Environmental Report 2000

of the German Council of Environmental Advisors

"Beginning the Next Millenium"

- Summary -

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The German Council of Environmental Advisors (Environmental Council)

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Foreword

On 10 March 2000, the German Council of Environmental Advisors published its environmental report for 2000 under the title “steps into the new millennium”. In this biennial report, the seven experts in the Council assess the state of the environment and environmental policy in Germany, and make numerous recommendations.

One of the focal points of this environmental report is the new direction in energy policy. The Council is of the opinion that the continued use of nuclear power is irresponsible, in particular in view of the disposal risks. It endorses the introduction of a change in energy policy and presents more detailed recommendations regarding the ecological tax reform.

The Environment Council supports the concept of ecological modernisation which the German government wishes to develop further as part of a strategy oriented to innovation and employment. In principle, and on many individual aspects, it supports the path chosen by the German government. Within the framework of sustainable development, we have to reach agreement in our society on strategies which combine environmental protection, innovation and employment. We need products, procedures and services that keep the consumption of energy, raw material and land to a minimum. This is both an economic and ecological criterion for quality.

In many places, the Council is also critical of environmental policy. It highlights the great need for action in the area of nature conservation. A permanent new trend in the number of endangered native animal and plant species in Germany has not yet been achieved. In this context, the Council supports the German government's policy concept for nationwide nature conservation, combined with a large-scale system of interlinked biotopes on 10% of land in Germany. The contribution that can be made by sustainable forest management is dealt with in a separate section.

Further areas covered in the report are closed substance cycle and waste management, water soil and climate protection, air pollution control, public health protection and issues of genetic engineering. The report pays particular attention to the environmental aspects of the EU eastern enlargement. The network of European Environment Advisory Councils, the coordination of which presently lies with the German Council, strongly supports intensifying discussion on environmental policy with the candidate countries.

On the whole, I rate this report as construct support for the German government's policies. It contains important recommendations for further developing environmental policy, and provides a further stimulant to discussion on environmental policy in Germany.

Jürgen Trittin
Federal Minister for the Environment,
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Preface

The expectations placed on environmental policy-makers have been running high since the change of government in 1998 and the takeover of the Ministry of the Environment by the Green Party. Expectations that this takeover would once again enhance the status of environmental policy were certainly somewhat unrealistic from the very outset. The topics of ecological tax reform and phasing out nuclear energy use have also served to divert attention from other important environmental topics. In view of this development, the German Council of Environmental Advisors (henceforth the Council), in keeping with its charter and mandate, would to like to point out that there are many other environmental problems which still need to be tackled and explained to the public at large in a manner that will create understanding for perhaps drastic measures and the need to comply with obligations to implement sustainable development.

Sustainable development still basically exists only on paper, especially as regards its concrete implementation. Since 1994, the Council has, in its environmental reports and in its statements, repeatedly proposed ways and means of translating the concept of sustainable development into practical policy (see, e.g., http://www.umweltrat.de). Nevertheless, its proposals and models have not been sufficiently adopted by German politicians. For this reason, the Council is again taking a close look at the progress made in the discussion on sustainable development, and at the progress made in formulating environmental objectives or an environmental strategy. In this context, the Council examines the experiences of other European and non-European countries, especially in order to ascertain what Germany could learn from these experiences. First of all, however, a procedural framework for setting environmental objectives needs to be outlined, as the Council pointed out in its previous environmental report. In this year's environmental report the Council also deals with the role of the proposed, pluralistically composed Sustainable Development Council. By including a range of persons in this council who represent a variety of interests, the basic conditions are created for making the process of establishing environmental objectives more transparent and for engendering better acceptance of these objectives amongst the public at large. A consultative body like the Council, however, as a scientific policy-advising council, is

responsible for (1) evaluating and analyzing new scientific findings, drawing conclusions from them and making them usable for setting environmental objectives, and (2) evaluating current objectives from a scientific point of view. In this context, the Council would like to point out that environmental protection policy is closely linked to other policy areas and, thus, there is a need to integrate policies.

The Council has thus increased it cooperation with the Council of Economic Experts. The two Councils and their scientific staff now hold joint meetings. In addition, they held a meeting entitled "Nachhaltiges Wachstum? Schnittstellen in der Arbeit der Sachverständigenräte für Wirtschaft und Umwelt" (Sustainable Development? Intersections in the Work of the Environmental and Economics Councils) in Tutzing on March 1-3, 1999, in which they informed the public about the nature of this cooperation.

