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A Regulatory Framework for a Policy of Sustainability: Lessons from the Neo-Liberal School

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Abstract
In this paper targets, institutions and policy measures for describing and implementing sustainable development are evaluated in terms of their conformity with the economic framework of a market system. Firstly, from the viewpoint of neo-liberal economic thinking as conceived by the German Freiburg school of economists (Eucken), a general set of criteria is developed, including issues of operationalization and legitimation of goals as well as institutional and instrumental issues. On this basis general rules for designing an ecological framework guaranteeing the greatest possible degree of conformity with a market system are derived. The concrete application of these rules leads to recommendations for a policy of sustainability with respect to the setting of goals, the establishment of institutions (role of ecological councils, of a central environmental organization on UN level and of the GATT/WTO regime) as well as the use of appropriate instruments.

Keywords: sustainability targets, regulatory rules, neo-liberal framework, environment and international trade, environmental policy assessment

JEL Classifikation: Q 58

Non technical summary

The model of a social market economy has been constituted as an answer to the social question of the 19th and 20th centuries. The idea was to have a social framework underpinning an economic system designed primarily for competitive endeavour. Today, proponents of what is called sustainable development develop similar proposals for solving the social (especially in developing countries) *and* ecological crisis of the 20th century. Questions of designing a sustainable economy are mainly discussed within the interdisciplinary stream of ecological economics.

This paper is designed as an attempt to develop a liberal approach for embedding the basic thinking of ecological economics into a concept of political regulation. To evaluate in terms of their regulatory efficacy the goals, institutions and measures for describing and implementing sustainable development, the first requirement is a set of check criteria. An analytical raster of this kind is formulated in this paper, and comprises the following steps: goal operationalization and legitimization, institutionalization, and instrumentation:

- In developing a goal system, it is crucial to define consistent subgoals, demonstrably able to correct the deficits of a pure free-market system.
- When selecting the decision-making level, the primary consideration must be to find a balance between the subsidiarity and congruence principles. While the subsidiarity principle basically favours decentralized solutions, the criterion of objective congruence demands that global problems be tackled on the level of supranational institutions.
- Finally, any assessment of instruments will in terms of regulatory efficacy concentrate on criteria of effectiveness (goal-conformity), necessity (system-conformity), economic efficiency, and institutional controllability.

The way in which sustainability goals are formulated is highly relevant in terms of regulatory policy-making. Starting from regulatory considerations, maximally differentiated, impact-oriented policy goals (i.e. environmental quality indicators) must be paramount in any system of sustainability indicators. The less specifically the goals of sustainable economic management are defined, the more likely they are to result in concepts of dubious regulatory utility, tending towards blanket restrictions in economic activities and economic growth as such. Formulation of sustainability goals must therefore satisfy the principle of necessity and the postulate of maximising freedom under given ecological restrictions

If these basic principles are followed, the targets derived from them can be legitimized, even when applying strictly neo-liberal criteria for evaluating economic

policy measures. Reduction targets of this kind do not (despite recurrent warnings to the contrary) signify a descent into an eco-dictatorship, but quite the reverse: a necessary expansion of liberal constitutions for the economy. A conclusion drawn from the insight that the market cannot of itself guarantee the preservation of ecological support capacity. Ensuring ecological carrying capacity thus additionally demands a framework of sustainability.

Institutional implementation of the principles of sustainable development is primarily characterized by the ambivalent relationship between the equivalence and congruence principles. From a regulatory viewpoint, decentralized solutions should always be given preference. Global change, however, entails a heightened necessity for international coordination.

As yet there have been no totally persuasive proposals for the establishment of ecological councils capable of assuming long-term responsibilities in democratic decision-making processes otherwise focused on the short term. The fundamental problems involved in these proposals usually stem from the inadequate democratic legitimization of such councils, and in over-ambitious ideas concerning the scientific expertise of the members concerned, which would have to cover all the specialized fields involved in sustainable development. It would appear more sensible to strengthen the existing councils and commissions.

Regarding the institutional revamping of global environmental policy-making, in view of the sheer scope of the job and the responsibilities involved for a policy of sustainability, it appears advisable to create a new, central organization for global environmental and resource protection.

The deficits and ambiguities of the GATT/WTO regime in regard to environmental problems highlight the necessity for an ecological reform. One example is offered by the NAFTA (North American Free Trade Agreement), which establishes a free trade zone between the USA, Canada and Mexico. Environmental aspects were of some importance for congressional approval, so that a relatively sophisticated body of rules had to be created. It can be foreseen that the topic of foreign trade and the environment will take on major importance in future GATT/WTO negotiating rounds. The objective should be to seize this opportunity to put through substantive reforms which are outlined in this study.

An analysis of environmental policy instruments in terms of their regulatory efficacy requires that they be evaluated against a variety of problem constellations. Not only must a distinction be drawn here between averting dangers and making provision for risks; the nature of the market's failure in each case (external costs, inflexibility, lack of information) and the level of informed public opinion on possible environmental damage must also be taken into account.

1 Introduction

The model of a social market economy has been constituted as an answer to the social question of the 19th and 20th centuries. The idea was to have a social framework underpinning an economic system designed primarily for competitive endeavour. Today, proponents of what is called an ecological market economy develop similar proposals for solving the ecological crisis of the 20th century. With the idea of an ecological framework, economists delegated the problem of defining ecological goals almost entirely to the politicians and scientists, while they devoted themselves primarily to developing instruments of maximized efficiency for externally specified goals formulated by environmental policy-makers.

Ecological economics attempts to break away from the present fixations with instruments as such. It rather takes a step backwards, aiming first to achieve better comprehension for ecological/economic causal interrelationships and the basic ethics involved, so as not to obliterate the problems precipitately with conventional economic nostrums. One pertinent introduction to questions of ecological economics puts it like this: „We must transcend the focus on tools and techniques so that we avoid being ‘a person with a hammer to whom everything looks like a nail’“ (COSTANZA, DALY AND BARTHOLOMEW, 1991, 3). The main focus of the sustainable development concept, the predominant concern of ecological economics, is thus to describe the problems and define the relevant goals.

This paper is designed as an attempt to develop a liberal approach for embedding the basic thinking of ecological economics into a concept of political regulation. Fundamental questions of regulatory policy geared to viable sustainability can be identified on several different levels:

- Substantive level: to assess the relevance of particular recommendations for a policy of sustainability, the first necessity is to concretize the goal system involved in sustainable development by means of appropriate criteria and indicators.

- Institutional level: besides the formulation of substantive goals, studies must also examine what institutions must be created with what prerogatives on what decision-making level, to enable them not merely to formulate, but also to implement these goals in the ongoing political process.

- Instrumental level: consideration must also be given to whether the measures recommended within the framework of concepts for sustainable development accord with the system-inherent characteristics of a social market economy,

or whether they run unduly counter to free-enterprise rules as societal coordinating mechanisms.

The different levels are integrated into this paper as follows: after clarification of the term „sustainability“ (Chapter 2), a catalogue of criteria is developed against which recommended policies can be assessed in terms of their contribution to implementing sustainability (goal-conformity) and also in regard to their conformity with the model of a social market economy (system-conformity) (Chapter 3). Against these criteria, the paper examines how the sustainability model can be operationally formulated, and legitimized in terms of regulatory policies (Chapter 4). Chapters 5 and 6, finally, apply the paradigm criteria to the institutional and instrumental levels, by asking on what decision-making level the model must be implemented by what bodies, programmes, instruments and action.

2 Definitions and concepts of sustainable development

Among the many definitions for the concept of sustainable development, the simplest and most general comes from the Brundtland Commission, which describes a development sustainable when it „meets the needs of the present without compromising the ability of future generations to meet their own needs“ (HAUFF, 1987, 46).[2] Since the concept of sustainable development plays a central role in international environmental and development policy-making, economists are also endeavouring to formulate a more general definition of this term going beyond former, narrow definitions in resource economics. PEARCE and TURNER (1990, 43 ff.) define development as a positive societal change, i.e. an empty formula for which society must provide the substantive meaning.[3] Their concept of sustainability demands a constant level of nature's capital stock.

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[2] It is important to remember that the definitions in the Brundtland Report explicitly represent an anthropocentric position, which legitimates the goal of a sustainable development from rational reasons and considerations of fairness. In a pluralist society, biocentric or religious justifications for sustainability above and beyond this will hardly be amenable to conversion into generally binding rules (HAMPICKE, 1991, 99).

[3] Elements in the development vector can, for instance, include per capita income, infrastructural facilities, education, income distribution, health, personal liberties or the quality of the environment. The wider the definition of this concept, the more problems are involved in adequately measuring it. A development is designated as sustainable when the value of the development vector does not decrease over time. Pearce and Turner extend the concept of sustainability to include the consumption of exhaustible resources and the environment’s function as a medium for absorbing pollutants.

Depending on whether the demand for a constant capital stock is referenced to nature in the narrower sense of the term or whether under a broader interpretation it signifies merely a constant level in the nation's economic capital stock overall (which in most cases will implicitly presuppose the exchangeability of artificial and natural capital), concepts of weak and strong sustainability can be distinguished (RENNINGS AND WIGGERING, 1996).[4] While most neo-classical environmental economists advocate a position of weak sustainability, proponents of ecological economics tend to accept absolute limits of ecosystem functions, especially of some critical essential functions like climate stability. These limits constitute a central element in the overall concept. Thus, Daly (1992, 185 ff.) distinguishes between three fundamental, separable tasks of economic policy: allocation, distribution and scale. Within this approach, the scale issue addressing the demand for taking ecosystem limits into account gets the highest degree of priority.

