfare made by this extra unit of pollution.

As pointed out in Dr Maier-Rigaud's paper, with most private goods and services the market mechanism tends to bring about the right balance and to ensure that such goods and services are produced up to the point where the costs of producing them is equal to their benefits. Why does this not happen in the case of pollution of the environment? Why don't firms, say, only use the environment up to the point where the social benefits of doing so equal the social costs? This amounts to asking the question why don't firms only use the environment up the point where the costs to them of not using it would be less than the damage that their use of the environment inflicts on society?

As soon as one poses the question in this way the answer is obvious to anybody and one does not have to be an economist to see what it is. The answer is simply that the firm does not usually have to pay for its use of the environment. Since it usually pays nothing for it, it will use the environment as long as there is the slightest gain to it in doing so - i.e. even where this gain is far less than the social cost. The basic theory of what is known as 'welfare economics' - of which the Pigou book I referred to above was the first full exposition - sets out numerous conditions that have to be satisfied in order to ensure that a free market will lead to a socially optimal allocation of resources between different uses. Hardly any of these conditions are satisfied fully, and in the case of the environment one of them is rarely satisfied at all. This is the condition that there must be a market in all goods and services relevant to the allocation of resources.

This indicates at once why, in general, a firm will not bear the cost of using the environment. For, in general, nobody owns it. In general there are no 'property rights' in the environment. Consequently, in general, there is no market in it. And if nobody owns it anybody can come along and use it up free of charge. If, instead, the people who are harmed by use of the environment, who, for the sake of simplifying the argument, we shall call the 'victims', had property rights in it, it might be possible to set up a market in which they would sell some of their property rights in it. In other words they would allow polluters to buy the right to pollute provided they paid enough. In general, and subject to various assumptions which I shall not go into here, the price would be fixed at the point where their loss of welfare from a marginal unit of pollution was just compensated by their gain in welfare from their sale of it to the polluters. In this way social welfare would be maximised.

This way of looking at the problem indicates the lines on which one ought to be thinking in devising policies to deal with the problem of environmental pollution. For it seems to follow from the above that the solution must consist of making polluters pay for their pollution. It happens to be true that it may not matter much if it is the polluter who pays or the victims. There is a classic theorem in economics, known as 'the Coase theorem' after the economist R.H. Coase who published a seminal article on the subject in 1960, to the effect that as long as the property rights in the environment are clearly defined the market will lead to an optimal solution irrespective of to whom the property rights are assigned. Thus, for example, if the polluter had clearly defined property rights in the environment then it would be theoretically possible for the victims to get together into some sort of association in order to bargain with the polluter and reach some mutually acceptable deal whereby the polluter agreed to reduce his pollution in return for some payment. In other words the polluter would sell his property rights in the environment. Indeed, there are some instances where some such transactions may indeed take place.

But, for various reasons - notably high transactions costs - such a solution is rarely feasible. Instead, therefore, the optimal solution is for some authority to intervene to set a price on pollution that the polluter has to pay. If the correct price is set then the polluter will finish up reducing his pollution to the socially optimal point as defined above. Of course, there are innumerable practical difficulties in trying to find the correct price and one should have no illusions about this. Unfortunately these and other difficulties have often been alleged to be sufficient justification for an alternative approach, namely quantitative rules and regulations and standards governing pollution control.

In general there is no justification for preferring the so-called 'command and control' approach. It is true that one cannot know exactly what pollution charge should be imposed on polluters. But for the very same reason one cannot know exactly what is the socially optimal level of pollution that should be permitted. The two ways of looking at the optimal level of pollution - in terms of quantities or in terms of the optimal charge - are just different ways of guessing the point at which the marginal social benefits of pollution equal the marginal social costs. If one cannot estimate this optimal point accurately one cannot estimate either its price dimension or its quantity dimension.

And, at the same time, if one has to get it wrong - as one does - there are lots of advantages in getting it wrong the charges way rather than getting it wrong the command and control way - as the disastrous experience of the East European economies now demonstrate clearly to the whole world. With pollution charges, one can at least be confident that such pollution abatement as is carried out will be achieved at less cost than with the command and control method. With the latter there is no mechanism to ensure that pollution abatement is carried out most in firms that can do so at least cost. By contrast, if firms have to pay a charge for using the environment, those who can reduce pollution cheaply will prefer to reduce pollution more than the firms who would find it very expensive to do so. In other words pollution abatement will tend to be concentrated on those firms that can carry it out at least cost. Hence, a given amount of pollution abatement will be achieved at lower cost to society as a whole. This amounts to saying that, for a given real cost to society, more pollution abatement can be carried out. Hence, those who profess to be most concerned with the environment ought to be strongest in their support for this price mechanism approach to environmental protection.

Furthermore, the pollution charge approach provides a continuous incentive to firms to find ways to economise in their use of the environment, for which they will have to pay in the same way that they have to pay for their use of labour and capital and raw materials. One would thus achieve not only economies in the reduction of pollution for any given degree of technical knowledge but, in addition, much greater progress in pollution abatement technology.

Of course, numerous other objections have been raised to the use of pollution charges, and I do not have time here to go through them all. I did try to answer most of them in the Minority Report of the 2nd Report of the Royal Commission on Environmental Pollution (H.M.S.O London, 1972) and in a pamphlet I wrote in 1975 called Pricing for Pollution and which has just been reprinted (London, Institute for Economic Affairs, reprinted 1990), so I hope you will not mind if I do not repeat all the arguments contained therein and confine myself to answering specific questions later today.

I would only like to make one amendment to the arguments that I have already set out in these (and other) publications. This concerns the use of what are known as 'tradeable permits'. These are permits to pollute the environment up to a certain fixed quantitative amount that are either auctioned or are distributed to firms who then have a right to buy and sell them amongst each other. This method, which was first suggested in 1968 by a Canadian economist, J.H. Dales (Pollution, property and prices, University of Toronto Press) combines the advantages of the price mechanism - i.e. achieving a given pollution reduction at least cost - with the security of knowing that pollution will not exceed a certain fixed physical limit. How important this latter advantage is depends on one's degree of risk aversion - i.e. how much

latter advantage is depends on one's degree of risk aversion - i.e. how much importance one attaches to the possibility that, through failing to guess the correct pollution charge, the physical amount of pollution may exceed the target amount to an extent that would be very dangerous.

Because of this aspect of the tradeable permit system it has been widely assumed that it is the best system to be used to deal with the international pollution problem associated with the global warming threat. I do not have the time here to go into the economics of global warming and it is anyway outside my terms of reference. But I would like simply to say that, personally, I think that (i) the global warming threat has been greatly exaggerated in the media and the case for early and costly measures to reduce CO2 emissions is by no means clearly established; and (ii) it is an illusion to believe that internationally tradeable permits hold the key to the terribly difficult problems that will have to be faced in attempting to reach some form of international agreement to deal with greenhouse gases, and I suspect that pollution charges associated with special kinds of subsidies to pollution abatement hold out more promise.

By contrast, there are serious problems of local and regional pollution that have to be faced here and now. The whole international aspect of trans-national pollution opens up a host of further difficult issues. Economics can play its part in clarifying many of these issues, I believe, but they are not simple and if I have not spent any time on them today it is not because I want to minimise their importance.

In conclusion, I can only say that the environment is a serious matter and if one wants to make a serious contribution to the formulation of proper policy to deal with it one has to be prepared to understand the basic analysis of the problem. It is not enough to bandy around vague slogans and emotional assertions of one's spiritual purity and dedication to higher values. Rhetoric may be fine on the University campus or the political hustings. But when it gets down to serious policy formulation one has a duty to master the details of the argument. For all their faults, this is one area in which economists can provide some guidance, though it can only be used in conjunction with advice from experts from a variety of other disciplines.

LA GESTION DES PROBLEMES D'ENVIRONNEMENT
A DIMENSION TRANSNATIONALE:
NECESSITE ET LIMITES DES INSTRUMENTS ECONOMIQUES

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1. Une classe de problèmes à structure très spécifique:

Depuis le début des années 1980 plusieurs dossiers, souvent spectaculaires, ont marqué la venue sur le devant de la scène d'une classe de problèmes d'environnement à dimension fortement transnationale (pluies acides, risques nucléaires, ozone et maintenant risques climatiques) dont les modalités de prise en charge collective sont fort problématiques.

Je partirai de l'idée simple que, sauf à adopter un comportement de "laisser-faire, laisser aller" le problème à résoudre est celui des formes de coordination des intérêts et des actions à l'échelle internationale, formes susceptibles de promouvoir ce qu'une part croissante de la littérature désigne sous le vocable de "sustainable development". C'est en effet dans cette perspective que doit être examinée la contribution potentielle des instruments économiques. Mais il convient alors de bien percevoir au préalable en quoi ce type de problème bouscule notablement la structure logique de l'économie de l'environnement telle qu'elle s'est constituée au cours des années soixante et soixante-dix.

Même si ces enseignements n'ont pas, tant s'en faut, été suivis dans les politiques réellement appliquées, même si l'on peut aisément en montrer le caractère réducteur, il reste que cette économie a su produire des concepts de référence pour les débats environnementaux (par exemple le principe "pollueur-payeur") et sous-tendre de politiques souvent efficaces, par exemple dans le domaine de l'eau. Sa structure de raisonnement est très simple :

- la protection de l'environnement doit être, comme les autres biens collectifs, soumise à un arbitrage économique: l'amélioration de la qualité d'environnement est justifiée tant que le coût additionnel qu'elle entraîne reste inférieur aux satisfactions qu'une société en attend (bilan coût/bénéfice). Celles-ci sont certes difficiles à calculer, mais peuvent être "révélées" par exemple en évaluant la disponibilité des différents agents d'une collectivité à payer pour tel ou tel niveau de qualité;

- l'essentiel des dysfonctionnements dans la liaison économie-environnement vient de l'existence "d'externalités", c'est-à-dire du fait que les agents "pollueurs" ne reçoivent pas d'information adéquate sur les dommages qu'ils causent ou peuvent se permettre de les ignorer;

- plusieurs procédures existent pour inciter les agents économiques à "internaliser les externalités" : normes, règlements, subventions, principe pollueur-payeur, marchés de droits à polluer. Même si les pratiques institutionnelles dominantes sont de type juridique et réglementaire, la plupart des économistes de l'environnement y voient des risques de rigidité, d'inefficacité économique, voire d'inéquité ou d'arbitraire. Sauf dans le cas notable de phénomènes irréversibles, d'effets de seuil ou de dérive exponentielle des coûts écologiques, ils privilégient pour leur souplesse les solutions de marché. A travers le principe "pollueur-payeur" par exemple, on inclut le coût des nuisances dans les prix de biens et services, information dont les agents économiques seront forcés de tenir compte dans leurs comportements de production (choix de technologies propres) et de consommation (réduction de la demande de biens et services à fort impact environnemental comme les transports par exemple).

Ce schéma intellectuel suppose, on le voit, des coûts et bénéfices calculables, de même que des acteurs bien identifiés, qu'ils soient pollueurs, pollués ou offreurs de solutions techniques écologiquement saines. Or, l'histoire récente montre que les problèmes d'environnement à dimension transnationale présentent, plus que d'autres, les caractéristiques suivantes :

- situation d'incertitude compliquée ici de la permanence de controverses scientifiques quant à la réalité des nuisances, à leur origine ou à l'efficacité des solutions à même de les réduire. Ce fut et cela reste le cas pour la sécurité nucléaire, pour l'origine de la mort des forêts ou pour le rôle réel des phosphates. Toute la difficulté vient de ce que des décisions doivent être prises avant même qu'un consensus scientifique puisse être atteint; le cas le plus spectaculaire est bien sûr ici celui de l'effet de serre.

- tentation normale et permanente d'instrumentaliser les débats environnementaux, de les mettre au service d'objectifs économiques, industriels et technologiques. L'adjectif "normal" peut surprendre; nous voulons simplement insister sur le fait que nous ne voulons pas juger ici ces pratiques d'un point de vue moral. Elles font partie du jeu naturel des rapports de force et, même si l'on tient compte du progrès dans la déontologie des agents économiques, il reste que le rôle de procédures internationales éventuelles est d'éviter que, dans ces confrontations, la protection de l'environnement ne disparaisse comme objectif en soi.

- non perception directe par la population de la réalité des problèmes; alors que des riverains d'une autoroute, trouvant le bruit insupportable, peuvent faire pression pour la construction de murs anti-bruit et que les automobilistes ou les contribuables acceptent de les payer (péage ou impôts), personne ne se plaindrait de la dégradation de la couche d'ozone ou de l'effet de serre sans l'activité des scientifiques, des médias et des hommes politiques. Ceci rend bien sûr peu fiable l'évaluation monétaire des dommages par des "pollués" qui ne se pensent pas comme tels et dont la sensibilité à une nuisance résulte principalement d'un processus médiatique. Dans bien des cas d'ailleurs, une difficulté supplémentaire surgit du fait que ces "pollués" sont les générations futures et que, dans ce cas, la solution théorique passe par la prise en compte de la solidarité des générations présentes avec ces générations.

Dès lors, c'est la mise en balance monétaire des coûts et bénéfices de la protection de l'environnement qui se trouve largement inapplicable, sinon invalidée au plan théorique. Passer du constat à l'abandon de tout instrument économique de gestion de l'environnement et au recours à une approche purement réglementaire est une démarche fréquente. Trois considérations permettent cependant d'en cerner les limites:

- l'impossibilité d'une évaluation économique standard n'empêche pas que toute décision a un coût et qu'il faut bien trouver des bases pour les arbitrages nécessaires,

- la prise de décision par norme et règlement voire par interdit de tel ou tel type de technique, si elle est très souvent nécessaire (voir le cas des CFC), comporte un risque réel: édicter des règles du jeu en fonction d'un état donné des connaissances et des jeux d'influence, règles susceptibles d'orienter l'innovation technique dans des voies dont les progrès dans la connaissance scientifique démontreraient ultérieurement la non-pertinence;

- dans un contexte international marqué par la compétition économique, et où il n'y a pas d'autorité légitime reconnue dans les domaines qui nous concernent ici, toute proposition de normes environnementales peut être perçue comme une arme en service de tel ou tel groupe d'intérêts; c'est ce que le sociologue français Philippe Roqueplo appelle une perception de "risque inversé", où le danger environnemental n'est plus traité dans sa réalité mais comme simple argument de la concurrence industrielle. La multiplication de telles situations, que nous avons connu lors des controverses sur le pot catalytique comme réponse à la "mort des forêts", aurait pour conséquence de retarder considérablement la réalisation de consensus, donc le traitement des problèmes.

Les impasses d'approches purement réglementaires pour la gestion collective des risques écologiques à dimension transnationale apparaissent donc dans tous les cas où un consensus rapide est hors de portée autour de normes acceptées par chacune des parties prenantes (1). Nous ferons donc l'hypothèse ici que le recours à des instruments économiques mérite alors d'être reconsidéré à condition que le fondement théorique de leur emploi puisse être trouvé ailleurs que dans la problématique classique d'un partage optimal entre des coûts et bénéfices eux-mêmes fortement controversés.

2. Un paramètre clef à intégrer dans les comportements et anticipations des agents économiques: la valeur de la prudence et du temps d'apprentissage.

Même si la théorie de la décision n'est pas si avancée qu'elle puisse prétendre fournir une solution toute faite, elle nous donne un point d'appui non négligeable à partir du concept de

(1) Un bon exemple est ici fourni par l'accord sur l'ozone: le consensus scientifique étant réel sur les risques, les CFC bien identifiés comme facteur responsable, et devant un nombre limité d'industriels et d'Etats concernés, un accord normatif pouvait être atteint sur l'élimination progressive des CFC, et, ce qui est le plus important, appliqué. A l'opposé, devant la pluralité des intérêts engagés, on voit mal tout accord formel sur la réduction des émissions de CO₂ pouvoir être traduit en décisions effectives mondialement acceptées de contingentement de telle ou telle activité.

valeur d'option. Ce concept nous rappelle d'une part le prix qu'il convient de donner au fait de pouvoir décider demain devant une gamme élargie de solutions et en présence d'une information meilleure, d'autre part le coût de toute décision qui nous entraînerait dans des processus irréversibles ou comportant des coûts d'adaptation très élevés.

Ce retrécissement des marges de manoeuvres peut venir de deux types de comportement:

- des "positions d'attente" qui font que lorsque nous disposerons des preuves définitives de la matérialité de tel ou tel danger, il sera trop tard en raison même de l'inertie des phénomènes écologiques et de nos propres temps de réponse

- des décisions prises au nom de l'urgence mais qui, nous fixant de manière précipitée dans des choix technologiques ou institutionnels rigides, nous empêcheraient de tenir compte de l'amélioration de l'information sur la nature des problèmes ou freinerait l'apparition de solutions techniques plus adaptées.

Le seul critère à même de fonder une conduite collective semble donc devoir celui du gain de temps d'apprentissage: ralentir le rythme auquel nous nous rapprochons de risques majeurs mais incertains et controversés et reculer le moment où des paris majeurs difficilement réversibles seraient inéluctables. Il faut bien insister ici sur le fait que ce temps gagné, utilisé pour accroître notre connaissance des phénomènes et élargir la gamme de nos solutions techniques est aussi un temps nécessaire pour assainir et renforcer les bases de la coopération internationale.

Le secteur de l'énergie nous fournit ici un exemple très éclairant avec le dilemme "risques climatiques" versus "risques nucléaires". En l'état actuel des controverses et des données scientifiques, vu l'énormité des intérêts employés, il est à peu près exclu que l'on puisse rapidement obtenir un consensus sur l'arbitrage à faire entre deux types de risques difficilement commensurables et dont la perception varie très fortement selon les pays. Le rythme et l'intensité du premier sont largement inconnus quand la réalité du second peut être nié, malgré Tchernobyl, par les tenants du nucléaire sûr. En revanche, les données scientifiques sont suffisantes pour établir la "présomption de risque" dans les deux cas.

Attendre que se fasse un accord international soit sur les paramètres de comparaison coût/bénéfice (approche économique classique) ou directement sur la nécessité de limiter ou d'interdire le recours à une filière technique précise reviendrait à geler toute action. Dès lors la maîtrise des consommations, la recherche d'une faible élasticité énergie-croissance offre un terrain de consensus rapide puisque qu'elle ralentit la montée en puissance de ces deux risques tout en ne condamnant aucune filière. Le champ reste alors ouvert pour chercher d'un côté les moyens d'une efficacité d'utilisation maximale des énergies fossiles ou le non rejet de CO₂ dans l'atmosphère, de l'autre la mise au point d'un nucléaire intrinsèquement sûr, sans compter évidemment sur les perspectives de percée des énergies nouvelles et renouvelables.

Dans ce contexte, le rôle des instruments économiques apparaît clairement: il s'agit d'inciter à l'exploitation, surtout dans les pays industriels, des potentiels existants de solutions flexibles, rapidement applicables, le plus souvent à coût assez réduit, voire nul ou négatif, et servant de toute façon d'autres objectifs (sécurité, équilibres macroéconomiques), et d'éviter un nouveau dérapage vers des modes de consommation plus intensifs en énergie. Pour ce faire, il convient de corriger les prix de l'énergie tels qu'ils ressortent de l'état du marché à court terme, par un paramètre reflétant la prise de risque à long terme qu'implique la consommation d'énergie.

C'est bien sûr l'évaluation de ce paramètre qui devient alors l'enjeu de tout accord. Il est exclu d'attendre de l'économiste qu'il puisse calculer un tel paramètre; par définition un tel paramètre ne peut venir que de l'expression collective du prix qu'une société est prête à donner à la prudence; sa détermination doit intégrer des données scientifiques mais reste par définition, qu'elle résulte de processus démocratiques technocratiques ou dictatoriaux, préalable à tout calcul économique.

L'économiste peut alors simplement aider à en clarifier les termes. Pour rester sur notre exemple de l'énergie, un débat vif se cristallise aux USA autour d'une projection des coûts macroéconomiques à très long terme d'une politique de limitation des émissions de CO₂ (2). La polémique vient de ce que le coût estimé reviendrait à 4% du PIB américain à 2030 et 2% à 2100, chiffre qui est perçu comme énorme et susceptible de décourager toute action préventive face à un risque incertain et qui entraîne donc, de la part des milieux convaincus de la nécessité d'une telle action, une vive critique de la fiabilité de l'étude. En fait, en admettant tels quels ces résultats, la question à poser ici est de savoir, par exemple en Europe de l'Ouest, si les 0,001% de croissance annuelle ainsi sacrifiés à horizon 2030 ne sont pas finalement un coût acceptable pour une assurance devant des risques potentiels. C'est ici que se situe le choix central à partir duquel il est possible d'étudier le contenu et le niveau des instruments économiques à même de traduire un tel effort dans la pratique, pour maximiser son efficacité.

3. Des instruments nécessaires mais non suffisants

Dans la problématique qui vient d'être suggérée, la sélection des outils pertinents pour la prise en charge des risques environnementaux doit donc intégrer le fait que les acteurs économiques doivent recevoir, de manière décentralisée, les impulsions nécessaires, celles-ci devant simultanément:

a) infléchir les comportements immédiats de consommation et de production,

(2) Je n'en citerai pas les protagonistes ici car je ne veux ni prendre parti ni discuter de la validité de l'étude mais simplement illustrer la nature du problème posé.

b) éclairer les anticipations des acteurs dont les choix déterminent l'univers des possibles à long terme (recherche-développement, infrastructures) par un signal clair sur les risques et contraintes à long terme,

c) éviter l'engagement prématuré dans des options technologiques ou institutionnelles lourdes et rigides, afin de pouvoir mettre à profit, le moment venu, le temps d'apprentissage acquis; à cette fin, sauf dans les cas où un produit ou une technique sont intrinsèquement "nocifs", il convient d'entretenir la pluralité des options en rapprochant le niveau des efforts de R & D qui leur sont respectivement consacrés.

Par ailleurs, pour ne pas perdre de temps dans la mise en place de stratégies préventives, il convient de mettre l'accent sur des critères d'acceptabilité que l'on peut résumer ainsi:

- respect des souverainetés (ou jeu sur les domaines où une autolimitation est aisément concédable) pour minimiser les controverses de légitimité,

- équité dans la répartition des efforts, y compris les effets secondaires de telle ou telle action,

- progressivité dans la mise en oeuvre, ceci pour minimiser les coûts d'adaptation et donner à chaque partenaire le temps de vérifier le sérieux de l'engagement de chacun,

- praticabilité en utilisant au maximum les savoir-faire administratifs existants et en minimisant les coûts de contrôle et de gestion.

Ces critères permettent de clarifier quelque peu le débat sur le choix à faire entre les outils institutionnels les plus couramment envisagés (droits à polluer, taxes incitatives, taxes additionnelles affectées, subventions) et de préciser le statut de mesures d'accompagnement (information, formation, normes et règlements) dont on verra qu'elles sont nécessaires.