Increasingly, the Council has to deal with (environmental) policy questions of an international nature. European environmental policy has undergone important and substantial change in the last decades, especially as a result of the Treaty of Maastricht in 1992 and the Treaty of Amsterdam in 1887. These changes in European environmental policy, the increasing melding of all environmentally relevant sectional policy areas and the concomitant impact thereof upon the development of national policies are an important challenge for the Council. Nationally oriented policy counseling will no longer suffice to meet future needs.

For this reason, the Council has actively supported improving cooperation between counseling institutions at the EU level and establishing a network of EU member country environmental councils. As a result, for example, these councils held a conference on September 9-11, 1999, in Budapest, together with councils from potential EU accession countries, to discuss environmental policy relevant aspects of eastern enlargement (see also http://www.Eur-focalpt.org).

The results of this conference and the discussion of eastern enlargement are presented in a special chapter in this report (Chapter 2.3.). In this chapter the Council calls upon the German government to participate to a greater extent in the discussion of environmentally relevant

issues pertaining to eastern enlargement. Otherwise, EU environmental policy issues are not dealt with in a special chapter, but rather wherever appropriate in the report, for example, where general views on environmental policy developments during the reporting period, 1998/99, are presented (Chapter 2.1), or where more particular views on the relationship between the environment and the economy are presented (Chapter 2.2).

Against the background of globalization, the range of topics covered in these chapters includes ecological tax reform, the privatization of the water supply sector, transposing the IPPC Directive into national law and including environmental aspects in the criteria used to grant export credit (Hermes) guarantees (see the special page on this on the Council's website). The EU and international components in the environmental policy areas of nature conservation, water protection, soil protection/contaminated sites, climate protection/air pollution control, waste management, and hazardous substances and human health are also becoming increasingly important.

In preparing this report, the Council examined the question of whether to continue to use or to abandon the media-based approach generally used in the environmental sector. Although the Council prefers an integrated approach, it decided to continue to use the media-based approach in this report (in structuring the chapters) in order to take account of the generally media-based structures still used in the Federal Ministry of the Environment and most ministries in the *Länder* and to be able to reach its audience better. Nonetheless, the Council has begun to change its approach by using environmental quality and environmental action objectives to evaluate the measures that have been taken, instead of presenting a situation analysis and then, based on this analysis, evaluating the measures that have been taken. In doing so, individual environmental media and the parties responsible for environmental problems are no longer the exclusive focus of attention, and linkages between the various environmental media are also taken into consideration to a greater extent.

In this report the Council focuses on assessing the environmental situation and environmental policy in Germany on the whole. At the same time, however, it also deals with special topics.

In dealing with the topic of forestry (Chapter 3.1), the Council maintains that attention should now be focused less on forest damage and more on ecological sustainability. Therefore the Council calls for restructuring programs to be begun now and for efforts to bring various forest use interests together to be intensified. In doing so, the Council devotes part of the chapter especially to the conflict between forestry and nature conservation.

Not least because of the discussion about phasing out nuclear energy use (see the special page on this on the Council's website), the Council also devotes a special chapter to energy and the environment (Chapter 3.2). Whereas the environmental burdens caused by producing and converting renewable energy sources are often pointed out in the public discussion of renewable energy, they cause far fewer burdens than fossil fuel use. Therefore, the Council delineates the main burdens caused by producing and converting renewable energy sources. Further, the Council deems it necessary to comment on the discussion about liberalizing the German electricity market, whereby it makes recommendations pertaining the further liberalization of the market that would allow environmentally friendly energy sources greater access to the market.

This report is addressed to the German government. However, the Council also addresses its recommendations to the legislatures, the *Länder* governments, the environmentally related sciences community and interested members of the public at large. Using scientific knowledge, the Council attempts to point out ways of further developing environmental policies and creating an understanding for perhaps drastic policy measures. The Council would like to emphasize, however, that its recommendations are conceptional suggestions and action options, not ready-made cures. Often its recommendations only point out a particular direction to take. Many of its recommendations need to be made the subject of further research or to be further developed by policy-makers and administrators.

In order to be able to make these recommendations, the Council depended, as regards particular topics, on the work performed by external experts, and held numerous discussions with scientists from a wide variety of disciplines, as well as with politicians, members of

ministries and other government authorities, and members of private associations. The Environmental Council would like to thank everyone who participated, especially its office staff and assistants, in preparing this report.