3 Analytical raster for assessing a policy of sustainability

The German Freiburg school of neo-liberal economists holds that the absence of markets, and any functional defects of existing markets, will result in corrective requirements which cannot be covered solely by an evolutionary competition of institutions - a view which will be pursued here below. This school regards as inadequate the process of natural selection emerging from international competition between institutions evolving as a quasi-random process, but not specified by the state, and the resultant elimination of inefficient institutional bodies. On the contrary, the Freiburg neo-liberals' concept of a free-enterprise economy presupposes that the state must selectively create institutions for countering existing defects and challenges (GROSSEKETTLER, 1991, 104 ff.). The efficiency of such institutions must be measured in terms of how far the principles of free enterprise are respected.

IN THIS CONTEXT, GROSSEKETTLER (1991, 110 ff.) distinguishes between basic and evolutionary principles. Basic principles represent the necessary conditions

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[4] The concept of weak sustainability has its roots in neo-classical welfare theory, and merely demands a constant level in the nation's economic capital stock overall, thus in principle permitting artificial capital to be substituted for natural resources. Losses in utility caused by increasing environmental impairment (e.g. tree death) can thus be compensated by growths in utility arising from human-generated capital (e.g. savings). In the concept of weak sustainability, therefore, the costs of environmental impact are used as indicators for actual losses in welfare. The concept of strong sustainability, conversely, rules out any complete substitutability between natural and artificial capital, and emphasizes the absolute limits of usability applying to natural resources. The impact limits for natural resources are accordingly measured in physical variables.

for a rudimentary form of a free-market economy, i.e. for a rudimentary regulatory organization of its mechanisms. Examples would be the right to private property and the principle of liberty to contract. The fundamental task of regulatory policies in a free-market economy is to defend, promote or establish these basic principles, so as to maintain the stability and efficiency of the free-market process.

The evolutionary principles, conversely, represent procedural rules for determining „legitimate“ measures designed to develop/improve the rudimentary regulatory framework already existing. It is regarded as essential to supplement these basic principles, since (as explained above) in the Freiburg school's paradigm the state is required to respond selectively in order to counter certain of the system's inherent defects and to master exogenous challenges. This would primarily include:

- functional deficits in existing markets (e.g. dominated markets),
- deficits arising from the absence of markets (e.g., as addressed in the concept of sustainable development, environmental problems or distribution patterns perceived as unfair).

The regulatory model of a free-enterprise competitive economy favours a strategy of maximized freedom; this means that in the elimination of market imperfections a maximization of the transactors' freedoms is both statically and dynamically targeted (EWERS AND HASSEL, 1995, 13 ff.).

Table 1 presents a generalized analytical raster comprising, in broad conformity with the evolutionary principles mentioned by GROSSEKETTLER and with the assessment scheme he presents, a catalogue of check criteria applying to the selection of instruments for eliminating deficits in a liberal market economy.[5] The criteria will be described in the following chapters. In principle, the raster would have to be applied separately for each single policy instruments.[6] Within this paper, however, we will focus on some basic questions of a policy of sustainable development.

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[5] cf. RENNINGS ET AL. 1996 for a detailed explanation of the criteria involved.

[6] Rennings, Brockmann and Bergmann (1997) have applied the analytical raster for assessing negotiated agreements in Germany.

Table 1: Systematized check criteria for evaluating economic policy measures in terms of regulatory efficieny from a liberal perspecitve

Step 1: Goal formulation and operationalization:

- Formulating the targeted goal system
- Indicators
- Assignment of goals, means and implementing agencies

Step 2: Legitimization of the action's goal in terms of contract theory:

- Hypothetical justification (Rawls)
- Reference to concludent action

Step 3: Selection of the decision-making level/process:

- Subsidiarity principle
- Congruence principle:
  - Equivalence: the user group must coincide with the payer group for a collective good
  - Democratic monitoring: the group of the decision-impacted must coincide with the group of entitled monitorers

Step 4: Economic legitimization of actions formulated:

- **Choice of instruments**: selection of conceivable instruments for goal implementation
- **Effectiveness (goal-conformity)**:
  - Degree of goal attainment (direction and dosage)
  - Speed of goal attainment
  - Invariance against changes in the macro-economic boundary conditions
- **Necessity (system-conformity)**:
  - Market-conformity:
    - Instrumental subsidiarity: designing measures with minimized impact on individuals' powers of decision-making (centralized/decentralized)
    - creation of fully functional markets (free price formation, fully functional competition)
    - Minimizing intervention into the functioning of existing markets
    - Priority of regulatory before process policy: formulation of a long-term orientation framework, and avoidance of stop-and-go measures
  - Minimization of detectable unwanted side-effects:
    - Stability-policy goals (economic compatibility)
    - Distribution-policy goals (social compatibility)
- **Economic efficiency**:
  - Static economic efficiency (cost-efficiency):
    - Purpose/avoidance costs
    - Transaction costs
  - Dynamic economic efficiency (innovation efficiency)
- **Institutional controllability**: implementability in the political process and allowance for the possibilities for abuse in the political/administrative apparatus

Source: In broad conformity with GROSSEKETTLER (1991, P. 114 f.).

4 Elements, criteria and indicators for describing sustainability

This chapter deals with the first two substeps in regulatory-policy analysis. It begins with an operational definition of the ecological, social and economic criteria for sustainability. These subcomponents are then re-integrated to enable actual welfare coefficients or reduction targets for environmental/resource consumption to be derived. The goals are operationalized, and legitimized both empirically and in terms of the theory of justice.

4.1 Ecological development

4.1.1 Management rules and safe-minimum standard

The ecological component of a sustainability concept inheres in the demand that social development shall move inside the limits set by nature, i.e. the ecological support capacity (SRU, 1994, Tz. 10). The concept of ecological support capacity, however, in many of the relevant publications either remains a very general one or is interpreted in numerous different ways.

Pearce and Turner have developed the concept of a constant natural capital stock for natural resources. This means that in order to ensure that subsequent generations are not worse off, the amount of natural capital must be kept at a constant level. The concept formulates three fundamental rules of management, which have to be followed if a constant stock of natural capital is to be maintained (PEARCE AND TURNER, 1990, 43 ff.):

- The use of renewable resources should not exceed their rate of regeneration.
- Exhaustible resources may be consumed only if equivalent alternatives are created, i.e. if they can be replaced by technical advances, real capital and/or renewable resources.
- Emissions must not exceed the environment's natural capacity to absorb them.

Once these three fundamental rules of management have been taken on board, the next question is how to flesh them out with substantive content. After all, even complete consumption of an exhaustible resource could be justified if subsequent generations are not going to need the resource concerned, perhaps because its functions can be provided by other means (e.g. by renewable resources or machines). But this kind of substitution for natural resources will in many cases, due to their multi-functionality, prove rather problematically. While oil supplies, for example, essentially function as providers of a raw material, and thus appear inherently replaceable, the conservation of species is by contrast a multi-purpose concern. Seals and whales, for example, are most

certainly amenable to substitution as providers of meat and fat, but in many people's view are irreplaceable in terms of their contribution to the richness of aquatic ecosystems. Species and ecosystems thus do not bestow utility solely through their direct utilization in the economic system (use value) but also and primarily through the inherent value of their very existence (non-use value).

Due to the difficulty of deriving certain quantitative utilization limits from the first two rules of management, the requirement is mostly reduced to assuring defined minimum levels which must in no case be withheld from subsequent generations. Ciriacy-Wantrup, for instance, in 1952 was the first to formulate what is known as the safe-minimum standard. Under this approach, economic activities must not be allowed to endanger essential elements of the biosphere in their existence, irrespective of the particular circumstances involved (HAMPICKE, 1991, 81). HAMPICKE (1992, 59) formulates a somewhat more concrete approach for determining possible elements of a safe-minimum standard.

To translate the third rule of management into a tool of practical use, the natural absorption capacity has to be quantified. As indicators for the ecological absorption capacity, the German Council of Environmental Advisors has proposed determination of critical impact values, known as critical loads and critical levels (SRU, 1994, Tz. 181 ff.). These impact limits must be specified very precisely in both spatial and temporal terms for particular effects at individual receptors. The critical levels/loads concept has been developed by the United Nations' Economic Commission for Europe (UN-ECE) to cover various air pollutants. Here, critical levels designate critical concentrations of air pollutants, while critical loads denote critical deposits. If impact is below the critical levels and critical loads, then to present-day knowledge no damage to receptors need be feared.

4.1.2 Entropy, material intensity and environmental indicators

The characteristic features of ecological systems and processes include their dynamics, the intricacy of their interactions and their non-linearities (TAPPEINER, 1993, 121 ff.). It is even more difficult to comprehend interdependences between economic and ecological systems: in fact, this becomes so complicated that scientific models attempt to reduce the complexity involved by incorporating simplificatory assumptions.

In particular, the approaches for determining the ecological carrying capacity are characterized by simplificatory assumptions of this kind. The carrying capacity is the number of human beings who can be supplied with the existing amount of renewable resources (VAN DIEREN, 1995, 130). According to MARKL (1995, 7) the global support capacity „for early Stone Age cultures was not

much more than 10 million people worldwide, while today's figure is almost 6 billion." The problems involved in exceeding the ecological support capacity are mostly addressed within a context of changes in environmental pollution, using a simple, static formula for calculating the current environmental pollution (*U*). As sources of environmental pollution the formula incorporates the population figure (*B*), the per capita GNP ($\frac{Y}{B}$) and the environmental impact per GNP unit ($\frac{U}{Y}$):

$$U = B \times \frac{Y}{B} \times \frac{U}{Y}$$

To be totally precise, we are dealing with a tautology here. But breaking it down into its individual components provides a vivid illustration of how substantially some variables are going to have to change in order to avoid a deterioration in the environmental situation as a result of assumed alterations in other variables.