La formule des droits d'émission échangeables permet théoriquement d'obtenir de façon certaine un niveau déterminé d'émissions sans que l'autorité tutélaire ait besoin de connaître les fonctions de coûts de chaque agent; elle permet une efficacité maximale de l'effort de réduction des émissions puisque les agents disposant d'alternatives techniques à bas coût peuvent procéder à une réduction importante de leurs émissions et céder leurs droits aux agents soumis à des rigidités techniques plus importantes. Séduisante en son principe, cette formule donne cependant lieu à de fréquents contresens en étant perçue comme la forme même d'une solution de marché:

- aux USA, seul pays présentant quelques expériences en vraie grandeur, ce mécanisme a, en fait, été jusqu'à présent un moyen d'introduire un peu de souplesse dans un système très strictement réglementé par des normes (d'émission et de qualité du milieu) et par des autorisations et contrôles administratifs très lourds,

- l'avantage attendu sur le faible niveau d'information nécessaire pour agir semble contrebalancé par la lourdeur des contrôles nécessaires pour vérifier que les agents disposent de droits correspondant à leurs émissions. Dans le cas de la pollution atmosphérique aux USA, les coûts d'information, les coûts et délais de contrôle administratif, les coûts de transaction, les stratégies de rétention des droits comptent parmi les facteurs ayant limité les échanges, la plupart des transactions effectives se sont déroulées à l'intérieur d'une même installation, entre plusieurs sources, ou à l'intérieur d'une même firme, entre plusieurs établissements. On n'a donc pas jusqu'à présent d'expérience d'un véritable marché.

- pour mettre sur pied un mécanisme de droits échangeables, on doit spécifier préalablement un ensemble de variables qui toutes posent des problèmes difficiles de légitimité: les règles d'allocation initiale des droits, les règles de durée de validité des droits, les règles d'émission ou de résorption ultérieures des droits, l'identité des agents ayant accès au système, la nature de l'autorité institutionnelle assurant son fonctionnement, l'étendue ou la limitation des possibilités d'échange, les formes de pénalisation en cas de dépassement des droits, les règles de comportement envers les pays qui n'auraient pas adhéré au mécanisme. Pour s'en tenir à un exemple simple, aucune règle de répartition initiale entre pays des droits d'émission de CO₂ (prorata des émissions actuelles, quota par habitant, par unité de superficie, par unité de PNB, en fonction des projets de croissance, ou simplement mise aux enchères internationales) ne satisfait aux critères de fondement rationnel justifiable, de simplicité suffisante pour être maniable dans le cadre d'une négociation internationale et d'absence d'effets pervers sur les incitations.

En d'autres termes, la référence au marché dans le fonctionnement de tels systèmes n'empêche pas qu'il s'agisse de systèmes administrativement et politiquement très régulés, dont la mise en place à l'échelle internationale risque d'entraîner une négociation hasardeuse et longue de même que la mise en place d'institutions nouvelles. On attirera donc l'attention sur les risques d'une transposition trop rapide à l'échelle planétaire d'une formule insuffisamment expérimentée à l'échelle locale et régionale. Que des pratiques s'inspirant de ces principes puissent être développées à cette échelle fait partie des possibilités à examiner, qu'elles puissent fonder une gestion internationale semble plus délicat.

Le deuxième type d'outil économique mobilisable serait un système de taxes incitatives non affectées sur les activités polluantes. Dans la mesure où ces taxes ne peuvent être fondées sur le schéma pigouvien de l'internalisation des effets externes visant la réduction des écarts entre coûts et bénéfices privés et coûts et bénéfices sociaux, ces taxes doivent représenter le coût d'option intégrant le prix de la prudence face à des risques majeurs et la valeur escomptée des progrès attendus de l'information sur les données du problème et sur les moyens d'y répondre.

Parler de taxe non affectée signifie bien sûr que l'on raisonne à prélèvements obligatoires constants (impôts plus cotisations sociales) soit par une diminution des taxes sur des substituts moins polluants, soit par une diminution de la fiscalité générale sur les biens et services. En dehors de son aspect incitatif, cette formule présente l'avantage d'offrir une

solution partielle au problème de la base sur laquelle il est légitime d'asseoir les ressources fiscales dans un contexte de mise en concurrence croissante des économies qui aboutit à réduire l'imposition sur le capital et les revenus, et à faire porter l'effort sur la seule valeur ajoutée et donc sur l'emploi.

Une telle formule présente des avantages significatifs : instrument techniquement maîtrisable, son coût administratif est réduit, puisqu'il repose sur l'utilisation des circuits existants; il peut entrer rapidement dans les faits avec la progressivité désirée; la maîtrise de son niveau permet de construire la prévisibilité stratégique requise; ses effets sont cernables par des études économiques standard.

L'intérêt d'une telle approche peut être mis en évidence sur le dossier de l'énergie que nous avons déjà utilisé comme exemple. Alors qu'il est difficile d'imaginer un accord portant directement sur des objectifs par pays pour la réduction des émissions de CO₂ ou des risques nucléaires, ou en tous cas d'accord accompagné de garanties d'application, il devient envisageable de s'entendre sur une taxe unique sur l'énergie pour inciter à un mode de développement sobre en énergie, c'est-à-dire en fait sur une "règle du jeu" permettant de mettre rapidement en oeuvre le sous ensemble de solutions susceptible de faire objet de consensus.

Deux arguments doivent cependant être examinés, qui vont à l'encontre de cette hypothèse de taxe non-affectée:

- le premier, aisément contournable, a trait aux possibilités de distorsions de la concurrence internationale: s'il est vrai que, pour les grands dossiers, la voie fiscale ne pourrait être suivie que de manière concertée à l'échelle internationale, on peut penser à un effet de démonstration lancé dans le cadre de la CEE par exemple et qui s'appuyerait sur les démarches d'harmonisation actuellement en cours. Une marge importante de progressivité dans l'extension progressive de tels systèmes pourrait être par ailleurs trouvée, dans le cadre du GATT, en imposant des taxes compensatoires à proportion de la nocivité des produits, aux importations en provenance de pays n'ayant pas adhéré au système.

- le deuxième est celui du montant auquel fixer de telles taxes pour que l'effet d'incitation joue vraiment. Pour beaucoup d'experts un tel effet ne saurait être atteint qu'en fixant ces taxes à des niveaux totalement prohibitifs risquant de mettre en cause l'acceptabilité des systèmes. L'argument est recevable si l'on attend des adaptations en jouant sur les "effets-prix" purs; les rigidités techniques, les manques d'information, le fait comptable qu'il faut une taxation importante pour que l'impact soit notable sur les prix et coûts globaux des produits et techniques, les contraintes financières contraignent très fortement les comportements d'adaptation. C'est pourquoi, cet argument renvoie à un problème de fonds qui est celui de ce qu'on peut attendre des instruments économiques, et finalement de leur statut dans la panoplie des dispositifs possibles.

Là encore, on peut s'aider de l'histoire énergétique récente. Le découplage énergie-croissance sur la période 1973-1987 est bien sûr corrélatif des chocs pétroliers; mais on sait aussi qu'il a mis en jeu, à côté de l'effet prix, des éléments aussi importants que le progrès technique autonome incorporé dans les nouvelles générations d'équipement, les changements structurels dans le secteur industriel, et les politiques plus ou moins volontaristes lancées dans les années soixante-dix en matière d'économie d'énergie (incitations fiscales, labels, assistance techniques etc..;).

En d'autres termes le niveau de taxation incitative à fixer est largement fonction des mesures d'accompagnement qui déterminent la qualité de la réponse aux prix. C'est pourquoi, le débat opposant de façon systématique le jeu sur les prix relatifs (par voie fiscale ou comme résultat des marchés de droits), aux subventions et mesures non-économiques doit être relativisé. Alors que les deux derniers éléments sont le plus souvent disqualifiés par une partie de la littérature économique, le bilan qu'on peut faire des pratiques réelles en matière d'environnement et d'énergie, nous rappelle l'attention qu'il convient de porter à ce qu'on pourrait appeler "la construction du marché": celle-ci passe par un ensemble d'actions visant la recherche technologique, la diffusion de l'information, la définition de normes techniques et de labels de qualité, la structuration de réseaux techniques compétents et la mise sur pied de procédures ad hoc de financement. A l'inverse, le signal-prix est indispensable, à court terme, pour réguler efficacement les arbitrages microéconomiques et pour donner leur pleine efficacité aux autres mesures d'accompagnement. Au niveau international, il existe cependant une différence de statut entre ces deux ensembles de mesures tous deux nécessaires: les instruments économiques doivent nécessairement faire l'objet d'un accord international (taxe unique sur les émissions de CO₂ par exemple) alors que les mesures d'accompagnement ne peuvent le plus souvent que relever de décisions nationales.

C'est dans cette démarche de "construction du marché" qu'il convient de souligner l'intérêt de subventions d'investissement financées par des taxes affectées. Ces formules sont fréquemment critiquées sous deux angles d'attaque: le fait qu'une fois lancées elles perdurent sans qu'on puisse toujours mesurer leur efficacité spécifique, le fait qu'elles introduisent des distorsions dans le jeu du marché. Si le premier argument pose le problème bien connu de l'autonomisation de dispositifs administratifs, le second mérite d'être réexaminé dans tous les cas où il s'agit de réparer des asymétries dans les moyens d'accès au capital. Très souvent en effet, une alternative technique très efficace microéconomiquement ne peut être diffusée parce que les agents économiques pour lesquels elle serait rentable à long terme ne disposent pas des moyens de la financer. Le cas classique est bien sûr celui des opérations de conservation de l'énergie (renouvellement de la chaudière par exemple) pour les ménages ayant acheté leur logement en épuisant leurs possibilités de recours au crédit. A l'échelle internationale un accord sur de tels systèmes ne peut qu'être partiel; il ne peut porter que sur l'assiette et le niveau de la taxe, plus difficilement sur ces conditions d'utilisation puisque, pour être efficace, on doit ici coller au mieux aux réalités socio-économiques locales. En revanche, puisque des considérations d'équité sont une condition incontournable pour la participation des pays les plus pauvres à une politique de prévention des risques globaux, on

ne doit pas exclure la possibilité de créer des fonds internationaux spécifiques les aidant à dépasser les contraintes sur lesquelles ils buteront pour financer les adaptations nécessaires.

CONCLUSION

Nous avons mis ici l'accent sur les instruments économiques de gestion des risques écologiques transnationaux dans la mesure où ceux-ci peuvent à la fois faciliter des accords dans des domaines scientifiquement très controversés et apporter des garanties d'application des efforts de prévention. Il nous faut cependant souligner ici que la mise en place de tels éléments ne représente qu'une partie des dispositifs nécessaires. Des éléments aussi déterminants à long terme que les infrastructures de transport, la dynamique urbaine ou la forme du progrès technique dans l'agriculture, pour énumérer quelques domaines majeurs, dépendent largement de décisions et comportements autonomes par rapport aux strictes incitations économiques. On ne pense pas par exemple aux coûts énergétiques dans les plans d'urbanisation qui déterminent pourtant l'ampleur des déplacements domicile-travail-loisirs et aucune taxe ne suffira à modifier les trajectoires en cours en jouant sur les seuls paramètres microéconomiques. Il y a là tout un ensemble de leviers décisifs à actionner mais sur lesquels il semble difficile d'agir à travers un accord international. Par rapport à eux, l'intérêt des instruments économiques serait simplement de créer un contexte où la valeur des risques écologiques à long terme serait affichée de façon suffisamment claire pour que, même non contraints par la logique microéconomique statique, tous les agents porteurs de ce type de décision structurante à long terme les intègrent peu à peu dans leur comportement. C'est l'effet dynamique lié à la présence d'un contexte d'anticipations collectives matérialisé par des signaux-prix clairs qui doit être recherché ici ce qui n'empêche pas, bien au contraire que l'on réfléchisse, à l'échelle des Etats nationaux ou des ensembles comme les Communautés Européennes sur des politiques de structure sans lesquelles une part importante de l'efficacité de ces signaux risque d'être perdue.

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Committee on the Environment, Public Health and
Consumer Protection

Hearing of the European Parliament on "Economic and
fiscal incentives to promote Environmental Policy
Objectives" in Brüssel.

Session I

21.6.1990

16.10 Uhr: On economic damages of pollution

Herr Vorsitzender,

um etwas über die ökonomische Dimension von Umweltnutzungen, von Umweltschäden und Umweltbelastungen aussagen zu können, muß man sie kennen.

Es gibt für die Bundesrepublik Deutschland inzwischen eine ganze Reihe von Arbeiten, die die Umweltschäden auf Teilgebieten beschrieben und auch monetär bewertet haben. Und es gibt auch umfassendere Ansätze, die über die Addition sogenannter "defensiver Kosten" bei Leipert oder über Umfragen zur Zahlungsbereitschaft für Umweltverbesserungen bei Wicke zu einem Anteil von rund 10 % des Sozialprodukts kommen. Es geht also um eine beträchtliche Größenordnung (200 Mrd. DM).

Ich möchte in meinem Beitrag auf drei Punkte eingehen, die sich mit den Informationen beschäftigen, die zu einer aktiven Umweltpolitik oder zu einer Wirtschaftspolitik benötigt werden, die auch ökologische Belange berücksichtigt. Zu Fragen des wirtschafts- und umweltpolitischen Instrumentariums werde ich mich dagegen nicht äußern.

1. Meine erste Bemerkung bezieht sich auf die Frage, welche Informationen bereitgestellt werden müssen, wenn die Beanspruchung von Umwelt und Natur in politische Überlegungen einbezogen werden sollen.

Die menschlichen Aktivitäten benutzen die Umwelt in dreifacher Weise:

- Die Umwelt dient als Lieferant von Rohstoffen aller Art.
- Die Umwelt nimmt Abfälle und Emissionen aller Art auf.
- Die Umwelt dient als Lebensraum und Standort.

Daraus ergibt sich, daß Informationen über den Verbrauch von regenerierbaren und nichtregenerierbaren Ressourcen, die Emissionen, die im Zuge der Produktion und bestimmter Verbrauchsprozesse entstehen, und die Nutzung der Umwelt von Interesse sind. Diese Angaben werden ergänzt durch Daten über die Immissionslage und durch Angaben über die Ausgaben für den Umweltschutz, die schon zur Emissionsminderung und zur Sanierung der Umwelt vorgenommen werden.

Die Anforderungen an ein entsprechendes Berichtssystem mit Umweltinformationen, in dem die zahlreichen Einzelinformationen zeitlich und geographisch zu entsprechenden Durchschnittsdaten verdichtet sind, kommen von zwei Seiten.

Erstens benötigt man stark aggregierte Angaben, die es ermöglichen, die traditionellen wirtschaftspolitischen Ziele um den Umweltaspekt zu ergänzen.

Die vier klassischen Ziele

- Wirtschaftswachstum
- Preisstabilität
- außenwirtschaftliches Gleichgewicht
- Vollbeschäftigung
- und - häufig vergessen - Zeitallokation
(also der Grad der Erwerbsbeteiligung, die Relation zwischen Arbeitszeit und Freizeit usw.)

vernachlässigen in ihrer Kombination die Umweltprobleme. Bezieht man das Feld der Umweltprobleme in die Betrachtung ein, dann können drei weitere Zielsetzungen formuliert werden:

- Sparsamer Verbrauch nichtregenerierbarer Ressourcen und Beschränkung des Verbrauchs regenerierbarer Ressourcen auf den in der Periode netto hinzuwachsenden Teil,
- möglichst weitgehende Vermeidung von Abfällen und Emissionen aller Art, weitgehende Entsorgung und Recycling,
- ökologisch schonende Behandlung der Natur als Lebensraum und als Standort für menschliche Aktivitäten.

Über diesen Zielen steht noch eine Reihe von Grundzielen wie Leben und Gesundheit, Eigentum, Entscheidungs- und Vertragsfreiheit und Stabilität des gesellschaftlichen Systems.

Alle diese Ziele stehen in einem bestimmten Verhältnis zueinander, meist konkurrieren sie miteinander. Jedes dieser Ziele kann in bestimmten Situationen stark gefährdet sein. Es ist dann Aufgabe der Wirtschafts- und Umweltpolitik, die Relation zwischen den acht genannten Zielen zu verbessern.

Die zweite Anforderung an die Informationen resultiert aus der Notwendigkeit einer speziellen aktiven Umweltpolitik.

Die meisten der acht eben genannten Ziele regeln sich in marktwirtschaftlich orientierten Wirtschaften ohne staatliche Eingriffe. Das gilt im Prinzip auch für die drei Umweltziele.

Dazu muß man sich klarmachen, daß sich Knappheiten und Überlastungen im Umweltbereich in der Regel auch ökonomisch mit entsprechenden wirtschaftlichen Vorgängen

auswirken, um diese Knappheiten zu beseitigen. Wenn zum Beispiel der Luftraum über einem Flugplatz wegen des Verkehrsaufkommens zu voll ist, wird eine zusätzliche Startbahn gebaut. Das erhöht normalerweise den Flugpreis. Der verminderte Holzeinschlag, der aus der für die neue Startbahn verbrauchten Waldfläche resultiert, führt außerdem tendenziell zu einem höheren Holzpreis.

Das bedeutet: Ökologische Knappheiten führen in der Regel auch zu ökonomischen Knappheiten und werden durch Wettbewerb und Marktpreismechanismen geregelt.

Es sind aber Fälle denkbar, in denen eine derartige marktwirtschaftliche Lösung ökologischer Knappheiten nicht befriedigen kann.

Dazu gehören:

- Umweltbelastungen, die die Gesundheit der Menschen beeinträchtigen,
- Umweltbelastungen, die nach dem heutigen Stand der Technik und Wissenschaft irreversible Schäden anrichten (wie z.B. Quecksilber im Trinkwasser, Verschmutzung der Weltmeere),
- Umweltbelastungen, bei denen wir vermuten müssen, daß sie unerwünschte oder katastrophale Langfristfolgen haben können (z.B. für das Klima, das Ozonloch durch Fluorchlorwasserstoffe, Treibhauseffekte durch Kohlendioxyd).

In solchen Fällen regelt der Markt die Knappheiten zu spät und meist über die Selektion der Nachfrager nach Umweltleistungen, zum Beispiel sterben Menschen an Hunger, wenn infolge Erosion fruchtbare Böden knapp werden, oder die Lebenserwartung von Menschen, die dauernd verschmutztes Wasser trinken, sinkt.

In der neueren Diskussion wurde seit einigen Jahren häufig die Forderung erhoben, die drei Umweltziele müßten im Zuge des Wirtschaftsprozesses so behandelt werden, daß auch in späteren Perioden ein Einkommen in mindestens gleicher Höhe erzielt werden kann. Diese sogenannte nachhaltige Entwicklung (sustainable development) ist also eine Forderung, die aus der allgemeinen Zielsetzung der Stabilität abgeleitet werden kann, sie stellt sozusagen ein Quantifizierungskriterium für die Umweltschonungsziele dar.

Es gibt also eine ganze Reihe von Gründen für eine aktive Umweltpolitik: Einerseits müssen Gesundheit und das Leben der Menschen ohne zeitliche Verzögerung geschützt, irreversible Prozesse in der Natur gestoppt werden und vermutete Langzeitfolgen müssen vermieden werden, andererseits können aus der allgemeinen Forderung nach Stabilität des gesellschaftlichen Systems unter dem Gesichtspunkt des nachhaltigen Wirtschaftens Ziele für einen schonenden Umgang mit den Ressourcen, mit der Kapazität der Natur zur Aufnahme von Abfall und anderen Emissionen und mit der Nutzung der Umwelt als Standort ableiten. Die Knappheit von Umweltleistungen oder die erwarteten Knappheiten müssen in allen diesen Fällen politisch verwaltet werden.

Dazu sind zwei Voraussetzungen zu erfüllen:

- Es müssen politische Entscheidungen über Prioritäten und den angestrebten Umfang der Umweltnutzung sowie die dazu einzusetzenden umweltpolitischen Instrumente getroffen werden. Dazu möchte ich mich hier nicht äußern.
- Es müssen objektive Informationen über den Umweltzustand und die erwarteten Belastungen vorliegen.

Wegen der unterschiedlichen Instrumente im Bereich der Umweltpolitik sind hier Aggregationen weniger nützlich, sondern vielmehr stark gegliederte Angaben gefordert, die untereinander kombiniert werden können. Die Umweltpolitik benötigt zum Beispiel Daten über Emissionen und Ressourcenverbrauch in der Gliederung

nach Produkten,

nach Anlagen,

nach Produktionsprozesse,

nach der Art der Entsorgung,

nach Recyclingsmöglichkeiten.

Diese Angaben müssen ergänzt werden durch weitere Daten, zum Beispiel über die Immissionslage und über die Maßnahmen und Ausgaben zum Umweltschutz.

Und alle Daten müssen regional tief gegliedert werden.

2. Meine 2. Bemerkung bezieht sich auf die Möglichkeiten einer monetären Bewertung

Eine besonders elegante und effiziente Möglichkeit, umweltrelevante Informationen für umweltpolitische incentives nutzbar zu machen, besteht in der monetären Bewertung.

Wenn es gelingt, Umweltbelastungen in Währungseinheiten auszudrücken, dann sind sowohl Vergleiche der Belastungen untereinander als auch Vergleiche mit anderen ökonomischen Kosten- und Ertragsgrößen möglich.

Man muß sich allerdings darüber im klaren sein, daß Umweltpolitik natürlich auch ohne monetäre Bewertungen auskommt: Auflagen und Verbote, auch Anreize aller Art lassen sich auch an physikalischen Größen binden.

Das Hauptproblem der Bewertung, der Belastung der Natur mit Emissionen und der Nutzung der Natur als Lebensraum besteht darin, daß es häufig keine Marktpreise gibt.

Unter den in Betracht kommenden Bewertungsmaßstäben halte ich folgende Kombination für besonders geeignet:

- Die Ressourcenentnahme wird mit dem Marktpreis oder den Förderkosten bewertet,
- Emissionen werden mit Schadensvermeidungskosten bewertet,
- Immissionen werden mit Reproduktionskosten bewertet,
- die Entsorgung und das Recycling mit den Entsorgungskosten.

Diese Bewertungen knüpfen eng an die Kosten an, die tatsächlich entstehen, wenn Vermeidungsmaßnahmen im Emissionsbereich durchgeführt werden oder wenn Sanierungen im Immissionsbereich erfolgen.

Die Bewertungen beziehen sich damit entweder auf bekannte Kostensätze aus tatsächlich durchgeführten Maßnahmen an oder sie erfordern entsprechende Ingenieursgutachten. Es werden Antworten gesucht wie "Die Entschwefelung der Abgase bei der Stromerzeugung kostet pro Kilowattstunde 2 Pfennig" oder "Das Auswechseln von kontaminierten Böden kostet pro Kubikmeter 800 DM".