The Council members listed below are solely responsible for the contents of this report.

Wiesbaden, February 2000

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1 Towards a National Sustainability Strategy

1.* Agenda 21, which was adopted at the 1992 United Nations conference in Rio de Janeiro, requires that the signatory nations develop a national strategy for sustained development. According to the resolution passed at the UN special general assembly in June 1997, the signatory nations are to have developed their sustainability strategy by 2002 at the latest. Germany, which in 1971 (when it was implementing its first environmental programme) could still be considered to be leading internationally in this field, is now among those lagging behind in this development. The new German government's coalition agreement included the decision to develop a sustainability strategy. The process of doing so was officially initiated in an all-party Bundestag resolution passed in January 2000.

2.* Environmental plans modelled on Agenda 21 are state action plans which have been drawn up with wide societal participation and which establish long-term objectives and priorities covering all media and sectors in an environmental policy which is economically and socially compatible. They are especially characterized by the following:

- a consensus of opinion on long-term environmental objectives,
- derivation of these objectives from the sustainability principle,
- the inclusion of important policy areas (policy integration),
- the participation of polluters in solving problems,
- the participation of important interest groups in developing objectives and policies,
- the obligation to report on the implementation of objectives (monitoring).

3.* So far, approximately 80 per cent of the industrialized countries have introduced different varieties of this approach. Moreover, in a number of OECD countries, existing environmental plans have been revised and in some cases elaborated. On the whole, the international

comparison shows that the most developed sustainability strategies, as well as the formulation of concrete environmental plans, are particularly characterized by the following factors:

- institutionalization of the sustainability strategy by creating a legal basis and reinforcing those environmental ministries and offices that are in overall charge (the Netherlands, Sweden, Denmark and South Korea),

- inclusion of environmental planning in public sector reform (the Netherlands, Sweden, Norway, New Zealand),

- ecological financial reform introduced parallel to the environmental plan (the Netherlands, Denmark, Sweden, Norway, Finland) or a comprehensive system of environment taxes (South Korea),

- environmental policies that are strongly technology and research policy oriented (the Netherlands, Denmark, Sweden, South Korea) and

- support for this through ecological investment programmes (Sweden, the Netherlands, South Korea).

However, the majority of existing sustainability strategies in the industrial countries are only the first generally formulated steps in the direction of integrated, objective-orientated policy formulation. As a result, they have certain deficits which the Council thinks should be avoided in developing the German sustainability strategy:

- The environmental objectives are often too vague; in other words they are not quantified and often do not contain any time limits for implementation.

- The tentativeness of the environmental objectives makes it difficult to determine whether they have been achieved. Exercising effective control over objectives and their implementation is hardly possible on this basis.

- The objectives are often limited to conventional environmental protection objectives which have already been implemented relatively successfully using existing environmental policy instruments. The largely unresolved 'creeping' environmental problems have, however, often been ignored.

- Often objectives are not based on a societal consensus, which makes environmental planning susceptible to changes in political priorities, especially when there is a change in government.

- In the majority of the cases, institutionalization of the planning process is weak.

- Finally, policy integration is poor; i.e., environmental objectives are not taken sufficiently into account by decision-makers in other environmentally relevant departments.

4.* For Germany, the subject of environmental planning or a strategic approach to environmental policy is not only significant because of the establishment of Agenda 21. It is just as significant—and this is often overlooked—in connection with reforming the public sector. At present, there is a strong tendency in industrialized countries towards objective- and result-orientated approaches in policy-making known as *New Public Management*. This is the case in various policy areas, but it is in environmental policy that the concept is especially often put to use. This approach is based on the notion that concrete, politically negotiated objectives addressed to the administration machinery (but also other actors) can simplify monitoring results, improve the motivation of the participants and improve the performance of the public sector.

5.* In countries such as the Netherlands, Sweden and Norway as well as New Zealand, Great Britain, Canada and Japan, the connection between the general modernization of the state and environmental planning is clear. It is a matter of complementing policy control based on general rules with policy control based on objective-orientated management. If, up to now, concrete instruments have been implemented for relatively vague objectives, concrete objectives are to now be achieved using more flexible means. Thus, objective- and result-orientated environmental policy planning can also be seen as a way of increasing the effectiveness and efficiency of environmental policy.