To estimate sustainability, the usual practice as the next step is to make certain assumptions on population increase and economic growth rates (WETERINGS AND OPSCHOOR, 1992, 5). The central control variable remaining is the environmental impact per GNP unit, i.e. an increase in technical eco-efficiency. This permits a (pretty rough) calculation of a factor (e.g. 10) by which this eco-efficiency has to increase in order to ensure that the environmental impact does not exceed an assumed ecological carrying capacity. Less commonly, economic growth and the population level are incorporated as control variables.

It is noteworthy that the environmental impact is measured with a single figure. In order to reduce the complexity of ecological effect relationships to a single coefficient proponents of ecological economics frequently cite the Second Law of Thermodynamics (the Law of Entropy), under which entropy increases in practically all physical operations. However, it remains contentious whether the Law of Entropy, formulated as it is for closed systems, is also relevant for open ecological and economic systems where a negative entropy flow is possible (BINSWANGER, 1993, 209 f.; YOUNG, 1991, 169 ff.).

Some proponents of ecological economics cite the Law of Entropy to substantiate demands for restrictions on economic activities. For example, Daly proposes the consumption of energy resources to indicate the ecological carrying capacity (DALY, 1992, 186). Another key figure in this context (developed at Germany's Wuppertal Institute) is the material intensity of goods and services (SCHMIDT-BLEEK, 1994).

The applicability of entropy-based approaches to explaining the interdependences between economics and ecology does, however, remain very

limited. Basically, they are demanding nothing more than a vaguely determined level of ecological efficiency, but entropy coefficients do not permit conclusions (still less quantified particulars) to be derived on various types of environmental impact, e.g. different consequences from the greenhouse effect, the urbanization of the countryside, or the toxicity of certain materials (BINSWANGER, 1993, 227 f.).

By now it becomes clear that the way how to define and measure sustainability is essential for designing the regulatory framework. In calculating the carrying capacity the main focus is on the environment's function as a provider of material and energy. Political proposals arrived at on this basis will consequently often demand restrictions on the input from production processes, and sometimes even an across-the-board reduction in economic activities or economic growth. If, however, we accept the postulate that for a properly functioning competitive economy we will be well advised to maximize the freedoms permitted to the transactors involved (EWERS AND HASSEL, 1995, 13 ff.), then reducing the input to the production process is at the very least a dubious option, and should be chosen only for good reasons. Moreover, from an ecologist's viewpoint, a more obvious option is to formulate sustainability goals tied as closely as possible to the goods concerned themselves (e.g. critical loads and levels, climatic stability).

4.2 Social development

The general goal of just distribution of the environmental utilization entitlements is concretized within the framework of the sustainability concept by means of two fundamental postulates: the demand for intergenerational and intragenerational justice. However, principles of equity and justice are interpreted differently from a socialist (need-referenced), liberal (performance-referenced) or conservative (vested-right-referenced) perspective. In most of the concepts, these principles are intermingled.

4.2.1 The neo-classical concept of economic sustainability

Whereas questions of intragenerational justice go beyond the scope of neo-classical welfare theory, there are concepts for intergenerationally optimized allocation of renewable and exhaustible resources. But most of them will not be compatible with sustainable utilization, since the preservation of resources in the present will usually entail economic opportunity costs. To achieve a sustainable management of resources, a longer-term perspective and more responsive allowance for future generations' preferences will normally be required. This explains the occasional proposals to reduce the discount rate in cost-benefit analyses, or to do away with discounting entirely, so as to express

that present-day welfare should not be valued more highly than welfare in the future.

Given an unlimited time horizon, however, a discount rate of zero will lead to infinitely high external costs for economic activities, which in the final analysis implies that today no resources should be utilized at all (PEARCE, 1993, 58). Nor should it be forgotten that the interest rate represents the relative price of capital, that any alteration in the interest rate will entail a change in relative prices, and may thus impair the efficiency of economic allocation. It would, therefore, appear more sensible to follow Daly's approach in leaving the interest rate inviolate as an instrument of allocation, but setting ecological limits for the market. This does, however, not mean that discount rates must be constant over time. Time-variant, decreasing discount rates as proposed by Rabl (1996) and Azar/Sterner (1996) seem to be an appropriate way of handling the problem.

Since the discount rate appears questionable as a point of approach for assuring intergenerational justice, economists have developed the alternative approaches of shadow projects and reinvestment to ensure just distribution. What is known as the Hartwick Rule (Hartwick, 1978, 972) demands that the economic rents from the consumption of exhaustible resources should be reinvested in reproducible capital. One example here would be to reinvest the rents from the burning of fossil raw materials in the development of renewable energies. The concept of shadow projects applies this rule to the environment's assimilative function, and demands that environmental damage should be compensated for by substitutional action (MARKANDYA AND PEARCE, 1991, 150). For both cases, it is noteworthy that welfare theory's criterion of hypothetical compensation is replaced by that of actual compensation.

The weakness of both these approaches is that they are based on purely monetary units of measurement, and thus assume unlimited substitutability of natural resources, i.e. they advocate a concept of weak sustainability.

4.2.2 Rawls' theory of justice and the environmental space concept

In their search for a criterion of justice, resource economists occasionally proceed from a Rawlsian „original position" version of the social contract, where citizens have to choose their preferred economic system from behind a „veil of ignorance", meaning that none of the protagonists possesses any information on the position he/she will occupy in the future society concerned (RAWLS, 1975). Rawls' theory of justice is thus an obvious choice for justifying the demand for intra- and intergenerational justice. If the entire generation living today were to decide on global distributions of income on the basis of principles of justice thus derived, then every citizen could (under the veil of ignorance as to whereabouts on earth he/she was to be born) be expected to opt

for an assured subsistence level in the poorer countries. Under the term „veil of ignorance“, Rawls also (1992, 61 f.) specifies that the parties (contemporaries) do not know the comparatively good or bad fate of their generations, i.e. „they have no information on the stocks of natural resources, the productive capabilities, or the technological status involved, above and beyond what can be deduced from the assumption that their use is governed by situational justice.“ To put it another way: sustainability or inter- and intragenerational minimum standards can be legitimized under this approach in terms of contract theory, so that following generations can indeed be reached by contract theory, though they constitute the subject-matter rather than a contracting party.

On a political level, too, not only can broad agreement with the general principles of sustainability be found in numerous reports and conventions, but perceptible progress has been made in concretizing and implementing the concept as well. Countries like Austria and the Netherlands have already translated the general principles into national plans for the environment (OPSCHOOR AND VAN DER STRAATEN, 1993; Österreichische Bundesregierung, 1995), and for the Federal Republic of Germany parliament has set up a „Protection of Humans and the Environment“ commission of inquiry to formulate a comparable plan (DEUTSCHER BUNDESTAG, 1995). Thus the political goals of inter- and intragenerational justice can be substantiated not only by a hypothetical Rawlsian „original position“ theory of the social contract, but also by pointing to actual political plans and decisions.

In 1992, the environmental organization „Milieudefensie“ in the Netherlands published its „Sustainable Netherlands“ study, whose central starting point was the environmental space concept developed by Opschoor (1992) and the principle of equal distribution, i.e. the conviction that sustainable development is possible only if the environmental functions available are redistributed all over the world on a basis of equity. Critics described this concept (which from these principles calculates maximum per capita consumption figures for the Netherlands' inhabitants) as a blueprint for eco-socialism, with elitist evaluations transformed into prescriptive edicts on the population's true needs.

The German Wuppertal Institute, too, uses the environmental space concept in designing a model for sustainable development (BLEISCHWITZ AND LOSKE ET AL., 1995). However, the Wuppertal study repudiates the charge of introducing a kind of planned economy. Equity is comprehended not in the sense of socialism, prescribing an identical batch of commodities for each of its citizens, but in the sense of equity of opportunity in satisfying one's needs and keeping options open. This applies particularly to the distribution of finite environmental resources between developing and industrialized nations. The demand for equal distribution of global resources here entails a very far-

reaching redistributive process, as can be easily demonstrated by adducing the present-day differentials in greenhouse gas emissions. And precisely this utilization of the atmosphere as a sink for greenhouse gases is an issue where the industrialized nations will not be able to maintain their privileged position indefinitely.

Overall, in the context of intra- and intergenerational distribution of environmental goods, we can thus conclude that in terms of contract theory only a minimum standard of subsistence can be legitimized for single individuals - analogously to the social minimum standards in the social market economy. As a distribution criterion for utilizing the environment as a sink for global pollutants, however, only an equality principle between nations can be justified in a long-term perspective.

4.3 Economic development

The requirement for economic efficiency in sustainable development is reflected in Daly's demand (1992, 186) for optimized scaling. This means that additional environmental protection above and beyond maintaining the earth's ecological support capacity may still be worth doing. Additional environmental protection measures are economically efficient for as long as the costs they cause are lower than the benefits they create.

4.4 Integration of the elements involved

To arrive at an operative goal system for sustainable development, the ecological, social and economic aspects, previously dealt with in isolation, must be reintegrated into a coherent whole. Holistic approaches of this kind are referred to as „new measures of welfare", „new welfare models" or as models for „integrated assessment".

4.4.1 Welfare measurement and sustainability indicators

One approach for integrating ecological, social and economic aspects is the long-discussed expansion of the System of National Accounts (SNA). In many of the world's countries, attempts are ongoing to develop an integrated economic and ecological reporting system, designed to overcome the familiar imperfections of gross national product (GNP) as a welfare indicator. It is admittedly questionable whether GNP ever claimed to be a welfare model, and thus whether (if there was never an „old" one) we really need a „new" measure of welfare. Beyond a doubt, though, GNP as an indicator of economic strength has led to a pronounced focus on economic growth targets, which should be

expanded to include ecological and social objectives attuned to a holistic sustainability concept.