Ich halte Zahlungsbereitschaftskonzepte als Bewertungsmaßstab für weniger interessant, weil sie tendenziell zu Ergebnissen kommen, die zu optimistisch sind, weil die Befragten ja meistens selbst in sogenannten "Angstmodellen" wissen, daß sie nicht wirklich zu zahlen brauchen, und weil sich lange Listen mit Einzelbelastungen praktisch kaum abfragen lassen.

Bestimmte Umweltnutzungen oder Umweltbelastungen werden sich aber einer monetären Bewertung überhaupt entziehen (wie z.B. Schäden der menschlichen Gesundheit) oder aber wegen ihres Charakters als für den Menschen unverzichtbares existenzielles Gut alle Bewertungen zwischen Null und Unendlich zulassen (z.B. Luft zum Atmen, Schwerkraft, aber auch die Nutzung der Natur als Standort).

Daraus folgt zweierlei:

- Die monetäre Bewertung kann sich nur auf ausgewählte Tatbestände beziehen. Wichtige Indikatoren werden aus der monetären Betrachtung ausgespart; sie lassen sich möglicherweise aber in physikalischen Größen darstellen oder umschreiben.
- Die Bewertung erfolgt im Rahmen einer Konvention, andere Bewertungsmaßstäbe und -ergebnisse sind denkbar.
- Die an Ingenieurwissen anknüpfende monetäre Bewertung von Emissionen und Nutzungseinschränkungen mithilfe von Schadensvermeidungskosten und eine ergänzende Bewertung der Immissionen mithilfe von Reproduktionskosten bezieht sich natürlich auf den jeweiligen Stand der Technik. Technischer Fortschritt und Veränderungen der Kosten führen damit zu ständigen Neubewertungen.

3. Bemerkung

Meine letzte Bemerkung bezieht sich darauf, daß es noch keine fertigen und erprobten Konzepte dafür gibt, wie die Umweltbelastungen in ein analytisches System gebracht werden, das leicht durchschaubar und für wirtschaftspolitische und umweltpolitische Zwecke effizient ist.

Mein Vorschlag ist, die Informationen über die wirtschafts- und umweltpolitischen Ziele für jedes Ziel getrennt zu sammeln und für die Analyse der Entwicklung zusammenzustellen. Die Ergebnisse sollten pur und unsalziert dargestellt werden. Das hat den Vorteil, daß die einzelnen Daten nicht durch Zu- und Abschläge für Erträge und Kosten aus dem Umweltbereich verändert werden. Es ist dabei auch zu beachten, daß die Umweltpolitischen Ansätze Ressourcenschonung, Emissionsminimierung und ökologische Nutzung des Lebensraums nicht zusammengefaßt werden dürfen, weil sie zum Teil miteinander konkurrieren.

Es ist möglich, diese Informationen in einem Satellitensystem zu den Volkswirtschaftlichen Gesamtrechnungen unterzubringen. Dabei wird neuerdings häufig die Forderung erhoben, die Volkswirtschaftlichen Gesamtrechnungen müßten umgestaltet werden, um falsche Signale über das ökologisch vertretbare wirtschaftliche Wachstum zu vermeiden.

Dazu möchte ich folgendes sagen:

Die Volkswirtschaftlichen Gesamtrechnungen sind für eine ganz spezifische Aufgabe, nämlich Konjunkturbeobachtung, konzipiert worden, sie nehmen diese Aufgabe in den meisten westlichen Ländern hinreichend genau und aktuell wahr. Unter diesem Aspekt besteht kein Grund, auf diese bewährte Information zu verzichten.

Dabei ist zu bedenken, daß Angaben aus den Volkswirtschaftlichen Gesamtrechnungen kein direktes Lenkungsinstrument der Wirtschaftspolitik sind. Das Verhalten der Unternehmen auf Märkten und im Umweltbereich hängt überhaupt nicht von den Ergebnissen der Volkswirtschaftlichen Gesamtrechnungen ab (wie auch immer diese gestaltet sind), sondern von den Gewinnen und Gewinnerwartungen.

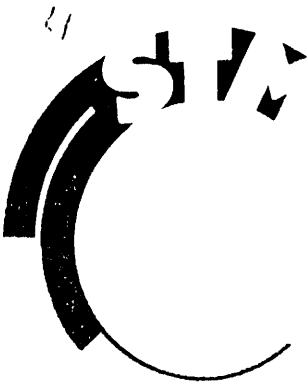
Der staatliche Bereich benutzt Angaben aus den Volkswirtschaftlichen Gesamtrechnungen in erster Linie, um das Verhältnis von Wirtschaftswachstum, Beschäftigungsgrad, Inflationsrate und außenwirtschaftlichem Gleichgewicht zu beobachten und zur Beurteilung von Einkommensbelastungen. Dafür reichen Ergebnisse der Volkswirtschaftlichen Gesamtrechnungen in ihrer jetzigen Form vollständig aus.

Das Statistische Bundesamt arbeitet zur Zeit an der Konzeption einer Umweltökonomischen Gesamtrechnung (Integrated System of Environmental Accounting), die sowohl Angaben über den Umweltzustand und seine Veränderung im Zeitablauf für ein Satellitensystem der Volkswirtschaftlichen Gesamtrechnungen als auch für andere analytische Zwecke in physikalischen und monetären Größen sammeln und bereitstellen soll.

Für ein eigenständiges Rechenwerk außerhalb der Volkswirtschaftlichen Gesamtrechnungen gab es folgende Gründe:

- Die konzeptionellen Arbeiten an einem Satellitensystem Umwelt für die Volkswirtschaftlichen Gesamtrechnungen sind noch nicht abgeschlossen. Die Formulierung der neuen Konzepte ist schwierig, in erster Linie wohl deshalb, weil die Berücksichtigung von Umweltschäden einerseits und entsprechenden Kosten zur Vermeidung der Emissionen und zur Reparatur von Umweltschäden gleichzeitig negative und positive Wirkungen in bezug auf die Wohlfahrt der Volkswirtschaft hat. Überlegungen zum Wohlfahrtsniveau stehen aber in der traditionellen Form der Volkswirtschaftlichen Gesamtrechnungen bisher nicht im Mittelpunkt der Betrachtung. Ihre Einbeziehung wirft eine Reihe gravierender Fragen auf.
- Ein solches Berichtssystem ist wegen der Fülle von Einzeldaten äußerst umfangreich. Außerdem ist es für viele analytische und wirtschaftspolitische Zwecke erforderlich, Umweltbelastungen und Umweltschäden sowie ihre Verbindung zur Produktion bestimmter Güter, die Entsorgung bestimmter Schadstoffe und Abfälle in möglichst tiefer Gliederung zu zeigen. Es liegt nahe, diese Verwaltung von umweltrelevanten Einzelergebnissen in einem Berichtssystem mit tiefen Gliederungen von den Arbeiten der Volkswirtschaftlichen Gesamtrechnungen organisatorisch zu trennen.

Wir gehen deshalb davon aus, daß es zunächst einfacher ist, die für die Wirtschafts- und Umweltpolitik benötigten umweltrelevanten Informationen ohne Einbindung in ein Satellitensystem zur Volkswirtschaftlichen Gesamtrechnung in einem separaten Rechenwerk zu sammeln und aufzubereiten. Die konzeptionellen Arbeiten zur Darstellung der positiven und negativen Effekte von Umweltbelastungen auf die Aggregate der Volkswirtschaftlichen Gesamtrechnung werden aber fortgesetzt.



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Environmental policy instruments in Dutch practice

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1. Introduction: direct regulation as the background

Dutch environmental policy deploys a large number of different policy instruments designed to influence the environmental behaviour of the various policy target groups. The policy instruments break down into a number of categories. Some aim to encourage new behavioural alternatives or, alternatively, to stop existing forms of behaviour. Others manipulate the information that the target group receives about the behavioural alternatives and their specific characteristics, or determine the importance the target group attaches to these characteristics. Finally, we have a large group of policy instruments that manipulate the characteristics of the behavioural alternatives themselves. Their purpose is to make one or several behavioural alternatives either more or less attractive to the target group.

Policy instruments that enlarge or restrict the number of behavioural alternatives have so far been negligible in Dutch environmental policy. The category of policy instruments that provides information and moulds the target group's perception of the environmental impact of its behaviour is rapidly gaining ground. Such "communicative" instruments include public information programmes, covenants and environmental effect reports. Their part in Dutch environmental policy is discussed in section 3.

By far the largest category of policy instruments in Dutch environmental policy concerns those that alter the consequences of the various behavioural

alternatives. These include regulations as well as financial incentives. The Dutch experiences with financial incentives are dealt with in section 4. But first section 2 will discuss the licensing systems and other regulations which play such a dominant part in environmental policies, both in the Netherlands and in many other countries. This will provide a background with which we can compare the experiences with communicative instruments and financial incentives.

There is a variety of criteria by which we can assess policy instruments. Evaluation studies of the practical effects of Dutch environmental policy tend to concentrate on the achievement of objectives and effectiveness. Often these studies look at whether the instrument is being applied properly rather than addressing the question whether it is up to the task of realising the actual policy objectives. As far as the research materials allow, we will also devote attention in the concluding paragraphs to the following questions:

- does the instrument permit spatial differentiation, e.g. to prevent "hot spots"?
- how much uncertainty surrounds the application of the instrument?
- Is the instrument flexible enough to respond to changes, such as economic growth or more drastic environmental objectives?
- what are the costs and who are to pay?
- is the introduction of the instrument a feasible proposition?

2. Licensing systems in practice

The central instrument in Dutch environmental policy is the ban on performing any environmentally harmful activities without a licence. The 70s in particular brought legislation covering virtually every aspect of the environment. The various environmental laws put forward this ban as the cornerstone of the environmental policy instruments. For a long time, the licensing systems based on the ban were virtually the only available instruments for manipulating environmental behaviour. The most important licensing systems concern nuisance, air quality, surface water quality, (chemical) waste substances and ionising radiation. A survey of a large number of Dutch evaluation studies gives us the following overall picture of the implementation and effectiveness of this dominating policy instrument.

Nuisance

The first major studies of the effects of licensing systems centred on the Nuisance Act. The aim of this act, incidentally, is not only to counter nuisance experienced

by humans, but also to protect the environment against activities that are not regulated under any of the other environmental acts. The results of these initial studies came as a bombshell. It was estimated that in 1976 only 25% of the relevant businesses had a valid licence. Hardly impressive, considering that the act had been in force since 1952 and had precursors dating back even further. Applications for licences took about eight months on average to process. But in 15% of the municipalities, mainly the larger cities, applications could take over a year to handle. One reason for this was that almost all of the applicants were operational long before the licence was granted. So no-one was in too much of a hurry. "For this reason, the Nuisance Act Departments of local authorities are often operated on a shoe-string, both in terms of manpower and resources." (TG,1976)

In a follow-up study in 1979, the research agency concludes that only 38% of approximately half a million businesses falling within the Nuisance Act actually possessed a licence. And only 24% had a licence that was sufficiently far-reaching. Among industrial and agricultural businesses the percentage was even lower (20%). The study also finds that, in certain cases, the Nuisance Act imposes licensing requirements on environmentally harmless or fairly harmless businesses while failing to clamp down on some of the confirmed polluters. At one-third of the businesses, the level of environmental damage had actually increased after being granted their most recent licence. About 65% of the time that officials spend on implementing the Nuisance Act is taken up by the processing of licence applications. Important tasks - such as the monitoring and tracing of businesses that fall within the Nuisance Act - receive only scant attention. (TG,1979)

Aalders (1980) concludes from a study in 5 municipalities that the formal sanction - i.e. the closure of the business - is rarely, if ever, carried out. He remarks that the sanction and, by extension, the act itself seem to have a purely symbolic function. This theme is elaborated in his dissertation that appeared in 1984. (Aalders, 1984) Aalders ascribes the problems that bedevil the enforcement of the Nuisance Act to the following factors: There are staff shortages. Serious forms of nuisance often stem from virtually irreversible legacies from the past. Police do not give the enforcement of the Nuisance Act priority, partly due to their reluctance to create precedents. "If you check one, you've got to check them all, and we simply don't have the manpower to do that." Local authorities often give precedence to economic considerations, especially employment. (Aalders, 1980)

In order to provide a more practical sanction, a provision for penalties was then incorporated into the Nuisance Act. But in practice, penalties prove to be almost as cumbersome as the ultimate sanction of closure as the courts require all due caution to be exercised before proceeding to impose the slightest sanction. (Hillen and Nijhoff, 1983)

A study carried out in 1983 by Berenschot, a consultancy, confirms this picture. The Nuisance Act is enforced passively or selectively. There is no question of strict enforcement (either to the letter or the spirit) and this laxity is often deliberate. There is a shortage of manpower and equipment, both in terms of quantity and quality. More intermunicipal cooperation is badly needed, but so far this has been slow to get off the mark. (Berenschot, 1983)

In 1986, the situation in two categories of business - then still falling within the Nuisance Act but later to be governed by general rules - was far from optimal. The first category was the bakeries: though 86% had been issued with a licence, only 44% had one that was sufficiently stringent. On balance, the second category - propane storage plants - showed a slightly more favourable picture: admittedly, only 72% had a licence, but 64% of these were at least sufficiently far-reaching. But again these licences are not vigorously enforced. Local authorities tend to turn a blind eye unless residents complain. (TG, 1987) In his dissertation, Aalders claims that it is only through "social side-effects" (i.e. manipulation of perceptions and attitudes) and informal consultation that the Act has any practical effect. Bennet (1984) also points to the importance of consultation between industry and government. The cases he studied show that in the event of serious differences in opinion, both parties inevitably look for a compromise. It also became evident that the authorities are inclined to bow to business and industry, not least out of economic (employment) considerations.

In an effort to improve the implementation, and thereby, the effectiveness of the act, the so-called nuisance act enabling programme was introduced (HUP). Under this programme, an inventory is made of the existing backlogs and measures are taken to improve the issuing and enforcement procedures. Local authorities that commission a HUP qualify for a refund of the costs involved and many have taken advantage of this opportunity. An evaluation study conducted by the consultancy DHV remained unpublished. However Ten Elshof did combine the results of DHV's study with the results from his own research. His study shows that HUPs do help to reduce the backlogs of applications for licences, but fail to stimulate more vigorous enforcement efforts. For this reason, he concludes that the HUP is too weak an instrument and even voices the fear that the Nuisance Act is doomed to remain a paper tiger. (Ten Elshof, 1988)

Air

In 1972 the Air Pollution Act entered into force. By 1 January 1976 about half of the businesses concerned had applied for licences and in 60% of the cases licences had indeed been issued. (TG, 1976) So it's fair to say things got off to a rather slow start. A follow-up study of the situation in North Brabant until mid-1977 showed that 15 of the 50 businesses concerned had one or more licences under the Air Pollution Act. (TG, 1977)

One study in the early 80s concluded that about eight years after the act became effective, three-quarters of the businesses concerned had been issued with licences. According to the provincial authorities, two-thirds had adequate licences. (VAR, 1981)

A study of the Rijnmond area (where the refineries are concentrated) revealed that the levels of SO₂ emissions had fallen between 1974 and 1980, but that this had little bearing on the licensing requirements. Far from it, in fact. For these requirements permitted pollution levels one-and-a-half times higher than those actually produced. The main reasons for the reduced levels are the economic slowdown, the switch to cleaner fuels (gas) and a central government measure reducing the maximum permitted levels of sulphur in fuels. (TG, 1982)

Unlike previous studies, Honigh (1985) first measures the achievement of objectives and the effectiveness of the Act, and only then turns his attention towards the implementation process in order to explain the results. His study centres exclusively on SO₂ and NO_x pollution caused by industry and power stations. This form of pollution rose between 1976 and 1982 by 7%. The slight deterioration is made up of various components. It turns out that it was mainly SO₂ pollution from refineries and other industrial plants that fell sharply (-33%), but that this reduction was more than offset by the increase in pollution from electricity-generating plants. Almost 50% of the fall in industrial pollution is the product of increased energy efficiency. The air pollution policy seems to provide the most plausible explanation for at least part of the remaining 50%. The pollution from power stations has increased largely because the shift to cheaper and dirtier fuels (coal and oil) in the research period was not compensated by additional purification facilities.

In order to explain these results, Honigh analyses the aims, available information and power of the parties involved in the policy implementation process. His explanation for the failure to effectively curb industrial pollution is that not all provinces see air pollution as a policy priority and often give precedence to economic considerations. The enforcement efforts and the percentage of adequate licences also differed widely from province to province. Furthermore, many provinces did not have the know-how required to assess the licence applications properly. As a consequence, they often erred on the side of caution to avoid making unrealistic demands. The provincial authorities also complained that the law only provided them with heavy-handed - and therefore impractical - sanctions. The reason for the deterioration in the electricity generating sector is ascribed to the high priority that the Ministry of Economic Affairs and the electricity-generating companies give to minimising electricity prices and, furthermore, to their (informal) position of power vis-à-vis the licence-issuing provinces. Van der Tak (1988) takes issue with this view. He argues in his dissertation that the electricity generating companies in the province of North Holland were subjected to a rigorous regime. It is hard to say whether or not North Holland is an exception.

Water

The implementation of the licensing system under the Surface Water Pollution Act is also far from perfect. Again we note the by now familiar phenomena of (substantial) backlogs of applications for licences and inadequate enforcement (Audit Office, 1987). This even holds true for heavy metal pollution, one of the water management boards' top priorities.

Since 1984 regional water quality managers have been empowered to issue licences directly in order to enable them to impose restrictions on firms that discharge the so-called grey and black list substances - in particular heavy metals - into the municipal sewage systems. A survey conducted by DHV among water quality managers from 1984 to 1987 shows that just over half of these firms were issued with licences. Moreover, the requirements contained in these licences were more moderate than initially envisaged. The business's economic position was often the overriding concern, even to the extent that the "best existing techniques" criterion was often interpreted as "the best practicable/affordable techniques", a formulation that central government had expressly avoided in relation to these substances.

Chemical and other waste substances

Various researchers have observed that by no means all chemical waste is disposed of legally. Henselmans and Noë (1984) estimate that disposal takes place legally in merely 15% of the cases. The main reason for this is that the waste disposal is often carried out by the businesses themselves. This, in itself, need not be a bad thing. But the absence of supervision has detrimental effects. With small chemical waste, 40% (Meijer et al., 1986; study of the Gooi and Vecht areas) or 50% (Heuvelman et al., 1988; nationwide study of 10,000 small businesses) of the businesses are guilty of illegal disposals. Excluding used oil, it is estimated that 18% (Meijer et al., 1986) or 36% (Heuvelman et al., 1988) of the disposals are illegal. Furthermore, Kremers et al. (1989) studied thirty dumps for ordinary waste and found that the requirements laid down in the licences were often not compatible with the policy guidelines. And even these requirements were not fully observed at a single dump.

Radiation

Studies into the implementation and effects of the licensing system and reporting scheme contained in the Nuclear Energy Act for radio-active substances and

equipment (i.e. not nuclear power stations or nuclear fuels) reveal that in this case the licensing system is effective. Most businesses operating in the field of radiation have licences. Though not all the licence requirements are consistently observed, most infringements have little bearing on safety. One reason perhaps for this exceptionally good record is that in this sector, unlike most sectors of environmental policy, the staff of the businesses involved stand to suffer most from the consequences of carelessness. Furthermore, the researcher attaches great value to the easily enforceable requirement that institutions must employ at least one expert whose training corresponds with the specific radiation sources used.

However, excessive zeal on the part of officials and time-consuming advisory and co-signing procedures do impair the effectiveness of the current licensing system (Arentsen, 1988).

Conclusions

Clearly the mere existence of a licensing system in an environmental act does not necessarily entail that the businesses falling within the act will actually have adequate licences. And even those that do have licences are not compelled to comply with them due to the lack of efficient enforcement. If we link the findings of these evaluation studies to our other criteria, the following picture emerges. The backlogs of licence applications and checks vary from region to region, but this of course is not the kind of spatial differentiation envisaged by policy-makers. The ability of the system to respond to altered circumstances - e.g. by issuing revised licences - is also questionable considering its inability to issue all businesses with proper licences in the first place. On paper, the licensing system is an effective means of controlling the operational activities and environmental behaviour of businesses. But practice shows the system is fraught with uncertainties, and therefore often ineffectual. One cause may be that the implementation costs of the licensing system are underestimated, resulting in a lack of manpower (both in numbers and skills). On the other hand, adequate implementation would probably be very expensive. Another disadvantage is that the degree of implementation varies from region to region. As a result, businesses in a relatively strict area will pay more in the way of environmental costs than a business in a laxer area. This, in turn, could distort domestic competitiveness. But notwithstanding all these drawbacks, the universality of the licensing system in Dutch environmental policy does indicate that this instrument is still very feasible.

3. Communicative instruments

Direct regulation through licences and other regulatory measures has not been selected as the main policy instrument in all environmental sectors. In the field of energy saving and products policy, for instance, there is a clear preference for communicative instruments. We have defined communicative instruments as instruments that provide information (e.g. through public information programmes) in an attempt to manipulate the target group's behaviour or to change the significance the target group attaches to environmental values (persuasion). These instruments were particularly popular in the 80s because they seemed to fit in with the new relationship that had developed between government and society. The 80s saw government and the private sector as partners who were both instrumental in the shaping of social developments. Within the framework of Dutch environmental policy, the following instruments have been applied and assessed: information on energy saving to industry and households, so-called covenants between government and (representatives of) business and industry, and the environmental effects reports. Though the latter instrument is based on regulations, its purpose is to increase the environmental awareness of the various actors (and so influence their environmental behaviour) by guaranteeing the availability of sufficient relevant environmental information. For this reason, it certainly belongs among the communicative instruments.

Information on industrial energy-saving

The literature distinguishes between four types of energy-saving behaviour, namely energy management (e.g. comparing meter readings), investments in the adjustment of existing plant (e.g. insulation), investments in an independent energy supply and investments in the replacement of existing installations. Van der Doelen (1989) studied the application and effectiveness of policy instruments in the field of industrial energy-saving from 1977 to 1986. This study shows that information sent to businesses in the form of publications had some positive effects on energy management but failed to stimulate other forms of energy-saving behaviour. In fact, the indications were that the information actually discouraged investments in adjusting existing plant. Evidently additional information tends, on balance, to make businesses averse to invest in adjustments. Two more targeted information instruments - i.e. visits from information officers and grants to pay for external advisors - had no visible effect on any form of energy-saving behaviour.

Information on household energy-saving

An experimental study among households (Ester, 1979) examined whether certain communicative instruments had indeed prompted consumers to start saving energy. It was found that public information and the advice given to consumers to read the meters regularly resulted in small but lasting savings.