6.* An important aspect of national environmental planning in accordance with Agenda 21 is *policy integration*. This means including environmental policy objectives and criteria in other departments and policy areas. The Council is of the opinion that much needs to be done to implement policy integration. The difficulties in doing so should be taken into account. It is of the opinion that environmentally relevant political integration requires a realistic limitation of

additional integration requirements which is achieved by setting priorities. The Council considers the following integration mechanisms to be useful:

- The instruction of the relevant department by the government or parliament to develop their own strategies in ecological problem areas belonging to their area of responsibility (an approach which the Scandinavian countries have already implemented and which is now being implemented by the EU).

- The binding establishment of decision-making rules in order to take into account externally defined, cross-sectoral ecological criteria.

- The general integration of environmental aspects into the government reporting system, while prescribing reporting criteria in order to prevent pro forma reporting.

- Generally making the provision of support in environmentally relevant areas dependent on compliance with basic ecological standards and giving preference to support applicants whose ecological performance is better.

- The early, institutionalized participation of environmental interest groups in the process of policy formulation. This includes opening up and making pluralistic the insulated political networking that precedes parliamentary decisions in such areas as transport, energy or agriculture.

7.* The Council basically sees cooperative environmental policy planning as stipulated in Agenda 21 as a model of policy learning with regard to problems, objectives and means of implementing long-term environmental protection on a broader basis. German drafts of a sustainable development strategy should take relevant new international experience into consideration. The Council would like, in principle, to emphasize the significance of the reform tendency towards objective and result targeting in environmental policies and refers the reader to its 1998 report.

8.* The present German government is starting the process of formulating a national sustainable development strategy at a time when environmental issues, although still important, are not of as great a public interest as they were at the beginning of the 1990s. The reasons for this are various and are partly due to the fact that environmental policies have successfully

dealt with environmental issues which were of great public interest, such as smog. This has led to an 'all-clear' effect, and problems which are not as 'visible', especially those with long-term effects, have often remained unresolved.

9.* The Council has repeatedly emphasized that the process of formulating objectives for a sophisticated sustainability strategy has to be based on comprehensive problem diagnosis and description. If it is not, environmental policy lacks the basis in public awareness which this sophisticated process needs. Problem descriptions and the catalogue of cross-sectoral environmental quality objectives and concrete environmental plans of action which have to be drawn up on this basis, need to be able to serve as an orientational framework for decentralized activities such as local and regional Agenda 21 activities and voluntary agreements. The main regional environmental problems should be identified and the contributions of the most important polluter sectors to these problems should be outlined in a matrix structure. The environmental barometer proposed by the previous German government, with its key indicators, would be well-suited for purposes of problem description.

10.* Action plans should be derived from established environmental quality objectives. It should be clearly defined which sectors are responsible for implementation. These sectors should be required to use clearly specified reporting methods to report on implementation progress. It is generally recommended that German environmental policy-making at all levels adopt an objective-orientated approach based on the newer public management concepts. However, the Council is of the opinion that the formal strategy of sustainable development should not aim for an extensive system of objectives, but, rather, should set clear priorities.

11.* On the whole, in order to avoid further delays, the 'step-by-step' process of the previous government should be used as a basis and the opportunities that this provides with respect to developing an all-party sustainability strategy should be explored. A suitable scientific input for the objective formulation process would be the Federal Environmental Agency's study entitled *Nachhaltiges Deutschland*, which would, however, have to be heavily revised. The draft of the environmental priority programme submitted by Federal Environment Ministry needs to be formulated more specifically, especially as concerns the

part of the draft dealing with implementation. Further, the transport sector should not be considered the only polluter sector.

12.* In the opinion of the Council, the planning procedure should be established institutionally and made binding. One way of doing this is to embody it in law, as has been done in a number of OECD countries. Another way is for parliament and/or the government to establish a council to deal with sustainable development and specify the technical and procedural aspects of its mission. In doing so the government should clearly commit itself and, if necessary in particular cases, assign sectoral responsibilities within the executive. In this context, the Council welcomes the chancellor's plans to formally take charge of the planning process. As in other OECD countries, the Ministry of the Environment should be in charge of managing the technical aspects of the planning process.

13.* Creating new institutions is, as the leading countries in this process have shown, not a necessary requirement of the planning process for sustainable development. The Council expects, however, that the Bundestag's resolution concerning the establishment of a pluralistically composed Sustainable Development Council will be implemented quickly. The Council recommends that this council concentrate on the core functions of initial environmental problem assessment and consensus building. It should not be a decision-making organ; nor should it have any additional advisory functions. It would be detrimental to a sustainable development strategy if the competent departments in the executive were to be deprived of their powers or even be freed of their responsibilities.