A closer examination, however, reveals that so far there is no properly integrated economic/ecological approach in existence: merely various approaches which can be differentiated as either economically or ecologically oriented in terms of their methodological origins. Economically oriented approaches aim to integrate ecological aspects in the SNA scheme. In a thus expanded environmental-economics national accounting system, GNP is to be superseded by a new indicator, which will also subsume the costs for environmental damage and the utility of environmental protection. Concepts for indicators of this kind are being discussed under the headings of Green GDP and sustainable income. The most advanced accounting system of this type is the System for Integrated Economic and Environmental Accounting (SEEA) of the United Nations.

But it is unrealistic to expect a new measurement of welfare to provide quantified targets on which to base a policy of sustainability. Hueting's concept of sustainable income, for instance, is not intended to supply sustainability standards; on the contrary, it presupposes the existence of these standards (HUETING, 1991; RADERMACHER, 1993, 338 f.). Sustainable income is calculated on the basis of specified political environmental standards, by estimating the potential costs which would have to be incurred to achieve the standards concerned. While public demands for a „green" national product are growing in number (VAN DIEREN, 1995), the researchers occupied with this task have gained in modesty: The German Statistical Office (Radermacher, 1995, 21), for instance, sees it as „a major handicap that first of all certain social decisions (emission standards, quality goals, etc.) have to be made. It is thus clearly unrealistic to expect that a corrected growth figure from neutral statistical accounting systems could replace or anticipate decision-making processes".

Due to the problems described above, economically oriented approaches are amenable to long-term implementation at best. Ecologically oriented approaches are now attempting to establish a satellite system to supplement the traditional SNA, enabling auxiliary calculations, both monetary and non-monetary in character, to be performed with application-specifically systematized methodology. One example here is the Canadian stress approach (FRIEND AND RAPPORT, 1991, P. 71), which is basically a classification scheme for environmental data, dividing environmental indicators into the three categories of environmental stress, state and social reactions. In the ongoing international debate, wide acceptance has greeted the OECD's Pressure-State-Response approach, a variant of the stress approach featuring the same

categories. In order to integrate the social and economic aspects into indicator systems as well as the ecological component of sustainable development, the Commission on Sustainable Development (CSD) has used this foundation to develop the „Driving Force-State-Response“ approach (DSR) (UNITED NATIONS, 1995). In line with Agenda 21, the DSR introduces additional institutional indicators, and covers the following categories:

- driving force (social, economic, ecological development),
- state (status in terms of sustainability), and
- response (political options for sustainable development).

To sum up, we can say that the development of indicators for sustainable development within the framework of an environmental-economics accounting system is restricted to supplying information on major trends as a basis for political decision-taking. Environmental economists deliberately avoid making normative statements, or specifying target figures for sustainable development, arguing that this is a job for politicians, not for statisticians. Nonetheless, indicators using the DSR approach are very useful for politicians; after all, there is still an option for closing the gap by specifying targets or drawing comparisons with existing goals.

4.4.2 Deriving reduction targets

Numerous studies have attempted to derive concrete political goals from the management rules for sustainable development. The trend here was set by the Dutch section of Friends of the Earth and the Dutch Council for Environmental Research, with their studies on a sustainable Netherlands (INSTITUTE FOR SOCIO-ECOLOGICAL RESEARCH, no year given; WETERINGS AND OPSCHOOR, 1992).

When attempting to derive criteria for resource consumption, we immediately come up against the operationalization problems already described in Chapter 4.1. The Dutch Council for Environmental Research, for example, arrives at a pretty arbitrary formulation, to the effect that there should always be a sufficient stock of non-renewable resources available to last for at least another 50 years, and that human interventions in connection with renewable resources should remain relatively slight in comparison with natural regeneration. Similar problems emerge when deriving criteria for the impairment of ecosystems. There is scientific substantiation only for the target figures on environmental pollution, based on the concept of critical loads and levels. So it is hardly surprising that more recent works, like the 1994 Report on the Environment from Germany's Council of Experts for Environmental Questions, deal primarily with air pollutants, while for landscape impairments the goals formulated are predominantly qualitative in character. The „Sustainable Germany“ study from the Wuppertal Institute, conversely, (BLEISCHWITZ AND LOSKE et al., 1995) is

methodologically very close to the Dutch models, with some purely „political“ target figures added on, relating not to environmental quality, but directly to action options like the use of energy carriers and nitrogen fertilizers.

The studies mentioned here can be comprehended as stimuli for society's debate on environmental goals, which in the final analysis have to be specified by political bodies. Due to the subjective nature of many normative assumptions required for deriving reduction targets, academic advice can support, but not replace this political process.

Achieving the targets involved will necessitate radical changes in production/consumption patterns. Increasing eco-efficiency in production operations is referred to as an efficiency strategy, while changes in behaviour and consumption patterns are known as a sufficiency strategy. There are also authors who regard an active population control policy as an indispensable element in any policy of sustainability. PESTEL and RADERMACHER (1995, 9 ff.) urge that the world's population should be reduced by a factor of 5 in the long term.

Within the framework of a sufficiency strategy, concepts are being developed for new forms of consumption and behaviour, encapsulated in buzzwords like deceleration, deglomeration, decommercialization and a path to simplicity („back to basics“). Concepts of this kind are primarily used to illustrate the meaning of abstract reduction goals for defined target groups. As political recipes, however, against a background of the competitive model for search/discovery procedures, they require critical scrutiny. MAIER-RIGAUD (1994, 99) points out that: „Political orientation requires neither designs defining a sustainably future-friendly development, nor proposals for solutions, nor messages on new lifestyles. What really matters is creating the political conditions in which the business community and society as a whole are able to compete in discovering up-to-the-future solutions. We need socio-economic search processes instead of counterproductive recipes and promises“.

5 Institutions for implementing a policy of sustainability

Analysing concepts of sustainable development in terms of regulatory policy entails answering the question of the most adequate decision-making level for each of the sub-goals concerned, i.e. one separate institution in succession for each subgoal in a sustainable development concept. Space constraints preclude such a detailed treatment here, so that we must focus on certain important areas and institutional trends. After clarifying the basic principles involved in the

relationship between subsidiarity and sustainability, we shall accordingly deal with the establishment of long-term responsibilities and global institutions.

5.1 Subsidiarity and sustainability

Under the subsidiarity principle, institutional solutions must act on as low a level as possible, i.e. priority must be accepted for decentralized solutions, due to the informational, motivational and monitoring advantages involved. If decision-making powers are to be shifted to a higher level, „good reasons“ have to be adduced (EWERS AND HASSEL, 1995, 12).

In this context, it is helpful to evaluate the experience gained in concretizing and implementing the subsidiarity principle in terms of the European Union's environmental policies. In line with the subsidiarity principle, for a long time the Community restricted itself to formulating the regulatory framework and the general goals, while leaving it up to the member states to firm up the details and implement the legislation. As JARASS (1994, 11) writes, this corresponded with a reluctance on the part of member states to comply. Thus advocating standardized implementation of environmental protection guidelines in order to provide a level playing field will inevitably entail restrictions on the subsidiarity principle.

The principles of congruence and equivalence are „good reasons“ for responding to transnational problems (such as climate protection) with transnational institutional solutions. Even problem areas like soil protection, which at first sight would appear to be more local or regional in character, are exhibiting signs of change on a global scale, which can be adequately treated and controlled only by supraregional institutional solutions (WBGU, 1994, 186).

The relationship between the equivalence and subsidiarity principles is obviously ambivalent in regard to the problems of sustainable development. Wherever possible, decentralized solutions should be given preference. At the same time, global change is unmistakably entailing a reinforced necessity for international coordination and cooperation.

5.2 Ecological councils: the institutionalization of long-term responsibilities

Sustainable development demands decisions reflecting an awareness of responsibility for future generations. Politicians, conversely, are only elected to relatively short periods in office, and thus will tend to place their short-term interest in being re-elected over any long-term interest in the functioning of

ecosystems. This is the reasoning behind the recurrent demands for taking far-reaching decisions on our future out of the hands of democratically elected parliaments and relocating them on a level where scientific expertise rather than spin-doctoring are the determinant considerations (SRU, 1994, Tz. 81).

The German national bank is sometimes cited as a model for an independent institution with long-term responsibility, whose assigned task it is to run a professional, continuous, monetary policy based on long-view considerations, and to prevent any hectic, politically motivated „stop-and-go“. Just as the national bank decides the amount of money to be allocated to the economy on the basis of the economy's real net output, so (runs the analogy) could a sort of Eco-bank allocate resource consumption to the economy against economically sensible and ecologically justifiable criteria. Another proposal is oriented on the model of the German Academic Council, which formulates recommendations on the development of universities and the academic and research communities in general (GETHMANN AND MITTELSTRASS, 1992, 24 ff.). An Environmental Council, runs the analogy, should formulate recommendations for environmental standards. For the European Union, too, academics have proposed an Ecological Council, to raise the status of environmental policy-making (ÖKOLOGISCHE BRIEFE, 1994a, 7).

The problem involved with Ecological Councils of this kind would appear to be their lack of democratic legitimization (ÖKOLOGISCHE BRIEFE, 1994b, 4). In addition, it must be doubted whether there can be a council possessing the relevant expert knowledge in all the future-referenced questions pertaining to sustainability. Finally, it must be remembered that in Germany, as in some other countries there are already a large number of academic advisory bodies and parliamentary commissions dealing solely with environmental questions.