Covenants

In the 80s, the Dutch government concluded covenants in diverse fields with (representatives of) business and industry in an effort to counter various environmental problems. A covenant is a written agreement that is deliberately not given formal legal status. The government hoped that industry would be more willing to do business on this basis and also that it would be more committed to such arrangements than to regulations imposed from above. Covenants also provided a means of circumventing EC rules which are highly sensitive to any threat of market distortion whenever regulatory product policies are involved. Covenants were concluded in such fields as: mercury oxide batteries, alkaline batteries, drinks packagings, PET bottles, cadmium in crates, air pollution from heavy commercial vehicles, CFCs in aerosols and phosphates in detergents.

Klok (1989) concludes that, considering the objectives of the Ministry of the Environment, the content of the covenants was satisfactory in five out of eight cases. In three of the five cases, agreement was not difficult to reach as industry had already decided of its own accord - albeit for different reasons - to aim for the same result. The main purpose of these covenants, therefore, was to document existing intentions. In two of the eight cases, the result was less satisfactory. One case, concerning the use of phosphates in detergents, was difficult to judge. It involved a successive series of moderate covenants of which the last, though again not far-reaching, did lead to good results.

This brings us to the achievement of the objectives and the effectiveness of the covenants. The breakthrough in the detergents sector did not come until one of the manufacturers ventured to go ahead with the large-scale introduction of a phosphate-free detergent. The move was a great commercial success and others were quick to jump on the bandwagon. As a consequence, the results far surpassed the objectives laid down in the covenant. It is hard to say whether the covenant was actually instrumental in this development. The same goes for the other covenants. In four out of eight cases, it looks as if the objectives will be achieved. But again the actual significance of the covenants is open to question. In the other four cases, it is either still too early to judge or there are already signs that the covenants will prove unsuccessful. All in all, an unimpressive result. But this should be seen against the background of the equally limited

effectiveness of regulatory measures as used in Dutch environmental policy. It is highly questionable whether alternative instruments would have given better results.

Environmental impact assessment

Like most industrialised countries, the Netherlands operates an environmental impact assessment system. The system came into force in 1987, but was preceded by a voluntary interim scheme. The scheme was designed to put the environment firmly on the decision-making agenda. To this end, it aimed not only to provide sufficient environmental information during the decision-making process but also to ensure that decision-makers would actually take this information on board. In addition, the arrangement was to help streamline the decision-making procedures. The evaluation studies of both the interim scheme and the actual scheme see improvements as regards the latter point, but are less positive about the main objective. In his evaluation of the interim scheme, Haskoning (1986) observed that in most of the evaluated cases the actor and the local authorities had already reached agreement before the e.i.a. procedure was set in motion. There was a danger that the e.i.a. reports would thus degenerate into a mere procedural formality, serving exclusively to make proposed plans more acceptable to the public at large.

The actual e.i.a. scheme has been evaluated in greater detail. But Berenschot (1990) arrives at similar conclusions to Haskoning. Despite doubts voiced by some when the scheme was first introduced, the actual implementation seems to pose few problems. Thanks to the e.e.r, there is also a plentiful supply of good-quality information. But whether this information has helped to give the environment added weight in the decision-making process is doubtful. A more realistic view would probably be to assume that -in addition to the objectives and sources of power of the various actors - information is only one of the factors that determine the decision-making process and, as such, the importance attached to the environment within that process. As a consequence, even if the e.e.r functions well as an instrument for diffusing information, its ability to put the environment high on the decision-making agenda is strongly dependent on other factors.

Conclusions

The adopted communicative instruments are too diverse to allow any general conclusions about their effectiveness. But what goes for the e.e.r, probably also applies to communicative instruments in general. Communicative instruments can effectively manipulate behaviour only insofar as other factors create a decision-

making context in which the new information can tip the scales. If such a context does not already exist, it may be created by means of other policy instruments. This brings us back to policy instruments which are capable of changing the consequences of behavioural alternatives for the target group. In section 2 we discussed the experiences with licensing systems. In the next section, our attention will centre on financial incentives.

4. Financial incentives

In the past, financial incentives have proved more stimulating to the imaginations of environmental policy scientists than to the willingness of businesses to change their environmental ways. Throughout the Western world a wide range of financial incentives has been used, but rarely did these instruments ever have any real practical impact (Opschoor and Vos, 1989). Instruments with a direct regulatory effect, such as licensing systems, generally set the tone. Still, a number of financial instruments with regulatory potential have been used in the Netherlands. The Dutch water pollution levy, for instance, is one of the most interesting examples in the world of a financial incentive used as an environmental policy instrument. For this reason, we have discussed it at greater length in appendix 1. The Netherlands also operates several subsidy schemes. Of these schemes, the results of the subsidies granted for industrial energy-saving, the reduction in water pollution from heavy metals and the reduced use of PCBs have been evaluated. Researchers have also evaluated the Dutch tax differentiations introduced for cleaner and dirtier cars, and for leaded and unleaded petrol. Finally, an evaluation study has been made of a compensation scheme whereby industry is granted subsidies to cover "abnormally high" costs for cleaning up, most specifically, the air.

Industrial energy-saving subsidies

In the same study as cited above in connection with information on industrial energy-saving, Van der Doelen (1989) also investigated the effects of the various subsidies on industrial energy saving. The investment grant scheme effective from 1980 to 1987 had no significant impact on the relative level of adjustment investments (insulation, heat recovery, etc.), but did have some positive effect on investments in independent energy supply systems. The energy credit scheme (soft loans) also encouraged businesses to a certain extent to invest in the replacement of energy-intensive parts of the production process. But the policy

instruments only had a modest independent effect. The overriding factor in all forms of energy-saving behaviour is energy prices. Van der Doelen concludes that the effectiveness of the instruments is overshadowed by what he has called the Matthew effect after the apostle's words "To him that hath, shall be given". Businesses that already have information and/or financial resources will get the most benefit out of the communicative and financial policy instruments without making any additional changes to their behaviour.

Subsidies for the reduction of heavy metals in effluents

Heavy metals in industrial effluents contribute to water pollution. As a supplement to other policy instruments, one of the water managers decided to introduce a subsidy for businesses who removed heavy metal pollutants from their effluents. The scheme was successful in the sense that most businesses did indeed proceed to clean up their effluents. Vermeulen (1989), however, argues that this was not directly attributable to the subsidy which, incidentally, only covered a small portion of the costs. But he does note an indirect effect of the subsidy: the scheme did wonders for the relations between the water manager and industry and this, in turn, significantly enhanced the effectiveness of other policy instruments (licences and levies).

Subsidy for the reduced use of PCBs

PCBs are used in coolants, transformers and condensers. A scheme was introduced to subsidise the replacement of PCBs before the PCB replacement drive had well and truly got under way. But the period from 1984 to 1989 brought the replacement of 72% of all PCBs. No less than 21% of this result was accounted for by one company which fell under a separate scheme. Vermeulen and Goes (1989:119) also observe that the scheme deserves credit for 32% of the reduction while the remaining 19% is attributable to other considerations. PCBs are still widely used in small condensers and these account for the largest part of the unreplaced portion. The researchers point out that the subsidy not only acted as a financial incentive, but also prompted industry to think more about the problem.

Compensation scheme

Various environmental laws incorporate compensation schemes to ensure that the principle of "the polluter pays" does not significantly distort the competitiveness of certain businesses. For this reason, businesses that incur "abnormally high"

costs are, in principle, entitled to compensation for the excess costs. An evaluation study of the effects of the compensation scheme under the Air Pollution Act (Grimbergen et al., 1988-a) reveals that compensation was effective in five of the seven cases studied in greater detail. The term "effective" here means that without compensation the competitiveness of the businesses in question would have been seriously undermined. It was also found that, especially in the initial years of the scheme, compensation was often allocated without due regard to the two key criteria, i.e. the "abnormally high" costs and the serious distortion of competitive relations if compensation were withheld.

In a follow-up study, Grimbergen et al.(1988-b) investigated whether the compensation scheme enabled the authorities (provincial or local) to negotiate additionally stringent environmental regulations with the licensee (the business). For the second objective of the scheme is to permit the licensor, where necessary, to take additionally strict environmental measures (cf. the problem of the "hot spots"). The follow-up study of all 67 cases showed that, in 40% of the cases, compensation did not stimulate the businesses to make "abnormally high" investments in environmentally friendly facilities; and, in a further 13% of the cases, such a causal relationship is doubtful. On the other hand, it seems that in about half of the cases compensation did induce businesses to take more far-reaching environmental measures than their competitors, and that these businesses would not even have contemplated such action without compensation.

Cleaner cars

The Dutch government is not completely free in the way it chooses to stimulate the introduction of cleaner cars. The European Community views national measures in this field with considerable distrust, fearing that such initiatives might lead to unfair competition. For this reason, and also because clearly more can be achieved through a pan-European approach, the policies of the individual member states are governed by a European policy. This restricts the policies of member states such as Germany and the Netherlands who actually favour more radical action. However, these states were given permission to promote the introduction of cleaner cars (i.e. cars that already comply with the future European standards) by means of financial incentives on condition that the incentives did not exceed the additional costs. In other words, cleaner cars were not allowed to be cheaper than dirty ones, but at best just as expensive. The Netherlands achieved parity between the two kinds of cars by applying different rates of sales tax. The tax was reduced for cars that complied with future Euro-standards and raised for the dirtier models.

Though less drastic than originally envisaged, the measure was an immediate success (Klok, 1987). In the market for small cars (two-thirds of the market), the percentage of future Euro-standard cars jumped from 37% to 70%, an increase

achieved in half the time the ministry of the environment had expected. Considering the ineffectiveness of most environmental policy instruments, this was an exceptionally good result. The results were less spectacular in the market for larger cars, partly because the tax differentiation did not fully compensate the more stringent standards applicable in this category. In view of this success, it was not surprising that the Dutch government extended the measure to include compensation for compliance with the stricter American standards. This was initially done under protest of the European Commission, but with the general approval of the Dutch parliament. Again the measure caused the number of new cars fitted with a regulated three-way catalytic converter to shoot up. Because the European Commission was eventually reluctant to ban the measure, it even helped to reinforce the Community's overall commitment to the clean-car policy.

Unleaded petrol

Cars fitted with catalytic converters run on unleaded petrol. For this reason, a regulatory levy - the only official regulatory levy in Dutch environmental policy - was introduced to ensure that unleaded petrol would be widely available. In this case, the absence of EC restrictions even made it possible to make unleaded petrol cheaper than leaded petrol. The result was that, within the space of two months, unleaded petrol had completely ousted normal petrol from the forecourts. (Klok, 1987)

Water quality charge

The most far-reaching and best-known financial incentive in Dutch environmental policy consists of the charges on water pollution. In 1970 the Surface Water Pollution Act came into force, delegating the task of water quality management to the provincial authorities and often, through these authorities, to the water management boards. An important aspect of the task in hand was the need to clean up sewage water. This called for a great deal of money. So the water boards were permitted to introduce charges in order to cover their annual costs. Degradable organic pollution, for instance, was taxed with a hefty charge per unit of pollution. Each water board applies different rates, according to their costs and the number of units of pollution these costs have to cover in their district. Within a few years almost every water board had raised the rates to such a level that it paid businesses to start significantly reducing pollution levels. From 1970 to 1980 organic pollution from industrial effluents fell by two-thirds. Research (Bressers, 1980, 1983, 1988 and Schuurman, 1988) showed that almost all credit for this reduction went to the charges. The licences introduced at the same time as the charges had had little effect. This is a striking result,

considering that it was the licences, not the charges, that were officially designed to manipulate the environmental behaviour of businesses. Bressers (1983) attributes part of the charges' success to the drastic change they bring about in the consultative climate between the water manager and industry. The keynote of the contacts is collaboration rather than conflict now that industry is able to achieve significant savings by cleaning up pollution. In practice, therefore, environmental charges do not function as a purely economic mechanism. They do not replace consultation between authorities and industry, but actually increase its beneficial effects on environmental conservation.

In view of the damage that heavy metal pollution causes to the sewage water treatment process and to the quality of the resulting purification sludge, most water boards also introduced a charge on the presence of heavy metals in effluents. But as the charge was relatively low, the water boards felt it had little to do with the 50% reduction of heavy metals in industrial effluents achieved between 1975 and 1980. Without negotiations and licensing regulations, so they thought, industry would be unwilling to budge. Statistical analysis (Bressers, 1988) showed, however, that negotiations in districts that had substantially raised the charges were much more successful than in other districts. So the regression analysis revealed that the charges, far from being insignificant, were in fact the most powerful policy instrument!

Conclusions

The Netherlands has used a number of financial incentives in its environmental policy. Generally speaking, these incentives have given good results compared with the other instruments. In fact, so far, it's the charges and tax differentiations that lie behind the success stories of Dutch environmental policy. One of the main strengths of financial incentives is that they do not simply operate as economic mechanisms, but also help to enhance the effects of consultation between government and industry.

A look at criteria other than effectiveness shows the following picture. As a rule, spatial differentiation within the Netherlands was not an environmental policy aim. The only exception is the compensation scheme. With this particular scheme, we do indeed see strong regional variations. But these evidently reflect the familiarity (or unfamiliarity) of the local and provincial authorities with the scheme and tell us little about the relative gravity of the local environmental problem. However, the example of water quality charges - where higher local rates led to stronger local reductions in pollution - do make it clear that charges are capable of achieving spatial differentiation where required. Naturally, such spatial differentiation would make certain "expensive" areas less attractive to businesses than "cheaper" areas. But the same holds true for differences in land prices, and everyone accepts these without a second thought.

The same example indicates that charges are fairly easy to adjust to changing circumstances. Note, however, that in the Netherlands such changes were not prompted by the desire to reduce pollution levels, but rather by the need to meet water treatment costs. Businesses may be less willing to accept increases in rates for financing new policy objectives than increases necessary to meet higher purification costs.

In all cases, there was a great deal of uncertainty about the effects of the instruments in all cases. As we have seen, the water quality charges were actually not even intended to change environmental behaviour. Strikingly enough, this uncertainty did not in most cases lead to disappointing results and, in a number of cases, even to much-better-than-expected results. After the generally poor performance of licensing systems, this is truly remarkable.

The feasibility of financial instruments varied strongly. Subsidy schemes seem to meet with little resistance. In the case of tax differentiations, EC restrictions clearly impressed their stamp on the policy. The charges on water pollution were acceptable because they were introduced as charges for sewage water purification, i.e. as payments for services rendered. The employers' organisations in the Netherlands still maintain that other forms of charges would be completely unacceptable to them. This may be precisely where the effectiveness of the instrument lies. Another reason for this resistance may be that charges without compensation impose a heavier burden on industry than on government.

5. In conclusion

This paper summarises the results of the studies into the implementation and effects of various policy instruments in Dutch environmental policy. The author was involved in a large number of these as a researcher, project manager and supervisor. The overall picture is not very positive. The dominating policy instrument - i.e. licences - is in practice bedevilled by implementation problems and, as a result, largely ineffective. One could summarise the results of Dutch environmental policy so far in the following sentence. About half of the policy objectives formulated in - and with the insights of - the 70s have been achieved, but our current insights tell us we need to achieve objectives that reach twice as far. In recent years, many people in and outside the Netherlands have become convinced that a much more intensive environmental policy is necessary to bring the objective of a sustainable environment closer. But whether the licencing system - without additional measures - will permit the implementation and enforcement of a much more intensive environmental policy is very much open to question.

The communicative instruments studied in this paper worked well enough but can only play a supplementary, and hence limited, role. As a rule, the policy mix must - in addition to communicative instruments - include other instruments that do have the power to change the consequences of the various behavioural alternatives for the target group.

Financial instruments fall into two categories: first, subsidies and related instruments which the target group applies for on its own initiative; and, second, charges and related instruments such as tax differentiation. The latter category has made the most visible contribution to the success stories within Dutch environmental policy.

Furthermore, it has become clear that no absolute statements can be made about the feasibility and effectiveness of policy instruments. The effectiveness of an instrument or mix depends very much on the given circumstances, and no instrument will be effective in all circumstances. It is therefore essential that theories on the feasibility and effectiveness of instruments take these circumstances into account. Building on our experience with research into the effectiveness of large parts of Dutch environmental policy, a contingency theory has been developed at the University of Twente. This contingency theory assesses the feasibility and effectiveness of policy instruments, taking into account the circumstances in which the instruments are applied (see appendix 2). It therefore enables us to make global predictions and statements about the feasibility and effectiveness of the various (combinations of) policy instruments in different situations.

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- the expansion of the water purification capacity;
- the reduction of pollution from industrial effluents containing organic substances and heavy metals;
- the reduction of air pollution from SO₂ and NO_x by industry and power stations;
- the introduction of cleaner cars and unleaded petrol;
- the reporting scheme and the licensing system of the Nuclear Power Act;
- the compensation scheme under the Air Pollution Act;
- the evaluation of the Act on General Provisions for Environmental Protection;
- the reduction of traffic noise;
- the nuisance act enabling programmes (HUPs);
- energy saving in industry;
- environmental covenants as an instrument of product-oriented environmental policy;
- the environmental impact assessment;
- the introduction of industrial environmental care (current research);
- the official evaluation of the Act on Environmentally Hazardous Substances (current research);
- the general regulations within the Nuisance Act (current research).

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Economic instruments for an environmental energy-policy in the
European context

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Summary and conclusions

The CO₂emission level of the industrialised countries is extremely high compared to the rest of the world. A world situation of sustainability and the realisation of the available perspective of a future abundance of clean energy means a decrease of CO₂emissions of 80% in 2025 in Europe. This decrease and the future perspective cannot be realised with propaganda and soft measures but only with a strong market incentive on energy-efficiency and CO₂reduction. To create such a required market-incentive an energy-tax on fuel, up to a level of the expected minimum long term price of f 15 guilders per Gigajoule for clean energy, is suggested. To eliminate market-disturbances on the international borders additional measures are required. Some measures are described and intensive study on this problem is recommended, together with an immediate start with a modest energy-tax. The suggested harmonisations on a low level energy-tax and low motor-fuel-prices of October 1989 plus further delay in de creation of a strong market-incentive on energy and environmental efficiency, should be regarded as the type of policy that will guide Europe to the future status of underdeveloped country.



1. State of the art concerning the development of an environmental oriented economic policy

To realize a sustainable economy in a globally sustainable environment, the priorities in the economic policy have to be changed. Such a change is difficult. Five separate steps have to be taken in this proces of change. Figure 1 illustrates this proces of the five steps or five switches.

Figure 1

Five steps to a sustainable economy

Consensus on the following questions

1. Is there a real environmental problem?
2. Is there agreement about the required policy-measures?
3. Are the consequences of the required measures accepted?
4. Are the required measures in accordance with the economic priorities?
5. Do the required changes fit into our culture?

At this moment only the first switch is more or less taken. This can be demonstrated for example by the international exceptance of the conclusions of the Dutch report "Concern for tomorrow" [1]

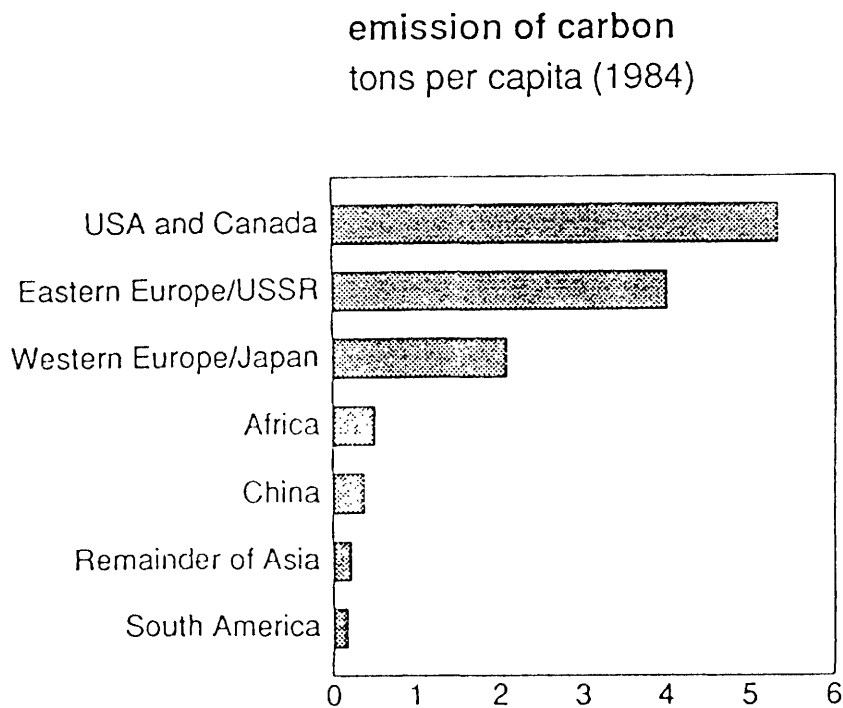
There is not much difference between the individual countries in Europe in there thinking about energy-environment and economy, although the status of plans and targets may differ for the moment.

2. Required scale of CO₂-reduction

Between the required emissionreduction from the report "Concern for tomorrow" and the highest reduction target from the side of any government in Europe is a wide gap.

The most recently agreed targets from the latest environmental plan in Holland - the so-called NMP-Plus [2] - mean a declining CO₂-emission after 1995 starting from an emissional level in 1995 which is the same as the level in 1989. This target differs strongly from the target in "Concern for tomorrow", where a reduction of 80% is mentioned. If this reductionlevel is reached in the year 2025, there is still a world-temperature rise of 1,5° to 4,5° C to be expected in the year 2100. To realize a reduction 80% over a period of 35 years means a yearly reduction of 4,5% to begin in 1990. According to the latest Dutch governmentplan the CO₂emission will no sooner start declining than 1995. This means that the decline is postponed for another five years.

Figure 2



The conclusion is that the required emission-reductions require new and future oriented types of policy measures. Figure 2 indicates the unbalance between the different parts of the world and the extremely high emission-level of the industrialised countries.

3. CO₂ reduction perspective

On a long term basis a pollutionfree energy supply on the 1990 level or higher is technically certainly possible [3, 4, 5]. Such a type of energy supply would be more expensive than the existing practice of energy supply, but would not be more expensive than two times the existing pricelevel for bulkdelivery of fuelrelated energy [3, 4, 5].

If a two times more expensive energy is combined with a possible two times more efficient energy-use [5], the prices of the energy-related services could on the long term possibly be about the same as with the polluting-energy system that we have now.

The required long-term future energy supply-system has to be based on sun- or nuclear power. Sunpower is sure, nuclear is not. Sunpower is clean, nuclear probably not. Delivery of sun-produced fuels in desert-plants requires huge investments but these huge investments could easily be realised in the next century. The investmentlevel is small in respect to the expected total investmentlevel in the future and not impressive in respect to the now-a-days investmentlevel for the existing total energy supply-system.