The Council also recommends keeping the conducting of scientific groundwork (coordinated in particular by the Federal Environmental Agency) separate from the processes of political consensus building. Whereas the proposed Sustainable Development Council should logically focus on political agreement and compromise processes, the scientific diagnosis of problems and formulation of objectives should logically be based on scientific principles. Merging these two processes, as was done by the previous government in its 'step-by-step' process, should be avoided. By clearly separating the two processes, the scientific analyses which initiate the consensus-building process can be compared with the consensus that has been reached, and this comparison can, in turn, influence agreement processes such that they arrive at more sophisticated solutions to problems.

14.* Although the Council sees no need to create new institutions, it does see an urgent need to create a suitable scientific and organizational infrastructure for the planning process, one that allows the input of highly technical knowledge and the professional management of a cross-sector, integrative objective formulation process, and one that confronts disinterested or even reluctant actors with problems and resolution opportunities in such a manner as to motivate a consensus for sophisticated objectives. The Council recommends establishing a task force consisting of officials from various ministries to professionally organize the planning process, under the direction of an appointed project manager and with the assistance of external experts.

15.* An objective- and result-oriented sustainability strategy should be supported by improving the framework for environmental protection. This concerns indirectly objective-oriented environmental measures such as eco-audits, environmental liability, lawsuits filed by associations, etc., as well as measures relating to other special sectoral policies. The Council recommends orienting the promotion of research towards the action objectives of the sustainability strategy. In doing so, it will be important, contrary to traditional promotion policy, for policy-makers to point out problems and objectives and let the grant recipient innovate. The precondition for this is an open, competitive procedure for awarding grants in which the government refrains from anticipating the process of innovation by taking any particular measures.

16.* With respect to the supporting function of economic policy, the Council recommends promoting innovative model projects within the framework of the main planning emphases. Further, the Council recommends providing investment incentives for local model plans in the framework of Agenda 21 processes, which would make them economically significant in a real sense and would engender ecologically and economically relevant demonstration effects. The reference here is to grant applications pertaining to the development of municipal (district) sustainability concepts which relate to consensually agreed-on investment projects in various areas such as nature protection, soil protection, waste, energy, transport, construction, nutrition. The plans that should be promoted are model plans that will produce diffusion effects that will be able to engender imitation effects in intermunicipal competition. They should be promoted as examples, using open, competitive procedures, but should nonetheless be promoted generously. Finally, the Council recommends also providing innovation

incentives and promotion programmes for developing solutions to larger-scale problems such as rehabilitating land and changing transport routes to mitigate habitat fragmentation (i.e., to re-establish biotope systems).

2 The Environmental Situation and Environmental Policy

2.1 Environmental Policy Developments

Environmental Policy and the Change of Government

17.* The new government which took up office in 1988 is subject to much higher expectations as regards environmental policy expectations than its predecessor. Thus, it has attempted to give environmental policy new directions in spite of the overall worsening of economic conditions. In its coalition agreement, the new government agreed to push through an ecological tax reform and to close down Germany's nuclear power plants. Further, it committed itself to introducing a formal sustainability strategy along the lines of Agenda 21 and to drawing up a (previously envisaged) Environmental Code, but has as yet failed to do so.

18.* On the whole, the concept of an 'ecological modernization' in the sense of an innovation- and employment-oriented strategy is basically to be welcomed. In the opinion of the Council, it should, however, be made more concrete and expanded upon. The government would do well to elucidate its environmental policy objectives as well as to point out the long-term problems it intends to deal with. In order to do so, it is essential that a consensus of opinion be reached in the government about the value of environmental policy. In reaching a consensus, a greater capacity for integration will have to be achieved in the sense that the centralized environmental policy decision-makers and the environmentally relevant sectors will have to cooperate better than previously in developing demanding common goals and measures.

The Environmental Code and the IPPC Directive

19.* Beginning in spring 1988 the Federal Ministry of the Environment attempted to achieve its objective of implementing the EU Directive on Integrated Pollution Prevention and Control (IPPC Directive) and the Amendment of the Directive for Environmental Impact Assessment

(EIA-II Directive) within the framework of the First Book of the Environmental Code, but it was thwarted by a departmental vote in autumn 1999. The reasons for this were uncertainty about the legislative competence of the government, the opposition of the Federal Ministry of the Interior to exempting planning approval procedure from administrative procedure law, and, in particular, opposition in the economic sector. Now, the above directives are to be implemented via a separate act. Nevertheless, the deadlines for implementation of the directives have not been met, and Germany can thus add two more EU directives to the preponderant number of EU environmental directives it has not implemented.