5.3 The internationalization of environmental policies

To progress a policy of sustainability, intra or supranational agreements and organizations must be used to substantivize binding commitments enabling the world community to escape from the prisoners’ dilemma in which the overuse of global environmental goods has enmeshed it. There are numerous approaches for international cooperative self-commitment. Since the first UN Environmental Conference in Stockholm, more than 60 multilateral environmental agreements have been concluded, but as yet we do not have much substantiated data on whether these contractual arrangements have been able to make an effective contribution to coping with global environmental problems. The question thus arises (most recently in the annual report from the German Advisory Council on Global Change (WBGU, 1995, 59)) of whether

the institutions involved in global environmental and resource policies require a fundamental reform aimed at gearing them to sustainable development.

If a fundamental reform is to be implemented, LIPPOLD (1995, 11) recommends that global environmental policy-making be anchored in institutions equivalent in status to their counterparts for global security, economic and financial policy-making. For this reason, he pleads for the establishment of an „Environmental Security Council“ at the United Nations, on the model of the military Security Council. Section 5.4 discusses the concept of a „UN Environmental Security Council“, as well as alternative proposals for institutional anchoring of a global environmental/resources policy.

The environmental effects of promotional programmes run by the World Bank and the IMF are still being regarded with scepticism by many observers. Increasingly, however, it is the environmental effects of foreign trade policy and indeed the effects on foreign trade of environmental policies which are moving to centre stage in the ongoing debate on international environmental policies. And since the GATT regime has been significantly strengthened by the establishment of the WTO, the remarks in Section 5.5 apply essentially to the eco-relevant rules of this regime.

5.4 An Environmental Security Council of the United Nations

5.4.1 Concept and tasks

To work efficiently, any organization for implementing a global policy of sustainability must be equipped with extensive powers, responsibilities and monitoring prerogatives for global environmental and resource policy-making. Its job in the community of nations could be derived from the existing job definition for the UN, applying an expanded interpretation of the UN's security and peace concepts (KILIAN, 1991a, 868 and HELM, 1995).

As an alternative to an exptended interpretation of existing tasks, the actual Charta of the United Nations could be expanded, and a new job defined for the UN in terms of global environmental and resource protection, so as to explicitly enhance the status of environmentalist thinking, and thus also to underline the perceived importance of environmental protection as fully equivalent to other fields of policy-making. This procedure is a particularly attractive option if a new organization is to be established in order to implement a global policy of sustainability. The weight of this organization will be emphasized, and its tasks and prerogatives can be unambiguously specified.

It would seem advisable to base the job definition of a global environmental organization on Agenda 21. In view of the pressure exerted by international

politics and international economic relationships, its powers must be maximally wide-ranging (LIPPOLD, 1995, 10; FRENCH, 1995, 64 plus MEYERHOFF AND SOETE, 1994, 23):

The job definition should include preparing the ground for internationally negotiated restrictions on the principle of national sovereignty. This is why it is so important to ensure efficient institutional arrangements for extending the self-commitment mechanisms. The Montreal Protocol contains a progressive, pathbreaking voting rule: more stringent regulations can, if a consensus is not reached, be incorporated as binding for all parties in the agreement by means of a qualified majority.

A global policy of sustainability should be flexible in design; in particular, a global environmental organization should possess options for expeditious and fast renegotiation of existing rules, enabling it to respond effectively to changing trade flows and altered conditions in the global and national economies.

A global policy of0 sustainability should be dominant over the GATT/WTO regime. This requirement corresponds directly with the scaling requirement of the sustained development concept. However, this does not imply that free trade is incompatible with sustainability. But, it can no longer be the paramount goal of the world community (as recorded in the GATT agreement of 1947) to implement a „continually rising level of real income“. Nor does it appear adequate when the new agreement for setting up a world trade organization aims explicitly at economic growth, with simultaneous „utilization of the world's resources in harmony with the goal of a sustainable development“ added virtually as a parenthesis.

5.4.2 Organizations

Within the United Nations, besides UNCED and UNEP, bodies with their own environmental policies (or whose fields of activity affect environmental policy concerns) also include UNDP, UNCTAD, ILO, UNESCO, WHO, FAO and the World Bank Group (KILIAN, 1991a and FRENCH, 1995, 65). If a single central body is to be set up for handling global environmental policy-making, one of the first priorities is accordingly to reorganize the UN's existing structure in the environmental field, and to assign clear powers and prerogatives in regard to handling questions of intra- and intergenerational utilization of the environment and natural resources. Radical restructuring of the intermeshing institutional bodies dealing with global environment and resource policies is being discussed primarily in terms of two different concepts:

- creation of an „Environmental Security Council“ at the United Nations (Lippold, 1995, 12).
- upgrading the status of the United Nations' environmental programme (UNEP) into a special UN organization with an expanded mandate (WBGU, 1995, 64).

The *Environmental Security Council*, says Lippold, should coordinate its global solution strategies with global economic institutions (World Bank, IMF, GATT/WTO) and regional economic bodies (e.g. EU, G7, OECD), to whom important tasks would have to be delegated under the subsidiarity principle.

Besides the option of setting up an entirely new UN Environmental Security Council, it would also be conceivable to redefine the function of the UN Trusteeship Council to form a „UN Environmental Security Council“ or a „UN Environmental Trusteeship Council“ (WBGU, 1995, 64).

To assess the second concept of *upgrading the status of UNEP*, the key question is whether the UNEP environmental programme is fundamentally suited to a role requiring it to implement a global policy of sustainability. Originally, UNEP was to coordinate the environmental activities of all international environmental institutions inside and outside the UN, and to serve as a catalyst (KEIL, 1994, 83 and FRENCH, 1995, 65). Though Keil pays tribute to UNEP's work and its role in progressing eco-awareness on an international scale, he sees no outstanding successes, and often no tangible ones. Nevertheless, in view of the experience gained by UNEP and the network it has meanwhile established, he opts for upgrading UNEP's status and recognizing it as the sole environmental programme within the UN. Or UNEP could perhaps be incorporated as part of an entirely new agency.

Less optimism in regard to UNEP's perceived efficacy and utility as a foundation for a central UN organization to deal with environmental and resource-related questions is shown by authors like LIPPOLD (1995), ALTMANN (1994) and KILIAN (1991b). The global decision-making structures to be established should therefore, in Lippold's view, not be based on UNEP alone, primarily since this organization, he feels, is not high-profile enough, and would find it difficult to cope.

Taking an overall view, considering the sheer scope of the job involved, and the responsibilities entailed by a global policy of sustainability, it appears advisable to opt for the concept of a newly created central organization to deal with global environmental and resource protection, conceivably by redefining the purpose of the UN Trusteeship Council. UNEP, and perhaps UNDP as well, must be integrated into this new organization. To enhance the institution's organizational status in the UN set-up, and to define its tasks and powers, the UN Charter

should be expanded to include a comprehensive definition of the UN's role in terms of global environmental and resource protection.

As long as an „Environmental Security Council" or an alternative concept for a global environmental organization cannot be implemented, we must continue to progress the present practice of international conventions. Existing and future agreements would then have to be integrated after a global organization had been created.

5.5 Reform of GATT/WTO

When the General Agreement on Tariffs and Trade (GATT) was concluded back in 1947, protection of the environment was not a major political issue, so that environmental concerns were not given a specific mention. The agreement was, however, always open for supplements or re-interpretations of existing rules. That this did not happen is (as the German Advisory Council on Global Change rightly remarks in WBGU, 1995, 179) primarily attributable to the eco-political caution displayed by the major economic blocks.

When the Uruguay Round was concluded in early 1994, international trade entered a more dynamic period: previously there had been GATT, an internationally negotiated set of rules which had to be modified and extended in repeated new rounds of negotiation. Now, with the World Trade Organization (WTO), there was another, separate institution with its own juridical personality, able to tackle new areas on its own initiative, and conceive new rules on this basis.

From the wide field of study afforded by GATT/WTO and the environment, the sections below will deal with the GATT-conformity of trade restrictions to achieve extraterritorial environmental goals, the relationship between GATT/WTO and existing environmental agreements, the problems involved in the environment and subsidies, and the usability of GATT/WTO regulations for measures of resource policy. In conclusion, appropriate proposals will be formulated on how GATT/WTO as institutions can be developed in terms of environmental and resource protection.

5.5.1 The GATT-conformity of ecologically motivated trade restrictions

The GATT/WTO system basically gives governments a free hand in defining the national goals for their environmental policies, but difficulties arise when measures are taken with a cross-border effect, which act to discriminate between imports and domestic products, or between imports of like products from different countries (non-discrimination), when the sovereignty of other states is violated (extraterritoriality), or when national environmental standards

affect justified trade interests of other contracting parties (REITERER, 1994, 480-482).

Under the new GATT/WTO regime, there are only limited options for utilizing foreign trade policy initiatives to achieve extraterritorial environmental objectives. Permissible at best are non-arbitrary and not unfairly discriminating measures for protecting the life and health of persons, animals and plants (Art. XX(b) GATT) or for preserving exhaustible natural resources (Art. XX(g) GATT). The latter only under the proviso that the trade related measures concerned be taken in connection with restrictions on domestic production or domestic consumption.

GATT's rules in general relate first and foremost only to direct international flows of materials and goods, consequently to internationally traded waste as well. The methods and technologies used in cultivation, extraction and processing (the primary concerns in a context of global environmental problems) remain largely outside any control. The crucial point here is the definition of the above-mentioned term „like products". Differences in geographical factors, cultivation methods, processing procedures or genetic features have in GATT panel decisions (e.g. in the „non-dolphin-safe tuna" dispute between the USA and Mexico in September 1991) not as yet been regarded as sufficient grounds for differentiated treatment in foreign trade (REITERER, 1994, 483).