Figure 3

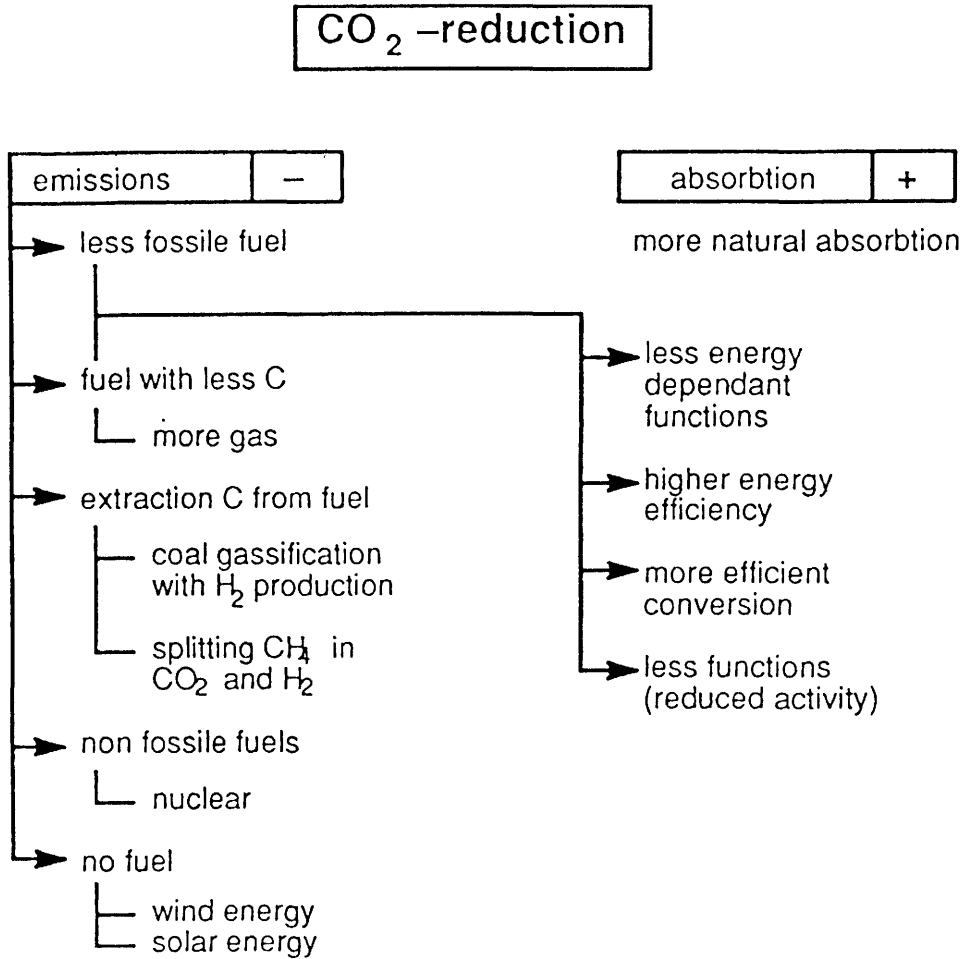


Figure 3 gives an overview of the technical methods to reduce the CO₂emission. A step by step approach towards the final situation of a clean energy production around the year 2100 is possible. Figure 4 gives an indication of long term energy costs.

It is however quite clear that the transformation to a different energy-supply system requires new policy instruments. The arguments for strong and new policy instruments are, on the one hand the available perspective and on the other hand the very high risks and future environmental costs of the now-a-days energy-supply-practice.

Figure 4. Summary of potential and minimum estimates of the long term costs of energy supply options without CO₂-emissions (source: 4)

option:	potential PJ/yr.	costs Dfl/GJ
1. inland production of energy from renewable sources (photovoltaic + wind, incl. continental shelf)	ca. 900	17 el
2. production of hydrogen from surpluses of 1.	-	25 H ₂
3. production of solar heat and biogas	ca. 200	25 th
4. production of electricity from breeder reactors	large	>23 el
5. production of hydrogen from surpluses of 4.	large	>25 H ₂
6. import of liquid fuels from biomass	large	>15 th
7. import or hydrogen from solar energy in (sub-)tropical areas	large	>15 H ₂
8. hydrogen produces after removal of CO ₂ from fossil fuels and storage of CO ₂ in old oil/gasfields (minimum storage capacity ca. 50 yrs.) (H ₂ from natural gas at present production cost of natural gas costs approx. Dfl. 7/GJ H ₂)	2500	15 H ₂

el = electricity

H₂ = hydrogen production

th = thermal

4. Required instruments, the role of financial instruments

Figure 5 **Instruments of environmental policy**

main groups

1. social (information, education, covenant,)
2. physical (permits and regulation)
3. financial (charges, taxes, deposit-refunds, tradeable permits)
4. institutional (public utilities,)

Figure 5 gives a short list of different kinds of policy instruments. In this list the financial instruments are very important because the use of energy and the supply of energy is very much price dependant. On the other hand information about efficient energy-use is much more effective if there is a market-incentive for energy-conservation. Also regulation is price-dependant in its effect. Without a strong market incentive regulation is complicated and unattractive. With a strong market-incentive regulation is in many situation not required.

Figure 6 **Financial instruments for environmental policy**

main groups

1. revenue-raising charges
2. environmental incentive charges
3. deposit-refund systems
4. tax credits
5. subsidies
6. tradeable permits

Figure 6 gives different types of financial instruments. Regulating instruments have a direct effect on the market incentive. The regulating effect depends on the height of the financial charges.

With the height of the charges (on fuels, electricity and CO₂-emission) the government-income increases. To eliminate this effect the extra government income can be returned to the taxpayer by means of tax reduction on labour or other products and activities which have a relative low impact on the environment. Governments have, with the existing methods of tax-collecting, already a very strong influence on the market. This influence is for historical reasons primarily stimulating the increase of labour efficiency and not the increase of environment- or energy efficiency. In Holland the total taxburden (which is about 40% of the BNP) is for 75% collected by charges on labour. A shift from labour-tax to energy tax therefore deserves high priority and can have an considerable effect. It is very important to realise that this type of tax-shifting does not increase the government budget.

5. Long-term energyprice as a basis for short term tax charges on fuel

Tax charges on fuel, electricity and CO₂emissions create a required market incentive for the increase of energy efficiency and CO₂reduction. Such charges will have a positive and strong influence on the environmental impact of many activities which are energy dependant as transport, heavy steel and chemical industry, construction of houses, agricultural activity etc.

What should be the height of this type of charges? The CE in Delft has worked out a method by which the height of the charges are correlated tot the expected long term energy and CO₂ reduction costs [6]. There is a lot of information available about the long term cost of emission free energy [5]. According to this information the long term price is about 15 Dutch guilders per Gigajoule [4]. The CE proposal is to increase existing fuelprices (in relation to the CO₂ emission of the specific fuels) to the indicated long term cost-level. This would mean an energy tax according to the table in figure 7.

Figure 7:

Energy tax

long term ~~avoidable~~ costs

sustainable energy price: > 6,4 ECU/GJ
(level of 1984)

resulting energy tax:

natural gas	3,4 ECU/GJ
oil products	4,3
coal	5,6
nuclear	0,03 ECU/kWh

tax revenue 5% GNP (NL)

For the calculation of the energy tax from figure 7, the energy tax for oil is set in such a way that the oilprice including tax mounts up to the long-term-costs (LTC) of f 15,- per Gigajoule. The tax for coal and natural gas is relatively higher and lower in respect to the higher and lower CO₂ level after burning of this fuels. The energy tax for H₂ or non-fuel energy is zero.

In figure 8 the calculated prices are given for motor fuels. The first line of figures indicates the LTC-price, the second line gives prices in which the long term costs and all relevant specific social costs of motor traffic are taken into account [7]. The last line gives the proposed harmonisation-prices for motor fuel of October '89. From the list it is clear that the suggested harmonisationlevels are in conflict with the required price levels. The proposed harmonisationlevels will not create a market incentive for efficient energy-use and clean transport. These type of price-proposals mean that the technical possibilities are not developed and implemented and that the future, minimum cost level of f 15,- per Gigajoule cannot be save-guarded. After a relative short period of too low fuel prices the environmental

damage has to be reduced at high costs and the required energy efficient high-tech will not be available in time. So the lower the short time fuel price, the higher the future energy costs.

Figure 8:

Required fuel excise duties

	LTC on energy only	including all social costs	proposed harmoni- zation
leaded petrol		forbidden	> 337
unleaded petrol	170	800	> 287
diesel	170	800	195 - 205
LPG	130	700	> 84,5
heating gas-oil	160	160	47 - 53
heavy fuel oil	170	170	16 - 18

ECU/1000 l (kg)

6. Introduction problems

The suggested relatively high price increase of fuel prices will create possible market disturbances which have to be mastered. This problem demands a lot of creativity and study. The problem does not only apply to energy but also to other financial measures by which the future environmental costs can be build in into the existing market price.

The main problem by the introduction of such price-taxes on a national scale is the effect on the international competition between the individual European countries. The problem is reduced if measures are taken on a European base, but also in this case disturbance of the international competition between Europe and the rest of the world has to be avoided.

Figure 9:

Shift in taxation international competition

size of the problem ?

national policy to spare intern. companies

- 1 – each company may choose for the shift in taxation or not (CE-scenario, 1982)
- 2 – maximum of total environmental charges (1.7 % sales value; Sweden)
- 3 – higher VAT rates on fuel, lower VAT rates on labor. (CE-scenario, 1982)
- 4 – energy tax only on tariffs for households (CE-scenario 1982, Dutch Ministry for the Environment, 1990)

harmonization in EC
including import charges and export
subsidies

Figure 9 gives some possible measures to eliminate possible disturbance of the international competition in case of energy-taxes on an national base.

Up till now four possibilities are worked out. Method no. 1 means that individual companies can make a choice between: a. fuel tax without the relevant reduction of labour-tax, or: b. refusal of the energy tax in combination with the existing high labour tax-level. This means that some energy intensive industries which depend very much on export will exclude themselves from the energy tax but the other industries will except and so a reduced market incentive can still be created. Effects of the method were already calculated in '82 [8].

According to the second method, the energy tax will be applied as a national policy instrument, but the level of the energy tax will be determined every year and kept sufficiently low to eliminate unacceptable marketconsequences. This method was recently worked out in Sweden |8|.

The third method was also worked out in '82 |9| and means that the VAT rates on fuel are set at a higher level while VAT rates on labour are at the same moment reduced to create a budget-neutral-effect.

Method no. 4 means that the energy-tax and the related compensatory measures are only applied in internal national markets within specific sectors |6, 9|.

For example an energy-tax on natural gas for heating of houses in combination with a fixed yearly donation per dwelling . Another example could be an energy-tax for the governmentsector as a whole.

It should be underlined that the investigation of these possibilities has hardly begun and that much work should be done in this respect. It is however possible to start introduction of some types of energy-tax-measures on an reduced scale on short notice.

As has already been said, it is much easier to counteract market disturbances if these kind of measures are applied on a European scale. In this case the energy tax could be applied for the European Community as a whole. The collected tax-money could be redistributed over the national countries in relation to their national BNP. This would mean that it becomes profitable to realise a "cleaner" BNP within the European border. At the same time it will be necessary to have an exportrelease and an import charge on the common European border. These export and import measures however could be restricted to a limited number of energy-intensive products and fuels. The borderproblem is in this case expected to be very much reduced by the fact that energy-intensive bordertraffic between Europe and the rest of the world is much less

complicated and intense than the energy-intensive- bordertraffic on the internal European borders between the individual countries.

As far as overall economic consequences of the proposed energy-taxes are concerned it is expected that the tax-shift will have a moderate effect on the economy as a whole, but strong positive and negative effects on specific sectors [9, 10]. To study the consequences and possibilities of the required environmental measures in depth an extensive project was recently launched in Holland which is called the "Integrationproject Environment and Economy" [11].

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11. Integrationproject Environment-Economy" Informationreport
available at the CE-office in Delft (in Dutch). The project
started February 1990.

European Instruments for an environmental transport policy in the European Context.

Hearing organised by the Committee on the Environment, Public Health and Consumer Protection of the European Parliament on "Economic and fiscal incentives to promote environmental policy objectives". Brussels, 21 and 22 June 1990.

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It would take more time than is available to rehearse the catalogue of actual environmental damage caused by the transport sector in Europe. Fortunately this is now well documented and the EC Task Force report of late 1989, the ECMT proceedings of November 1989, the OECD report on Cities and Transport and the publications of UPI in Heidelberg and ILS in Dortmund provide a very full account of the extent of the problem.

The use of cars in cities and lorries for medium to longer distance journeys present particularly serious problems for the environment and for health. It is important to note that the problems are much wider than air or noise pollution or, indeed, the contribution to global warming and ozone pollution of exhaust emissions.

Transport is an important cause of loss of life and serious injury through road traffic accidents. Air and noise pollution particularly in cities combine with stress and fear to provide the single largest source of subtractions from quality of life. The effects on human health both physical and psychological are hardly understood but are becoming clearer. The overall economic effects on lost production and inefficiencies in labour markets are a serious drain on public and private funds. The demands made of land resources are enormous with most European countries committed to the building of new transport infrastructure in the form of high speed rail, new motorways or even new roads in cities. The case of Lancaster is typical here which has a plan and a land reservation for a major new four lane highway through the centre of an "historic" city. Here the fiscal and economic systems in place provide every incentive to "solve" transport problems by throwing money at the supply side of the equation

The emphasis in what follows is to explore "ex-ante" solutions as opposed to "ex-post" solutions. It is of course easier to attack the problem of environmental degradation by dealing with the energy consumption and emission production of vehicles rather than by seeking to influence the societal and spatial processes which generate the demand or "need" for vehicles. I regard carbon taxes, additional fuel taxes and end-of-pipe monitoring technologies as ex-post solutions which necessarily accept the conditions which influence demand for vehicular travel. I want to go deeper and influence the processes which generate the demand in the first place.

This approach does not in any way diminish the importance of ecological taxes which increase the cost of motoring. The work of Arie Bleijenberg in Delft (Bleijenberg, 1989) and Dieter Teufel in Heidelberg (Teufel et al, 1988) is very important indeed and the case for a significant increase in fuel taxation as part of harmonisation and the variabilisation of motoring costs is proven beyond doubt.

The case I wish to present in this paper is that we need a three part strategy to bring about environmental improvements by reducing the amount of traffic. The first part of this strategy is the adoption of the Bleijenberg/Teufel approach as soon as possible and as part of the harmonisation process. The second part of the strategy is the subject of this paper and deals with ex-ante proposals. The third part of the strategy is a public health one and is not dealt with here. It forms part of the work of the environmental epidemiology unit at Lancaster University (England) and takes as its starting point the principle that it is not acceptable that we should be able to purchase the freedom to inject recognised poisons into the atmosphere.

The scope for fiscal and economic incentives in the transport sector.

The conceptual base of what follows is that we should avoid metaphysical debate about the costs and benefits of this or that environmental problem and how market mechanisms might massage the process into submission. Rather we should set clear targets which indicate where we would like to be ten or twenty years hence and map out the areas of action which are open to intervention at any level of political decision making. Spurious monetary values placed on environmental problems simply shove the problem one step further down the line and one step away from a solution.

At the centre of this approach is the need to go for the jugular in the various processes which have taken society on an energy greedy and polluting trajectory. The jugular in transport is space and use of space. Transport can only function because society allocates vast amounts of space to the needs of vehicles. It is this use of space which erodes quality of life whether in noise and air pollution, accidents, poor access to facilities, poor health, fear and stress.

The source of most problems is vehicle use and the processes which spread facilities in a wasteful use of space to increase the need to travel by car and decrease the possibilities for walking and cycling journeys. A tangible product of these processes in Europe is the use of space for car parking. Car parking takes up valuable space in cities and is a prominent feature of out-of-town shopping centres, new leisure centres, high-tech science parks, airports etc etc. Car parks represent the actual demand made by vehicles on the remainder of transport infrastructure: a car park accommodating 500 cars has a quantifiable impact on the environment and use of space.

The provision of car parking spaces at work places is a subsidy to motoring. These spaces should be reduced by planning regulation, by rental charges and by company public transport schemes, particularly in cities.

Where journey to work expenses by car can be set against tax the system should be replaced by fiscal incentives with clear environmental priorities so that commuters who use public transport, bicycle or walking as modes of transport are rewarded with a lower tax bill. Car users would be penalised. The current system used in Germany is a direct subsidy to car manufacturers.

Any system which provides fiscal bias in favour of the car is benefitting the car industry and is working against the competition policy of the EC. This is particularly so in Britain and in Germany.

The special problem of lorries

The single market and the associated deregulation of lorries will bring about a 70% increase of tonne-km on the roads of Germany. (ILS,1990). The existing level of damage and nuisance brought about by the lorry is not acceptable and as part of deliberate EC strategy is set to get much worse. In answer to a parliamentary question the Transport Commissioner has said that he does not know by how much road freight will increase in Europe to the year 2000.

Lorries have prospered in already deregulated countries like the UK because of spatial concentration in the economy, new kinds of transport demands, motorways, fiscal bias and a lax approach to monitoring and punishing breaches of the law.

The use of lorries is supported and indeed encouraged by the enormous gains to be made in industrial organisations (and retailing) by global sourcing, production strategies which concentrate output at a small number of sites and logistics to reduce inventory. This externalisation of costs throws a huge burden on the transport system and the environment and there is no mechanism currently in use which can adjust the size of the burden in response to an assessment of the damage caused.

Proposal 1: use of car parking spaces.

All car parking spaces provided in any development in Europe should attract a "rental" charge as a fiscal incentive to reduce the demand for motorised transport, reduce the use of road space and hence the supply of new space and encourage better public transport links and links into walking and cycling networks. The "rental" would need to be set at a level which reflects the worth of a space to a developer. A minimum would be 10,000 DM per annum per space. The objective is to promote developments which are in keeping with the existing built form of an urban area, fully utilise public transport and do not generate extra motorised trips.

Proposal 2: car parking in cities.

The mass of evidence on the length of trips by car, on the social distribution of access to vehicles and on the damaging effects of vehicles in cities points to a general presumption against car-based trips into city centres. The fact that public transport, particularly trams, perform very well in cities makes such a presumption feasible. Trams, walkers and cyclists are extremely economic in their use of space. Cars are not. Cars must be stored at both origin and destinations and often at several points inbetween. This heavy use of space should be discouraged. It is in itself unpleasant, it sterilises land, and it represents a quantifiable measure of the demands which vehicles make on infrastructure. It is a good general surrogate measure for the severity of the transport problem.

Car parking in cities should be charged at whatever rate reduces its severity in a direct relationship with public transport charges and measures to improve the attractiveness of public transport. Parking rates already vary widely in Europe. Zurich provides a very good example of progress made through the operation of a high-parking charge policy. Parking charges should be set by operational experience in the success they have on achieving the objectives set and not by precise calculations of damage attributable to the use of the car.

Proposal 3: the removal of existing fiscal and economic incentives in favour of the car and car parking.

The problem of the company car in the UK is well documented. It represents a subsidy to car users of about 2 billion pounds per annum and is a direct subsidy to car manufacturers and the users of environmentally unfriendly modes of transport. It should be abolished without delay. The whole system of payments for car based journeys as part of work should also be dismantled. Every recipient of an "essential car user allowance", car loan or "essential mileage" payment is receiving support for car use which exceeds actual costs incurred. There are alternatives involving public transport, taxis and cycling and these should be utilised.

Proposal 4: lorries should be charged for their journeys on a mileage/km basis and by weight (a weight-distance tax or WDT).

The level should be set by experience to reduce tonne-km by a pre-selected percentage each year. The charge would reduce the advantages of spatial concentration, reduce the attractiveness of distant supplies and increase the attractiveness of local suppliers. A tax on distance attacks the basic processes which spread facilities across enormous distances and thus attacks the lorry problem at source.

A tax on distance normally replaces the fuel tax.

This kind of tax is already in place in ten states of the USA and is recommended by the American Association of State Highway and Transportation Officials (Source: AASHTO Quarterly, July 1984, Washington). It has been in place in Oregon since 1948 and New York since 1951 and is currently under consideration for US-wide application and Federal administration. It is also in place in Sweden where distance taxes were increased by 45% in 1988. Weight-distance taxes in Oregon due for implementation on 1.1.90 are shown in figure 1. There is a full discussion of tax levels and the general problem of road taxation in the American situation in Small, Winston and Evans (1989).

Weight-distance taxes were introduced in New Zealand in 1978 under the Road Users Charges Act (1977). All vehicles over 3.5 tonnes are required to purchase "distance licences". A 41 tonne six axle articulated trailer would pay NZ dollars 520 per 1000km or 52 cents per km (approximately 0.54 DM per km). Each vehicle paying these charges must be fitted with an approved distance measuring device such as a "hubodometer".

The USA already has in use new technology to assist WDT: Weigh In Motion (WIM), Automatic Vehicle Identification (AVI), and Automotive Vehicle Classification (AVC). WIM technology uses electronic weighing units that can weigh trucks as they pass.

France has a form of WDT introduced in 1968 as does Portugal which introduced its system in 1963. In Portugal the tax is doubled for trucks operating on routes competitive with rail services. In the UK Plowden (1987) has advocated the use of WDT as a means of limiting the occurrence of external costs.

The suggestion for a Europe-wide WDT made in this submission to the EP is not designed to increase cost-recovery, nor is it designed to make lorries pay for the damage they cause. Both of these things might well happen as a consequence of WDT but the main reason is to turn off the tap on a process which fuels higher and higher levels of lorry use and imposes a spatial logic on society which is intrinsically damaging in every conceivable way.

The WDT is more clearly linked to a desired change in the underlying processes than a fuel tax could be and carries advantages for local economies as opposed to the internal economies of large corporations. It is better than a fuel tax in allowing fine tuning on vehicle types which it is desirable to influence and it is more easily linked to other policies such as equalisation (see proposal 5), speed controls and social regulation observance.

Is more necessary?

The four proposals are worth very little without some Europe-wide mechanism for monitoring performance and acting on results. Any environmental measure without clear objectives over a clear time scale with clear penalties and incentives is worthless.

Proposal 5: the creation of performance measures and financial equalisation schemes in Europe.

Example 1:

with car parking it is possible on the basis of work already available to establish a relationship between environmental performance and number of parking places per 1000 residents. Performance on this criterion would be monitored at EC level and "over-suppliers" would incur extra financial charges whilst "under-suppliers" would be rewarded. Thus at national level there would be a financial incentive to improve performance which would complement the individual incentive which applies at the level of employer or developer to reduce parking places.

Example 2:

applying the same principle the EC could monitor percentage of journeys by car over distances of less than 5km (for example). On the assumption that public transport, walking and cycling can operate very successfully at this level countries over the norm would be penalised and countries performing well would be rewarded.

Example 3:

For lorries the norm could be tonne-km per capita of freight by road or distance travelled by vehicles with a similar financial equalisation procedure as in examples 2 and 3.

Proposal 6: the principle of countervailing expenditure.