20.* In and of itself the EIA-II Directive does not require that it be implemented in any particular manner. The nature of the IPPC Directive is, however, different. It requires a concept for integrating all of the agencies involved in permitting procedures, avoidance of environmental load shifting and a high degree of overall environmental protection. In the opinion of the Council these requirements go beyond mere procedural requirements. Changes need to be made as regards the objectives, definitions and decision-making processes stipulated by the Federal Air Pollution Control and Noise Abatement Act, the Federal Water Resources Management Act and the Federal Soil Protection Act. The directive does not, however, make basic changes to plant and facility (installation) permitting procedures necessary; taken as a whole, it merely represents a correction of media-based policy, which in the future will remain media-based. The member states of the EU are charged with seeing to it that the requirements of the directive are met as regards permitting and permit reviewing procedures. Instead of accomplishing this by means of making various individual decisions, they can, however, establish general requirements in the form of environmental standards if they use an integrated concept and provide an equally high degree of environmental protection in doing so.

Following the Independent Expert Commission's draft of 1988, the Federal Ministry of the Environment proposed introducing a uniform permitting procedure which would take an integrated approach into account by using an integration clause and an opening clause. In more recent drafts, it has opted for implementation via standards rather than for implementation using an integrated permitting concept because the latter had been criticized; indirect impacts, interactions and loading shifts are to be taken into account and a high degree

of protection for the environment on the whole is to be achieved via environmental standards rather than via individual permits.

This implementation method is explicitly allowed by the IPPC Directive. It is also more in keeping with the German system of plant and facility licensing, which avoids assessing individual cases. However, it cannot be assumed that current environmental standards are in keeping with the integration concept, and thus they will need to be reviewed thoroughly. Further, even with the standards concept, it will be necessary, for two reasons, to insert into German plant and facility licensing law an integration clause providing for case-by-case assessment: (1) this is the only way to take site-related loading shifts into account, and (2) case-by-case assessment is necessary if, and as long as, integrative environmental standards do not exist.

21. Experience with EIA as an integrative approach indicates that the IPPC Directive, which is also based on an integrative concept, addresses problems (such as shifting pollution from one medium to another, indirect impacts and interactions, loading all media to their load limit) that do not often occur when a demanding media-oriented regulation concept is used. The integrative concept is primarily of importance as concerns emission requirements. Environmental quality objectives and environmental standards also need, however, to take into account cross-media impacts when 'goods' requiring protection, such as human health, are put at risk as a result of pollution accumulating via various paths or when there may be indirect impacts (e.g., pollution via air, soil or groundwater paths).

In England and Wales the integrative approach (BPEO, best practicable environmental option) is implemented using an overall index of water, land and air pollution, which is the sum of the quotients of additional pollution and the guideline value for all types of relevant substances and environmental media. This concept is intended to provide the ability to trade off substances and pollution, but in order to protect the environmental media meriting protection, 'appropriate' guideline values would have to be established that took into account the precautionary principle. Even if such a demanding pollution concept were implemented, it could only take into account the local need to protect individual media (i.e., the extent of their local endangerment) if, in addition to considering additional pollution, it also considered the marginal load, i.e., if it considered the difference between (1) existing pollution and additional

pollution and (2) the guideline value. Moreover, British experience with BPEO has shown that the commensurability problems in this approach are basically not resolvable.

The Council is of the opinion that these problems would seem to indicate that the British example should not be followed. Attempting to establish an overall index for all types of environmental pollution and interventions into nature and the landscape is bound to fail because commensurability is missing. Attempting to establish a limited index for water, land and air pollution would only be acceptable from an environmental policy point of view if precautionary quality objectives or standards were established which could be used as a reference system. Further, a more complex index would have to be used in order to take into account the problem of local pollution (marginal pollution). Given the fact that current environmental laws are based on technology-related or risk-related pollution standards, it would seem more logical to establish requirements with respect to inputs into one medium that also take into account their potential but unavoidable transfer into other media, and that take into account waste generation and climate impacts, rather than to establish an index based on a reference system. In this case, policy decisions could use an index as an decision-making aid but would not be dependent on the index.