The old GATT recognized conformity only for those standards relating to characteristics inhering directly in the product (product standards). On the basis of the new GATT/WTO Agreement on Technical Barriers to Trade, processes and production methods (PPMs) can now also be standardized. However, only PPMs related directly to the product are covered by this. For example, specifications for using recyclable materials are allowed, but not an import ban on tropical timber produced without concomitant reforestation (SCHULTZ, 1994, 83).

But if restrictions on trade are nonetheless regarded as necessary for protecting the global environment, this could be done in conformity with GATT's rules within the framework of an international treaty on natural resources (Art. XX(h) GATT) or an international agreement on the environment, modelled on the Washington Convention on International Trade in Endangered Species. There are, however, differences of opinion regarding the GATT-conformity of existing international agreements on environmental protection. MEYERHOFF AND SOETE (1994) hold that although they are not compatible with GATT, they are nonetheless being tacitly accepted. HELM (1995, 76) and SCHULTZ (1994, 104), by contrast, contend that the GATT-conformity of trade-relevant provisions in

international agreements on the environment has not yet been definitely clarified. Existing and new agreements should therefore be legally validated in terms of their conformity with GATT. It should be noted in this context that the GATT-conformity of trade-related measures in international agreements on the environment can be enacted by majority vote even without altering the existing GATT/WTO regime. The ministerial conference can give an environmental agreement priority over GATT/WTO, provided three quarters of the members agree.

5.5.2 The environment and subsidies

Environmental protection and practised subsidization have several points of contact. Firstly, the charge is made that non-internalized adverse environmental effects represent a subsidy to production operations with less stringent environmental standards than their rivals. Secondly, governmental assistance to help companies adapt to environmental requirements is discussed.

The latter option is definitely in conformity with GATT, under Art. 2 (8.2c) of the Agreement on Subsidies and Countervailing Measures, provided the companies concerned have been in existence for not less than two years, and provided the environmental requirements involved result from laws and/or ordinances.

The first-named aspect of locational competition is frequently referred to as „environmental dumping“. However, dumping must not be confused with subsidies: the latter are granted by governments, whereas the term „dumping“ describes the pricing policy of private companies. Under GATT's definition, a charge of dumping is justified when companies can be proved to be applying different prices which are not determined by costs but by the specific markets being targeted (ROM, 1985, 226). It can hardly, however, be assumed that companies are going to apply lower environmental standards to the production process for export merchandise than to the manufacture of like products for domestic consumption.

As an alternative to „environmental dumping“, consideration should be given as to whether non-internalized adverse environmental effects constitute an „environmental subsidy“ from the state, so that (in conformity with GATT) trade-restrictive countermeasures would be justified. This, too, must be answered in the negative, since inadequate environmental protection regulations do not come under GATT's concept of subsidy (KULESSA, 1992, 304 and SCHULTZ, 1994, 87).

To sum up, the existing GATT/WTO provisions cannot persuasively be interpreted to define an offence called „environmental dumping“ or

„environmental subsidy“, so that any corresponding countermeasures taken for reasons of environmental policy will not be in conformity with GATT.

5.5.3 The usability of GATT/WTO provisions for resource policy initiatives

Quantitative restrictions on foreign trade aimed at rendering resources „artificially“ scarce are not in conformity with GATT (Art. XI), due to the fundamental prohibition on quantitative restrictions for trade (Art. XI). There is, however, provision for exceptions.

For example, GATT/WTO is no impediment to quantitative restrictions on foreign trade arising from an international agreement on primary commodities (Art. XX(h) GATT). If the restrictions concerned have been enacted in order to conserve natural resources, this will under certain conditions be in conformity with GATT as well, under Art. XX(g). The national endeavours of a heavily forested country, for instance, to ban the import of non-sustainably produced timber might indeed be in conformity with GATT, provided the sale of non-sustainably produced timber from domestic stocks is prohibited at the same time. Under certain circumstances, e.g. if the country concerned has no significant forested areas, the trade-restrictive measure would, however, de facto constitute a measure of extraterritorial environmental protection referenced to „unrelated PPMs“, and would thus be in breach of GATT rules. Further clarification is required here.

5.5.4 Basic principles for an ecological reform of GATT/WTO

The deficits and ambiguities of the GATT/WTO regime in relation to environmental problems, as outlined in the preceding sections, highlight the necessity for an ecological reform of the regime. The German Advisory Council on Global Change proposes (WBGU, 1995, 187) that any such reform should incorporate the principles listed below:

- If a trade-related measure is used to progress ecological interests, then the state taking the trade-related measure concerned shall have a justified environmental interest in so doing.
- Every trade-related measure which a state takes in order to achieve environmental goals must also involve a reasonable contribution by the state concerned to eliminating the adverse environmental effect targeted by the measure in question.
- Trade-referenced measures shall relate to concrete environmental goals, be reasonable in scope, and non-discriminatory in their range.
- Cooperative solutions should always be the primary aim.

A justified interest in terms of environmental policy will always apply in the case of cross-border effects arising from international environmental problems (greenhouse gases, extinction of species). Criteria have to be laid down for defining impermissible uses of the environment and describing permissible trade-related countermeasures, without neglecting questions of intergenerational justice, i.e. taking the history of the environment's utilization in the present-day industrialized nations into account as well. If appropriate, compensatory mechanisms must be established for the renunciation of environment utilization options in countries of the Third World.

One example of how GATT/WTO could be progressed in terms of environmental problems is offered by the North American Free Trade Agreement (NAFTA), which establishes a free trade area between the USA, Canada and Mexico. Environmental aspects were of some importance for congressional approval, so that a relatively sophisticated body of rules had to be created (SCHULTZ, 1994, 78-79; see also ESTY, 1994).

It can be foreseen that the topic of foreign trade and the environment will take on major importance in future GATT/WTO negotiating rounds. In Marrakesh, a separate Committee for Trade and the Environment was set up specifically to address these questions. Trade-related measures with extraterritorial environmental impact will play a particularly prominent role, since (as explained above) the existing GATT/WTO regulations offer almost no fruitful points of approach in this context (HELM, 1995, 3). The committee's remit is to identify the interrelationships between trade and the environment, and to make any appropriate recommendations for changes in the multilateral trading system. It has also been asked to formulate proposals for its cooperation with any relevant supranational and non-governmental organizations (REITERER, 1994, 493).

6 Instruments for implementing a policy of sustainability

6.1 Regulatory policies and instruments

STREIT (1979, 91) defines regulatory policy as „the provision of an institutional infrastructure, with the purpose of establishing a selected economic system and helping to safeguard it, as well as modifying it as appropriate". The privatization of environmental goods (Coase's solution) under regulatory aspects of policy will accordingly constitute the most advantageous solution. The requirement for governmental action is here restricted to a „one-off political act of legislation" (WEGNER, 1994, 10) or the taking of a basic decision of regulatory policy regarding the allocation and specification of property rights, with only allocative control of the environment's utilization being left to

the market. However, regulatory measures alone in the tradition of Coase's solution will frequently fail in environmental matters simply because for many environmental goods there is no exclusionary technology available.

Moreover, most environmental economists agree that ideal allocative solutions rooted in welfare theory can no longer serve as models for practical environmental policy-making, and we must turn to „politically responsive solutional approaches". This entails an unambiguous rejection of „the regulatory idea of an endogenous goal formulation" as a control norm of the kind contained in property-right privatization models (WEGNER, 1994, 25).

As a postulate for regulatory policy-making, Wegner (1994, 26) builds on Hayek's ideas of development to formulate the demand that environmental-economic corrections to market processes be implemented only insofar as the market's dynamics of development are not endangered. This means that to be wholly acceptable in terms of regulatory policy-making, environmental policies must firstly contribute to innovative creation of internalization options, and secondly must not implement a policy of permanent regulation, which through continual post-intervention will trigger a lasting increase in the economy's transaction costs.

Table 2 provides - in broad conformity with the Enquete-Commission of the German Bundestag (1994) - an overview of the instruments which will be examined below against the regulatory criteria presented in Chapter 3 above.

Table 2: Instruments of environmental policy

Instruments of environmental policy		
command-and-control	**economic**	**informational, organizational, voluntary**
- *prohibitory requirements* - *mandatory requirements*	with a state management concept: - *environmental taxes* - *environmental permits* - *environmental subsidies* without a state management concept: - *Privatization models* - *Environmental liability law*	- *environmental management and eco-audit* - *corporate environmental accounting* - *ecological marketing* - *cooperative solutions (eg. voluntary agreements)* - *etc.*

Command-and-control instruments in the form of mandatory and prohibitory requirements constitute the classical range of instruments for environmental policies aimed at averting dangers. The economic instruments are then, on the basis of the above considerations and in broad conformity with EWERS AND BRENCK (1995, 190), classified in terms of whether they presuppose a state management concept or not.

The first of these categories includes the environmental taxes conceived under the standard-price-approach (BAUMOL, OATES AND WALLACE, 1971), together with tradable permits. A state management concept is not required in the case of instruments relating to property rights, like the privatization of environmental goods and environmental liability legislation. This latter constitutes an internalization strategy, which under ideal model conditions leads to optimum damage avoidance by obligating the polluter to provide compensation for any damage he causes (see e.g. ENDRES, 1994; CANSIER, 1993).

Classifying burden-sharing environmental subsidies as economic instruments is not without its problems. In the form of tax incentives and investment aid they serve to support the polluter-must-pay principle by aiming to overcome financial bottlenecks impeding expeditious implementation of environmental protection initiatives (see German Federal Government, 1986, 13).