All financial gain which would accrue to individual countries if proposal 5 were implemented should be disbursed in a way which further accentuates the tendency which has been rewarded. Thus gains from car parking policies would be spent on measures to improve walking, cycling and public transport. Gains from performance improvements in per capita tonne-km consumption of road freight would be used to improve combined transport, goods distribution depots in urban areas and physical relocation of "bad-neighbour" traffic generators (a good example of which exists in Lancaster (England) where a very badly located industrial estate (Lune) generates traffic through residential areas and whilst money could be available for a new road, none is available for re-location).

Note

The full titles of the organisations referred to by initials are as follows:

UPI is the Umwelt- und Prognose- Institut, Handschuhsheimer Landstr.118a, 6900 Heidelberg, FRG.

ILS is the Institut für Landes- und Stadtentwicklungsforschung des Landes Nordrhein-Westfalen, Königswall 38-40, 4600 Dortmund 1. the material referred to is produced by Aufgabenbereich 4 (Verkehr).

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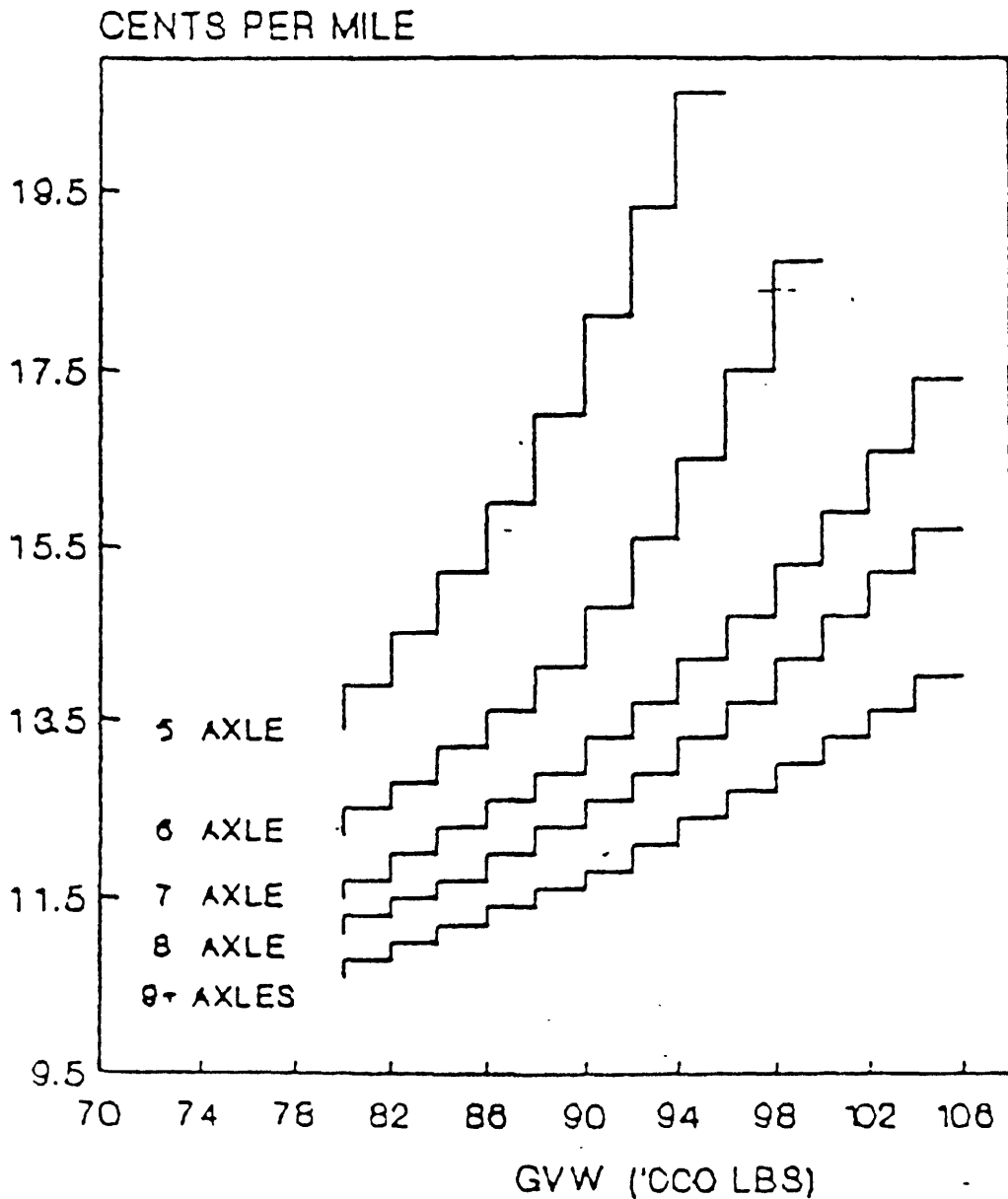
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Figure 1

OREGON DEPARTMENT OF TRANSPORTATION
RECOMMENDED TAX RATES WITH DIFFERENT
GROSS WEIGHTS AND NUMBER OF AXLES



FOR IMPLEMENTATION ON JANUARY 1, 1990

Source: The Use of Weight - Distance
Taxes for Highway Vehicles
(Nov '89)

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**ECONOMIC INSTRUMENTS FOR
AN ENVIRONMENTAL AGRICULTURAL POLICY
IN THE EUROPEAN CONTEXT**

Alex Dubgaard

Hearing of the European Parliament, Committee on the Environment, Public Health and Consumer Protection on: Economic and Fiscal Incentives to Promote Environmental Policy Objectives, Brussels, 21-22 June 1990.

ECONOMIC INSTRUMENTS FOR AN ENVIRONMENTAL AGRICULTURAL POLICY IN THE EUROPEAN CONTEXT

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Introduction

During the last few decades most EC countries have experienced a substantial increase in the intensity of agricultural production - particularly with respect to chemical inputs like nitrogenous fertilizer and pesticides. Pressure from economic and technological forces has also resulted in a persistent trend towards specialization, at the farm level as well as regionally.

In recent years there has been growing public and political concern over the adverse environmental effects of these changes in agricultural practices. The major issues are the rising content of nitrate and pesticide residues in ground and surface water and the side effects of pesticides on flora and fauna. Other areas of concern are soil erosion and the loss of habitats and amenity caused by modern farming.

The principal issues selected for closer examination in this report are the use of economic instruments to reduce the intensity of nitrogenous fertilizer and pesticides. If the use of fertilizer and pesticides were reduced to a socially acceptable level this would help solving not only the environmental problems but also the surplus problems in European agriculture.

Market Failure

In economic analysis environmental damage is usually associated with the existence of market failure - implying that the price mechanism does not provide (sufficient) incentives for firms and households to economize with unpriced resources like environmental goods. Therefore, some form of public intervention is needed to ensure a socially acceptable use of common resources like air, water, landscape amenity, etc.

By levying taxes on polluting activities, society can introduce a set of prices for the private use of common resources such as the use of air and water for the discharge of wa-

stes. Thereby, the social costs of pollution can be imposed on the polluters and cost-minimizing firms will cut back on emissions. Thus, assuming a cost-minimizing behaviour by all relevant firms, a tax on pollution can achieve a preselected standard for environmental quality.

Non-point sources of pollution, like nitrate leaching and pesticide application, cannot be monitored on a widespread basis at realistic costs. This makes the use of an emission-based pollution tax infeasible. Instead, the polluting inputs can be taxed, i.e. nitrogenous fertilizers and chemical sprays.

Policy Failure

Environmental problems created by agriculture cannot be ascribed to market failure alone. They are also associated with policy failure.

The aim of the Community's Common Agricultural Policy (CAP) is primarily to maintain farm incomes at a politically acceptable level. This has created major distortions in agricultural price relations and contributed to increasing the combined problems of over-production and over-intensification.

Thus, during the last two decades the intensity of nitrogenous fertilizer has increased by more than 50 per cent and the intensity of pesticide application has about doubled. In the same period yield in grain production has increased by one third leading to considerable surplus-production, budgetary tensions and trade conflicts with the traditional grain exporting countries.

However, it must be emphasized that reductions in crop prices will not suffice to solve the environmental problems in EC agriculture - mainly because application of fertilizer and pesticides is rather insensitive to changes in crop prices. Similarly, the land set-aside and extensification programmes will affect only a limited part of the agricultural area.

There is a need, therefore, to focus attention on policy measures that could achieve a significant reduction in the overall intensity of agriculture and surplus-production as well. In this context input taxes and/or quotas on nitrogenous fertilizer and pesticides would be a useful supplement/alternative to present EC policies aiming mainly at reducing crop prices and implementing supply management schemes.

Policy Measures to Reduce Nitrogen Intensity

In the following the results of Danish studies will be presented to illustrate the implications of using various economic policy instruments to achieve a reduction in the intensity of nitrogenous fertilizer.

Table I shows the impacts of the following policy measures:

- Reduction in crop prices;
- Tradeable quota on nitrogen in commercial fertilizer;
- Tax/product charge on nitrogen in commercial fertilizer.

The findings are not limited to Denmark. Other European studies indicate that they will apply to a large extent to most EC countries in northern and central Europe.

Crop Price Reduction

As already mentioned, price cuts would have to be very substantial to significantly affect the overall intensity of crop production.

Table I shows that to generate a 30-35 per cent reduction in optimum nitrogen rates, crop prices would have to fall by about 50 per cent. This would result in land rents (net returns) dropping below zero for most soils - and eventually force these lands out of production. Consequently, a balance between supply and demand for agricultural commodities would no doubt be reached long before output prices would actually have fallen by 50 per cent implying that most agricultural land would still be farmed at a higher nitrogen intensity than environmentally desirable.

Table I. Economic Impacts of Measures to Reduce Nitrogen Intensity In Denmark (Heavy Soil), 1988 Prices

	Reduction in crop prices = 50%		N quota (tradeable) = 85 kg N/ha		Nitrogen tax = 150%	
	N rate	Loss	N rate	Loss	N rate	Loss
	% fall	ECU ha	% fall	ECU ha	% fall	ECU ha
Spring Barley, cont.	31	370	31	14	31	80
Cereals/Oilseeds ¹⁾	32	700	23	48	23	115
Cereals/Peas ²⁾	33	490	29	-3	29	65

1) W. Wheat, W. Wheat, W. Barley, W. Oilseed Rape.

2) Spring Barley, Spring Barley, Grain Peas, W. Wheat.

Source: Rude and Dubgaard, 1989.

Thus, measures that could achieve an overall reduction in nitrogen intensity would be an interesting alternative/supplement to the present EC policies aiming mainly at reducing output by forcing marginal land out of production.

Taxation as a Means of Reducing Nitrogen Intensity

Economic measures of controlling the use of nitrogenous fertilizer in Danish agriculture have been studied using nitrogen response functions.

As illustrated in table I, the findings indicate that it would be necessary to levy a 150 per cent tax on nitrogen in commercial fertilizers to achieve a 25-30 per cent reduction in the use of inorganic nitrogen.

A 150 per cent increase in the nitrogen price would reduce land rent by up to one third on good soil while land rent would drop below zero on many poorer soils. A tax reimbursement scheme would therefore have to be implemented, if significant producer (landowner) losses should be avoided. An administratively fairly simple scheme would be to refund the revenue at a flat rate per hectare. If tax proceeds are reimbursed, the loss incurred by farmers would be reduced to about 10 per cent of the present land rent for most rotations on good soil.

Reimbursement would not affect the incentives to decrease nitrogen application rates, provided tax proceeds are reimbursed in the form of lump-sum payments, i.e. payments independent of the nitrogen tax paid by the individual farmer.

The income effects of an input tax could also be reduced significantly by levying the tax on marginal quantities of the input only. A marginal tax on nitrogenous fertilizer could be implemented by allocating a tax-free amount (quota) of nitrogen to farmers and taxing additional nitrogen purchased. Depending on the size of tax-free allocations this would affect economic behaviour in the same way as a nitrogen tax levied (by the same rate) on the total amount of nitrogen purchased, but income effects would not be nearly as great (see Rude and Dubgaard, 1989).

Quota Regulation of Nitrogen Application

Alternatively, the use of nitrogen could be controlled by imposing a quota on nitrogen in chemical fertilizers. If a market was established for the rights to purchase inorganic nitrogen, an optimal distribution of available nitrogen could be found by the market. This is an approach similar to distributing tradeable discharge permits for point sources of pollution where cost effective monitoring of emissions is possible.

Quota regulation has certain advantages compared to input taxation. First of all, input quotas would have much less effect on farm income than an input tax (as seen in table I) provided that they are allocated to farmers free of charge. However, if tax proceeds are reimbursed, the income effects would tend to be the same in both alternatives (see Rude and Dubgaard, 1989). It might be a psychological advantage, though, that money would not have to circulate through a transfer system in the quota alternative.

Yet, the predictability of the quantitative outcome of input quota regulation is no doubt a more important advantage. If input quotas are used, regulatory authorities will not have to make estimates of the likely response by farmers to changes in price relations. The total amount of inorganic nitrogen applied would be given in advance while the distribu-

tion of available nitrogen between crops and regions and the price of quotas would be determined by the market.

The incentives to adjust cropping patterns to include more nitrogen fixing legumes would be the same in the quota and the taxation alternatives.

Taxation of Pesticides

Pesticides are not a homogeneous group of products. Furthermore, there are considerable regional and annual variations in the need for pest control. Therefore, quantitative restrictions in the form quotas would probably be inefficient as a means of controlling pesticide application. The only manageable control policy would be the use of economic measures in the form of a tax or charge on pesticides.

The effects in Denmark of taxing pesticides were estimated for a levy that would increase the average pesticide price by about 120 per cent. The estimated total effects of levying a tax of this magnitude would be a reduction of pesticide application by 40-45 per cent (see Dubgaard, 1987).

Land rent would be reduced by about 15 per cent (on good soil). However, the income effects of a pesticide tax could be neutralised to a considerable extent by reimbursing the tax proceeds to agriculture - for example at a flat rate per hectare.

Subsidies to Environmentally Beneficial Services

From a social point of view most agricultural land serves multiple purposes. Besides performing the function as a factor of production in agriculture it provides a number of non-market social benefits, the most important being: Ecological benefits associated with the function of agricultural land as a wildlife habitat and a source of ground and surface water supply; and visual-cultural benefits comprising recreational and aesthetic services.

Being largely external to the land owner these benefits are common property and the individual farmer has little or no incentive to improve or preserve the capacity of the land to produce such environmental services.

Therefore, to the extent that it is socially advantageous, society should provide incentives for farmers to provide environmentally beneficial services - for example by supporting the preservation of traditional production systems, maintenance of valuable landscape features and provision of recreational opportunities. Subsidies could also be used to create incentives to implement environmentally more favourable production methods - for example organic (chemical-free) practices.

Pollution Taxes Will Reduce Surplus Problems

It is difficult to forecast the effects on output from a reduction of intensities in crop production - inter alia because a significant increase in the price of nitrogenous fertilizer and pesticides would make the use of these inputs more efficient (and less polluting).

Assuming for example a 25-30 per cent reduction in the use of nitrogen in commercial fertilizer and a 40-50 per cent reduction in pesticide application, the output effects can be tentatively estimated to a 10-15 per cent fall in total crop production.

For the EC as a whole the grain surplus is about 15 per cent of total production. A 10-15 per cent fall in EC crop production would therefore result in an appreciable alleviation of surplus problems - and the strain on EC finances from the disposal of agricultural surplus-production.

The Cap Requires a Common Environmental Policy for EC Agriculture

The supranational character of the CAP enables a Member State to transfer most of the marginal costs of its own contribution to agricultural surpluses to the other Member States. A "free rider" problem like this does no doubt influence Member States' environmental policy for agriculture. By responding to internal EC prices rather than world market prices the costs of reducing the intensity of agricultural production will be overvalued by national policy makers.

In other words, there is no reason to believe that the individual Member States will attach much importance to savings on the EC budget when determining their own policy for agriculture. If anything, the negative output effects of reducing intensity will rather be seen as a disadvantage from a national point of view.

There is a need, therefore, to establish a common input pricing policy for EC agriculture using charges on nitrogen and pesticides, especially, to ensure that the intensity of these yield increasing and environmentally damaging inputs will be socially acceptable from a Community point of view.

Farmers' Incomes Need not be Affected

A common input taxation policy in the EC would make it possible to alleviate the pressure on crop prices because surplus problems would be reduced or eliminated. It is important to note in this context that a compensatory increase in crop prices would not neutralize the effects of pollution taxes on the use of nitrogen and pesticides.

Thus, let us assume that nitrogen use was to be reduced by for example 25 per cent through a nitrogen tax. This would reduce land rent by about 10 per cent on the average (provided that the tax revenue was returned to agriculture). This income loss could be offset by increasing crop prices by about 5 per cent which in turn would lead to an increase in nitrogen use by (no more) than 1-2 per cent - implying that net reductions in nitrogen use would remain close to the targeted 25 per cent mentioned above.

In fact grain prices would not have to be increased to compensate farmers for higher fertilizer prices. By removing the present co-responsibility levy on grain, the grain price obtained by farmers would increase by about 5 per cent.

Conclusions

In EC agriculture environmental problems and surplus problems are interrelated. There is a need, therefore, to implement a Common Environmental Policy for EC Agriculture to achieve environmental goals as well as a reduction in surplus-production.

The most efficient policy instruments in this context are input charges on fertilizer and pesticides or limitations in the use of these inputs through tradeable input quotas.

Farm incomes would not have to be dramatically affected by such a policy. The income effects of input charges could be neutralized to a large extent by reimbursing the revenue to agriculture and existing EC support schemes could be adjusted to compensate farmers for the remaining income loss.

The support programmes of the CAP have stimulated surplus-production resulting in international trade conflicts. A transformation of existing support programmes into environmental incentives also alleviating surplus problems would make it easier to reach compromises in international trade negotiations.

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Vortrag zum Thema:

"Wirtschaftliche Instrumente in der Abfallwirtschaftspolitik

und ihr Bezug auf Europa"

anlässlich des Hearings des Europ. Parlaments

zum Thema: "Ökonomie und steuerliche Anreize

zur Erreichung von Umweltschutzzielen"

am 21./22. Juni 1990 in Brüssel

von

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und

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Juni 1990

1.0 Einleitung

"Wir leben in einer Phase der Geschichte der Nationen, die wie keine zuvor Bedarf hat nach internationaler Kooperation und Verantwortung", so heißt es im Brundtland-Bericht ("Our Common Future"), einem globalen Aufruf zur Aktivierung gemeinsamer Überlebensinteressen und besonders zur Verminderung der Ressourcenverschwendung und der Umweltverschmutzung. "Das Ausmaß der Ressourcenverschwendung in den Industrieländern ist weder für diese noch für die Welt als Ganzes aufrechtzuerhalten. Die Umweltverschmutzung, zunächst nur als Problem der reichen Länder und als Nebeneffekt industriellen Wachstums verstanden, ist inzwischen zu einem Überlebenssthema für viele Entwicklungsländer geworden. Viele der derzeitigen Versuche zur Sicherung und Steigerung des Lebensstandards, zur Bedürfnisbefriedigung und zur Verwirklichung menschlicher Ambitionen sind nicht durchzuhalten - weder in den reichen noch in den armen Ländern".

U.Simonis und E.U.v.Weizsäcker schreiben in ihrer Studie (2) über globale Umweltprobleme dazu weiter:

"Die weltweite Umweltdiskussion begann mit dem Sichtbarwerden der ökologischen Effekte der Ökonomie. Nun beginnt das Bewußtwerden der ökonomischen Effekte der Ökologie. Luft-, Wasser-, Boden- und Abfallprobleme haben erhebliche Auswirkungen auf die Funktionsfähigkeit der Ökonomie. Nachdem die Verschuldungskrise die ökonomischen Abhängigkeiten der Nationen deutlich sichtbar gemacht hat, macht die Umweltkrise deren ökologische Interdependenz bewußt".

Ökologie und Ökonomie werden immer intensiver verflochten - lokal, national und global und die Erkenntnis hierüber nimmt rasch zu. Umweltprobleme treten heute in den armen Ländern als Folgen von Überbewirtschaftungen genau so auf, wie in den reichen Ländern als Folge ihres materiellen Überflusses. Gleichzeitig

läßt die Verschuldenskrisen die Umweltkrise aber als unlösbar erscheinen; zumindest stehen viele Entwicklungsländer unter einem enormen ökonomischen Druck, ihre Ressourcenbasis übermäßig auszubeuten und ihre natürliche Umwelt zu belasten. Auf diese enge Verknüpfung von Wirtschaft und Umwelt aber sind die nationalen wie die internationalen Institutionen nicht oder nicht hinreichend ausgerichtet. Derzeit ist es so, daß die Akteure, deren Handeln die Umwelt schädigt, nur schwer in die Verantwortung einbezogen werden können, und im konkreten Konfliktfall mit der Wirtschaft, dem Verkehr, der Landwirtschaft und dem Militär bleibt die Umwelt sowohl national als auch international der Schwächere. Und damit sind wir beim Thema: Wirtschaftliche Instrumente in der Abfallwirtschaftspolitik in Bezug auf Europa.

2.0 Abfallprobleme

Der amerikanische Ökonom G. Roegen formulierte drastisch: "Die industrielle Ökonomie verlangt die schnelle Umformung wertvoller Ressourcen in nutzlosen Abfall". Unser derzeitiges Wirtschaftssystem erzeugt zwangsläufig und systematisch Abfall. Das mittlerweile weltweit beklagte Müllproblem ist das konsequente Ergebnis unserer effektiven Produktionsmaschinerie. Wir wissen nicht mehr, was wir mit dem Überfluß an Gütern machen sollen. Wir werfen ihn weg. Unsere Gesellschaft hat sich zu einer reichen Wegwerfgesellschaft entwickelt. Die Ökonomie der Ressourcenbewirtschaftung unserer Alten ist vergessen und gilt als antiquiert. Jeder Vorstand ist stolz auf seine Produktionssteigerungen am Ende eines Geschäftsjahres und doch hat er in erdgeschichtlichen Zeiträumen gedacht nur Abfall produziert. Bei dieser Betrachtungsweise ist zugegebenerweise die Bewertung der dazwischenliegenden Güternutzung unberücksichtigt.

Die moderne Ökonomie kennt zwar die Produktionsfaktoren Arbeit, Kapital und Boden, aber sie hat bisher trotz vieler Bemühungen, noch kein adäquates Mittel zur Internalisierung von Umweltkosten gefunden. In diesem besonderen Falle: es gibt keine Antwort auf die Frage, was mit einem Produkt nach Nutzung oder Gebrauch zu erfolgen hat. Das Produkt wird im Hinblick auf seinen Nutzen entworfen und produziert. Die Antwort auf die Frage was nach der Nutzung kommt, bleibt meist unbeantwortet.