22.* As regards procedure, the IPPC Directive does not prescribe a uniform permitting procedure; complete coordination of the procedure and of permit requirements suffices. Instead of a uniform procedure, a policy of extensive coordination could thus be pursued, and the present regulation of the procedure as delineated in Section 13 of the Federal Air Pollution Control and Noise Abatement Act (BImSchG), which excludes water permits, could be maintained if the agencies responsible for the excluded permits were made subject to an obligation to coordinate and if their internal assessments were made externally binding when permits are issued.

23.* The difficult process of transposing the IPPC Directive and the EIA-II Directive has brought up the problem of who has legislative competence, as defined by the constitution, over the codification of environment law and over the transposing of EU environmental law. A unified regulation of environmental law in the form of an environmental code that does not pose any risks to the constitution is only possible if the federal government is able to compete with the *Länder* (the German states) in matters of legislative competence. The federal

government's traditional practice of basing cross-sectoral environmental regulations on a mosaic of competing legislative competences over the various areas of environmental protection and business law, and of utilizing the general competence framework extensively to establish comprehensive regulations, has been called into question by the government's constitutional authorities as a result of the restrictive amendment of Article 75, paragraph 2, of the Basic Law. According to the amended article, detailed regulations which appeal to the public may, except in special cases, no longer be enacted. The federal government is stretching its competence as delineated in the article when it enacts comprehensive, cross-sectoral regulations rather than isolated partial regulations.

The blurring of responsibilities which results from turning political disputes into disputes about constitutionally allowable competences is alone reason enough to resolve the problem by simply changing the constitution rather than by attempting to interpret it. Nevertheless, it is unlikely the *Länder* would approve any changes. Further, an amendment act would also raise competence issues. If necessary, the federal government could, however, base regulations pertaining to industrial installations on Article 74, number 11, of the Basic Law and require the *Länder* to regulate municipal installations in a similar manner.

Environmental Policy and International Cooperation

24.* Along with national agreements and declarations, international agreements and declarations are increasingly pointing out the direction in which environmental policy should be developed. In this context, there has been a great deal of debate about whether economic and trade policy should incorporate environmental policy requirements to a greater extent. As regards this debate, the Council would like to re-advance the proposals it made in its *1998 Environmental Report* concerning revising the GATT so that it takes environmental aspects better into account, concerning bringing about more comprehensive international environmental and resource protection policies, and concerning reforming the WTO and the environmental organizations of the United Nations. These proposals are as topical now as they were then. The Council sees no reason to make any further reform proposals; rather, it deems that there is a massive deficit as regards implementing existing reform concepts with which to bring about a world trade order that is more environmentally oriented.

25.* The third WTO Conference in Seattle in December 1999 has to be seen against this background. The conference was a failure because of the different interests of the participants and because of increasing criticism that the WTO is largely undemocratic and lacks transparency. The fact that the conference was a failure will, however, give the German government time, before the next conference, to prepare a better strategy with which to better incorporate environmental policy aspects into multilateral trade policy within the EU and to press for the implementation of existing concepts.

There is also a need for institutional initiatives. The WTO and UNEP need to cooperate better with each other. The cooperation agreement which they signed in December 1999 is a first step in this direction. Further, numerous proposals have been made with respect to enhancing the status of UNEP and to networking the UN's environmentally relevant programmes and organizations more efficiently in order to provide the WTO with an equal negotiation partner. Transforming the UN into a world environmental organization is, however, a project that can only be accomplished in the long term. For the foreseeable future, it could overtax the innovational potential of the international community. The German government should thus lend its support to pragmatic ways of accomplishing the transformation rather than to a 'grand plan' that could run afoul of reality.

2.2 The Environment and the Economy

2.2.1 Environmental Protection and Economic Development

26.* For some now, objectives other than actual environmental objectives, in particular economic policy objectives, have increasingly become the main determinants of the type and scope of the instruments used in environmental policy-making. There are two reasons for this:

- combating unemployment has become a general policy objective and
- 'creeping' environmental problems, which only become obvious in the long term and which are irreversible (such as impacts engendered by climate change, loss of species, loss of fertile soil, destruction of tropical forests), are becoming more important than the 'classic', directly visible problems (such as air and water pollution).

The overall economic extra costs of environmental policy measures depend, like the employment effects, on the overall economic reference scenario. If, however, tax and subsidy policies that provide disincentives can be expected to be abolished, environmental policy measures can engender profits rather than costs.