When it comes to informational, organizational and voluntary instruments, the rest of this paper will focus mainly on regulatory monitoring of voluntary agreements, categorized as „associatory cooperative solutions“, and used as

alternatives to regulatory or fiscal measures (FÜHR, 1995, 140). Voluntary agreements represent voluntary unilateral declarations by sector-specific associations designed to avert the enactment of stricter laws or statutory ordinances (KLOEPFER, 1991, 740).

6.2 Assessing the instruments against the criterion listing

6.2.1 Goal-conformity

Command-and-control instruments represent the most goal-conformant option if emissions have to be reduced in the immediate vicinity of particular facilities in order to avert dangers, and for ecological reasons relocational reactions by the operators involved are seen as undesirable. If, however, environmental policy aims at reducing the total quantity of emissions, then facility-specific regulatory instruments are less goal-conformant, since they do not address the total emissions as the control variable. Enforcement deficits also have an adverse effect on the speed of goal attainment by regulatory measures (LÜBBE-WOLFF, 1995, 112 ff., 174 ff.).

Solutions involving taxes and tradable permits provide the companies higher degrees of individual freedom and flexibility, which in emergencies may delay prompt elimination of an environmental risk. The relative strength of environmental taxes and tradable permits is thus primarily in the field of preventive environmental protection. Whereas tradable permits (given appropriate spatial differentiation) will precisely guarantee compliance with quantified ecological targets, taxes and levies are less goal-conformant: here, information deficits at the governmental agencies concerned regarding the avoidance costs may lead to uncertainties of steering (NAGEL, 1993, 71). For this reason, taxes and levies are frequently discussed as a parallel instrument for „supplementing and enriching the options for practical environmental policies“ (BONUS, 1990, 354) and practised in the Federal Republic of Germany in the form of what is called a „residual pollution charge“ in the statutory water code.

Theoretically the same ecological steering effect as with taxes can be achieved with environmental subsidies in the form of „emission reduction subsidies“ (CANSIER, 1993, 140 ff.). This theoretical model, however, is open to criticism for flaws like the system's high information requirement or the long-term economic inefficiency caused by transmission of incorrect price signals. In practical environmental politics, the main job of environmental subsidies is to supplement and to support the range of regulatory instruments available. But any further ecological goals are almost impossible to achieve. HANSMEYER AND SCHNEIDER (1990, 53) advocate, especially in the transitional phase of environmental policy (towards wider utilization of economic instruments) the

use of state-financed promotional programmes, contributing incentives for sophisticated avoidance activities, and helping to eliminate information deficits.

Liability legislation may supplement the implementation instruments of a sustainability policy in areas where the state does not yet possess information on environmental damage or where the issue is solely the avoidance of liability-relevant reparable damage (LÜBBE-WOLFF, 1995, 52 ; SRU, 1994, Tz. 567). In the form of liability for default, there are only incentives to comply with the statutory standard for due care and diligence. Under the regime of absolute liability, there may be, above and beyond this, incentives to avoid damage arising from emissions in normal operation hitherto approved by the statutory authorities. However, the absolute liability regime cannot be utilized for implementing politically specified emission reduction targets either, since the degree of environmental quality will emerge endogenously from the market itself. In reality, the ecological efficacy of liability legislation will be severely restricted, e.g. because most environmental damage comprises long-term summation and long-distance damage categories, not permitting assignment to the particular polluters involved. When it comes to preventive environmental protection, in particular, seeking its effects below the relevant risk thresholds, mandatory liability and insurance are completely unsuitable options (LÜBBE-WOLFF, 1995, 52 f.).

Due to their legally non-binding character, and their resultant non-enforceability, voluntary agreements entail a risk that companies or industry confederations will seek to evade their formal obligations. Moreover, the bartering character of voluntary agreements means that the state has to accept substantive or temporal cutbacks in its environmental requirements so as to elicit from the business community any commitment at all to voluntary action (HARTKOPF AND BOHNE, 1983, 229). Voluntary agreements are thus presumptively goal-conformant only in certain applications, e.g. when the agreed goal triggers only marginal differences in interests between the state and the business community, and does not run significantly counter to corporate self-interest (MURSWIEK, 1988, 988). When more ambitious goals are involved, the parallel use of „hard“ regulatory or economic instruments and/or a credible threat of legislatory action by the state will be indispensable. The use of voluntary agreements must be ruled out when it comes to averting dangers or when there is immediate cause for concern (FÜHR, 1995, 143).

6.2.2 System-conformity

The command-and-control approach uses instruments of a centrally administered economy where the scarcity of environmental goods and the allocation of pollution potentials to the individual environment users is handled

by a centralized state institution (KNÜPPEL, 1989, 133 f.). The extent to which command-and-control instruments will limit individual options for action depends on their specific nature (technology-referenced requirements, for example, will restrict scope of decision-making more than emission-referenced requirements). Prohibitions, designed solely to prevent particular ecological damaging options for action, frequently offer a wider degree of freedom than do mandatory prescriptive requirements, and may thus indeed be nearer to free-enterprise principles. Compared to other instruments, however, the state's process-political interventionary intensity is at its greatest in the case of statutory environmental requirements (KNÜPPEL, 1989, 134).

In comparison to regulatory instruments, where the legally permissible „residual pollution" remains financially unburdened, in the case of taxes and tradable permits the polluter-must-pay principle is implemented more systematically. In the German federal government's view, the polluter-must-pay principle accords with the basic thinking behind the social market economy, since in this system „as a matter of principle, all internal and external costs are assigned to the products or services which cause the particular costs concerned" (German Federal Government, 1986, 12 f.). Economic instruments oriented on the polluter-must-pay principle must accordingly be classified as more system-conformant than governmental regulatory requirements.

Compared to command-and-control instruments, environmental taxes provide more scope for behavioural choice, since they constitute an „indirect, behaviour-inducing and not behaviour-prescriptive state intervention" (REICHMANN, 1994, 132). The prospective taxpayer concerned can choose between reducing his use of the environment, or preferring to pay the tax involved. These regulatory advantages of taxes will accordingly be manifested only where (at least in the long term) there are options for avoidance. The scope for action provided is all the greater the more directly the basis of assessment is linked to the unwanted state of affairs. In contrast to tradable permits, under a tax-based regime the price for an environmental good does not represent a decentralized or free-market-driven scarcity price, but possesses the character of an „administered fixed price", which merely imitates the market-driven formation of scarcity prices (KNÜPPEL, 1989, 35).

Environmental permits, akin to the property-right-based Coase concept, constitute the most system-conformant solution to environmental problems: the state merely establishes an ecological framework in the form of a permissible quantity of emissions. Only when the state actually intervenes on the license market (e.g. in order to implement more stringent ecological goals) does the concept of tradable permits acquire a process-political component (KNÜPPEL, 1989, 35 f.). Tradable permits grant companies a similar freedom of choice as

do taxes or levies, since here, too, the individual transactor has the choice of acquiring tradable permits or reducing his own emissions. The market prices emerging on the markets for tradable permits may be interpreted as „shadow prices for environmental restrictions“ (BONUS, 1990, 350).

Voluntary agreements give the business community maximized freedom in deciding the means by which an agreed goal can be achieved. From a legal viewpoint, however, there is a perceived danger that „with this quasi-corporatist element of self-legislation the democratic principle and the safeguarding of public welfare may be put at risk“ (KLOEPFER, 1991, 740). The market-conformity of voluntary agreements at a sectoral level will critically depend on whether when implementing the goals at the individual members of the federation involved, recourse is had to market mechanisms, e.g. by introducing intra-sectoral tradable permit models (KOHLHAAS and PRAETORIUS, 1994, 179). In terms of regulatory policy, reservations are expressed concerning the case-referenced character of voluntary agreements, as well as within the context of anti-trust and competition laws (FÜHR, 1995, 143). The limits of the reasonableness principle will thus be violated if „the state were to utilize agreements no longer in isolated cases and in support of legally regulated instruments as hitherto, but „on a broad front“. For by a network of agreements it would impair not only free-enterprise competition, but also (since every agreement requires a concession by the state) environmental concerns overall (HARTKOPF AND BOHNE, 1983, 236).

6.2.3 Economic efficiency

The central economic criticism of command-and-control regulations is that they do not permit any static allocative efficiency to be implemented on a national and sectoral level (GAWEL, 1994, 52 ff.). For „subsequent correction“ of inefficient command-and-control, flexibilization options (substitution options for allocated environmental rights of use) are being discussed and/or practised; these, however, basically leave regulatory enforcement untouched, and thus exhibit only slight allocative effects (HANSMEYER and SCHNEIDER, 1990, 59). Moreover, regulatory requirements are dynamically inefficient, since they generate no economic self-interest in environmental innovations.

The allocative advantages of economic instruments are based on the fact that the governmental decision-maker does not require so much information here, e.g. he needs no precise information on the plant-specific avoidance techniques. Rather, plant operators are given indirect incentives to themselves generate and utilize the knowledge available to develop cost-cutting techniques.

In the theoretical ideal case, environmental taxes, with marginal abatement costs balanced out, lead to cost-efficient implementation of governmentally specified

environmental goals, and thus involve gains in economic efficiency. But on a single-plant level too, environmental taxes and levies may exhibit cost advantages over technology-referenced statutory requirements. Emission taxes, especially, provide greater degrees of technological freedom, and thus opportunities to choose the most affordable avoidance option for the particular facility concerned (GAWEL, 1994, 56). Compared to statutory requirements, the tax solution is also ascribed greater dynamic incentivization effects for developing avoidance technologies.