Diese Frage war zwar auch Gegenstand volkswirtschaftliche Theoriebildung (Physikratischer Ansatz, Property Rights Theory). Sie hat aber keine Umsetzung in die Praxis gefunden. Früher erschienen die Ressourcen unerschöpflich und man konnte von ungesättigten Märkten ausgehen, deren stetiger Bedarf die neuen Güter und Produkte aufnimmt, ohne die gebrachten zu verdrängen. Später wiesen u.a. Meadows und Forrester auf die Begrenztheit der Ressourcen hin und die Produktlebenszyklusanalyse trug der zunehmenden Marktsättigung Rechnung.

Bei niedrigen Energie- und Rohstoffpreisen vergrößerte sich der Materialstrom ständig und seine Geschwindigkeit von der Rohstoffgewinnung bis zum Verbraucher beschleunigte sich ständig. Die Gesellschaft entwickelte sich von einer materiellen Mangelgesellschaft zur Überfluß- und Wegwerfgesellschaft. Der zunehmende Materialstrom findet sich, wenn auch verschlüsselt, im steten Wachstum der Unternehmen wieder. Dabei wird nicht verkannt, daß das heutige Wachstum des BSP in unserem Land eng mit dem wachsenden Dienstleistungssektor zusammenhängt, der weitgehend vom materiellen Wachstum entkoppelt ist. Trotzdem gibt es bis heute keine, analog zur Geldwirtschaft ausgebildete, Energie- und Stoffbilanz der Unternehmen. Auch an diesem Mangel zeigt sich die geringe Aufmerksamkeit, die der Unternehmer diesen Gesichtspunkt beimißt. Der sparsame Umgang mit Rohstoffen ist nur wichtig soweit er sich in Geld ausdrücken läßt. Er ist unwichtig was seine Eigenschaft als endliche Ressource angeht.

Ich glaube dies wird auch ein Kernproblem der europäischen Gemeinschaft werden. Wenn man den Waren-, Kapital- und Personalaustausch fördert, in dem man nationale Beschränkungen und Begrenzungen aufhebt, dann wird auch die Charakterisierung des Abfallproblems als Stoffflußproblem deutlicher. Man kann sich mit den Abfällen als Phänomen beschäftigen. Man kann ihre Sammlung, ihren Transport und ihre Entsorgung beschreiben und regeln. Dies ist aber ungenügend, wenn man eine zukünftige Wirtschaftspolitik entwirft, wie es derzeit geschieht, deren zwangsläufige Folge die Produktion von Abfall ist. Abfallprobleme haben danach mindestens soviel mit Ressourcenpolitik, Technologieentwicklung, Produktmarketing u.a. zu tun, als mit der Frage, wie man sich ihren entledigt, ohne daß kostspielige Spätfolgen zu berücksichtigen sind. Diese Verknüpfung spiegelt sich in der derzeitigen EG-Politik nicht wieder. Da wird Abfallwirtschaftspolitik, nach meinem Geschmack viel zu sehr als Teil der Umweltpolitik gesehen und damit werden grundsätzliche ökonomische Zusammenhänge übersehen.

Die Beobachtungen, daß es nichts gibt, was nicht gleichzeitig Abfall und Rohstoff ist, gerät dabei völlig in Vergessenheit. Abfall ist nicht naturwissenschaftlich zu definieren, sondern durch die Werte, die die Besitzer der Güter und Produkte damit verbinden. Für uns sind Dinge Abfall, die in armen Ländern oder Gesellschaften noch Rohstoff sind. Wer will da sinnvolle administrative Grenzen ziehen? Die Abfallwirtschaft ist die andere Seite einer Medaille, nämlich industrieller Weltwirtschaft, und so muß sie auch gehandhabt werden.

3.0 Ziele der Abfallwirtschaft

Die Abfallwirtschaft ist durch drei Bereiche charakterisiert. Der erste Bereich umfaßt die Beschaffung der Rohstoffe, ihre Verarbeitung, ihr Marktwert, die Seltenheit ihres Vorkommens bzw.

Der liberalisierte Welthandel fördert den Import und Export von Rohstoffen und Gütern. Wen rührt es, wenn die Industrieländer Metalle in Form von Halbzeug und Fertigprodukten, Obst in Konserven, Fasern in Form von Zellstoff einführen und die Exportländer mit den damit verbundenen Umweltproblemen alleine lassen. Wer wundert sich eigentlich ernsthaft darüber, daß z.B. die ständigen Einfuhren von Futtermitteln zur Viehzucht, von Metallen für hochwertige Industriegüter, von Brennstoffen zur Energiegewinnung, bei den Importländern als Stoffsenke wirken. In den Ländern reichern sich Produktionsrückstände in Form von Stäuben, Schlacken und Schlämmen an. Ein Teil der erzeugten Produkte verbleibt im Lande und muß als Müll entsorgt werden. Schließlich verteilen sich Stoffe diffus nach den Gesetzen der Entropie und reichern Flußsedimente, Straßenbegleitgrün, Klärschlamm u.a. mit Schadstoffen an. Wen rührt es an, wenn wir Transformatoren mit Hydrauliköl gefüllt oder Behältnisse mit Pestiziden gefüllt oder Kühlaggregate mit FCKW exportieren, obwohl wir ganz genau wissen, daß die Importländern über keine oder keine ausreichende Infrastruktur verfügen, um mit diesen Geräten und ihren Betriebsmitteln nach dem Gebrauch des Produkts fertigzuwerden? Würde man eine Rücknahme der Produkte durch die Erzeuger fordern, würde weltweit ein Sturm der Entrüstung ausbrechen. Man würde Handelshemmnisse erkennen und den internationalen Wettbewerbsdruck zitieren, um nachzuweisen, wie unsinnig diese Forderung wäre. Abfallwirtschaft zu betreiben heißt: sparsamer wirtschaften, eine Forderung die nicht unbestritten ist. So aber sind wir mittlerweile einig, wie verwerflich der Export von Giftmüll in Länder der Dritten Welt ist. Wir brauchen uns dann über die Konsequenz eines weltweiten Handels mit Produkten, die alle Abfall werden, keine unnötigen Gedanken zu machen.

der Energieaufwand zu ihrer Gewinnung. Der zweite Bereich umfaßt die Technik der umweltfreundlichen, langzeitsicheren Ablagerung. Damit verknüpft sind die Standortfragen, der Flächenbedarf, die chemisch/physikalische Vorbehandlung, die Überwachung, die Kosten und schließlich die Akzeptanz der Beteiligten. Der dritte Bereich schließlich liegt dazwischen. Er umfaßt die Konsequenzen der Technologie mit der Produkte und Güter erzeugt werden und schließlich die Erzeugung und die Verteilung der Güter selbst.

Damit lassen sich drei Abfallarten unterscheiden. Die sogenannte produktionspezifischen Abfälle. Sie entstehen bei der Gewinnung, beim Aufschluß von Rohstoffen und der Herstellung der Vorprodukte. Beispiel dafür sind Abfälle aus der Kohlegewinnung, Kohleverstromung, Zementindustrie, Stahlindustrie, NE Verhüttung u.a.

Diese Abfallmengen gehen tendentiell zurück, weil wir diese Vorprodukte zunehmend importieren und die eigentliche Gewinnung mit ihren Abfällen in die Exportländer ausgegliedert haben. Diese Strategie verlangt aber ausreichendes Kapital um die Rohstoffe zu kaufen und ausreichend Länder die verkaufen wollen. Sie macht die Industrieländer weitgehend abhängig von den Rohstofflieferanten. Diese Strategie führt dazu, daß die Importländer sich zu "Stoffsenken" entwickeln, mit der Folge, daß sich dort verstärkt Schadstoffe der Umweltwelt mitteilen. Und schließlich führt diese Strategie dazu, daß die nötige Technologie zum Recycling von Produkten und Gütern, soweit diese Technologie mit der Gewinnung und Aufkonzentration identisch ist, nicht vorhanden ist und nicht entwickelt wird. Abfälle müssen also exportiert werden, um sie stofflich verwerten zu können.

Außerdem gehen die produktionspezifischen Abfälle zurück, weil zunehmend bessere Technologien, geschlossene Kreisläufe, Rückführmaßnahmen u.a. eingesetzt werden.

Schlußendlich muß an dieser Stelle noch gesagt werden, daß alle nicht integrierten Umweltschutzmaßnahmen wie filtern, klären etc. dazu führen, daß Stoffe nicht in der Umwelt verteilt werden, sondern in Form von Stäuben, Schlämmen, Filtermassen u.a. als Feststoffe und Abfälle weiterzubehandeln sind.

Man könnte behaupten: Je weiter entwickelt eine Volkswirtschaft ist, je weiter entwickelt der sekundäre und tertiäre Bereich ist, umso geringer werden die spezifischen Produktionsrückstände.

Anders ist dies bei den Produkten selbst. Jedes Produkt, ob Frischhaltefolie, Getränkebüchse, TV, Auto oder Gebäude wird nach einer gewissen Lebens- und Nutzungsdauer zu Abfall. Es ist eine Frage des Werkstoffes und der Konstruktion, ob eine stoffliche Verwertung möglich ist und es ist eine Frage der Ökonomie, ob den Kosten für Sammlung, Transport und Dekonstruktion der gebrauchten Güter und Produkte, ausreichende Erlöse aus dem Verkauf der Altstoffe gegenüberstehen. Derzeit kann man davon ausgehen, daß zwischen 30 und 50 % der eingesetzten Materialien aus verwerteten Materialien bestehen. Dies trifft bei Kunststoffen nicht zu.

Sie sind der Prototyp für die derzeitige Produktentwicklung. Sie ist charakterisiert durch anwendungsspezifische Verbundwerkstoffe und Verbundkonstruktionen, durch zunehmende Veredelung mittels chemischer Hilfsstoffe und durch Miniaturisierung. Verbundkunststoffe, Glasfaser- und Keramikwerkstoffe, Hochleistungs-Legierungen u.a. sind die Werkstoffe der Zukunft. Die heute recycelten Werkstoffe wie Papier, Glas, Stahl, Guß, Steine, Ziegel, Holz sind dagegen die Werkstoffe der Vergangenheit. Bei den neuen Werkstoffen ist eine stoffliche Verwertung meist gar nicht mehr möglich. Hier werden technische Entwicklungen ein politisches Ziel, nämlich stoffliches Recycling, möglicherweise obsolet machen.

Die Verwertung von Rohstoffen ist in ihrer Wirkungsweise begrenzt. Die Verwertung setzt außerdem Märkte für die gewonnenen Produkte voraus, die sich bei den derzeitigen niedrigen Weltmarktpreisen für Primärrohstoffe meist nicht ausbilden. Außerdem spielen Gründe der Produktnormung (Funktion des CEN), der Gewährleistung, der Betriebskonstanz großer Produktionseinheiten, der Bequemlichkeiten und der betriebswirtschaftliche Ökonomie eine große Rolle, den Einsatz von Sekundärrohstoffen nicht auszuweiten.

Die Alternative Strategie zur Verwertungsstrategie ist die Strategie der Dauerhaftigkeit. Durch Modulbauweise, langlebige und reparaturfreundliche Konstruktionen, Mehrfachnutzung, Nutzungsstufen, Simulationstechniken läßt sich der Rohstoffeinsatz mindern, die Produktionslebensdauer verlängern, ohne daß damit Abstriche an Produktionsnutzung oder der Berücksichtigung wichtiger Innovationen gemacht werden müssen. Allerdings sei darauf verwiesen, daß bei dynamischer Betrachtung sich auch zu weniger Ressourcenverbrauch/Umweltbeeinträchtigung führende Innovationen schwieriger umsetzen!

Diese Strategie vermindert die Güter- und Produktmenge. Die Umsatzrückgänge auf der Produktionsseite müssen kompensiert werden durch Beratungs-, Pflege- und Reparaturaufwand. Die Folge wäre eine Umstrukturierung gewisser Produktionslinien.

Und schließlich gilt es die Infrastrukturabfälle zu betrachten. Darunter verstehen wir Abfälle die durch das Vorhalten von Infrastrukturelementen der öffentlichen Hand wie Straßen, Bahnen, Kanälen, Krankenhäusern, Labors, entstehen und deren Entsorgungskosten häufig keinem Verursacher zugerechnet werden können sondern aus allgemeine Steuermitteln gedeckt werden müssen. Als Beispiele solcher Abfälle gelten: Straßenkehrriech, Kanal- und

Sinkkastenschlämme, Straßenbegleitgrün, Kommunale Klärschlämme, Komposte aus unsortierten hausmüll, Baggergut, Hafen- und Seeschlämme u.a. mehr. Diese Abfälle nehmen in der Tendenz stark zu. Häufig sind auch sie das Ergebnis verstärkter Umweltbemühungen. Sehr unangenehm ist dabei, daß es sich häufig um Stoffmengen handelt, die früher problemlos recycelt wurden und deren zunehmende Schadstoffgehalte dies heute nicht mehr erlaubt.

Um mit all' diesen Abfällen umzugehen, gibt es mittlerweile eine weitgehende Übereinstimmung in den politischen Zielen und den einzuschlagenden Strategien. Auch die EG hat in ihren Dokumenten für den Umweltschutz diese Zielhierarchie nochmals bekräftigt:

- Abfallvermeidung
- Abfallverwertung
- Schadlose Ablagerung.

Wie lassen sich mit ökonomischen Anreizen diese Ziele besser erreichen?

4.0 Ökonomische Instrumente

4.1 Grundsätzliche Anmerkungen

Die soziale Marktwirtschaft muß durch einen ökologischen Rahmen zur "ökologisch und sozialen Marktwirtschaft" vervollständigt werden. Welche Instrumente sind geeignet, diesen Rahmen in quantitativer Hinsicht zu definieren? Zur Verfügung stehen ordnungsrechtliche und "marktwirtschaftliche", also ökonomische Lösungen. In bezug auf die Abfallpolitik hat der Gesetzgeber sich für staatliche Verantwortung für eine gesicherte Entsorgung entschieden und ein System der Abfallentsorgung geschaffen, das durch die Überlassungspflicht der Abfallbesitzer, die Entsorgungspflicht für öffentlich-rechtliche Körperschaften sowie die Anlagenbenutzungspflicht gekennzeichnet ist. Trotz dieses eingeführten Entsorgungssystems steigt das Abfallvolumen ständig. Darüber hinaus überfordert das eingeführte System die entsorgungspflichtigen Körperschaften dadurch, daß durch das staatliche Entsorgungsmonopol die privaten Abfallbesitzer zu einer im wesentlichen passiven Rolle bei der Abfallentsorgung gedrängt werden. Es sollte über eine neue langfristige Aufgabenverteilung zwischen privater Produktion und öffentliche Entsorgung nachgedacht werden.

"Die Umweltökonomik konfrontiert die ordnungsrechtliche Strategie der bisherigen Umweltpolitik mit einer marktwirtschaftlichen beziehungsweise marktkonformen Alternative. An die Stelle behördlicher Einzelzuteilung zulässiger Umweltnutzungen zum Nulltarif und nach dem Windhundverfahren setzt sie einen preislichen Sanktionsmechanismus, der darüber befindet, inwieweit zulässige Umweltnutzungen im Einzelfall in Anspruch genommen oder unterlassen werden." (Zitat: Hansmeyer/Schneider, "Zur Fortentwicklung

der Umweltpolitik unter marktsteuernden Aspekten", Köln 1989)
Die ökonomischen Instrumente übernehmen bei der Verteilung der verknüpften Nutzungspotentiale auf die Nutzungsinteressenten eine wichtige Informations-, Selektions- und Lenkungs-funktion, in dem sie den einzelnen Nutzer zur Mengenanpassung an Preise bzw. Kosten zwingen. Durch marktwirtschaftliche Instrumente wird also auf der Verursacherseite idealiter jeder umweltbeanspruchenden Nutzung, jedem Verursacher von Umweltqualitätsbeeinträchtigung Preise und damit Kosten auferlegt, und man kann davon ausgehen, daß diese "Zahlungspflichten" zum Kriterium für die individuellen Anpassungsentscheidungen werden.

Ökonomische Instrumente der Mengen- und Preissteuerung können nur dann wirksam ausgestaltet werden, wenn ihnen eine konkrete Ziel- und Programmplanung zugrunde gelegt wird. Gleichzeitig ist ein umfassendes Informations- und Kontrollsystem erforderlich, wenn von ihnen hohe Zielerreichungsbeiträge erwartet werden. Da Umweltschutz bisher offensichtlich im wesentlichen als Verwaltungsaufgabe entwickelt und praktiziert wurde, sollte für die Zukunft eine aufgaben- und ergebnisorientierte Planung mit räumlichem, medialen oder stofflichen Bezug und preislichen Sanktionsmechanismen angestrebt werden; die Festlegung von Vorsorge- und Sanierungszielen sollte eine vordringliche umweltplanerische Aufgabe von Bund, Länder und Gemeinden sein. Zu den Instrumenten im einzelnen und ihren, möglichen abfallwirtschaftspolitischen Einsatz:

4.1 Zertifikate

Beispiele möglicher Mengenlösungen sind Zertifikate und Kompensationslösungen. Zertifikate gelten als das "marktwirtschaftlichste" Instrument, da sich unter Modellbedingungen die insgesamt zulässigen Restverschmutzungseinheiten festlegen lassen und durch die von staatlicher Seite vorgenommene Gesamtkontingentierung sowie ihre Transferierbarkeit Marktpreise entstehen. Zertifikate haben eine wichtige, das Wirtschaftsgeschehen lenkende Eigenschaft: Sie kosten Geld, der Umweltutzer bezahlt den vom Markt bestimmten Preis für die zulässige Emission, aber das Geld bleibt im privaten Sektor. In der konkreten Abfallwirtschaftspolitik wäre ihre Einsetzbarkeit jedoch relativ gering, weil nach der bisherigen, ordnungsrechtlich geprägten umweltpolitischen Grundstrategie technische Mindeststandards festgelegt, diese administrativ fortgeschrieben und die zulässige Restverschmutzung kostenfrei toleriert werden. Aus diesem Grund wird bei der Einführung von Lizenzmodellen in einem ordnungsrechtlich geprägten System ein hoher Verwaltungs- und Kontrollaufwand erwartet. Da ihre Anwendungsmöglichkeit nach meiner Einschätzung im wesentlichen bei der Minderung großräumiger Belastungen (z.B. durch klimarelevante Spurengase) und innerhalb geschlossener Systeme (z.B. Indirekteinleiter im kommunalen Abwasseranlagensystem) gesehen werden, steht ihre praktische Handhabung im Rahmen eines Versuchs ihrer pragmatischen Anwendung und Anbindung an das Ordnungsrecht noch aus. Weniger schwierig scheint die Ausgestaltung von Kompensationslösungen zu sein, da diese als Bestandteil des ordnungsrechtlichen Systems zu den selben oder günstigeren Ergebnissen bei begrenzten Emissionen und gleichzeitig gelockertem Einzelvollzug der allgemein gültigen Emissionsnormen gelangen können.

Auch hier werden die Einsatzmöglichkeiten im wesentlichen im Gewässer- und Immissionsschutz gesehen (Hansmeyer). Neuerdings wird der Einsatz von Kompensationsmaßnahmen in der Umweltzusammenarbeit mit der DDR diskutiert. Hier kommen vor allem Regelungen im Vorsorgebereich (§ 7 Abs. 3 Bundesimmissionsschutzgesetz) in Betracht, in bezug auf die Abfallwirtschaftspolitik würden sich die Bereiche Vermeidung und Verwertung einschließlich Schadstoffentfrachtung für gezieltere Überlegungen anbieten.

4.2 Abgaben und Steuern

Beispiele möglicher Preislösungen sind Umweltabgaben und Ökosteuern, die im Prinzip die Preise für Umweltnutzungen fixieren, und es somit den Emittenten überlassen bleibt, zu entscheiden, wieviel sie angesichts des Festpreises je Schadstoffeinheit emittieren wollen. Preislösungen gelten unter ökologischen Gesichtspunkten als nicht unbedenklich: Die Abgabensätze müßten den Knappheitspreisen der insgesamt zulässigen Umweltnutzung entsprechen. Allerdings ist niemand in der Lage, die Abgabensätze genau zu bestimmen, die die Einhaltung der festgelegten ökologischen Rahmenwerte garantieren würden. Knappheitspreise sind ohne Märkte nicht simulierbar. Außerdem ist die Änderung der Abgabensätze aufwendig und langwierig, unabhängig davon, ob sie als Steuer, Gebühren, Beiträge oder Sonderabgaben ausgestaltet sind. Zu den die Abgaben kennzeichnenden Elementen, nämlich

- Koppelung an das Ordnungsrecht zur Vollzugsunterstützung,
- Ausgestaltungsmöglichkeit als Lenkungsinstrument (z.B. durch Verbesserung der Ressourcen) bzw. als Finanzierungsinstrument (z.B. zweckgebundene Aufkommensverwendung),
- Übernahme der Vollzugs- und Kontrollkosten mindestens anteilig durch den Verursacher

ist viel geschrieben worden (Hansmeyer, Ewringmann, Faber).

In diesem Zusammenhang ist anzumerken, daß mit der Einführung von Umweltabgaben fast unvermeidlich der Staatsanteil erhöht wird und dieses zu politischem Zündstoff werden kann, da wegen der Zweckbindung der Aufkommensverwendung keine Steuerentlastung an anderer Stelle eingeführt werden kann. Diese Aussage ist nicht unbestritten.

Im Rahmen eines Emissionsabgabenkonzeptes wäre die Einführung von Abgaben mit dem Ziel einer marktkonformen Beeinflussung des Abfallbereiches eine sinnvolle und konsequente Ergänzung. Sie würde deponierungsbedürftige Abfälle, z.B. im Rahmen einer ausgestalteten Deponieabgabe, ebenso mit einer Abgabepflicht - etwa beim Anlieferer oder auch Deponiebetreiber - belegen wie andere Emissionsrückstände auch. Entscheidend ist der Eigenanreiz, bei dem mit der Abgabe belasteten Emittenten oder Abfallbesitzer durch weitgehende Abfallvermeidung die Abgabelast möglichst zu senken und dadurch kostengünstiger zu produzieren.

Die Einführung von Produktabgaben wird von Ökonomen eher skeptisch beurteilt: "Der erwünschte Effekt hängt... ausschließlich von den Überwälzungsstrategien und -erfolgen sowie den Elastizitäten auf dem betreffenden Markt ab, die von der Umweltpolitik über eine Produktabgabe nicht hinreichend gesteuert werden können. Hinzu kommt, daß selbst bei Substitution wegen der Unkenntnis der Umwelteigenschaften der Substitutionsgüter der Vorsorgeeffekt fraglich wird; diese Gefahr wird um so größer, je selektiver die Produktsteuerbelastungen sind." (Zitat: Hansmeyer/Schneider, "Zur Fortentwicklung der Umweltpolitik unter marktsteuernden Aspekten", s.o.).