Tradable permits also theoretically constitute a cost-efficient option for implementing emission reduction goals. The actual model variants for tradable permits, however, differ in terms of how far the spatial aspect of the pollution rights has to be allowed for in order to avoid deleterious emission concentrations (REHBINDER, 1994, 94 ff.). There may thus be a conflict of goals between ecological and economic viability. The use of tradable permits would accordingly appear, not least for reasons of economic efficiency, particularly promising for air pollutants with a global effect, or for quantity control in the field of closed systems, such as indirect dischargers into the municipal sewage system (HANSMEYER AND SCHNEIDER, 1990, 58). Tradable permits are frequently described as less dynamically efficient than environmental taxes, since as technical progress advances the permit price will fall, which at a given total emission level will result in reduced incentives for further innovations (EWERS AND BRENCK, 1995, 131). Additional reductions in emissions can (in contrast to the tax solution) be implemented only by boosting the system's dynamics from the outside (BONUS, 1994, 3).

Voluntary agreements may under certain conditions indeed constitute efficient instruments, since they permit a high degree of flexibility in implementing ecological goals (CANSIER, 1993, 138). Efficient implementation of environmental goals within a particular sector of industry is particularly endangered by the free-rider problem, which is all the more exigent the more unhomogeneous the sector concerned is, and the more companies belong to it. Moreover, a uniform price signal for environment utilization will not be formed, depriving the individual federation members of a basis for decision-making. Thus efficient allocation is by no means assured, and in fact rather improbable. And voluntary agreements provide no stimuli for technological advances going beyond the agreed reduction target (KOHLHAAS AND PRAETORIUS, 1994, 177).

6.2.4 Institutional controllability

When examining institutional controllability for individual measures of environmental policy, one question is how far these can be implemented in the

ongoing political process, and another is what difficulties may occur when the instrument concerned is utilized in the enforcement phase.

Governmental decision-makers prefer a policy of command-and-control over other instruments, not least because of its high visibility and allocability (GAWEL, 1992, 275; BENKERT, 1994, 50). When implementing command-and-control measures, moreover, comparatively slight resistance can be anticipated from the business community and the civil service (FABER, STEPHAN AND MICHAELIS, 1988, 99). The possibilities for abuse in the administrative apparatus lie, for instance, in the necessity for continual intervention, and the concomitant over-complexity of regulatory provisions, as well as in serious enforcement deficits.

Both on the part of governmental decision-makers and the civil service, and from the sectors of industry affected, there is considerable resistance to environmental taxes, partly based on a general aversion to institutional innovations, the concomitant reshuffling of prerogatives within civil service departments and corporate hierarchies, and (compared with a regulatory approach) the higher and sometimes incalculable cost burdens for industry (FABER, STEPHAN AND MICHAELIS, 1988, 99). The opportunities for political abuse with environmental taxes are seen particularly in the possibility that the revenues thus generated will be welcomed by the Treasury as an inexhaustible source of income, whereas steering goals of environmental policy will have to take a back seat. This poses a danger to goal-conformity, not to mention the possibility that corporate cost burdens will escalate to a level unacceptable within the regulatory framework (BONUS, 1990, 357). Thus the implementation of revenue-neutral tax reform concepts also involves inherent difficulties. However, ensuring revenue-neutrality is more of a political problem than one of taxation methodology (LINSCHEIDT AND TRUGER, 1994, 444).

The introduction of tradable permit systems is currently on the back burner, due to the lack of practical experience with this instrument so far, and to the lack of a consensus regarding the allocative procedures for the emission rights. Furthermore, the permit price for the environment user cannot be calculated ex ante, and the polluters fear that successes in the reduction of pollutants (which will be directly manifested in a price slump) will encourage the state to immediately enact a more stringent ecological framework.

Above all, voluntary agreements exhibit an incentivization problem in the implementation phase and a monitoring problem in the enforcement phase. This incentivization problem inheres in the fact that industrial associations must, in their own self-interest, commit themselves voluntarily to the environmentally sound behaviour desired. Particularly when ambitious reduction targets are

involved, this incentivization problem can be solved only if the state credibly threatens to introduce even more restrictive legislation, designed to come into force if voluntary agreements fails. The monitoring problem inheres in the fact that normally the goals concerned have not been specified in legally binding form, and thus in the event of non-compliance no legal action can be taken or sanctions imposed.

7 Conclusions

To evaluate in terms of their regulatory efficacy the goals, institutions and measures for describing and implementing sustainable development, the first requirement is a set of check criteria. An analytical raster of this kind has been formulated as part of this study, and comprises the following steps: goal operationalization and legitimization, institutionalization, and instrumentation:

- In developing a goal system, it is crucial to define consistent subgoals, demonstrably able to correct the deficits of a pure free-market system.
- When selecting the decision-making level, the primary consideration must be to find a balance between the subsidiarity and congruence principles. While the subsidiarity principle basically favours decentralized solutions, the criterion of objective congruence demands that global problems be tackled on the level of supranational institutions.
- Finally, any assessment of instruments will in terms of regulatory efficacy concentrate on criteria of effectiveness (goal-conformity), necessity (system-conformity), economic efficiency, and institutional controllability.

The way in which sustainability goals are formulated is highly relevant in terms of regulatory policy-making. Starting from regulatory considerations, maximally differentiated, impact-oriented policy goals (i.e. environmental quality indicators) must be paramount in any system of sustainability indicators. The less specifically the goals of sustainable economic management are defined, the more likely they are to result in concepts of dubious regulatory utility, tending towards blanket restrictions in economic activities and economic growth as such. Formulation of sustainability goals must therefore satisfy the principle of necessity and the postulate of maximising freedom under given ecological restrictions

If these basic principles are followed, the targets derived from them can be legitimized, even when applying strictly neo-liberal criteria for evaluating economic policy measures. Reduction targets of this kind do not (despite recurrent warnings to the contrary) signify a descent into an eco-dictatorship, but quite the reverse: a necessary expansion of liberal constitutions for the economy. A conclusion drawn from the insight that the market cannot of itself

guarantee the preservation of ecological support capacity. Ensuring ecological carrying capacity thus additionally demands a framework of sustainability.

Institutional implementation of the principles of sustainable development is primarily characterized by the ambivalent relationship between the equivalence and congruence principles. From a regulatory viewpoint, decentralized solutions should always be given preference. Global change, however, entails a heightened necessity for international coordination.

As yet there have been no totally persuasive proposals for the establishment of ecological councils capable of assuming long-term responsibilities in democratic decision-making processes otherwise focused on the short term. The fundamental problems involved in these proposals usually stem from the inadequate democratic legitimization of such councils, and in over-ambitious ideas concerning the scientific expertise of the members concerned, which would have to cover all the specialized fields involved in sustainable development. It would appear more sensible to strengthen the existing councils and commissions.

Regarding the institutional revamping of global environmental policy-making, in view of the sheer scope of the job and the responsibilities involved for a policy of sustainability, it appears advisable to create a new, central organization for global environmental and resource protection.

The deficits and ambiguities of the GATT/WTO regime in regard to environmental problems highlight the necessity for an ecological reform. One example is offered by the NAFTA (North American Free Trade Agreement), which establishes a free trade zone between the USA, Canada and Mexico. Environmental aspects were of some importance for congressional approval, so that a relatively sophisticated body of rules had to be created.

It can be foreseen that the topic of foreign trade and the environment will take on major importance in future GATT/WTO negotiating rounds. The objective should be to seize this opportunity to put through substantive reforms: conceivable initiatives would include a comprehensive anchoring of the precautionary principle, reversing the burden of proof in favour of the environment when invoking environmental goals (on the model of NAFTA), expanding the ambit of Art. XX to cover protection of the environment, international harmonization of product and production standards, classification of externalized environmental costs as impermissible subsidies, plus regulations designed to deter governments from entering into a competition for direct investments from abroad, via watered-down or inadequately enforced environmental legislation/regulations (on the model of NAFTA) (KULESSA, 1992; ALTMANN, 1994; SCHULTZ, 1994, and HELM, 1995). The selection of

criteria for determining permissible utilization of regional and global environmental functions is of central importance in this context (WBGU, 1995, 181); and the specific interests of the developing countries must be adequately allowed for.

An analysis of environmental policy instruments in terms of their regulatory efficacy requires that they be evaluated against a variety of problem constellations. Not only must a distinction be drawn here between averting dangers and making provision for risks; the nature of the market's failure in each case (external costs, inflexibility, lack of information) and the level of informed public opinion on possible environmental damage must also be taken into account. Table 3 provides an overview of environmental policy instruments evaluated in terms of the regulatory efficacy.

Table 3: Environmental policy instruments evaluated in terms of their regulatory efficacy

Environmental policy instruments evaluated in terms of their regulatory efficacy									
	Goal-conformity				**System-conformity**	**Efficiency**		**Institutional controllability**	
	Averting-dangers	Provision against risk				static	dynamic	Imple-men-tation	Execution
		Information	Lack of information	supplementary function					
Command-and-control instruments									
Mandatory requirements	*high*	*low*			*low*	*low*	*low*	*high*	*low*
Prohibitory requirements	*very high*				*high*			*high*	*high*
Economic instruments									
Environmental taxes		*high*			*high*	*high*	*high*	*medium*	*high*
Environmental permits		*very high*			*high*	*high*	*high*	*low*	*high*
Environmental subsidies				*conditional*	*low*	*low*	*low*	*high*	*low*
Liability legislation									
- Liability for default				*high*	*high*	*low*	*low*	*high*	*low*
- Absolute liability			*high*		*high*	*high*	*high*	*high*	*low*
Informational, organizational and voluntary instruments									
Informational and organizational measures				*high*	*high*			*high*	*high*
Voluntary agreements		*conditional*		*conditional*	*conditional*	*low*	*low*	*high*	*conditional*

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