4.3 Entsorgungskosten

Hohe Entsorgungspreise setzen hohe Entsorgungskosten sowie die angemessene Bewertung der Deponierisiken und der Seltenheit der Ressourcen Deponie voraus. Nur wenn die Entsorgungspreise hoch genug sind, stellen sie eine ausreichende Stimulanz für Verwertungsmaßnahmen dar. Die Attraktivität eines Sekundärrohstoffes mißt sich zunehmend nicht nur an den Kosten des Primärrohstoffes sondern auch an den Entsorgungskosten.

Hohe Entsorgungskosten setzen eine angemessene Technik voraus. Aus Wettbewerbsgründen muß diese Technik harmonisiert sein. Der Entwurf der zukünftigen Deponierichtlinie der EG zeigt bereits den Weg. Die Anforderungen an die Qualitäten des abzulagernden Stoffes bestimmen die nötige Vorbehandlung und die technische Ausgestaltung der Deponie. Die Deponie unbehandelter Abfälle muß dabei teurer sein, wie die behandelte Abfälle. Es bietet sich deshalb an, die Grundwasserrisiken der Deponien über eine Zwangshaftpflicht zu versichern. Weiter ist eine Rücklage aufzubauen aus der über Zeiträume von über 50 Jahren die Kosten für die Entgasung, Sickerwasserklärung und Schlammbehandlung, bauliche Unterhaltung und evtl. Sanierungsmaßnahmen finanziert werden können. Dazu ist eine Deponieabgabe zu erheben um die Kosten der Sanierung der derzeitigen Altablagerungen zu finanzieren, und es ist zu überlegen, ob eine Deponiesteuer das angemessene Instrument ist um die Seltenheit der Ressourcen Deponiefläche in der Kostenrechnung richtig zu bewerten. Oder anders ausgedrückt, die Vollkostenrechnung im Kommunalabgaberecht fehlt und müßte eingeführt werden.

Bei den derzeitigen Verbrennungskosten von Hausmüll die ohne Gutscheine, zwischen 200,-- und 300,-- DM/ta bzw. 70,-- DM bis 100,-- DM/E, a/E liegen müßte davon ausgegangen werden, daß die Deponiekosten mindestens 400,-- DM je t liegen. Diese Preise klingen gemessen an den derzeitigen Preisen von 2,-- DM bis 20,--DM je t sehr hoch. Gemessen an den Aufwendungen für den Verbrauch in der EG bezogen auf den Einwohner sind diese "Entsorgungskosten" lächerlich niedrig und indiskutabel. Wenngleich ihre Anhebung heftigste politische Auseinandersetzung auf kommunaler Ebene zur Folge haben werden.

Bei Sonderabfällen gelten die gleichen Bedingungen, allerdings müßten die absolute Höhen der Kosten um Faktoren 10 bis 100 höher sein. Die Entsorgungstechnik und die dafür benötigten Preise müssen zur Produktions- und Verteilungstechnik in einem angemesseneren Verhältnis stehen.

Die Folgen so hoher Entsorgungskosten sind:

- illegale Entsorgung wird zunehmen
- Exporte in Drittländer werden zunehmen
- Abfall zu Wirtschaftsgut zu erklären, und damit den abfallrechtlichen Bestimmungen zu entziehen, wird zunehmen
- Maßnahmen zur Verminderung und Verwertung werden zunehmen.

Man mag daran erkennen, daß der Einsatz dieses ökonomische Instrumentes nicht wirkungsvoll ist, wenn nicht gleichzeitig die administrative Überwachung verstärkt wird. Das Instrument wäre für den Wettbewerb neutral und verstärkt die Bemühungen um Verwertung und Vermeidung.

4.4 Stabilisierungszahlungen für Altmaterialien

Immer wieder gefordert, ökonomische Maßnahmen zu ergreifen, um die Preisschwankungen beim Verkauf von Altstoffen zu mindern und ein kostendeckendes Niveau für den Altstoffverkauf zu erzielen. Nur so ließen sich die Spannung zwischen Entsorgungssicherheit und Marktunsicherheit überwinden. Ich warne dringend vor solchen Maßnahmen, denn sie führen zwangsläufig zu weiteren, in der EG hinreichend bekannten Bergen. Kurzfristige Preisschwankungen lassen sich mit vertraglichen Ausgleichsmaßnahmen überwinden. Bei langfristigen Preisverfall müssen die Entsorgungsstrukturen angepaßt werden.

Derzeit beobachten wir aber einen anderen Effekt. Durch die hohen Gebühren in der Bundesrepublik Deutschland und den Zuzahlungen zur Altstoffsammlung aus diesen Gebühreneinnahmen als Strategie der Abfallminderung, werden Altstoffe relativ preiswert. Im Falle des Exportes führt es in den Exportländern zur Marktverdrängung dort gesammelter Rohstoffe. Ein Umstand der im Rahmen der europäischen Einigung sicher noch einer Klärung bedarf.

4.5 Der Rückkauf

Ein relativ wenig diskutiertes Instrument ist der Aufkauf von Abfällen. Im Zusammenhang mit der Festlegung von Cadmium haben wir dieses Instrument diskutiert. Cadmium ist häufig mit Zinkerzen vergesellschaftet und fällt bei dessen Gewinnung als Zwangsanfall an. Auf der Suche nach ökonomischer Verwertung wurde dieses giftige Metall in einer Vielzahl von Anwendungen wie Farbe, Korrosionsschutzmittel, Batterien usw. in die Umwelt verteilt. Es wäre sicher eine preiswerte Umweltschutzmaßnahme gewesen das Cadmium aufzukaufen und in eine Untertagedeponie konzentriert zu verbringen.

Ein anderer denkbarer Anwendungsanfall wäre der Rücklauf von Brennstoffaufbereitsrückständen und Tankballastwässern in Seehäfen. Die derzeit stattfindende mangelhafte Entsorgung führt immer wieder zu Umweltstörungen. So geht die weitaus größte Anzahl der an Öl sterbenden Seevögel an Ölrückständen aus den Schiffsbetrieb zu grunde. Bestünde ein solches Rückkaufsystem in den deutschen Häfen, bin ich sicher daß die erzielbaren Umweltentlastungen erheblich wären.

4.6 Schwierigkeit bei der Bewertung ökonomischer Instrumente

Die Wirksamkeit von ökonomischen Instrumenten, besonders in bezug auf Abfallverminderung, Abfallvermeidung und Abfallverwertung zu bewerten, fällt sehr schwer, wenn bei der Betrachtung der gesellschaftliche Kontext z.B. der Bundesrepublik verlassen wird, deren Ver- und Entsorgung durch das dezentrale Element geprägt ist und abfallwirtschaftlichen Initiativen der Kommunalpolitik mit viel Handlungsspielraum überläßt. Dies ist bisher z.B. in der DDR - noch - nicht der Fall, die zentralistisch strukturiert ist und deren zuständige Behörden bis vor nicht all zu langer Zeit einen zweifelhaften Tauschhandel "Müll gegen Devisen" betrieben haben. Diese Schwierigkeiten der Bewertung von ökonomischen Instrumenten sind im internationalen Zusammenhang noch größer. Hier sind starke wirtschaftliche, vom Gesetzgeber der Bundesrepublik kaum beeinflussbarer Kräfte am Werk. Wenn allein der EG-Bereich zu betrachten ist, wird von Seiten der Hersteller von umwelttechnischen Gütern ein großes Marktvolumen gesehen: Der Umweltmarkt Boden nach einigen Schätzungen hat in der europäischen Gemeinschaft bis zum Jahr 2000 ein Volumen von 15 Milliarden DM, der Umweltmarkt Luft ein Volumen von 22 Milliarden DM, der Umweltmarkt Wasser kommt auf 45 Milliarden DM, der Umweltmarkt Abfall auf 50 Milliarden DM. Die Hersteller und Anbieter dieser benötigten Umweltschutzanlagen können in den nächsten Jahren mit erheblichen Nachfrageimpulsen rechnen, vor allem für die Modernisierung und den Neubau von Kläranlagen, für Kanalbau und Kanalisation, für Luftreinhaltemaßnahmen, Altlastensanierung und Abfallvermeidung, Abfallverwertung sowie Abfallentsorgung. Insofern ist zu begrüßen, daß zur Verringerung schädlicher Emissionen alle verfügbaren Kräfte gesammelt

werden und auf eine breite Palette von Instrumenten sowohl ordnungsrechtlicher als auch ökonomischer Art zurückgegriffen werden kann. Der EG-Umweltkommissar Ripa di Meana bekräftigte in diesem Sinne Ende Mai die Absicht der Kommission, neben die Einhaltung der EG-Umweltgesetze die Einführung von Umweltabgaben sowie Steuerlösungen in den Mittelpunkt der künftigen Umweltpolitik zu stellen.

5.0 Utopische Instrumente

5.1 Weltressourcensteuer

Von großem Interesse ist auch der Vorschlag von Prof. Simonis, (9) eine "Welt-Ressourcen-Steuer" einzuführen. Sie soll dazu beitragen, eine ökologisch orientierte Umstrukturierung von Produktion und Handel in Gang zu setzen. In diese Richtung gehen auch Überlegungen der Bundesregierung, nämlich einen Tausch von Schulden der Entwicklungsländer gegen verstärkten Umweltschutz in deren Ländern zu unterstützen (debt-for-naturswaps); konkret: Die Bundesregierung wäre bereit, Brasilien einen Teil seiner Schulden zu erlassen, wenn es das Tempo der Abholzung des Tropenwaldes zumindest drosselte. Worum geht es Prof. Simonis? "Mit der Einführung einer globalen Steuer auf die Verwendung fossiler Energieträger beispielsweise und nicht - erneuerbarer mineralischer Rohstoffe würde eine Verknüpfung zwischen Ressourceneinsatz und einsatzbedingten Umweltschäden hergestellt (globales Verursacher-Prinzip) und ein Nettotransfer von Nord nach Süd bezweckt. Auf diesem Wege soll der Teufelskreis zwischen armutsbedingtem Ressourcenraubbau in den Entwicklungsländern und reichumsbedingter Energie- und Rohstoffverschwendung in den Industrieländern gebrochen werden (Steuerlösung). Eine

globale Ressourcensteuer bietet über die damit einhergehende Veränderung der relativen Preise der Wirtschaft (Erhöhung der Preise der fossilen Energieträger und der nicht erneuerbaren Rohstoffe) Anreize und Sanktionen zugleich: einerseits Anreize zur Entwicklung effizienterer Technologien und Produkte und zur Nutzung erneuerbarer Ressourcen, andererseits Sanktionen gegen die vorherrschende energie- und ressourcenintensive Produktionsstruktur und den Ressourcenabbau. Die Steuer kann, muß aber nicht, von einer speziell einzurichtenden internationalen Agentur erhoben und budgetiert werden. Die Steuereinnahmen könnten teilweise dazu dienen, andere, direkt oder indirekt umweltbelastende Steuern zu ersetzen. Mit einer globalen Ressourcensteuer würde also sowohl eine Änderung der Struktur des nationalen Steuersystems bewirkt als auch ein Netto-Steuerzuwachs für die Entwicklungsländer erzielt. Ein Teil des Aufkommens aus der Ressourcenbesteuerung könnte zum Abbau der Schuldenlast der Entwicklungsländer verwendet werden. Eine spezielle Zweckbindung eines Teils der Mittel für den Umweltschutz bzw. die Förderung umweltverträglicher Technologie wäre denkbar, erübrigt sich aber, wenn der "ökologische Präventionseffekt" der veränderten Steuerstruktur hinreichend stark ausgeprägt ist. Um die entstehenden wirtschaftlichen Anpassungsprozesse zu erleichtern, sollte die Steuer phasenweise eingeführt werden". (Zitat: Auf dem Weg zum "Weltbudget" - Gedanken zu einer Welt-Ressourcen-Steuer, Veröffentlichung Wissenschaftszentrum Berlin). Diese Steuerlösung, deren Wirkungen sehr stark an die seinerzeitigen Effekte der massiven Erdölpreiserhöhungen (rd. 40 \$ pro Faß) durch die OPEC Anfang der 70er Jahre erinnern, setzt allerdings die Einhaltung einer Reihe wichtiger Nebenbedingungen voraus: "Der Vorschlag erfordert vor allem, daß es hinreichend Anreize gibt, ihn zu befolgen. Für die Entwicklungsländer würde ein besonderer Anreiz darin bestehen, den derzeitigen Raubbau an Ressourcen zu beenden, weil höhere Entgelte für Energie und Rohstoffe und längere Nutzungszeiten von Naturkapital zu gewinnen wären. Für die Industrieländer würden

zwar höhere Kosten anfallen, aber zugleich erhebliche Einsparungen beim kurativen Umweltschutz; es würden zudem starke technische Innovationseffekte entstehen. Für die Umwelt selbst ergäben sich weltweit sofort spürbare Entlastungseffekte. Insgesamt könnte eine Welt-Ressourcen-Steuer daher ein Positiv-Summen-Spiel einleiten. Vieles hängt allerdings von ihrer konkreten Ausgestaltung ab". (Zitat: s.o.). Alles in allem ist der Vorschlag originell und regt zu weiterem Nachdenken an. Seine Umsetzung dürfte unter den gegebenen weltwirtschaftlichen und außenpolitischen Rahmenbedingungen größte Anstrengungen erfordern. Allein die Schaffung einer internationalen und mit globalen Kompetenzen ausgestatteten Weltsteuerbehörde mutet eher utopisch an; ganz abgesehen von so hoch brisanten Festlegungen wie Höhe und Staffelung der Steuersätze, Volumen der Besteuerung insgesamt und, last not least, deren Verteilung auf die einzelnen Länder sowie der Bestrafung von Steuerhinterziehern. Andererseits sollte Kleinmütigkeit nicht zu früh dominieren, denn: Wer hätte je geglaubt, daß es so rasch und so überzeugend zum "Montrealer Protokoll zum Schutz der Ozonschicht" kommen würde und es möglicherweise schon bald eine "Klimakonvention" zur weltweiten Reduzierung des Kohlendioxid gibt?

5.2 Verkauf von Nutzen statt von Produkten

Die Belastung der natürlichen Umwelt durch menschliches Wirtschaften könnte mit einer ganzen Palette von Konzepten reduziert werden, welche die Lebensdauer oder die Nutzungsdauer von Produkten erhöhen, ohne dabei Wohlstandseinbußen entstehen zu lassen.

W. R. Stahel, vom Büro für Dauerhaftigkeit in Genf, schlägt vor, mit der Strategie der Dauerhaftigkeit neue Wege der nachhaltigen Nutzung von Gütern zu öffnen. Durch eine Verschiebung von der heutigen kurzfristigen Optimierung von Produktion und Verkauf zu einer Nutzungsoptimierung über längere Zeiträume hinweg können Produktionswachstum, das Rohstoffe verzehrt, und wirtschaftliches Wachstum, was Reichtum produziert voneinander entkoppelt werden. Dauerhaftigkeit ist der Kern eines ganzheitlichen Produktmanagements vom Design bis zur Entsorgung. Mit der Dauerhaftigkeitsstrategie wird die traditionelle ökonomische Zieldefinition, ein Produkt solle "mit möglichst wenig Rohstoffen und Energie einen möglichst hohen Nutzen schaffen", um den Faktor Zeit erweitert.

Insgesamt wird zukünftig die Instandhaltequalität eines Produkts ebenso wichtig wie die Produktqualität. Abfallvermeidung ist billiger als Abfallbeseitigung.

Neben den rohstoffsparenden Effekten lassen sich bemerkenswerte Einsparungen bei den Energieinvestitionen machen, weil die ursprünglich in das Produkt investierte Energie weitgehend erhalten bleibt.

In gesättigten Märkten, wo der Kauf neuer Produkte ständig das Wegwerfen eines vorhandenen auslöst, erlaubt die Strategie der Dauerhaftigkeit eine erhebliche Reduktion der Abfallmengen, mit all den Umweltbeeinträchtigung in Produktion, Vertrieb und Entsorgung. In der Porsche-Studie für ein Langzeitautomobil

wurden diese Effekte vor Jahren schon erkannt und dargestellt, allerdings ohne weiterreichende Folgen. Diese Abfallminderung hat natürlich auch positive Effekte auf die Rohstoffnutzung. Es sei nur an die Studien des Club of Rome oder dem Bericht Umwelt 2000 an den amerikanischen Präsidenten erinnert, in dem auf die starke Inanspruchnahme von Rohstoffen und deren Endlichkeit hingewiesen wurde. Mit der Strategie der Dauerhaftigkeit würde dieses Problem besonders auch im Hinblick auf die neuen Erfordernisse der Entwicklung der osteuropäischen Länder lösbar.

Der im Rahmen der Dauerhaftigkeitsstrategie geforderte Verkauf von Nutzen anstelle von Gütern erfordert die Kostenoptimierung über die gesamte Produktlebensdauer schon bei der Herstellung. Eine solche Lebenszeitoptimierung sollte ergänzt werden durch "unbegrenzte" Herstellerhaftung. Mit dieser Strategie verlagert sich der Schwerpunkt wirtschaftlichen Interesses von der Herstellung auf das "Flottenmanagement". So sieht die dänische Hohlglasindustrie ihre Zukunft vor allem im Verkauf von Transportlogistik und Flaschensterilisation und nicht mehr in billigen Produzieren von Einwegflaschen mittels Glasrecycling.

Das wesentliche Argument gegen die Langzeitstrategie ist die Geschwindigkeit der Innovation in den jeweiligen Produktbereich. Am Beispiel des Energieverbrauchs für Herstellung und Fahrleistung oder bei der Abgasentgiftung beim Auto läßt sich dies leicht nachweisen. Vertreter der Automobilindustrie neigen daher eher zur Verbesserung der Dauerhaltbarkeit ihrer Produkte, d.h. sie wollen mit einem Minimum an Wartung und Reparatur über die Lebenszeit des Autos hinwegkommen. Sicher ist aber, daß die "geplante Obsoleszens", d.h. die bewußte Verkürzung der Lebensdauer von Produkten zwecks Umsatzsteigerung keine offenen Befürworter mehr hat. Die geplante Kurzlebigkeit eines Produktes ist kein Zeichen für Fortschritt mehr. Faktisch füllt aber das kurzlebige, modische, high-tec-Produkt unserer Abfallbehälter.

Ein weiteres Argument gegen die Strategie der Dauerhaftigkeit sei genannt.

An den Zusammenhang von Umweltschutz und Arbeitszeitverkürzung wird wohl seltener gedacht; allerdings werden durch Tarifabschlüsse langfristige Entscheidungen über die Lebensbedingungen der Bevölkerung getroffen. Eine verkürzte Arbeitszeit bei vollem Lohnausgleich hat eine erhebliche Verteuerung aller Dienstleistungen und somit u.a. auch einen Einfluß auf die Ökologie zur Folge: Eine hohe Verdichtung der Arbeitsleistung innerhalb einer relativ kurzen Arbeitszeit kann nur bei

- hoher Entlohnung und
- hohem Einsatz an Energie und Material

durchgesetzt werden. Eine starke Verteuerung der Dienstleistung für hoch qualifiziertes Personal bedeutet, daß z.B. Reparaturkosten, aber auch Kosten für die arbeitsintensive Wiederaufbereitung von Reststoffen aller Art steigen. Für diese Dienstleistungen müssen also vom Verbraucher höhere Preise entrichtet werden als für neue, mit größerer Arbeitsproduktivität erstellte Güter. Das bedeutet für den gut bezahlten Konsumenten, daß Kaufen billiger ist als reparieren, wegwerfen billiger als verwerten. Insofern ist in diesem wirtschaftlichen Zusammenhang auch eine Erklärung für das Anwachsen der Abfallmengen zu finden.

5.3 Produktverwertungsabgabe und Produktverantwortung

Die derzeitige Ökonomie besitzt keine systematische Antwort auf die Frage, was mit einem Produkt nach seiner Nutzung zu geschehen hat. Bisläng wird es, bei mangelnder Wertschätzung des Besitzers zu Abfall erklärt und mehr oder weniger umweltschädlich aufgehäuft.

Was spräche eigentlich dagegen, das Produkt nach seiner Nutzung dem Produzenten zurückzugeben, bzw. er wäre verpflichtet, es zurückzunehmen? Dieser Ansatz würde dem Produzenten eine wichtige Rohstoffquelle sichern. Es würden die Abfallmengen reduziert. Und was mir ganz wichtig erscheint, das Produktdesign würde von vornherein an einer Folgenutzung orientiert. Die heutigen Produkte orientieren sich ausschließlich am anwendungsorientierten Nutzen. Die Trends der High tec in Richtung auf Verbundwerkstoffe, Verbundkonstruktion, Miniaturisierung, chemischer Vergütung laufen alle in der Tendenz einer nachfolgenden Verwertung entgegen. Stoffliches Recycling wäre dann zwar ein politisches Ziel, praktisch aber nicht mehr realisierbar. Natürlich werden auch zukünftig nicht alle Produkte und Werkstoffe high tec Produkte sein und die Verwertung von Holz, Glas, papier, Steine, Ziegel wird auch zukünftig von großer Bedeutung sein. Um aber deutlich zu machen welcher Rückkoppelungseffekt wichtig erscheint mir die Rückkoppelungseffekt für den "Designer" des Werkstoffes oder Produktes der ihn dazu zwingt sich Gedanken über die Entsorgungbarkeit zu machen.

Natürlich könnte man sich die Rücknahme so vorstellen, daß analog zur Rentenversicherung bei Personen eine Produktabgabe in eine Versicherung bezahlt wird, aus der die Rückführungs- und Zerlegungsmaßnahmen bestritten werden. Die Beiträge wären nach der Recyclingfähigkeit der Produkte staffelbar.

Dieser Vorschlag wird derzeit bei einzelnen Firmen und Produkten bereits realisiert. Die Rücknahme von Elektrogeräten oder von Rückständen aus der Verbrennung von Kohle sind geeignete Beispiele. Auch die kürzlich in Betrieb genommene "Zerlegestation" von VW in Lehr, in der alte Autos systematisch, vor dem Shreddern zerlegt werden, um bessere Altstoffausbeuten zu erhalten geht in diese Richtung.

Sicher müßte man die Anwendung des globalen Grundsatzes in den konkreten Einzelfällen eingehend untersuchen. Ich halte diesen Ansatz aber langfristig für den einzig zum Ziel führenden.

*Deltagerliste/Anwesenheitsliste/Κατάσταση παρόντων/
Record of Attendance/Lista de Asistencia/Lista de Présence/
Elenco dei Presenti/Presentielijst/Lista de Presencas*

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European Communities – European Parliament – Directorate-General for Research

Catalogue: 0

Luxembourg: European Parliament · L-2929 Luxembourg

1990 – 162 pp – 21 x 29 cm

DA, DE, GR, EN, ES, FR, IT, NL, PT

ISBN: 0

Catalogue number: 0

Price (excluding VAT) in Luxembourg:
ECU 0

EN

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