The precautionary aspect is becoming more important because 'creeping' environmental problems are becoming more important than the 'classic' problems. The traditional environmental approach, which consists in attempting to reduce clearly specified damage to the environment by reducing pollution discharges, is no longer suited to dealing with long-term environmental risks. Since a large part of the costs engendered by neglecting to protect the environment now (even if the increasing uncertainties involved in forecasting are taken into account) will not be incurred until some time in the future, or, since, vice versa, the benefits of implementing a precautionary policy today will for the most part be reaped by future generations, a societal consensus is necessary about whether environmental damage that will accrue sometime in the future is to be considered as important as the environmental damage of today.

2.2.2 Environmentally Friendly Financial Reform

27.* Phase 1 of the ecological tax reform came into force on April 1, 1999. Its basic elements are

- an increase (within the framework of the 'oil tax') in fuel taxes amounting to 6 Pfennig/l for petrol and diesel, 0.32 Pfennig/kWh for natural gas and 4 Pfennig/l for heating oil;
- the introduction of a tax on electricity amounting to 2 Pfennig/kWh;
- a reduction in social security contribution rates amounting to 0.8 percentage points.

Phases 2 to 5 of the ecological tax reform, which will come into force on January 1, 2000, will increase the taxes on petrol and diesel on a yearly basis.

28.* The Council is of the opinion that the ecological tax reform provides an important signal that the costs of using the environment need to be assigned to the polluter and that incentives need to be provided to reduce these costs. Which type of environmental use the tax reform

law is intended to prevent is, however, not clearly specified in it objectives. The Council assumes that the ecological tax is primarily intended to help in achieving the objective of reducing greenhouse gases, especially of reducing CO_2 emissions by 25% by 2005. The Council would like to point out, however, that there are two other options for achieving this objective which are fundamentally better, options that achieve the same objective at much lower specific and overall economic costs:

1. A system of tradable CO_2 permits (or similar systems for other greenhouse gases) is ecologically and economically the superior option, since, unlike a tax, it targets a particular gas and can be used on an international scale. It can be used in all sectors and with all emitters, regardless of how small they are, if, as recommended by the Council, fuel producers and importers are required to have licences. The Council recommends that such a system be used in as many EU countries as possible, and even internationally.

2. An electricity and primary energy tax based on emissions has a disadvantage that the permit system does not, namely that it incurs additional administrative costs engendered by having to discover and adjust to the appropriate tax rate, and there is no guarantee that it can target a particular type of emission. Such a tax is thus considered to be the second-best option. Nevertheless, an emissions-based energy tax (calculated using the average emissions of individual power station fleets) has an advantage over the general tax on electricity in that it would encourage the use of the least pollutive power generation technologies, especially those using renewable energies and cogeneration. To prevent this kind of tax from giving domestic and foreign nuclear power a competitive advantage, the nuclear power plants in power station fleets could also be taxed.

The energy tax opted for by the German government is levied on general energy consumption, i.e., it does not differentiate between generation technologies with different emission intensities. From an economic point of view, the tax rate used by the general energy tax would have to be much higher than the tax rate used by the emission-based or primary-energy-based tax in order to achieve the same environmental objective. With the general electricity tax, the economy and households are thus made to bear an additional and unnecessary burden. Further overall economic costs are incurred because renewable energy and cogeneration programmes have to be given compensating development subsidies.

In spite of the fact that the ecological tax concept chosen by the German government is ecologically and economically inferior, it can nevertheless be inherently improved so that it takes environmental policy concerns better into account. The Council thus recommends:

- Basing the electricity tax on the ratio of fossil and nuclear fuels to renewable energy sources used by a particular power station fleet. If this ratio were 95% to 5%, the electricity tax rate would be calculated by multiplying 95% by the standard tax rate.

- Gradually increasing the tax rate up to and beyond 2003, until the environmental objective has been reached.

- Granting tax reductions to manufacturers based on the production processes they use.

Further, the Council would like to emphasize the necessity of abolishing all subsidies that are ecologically counterproductive.

2.2.3 Emissions Trading and Joint Implementation

29.* At the Third Conference of the Parties to the United Nations Framework Convention on Climate Change in Kyoto in December 1997, the parties agreed, in the framework of the protocol on legally binding commitments to reduce greenhouse gases (GHGs), at least to introduce flexible market instruments. In the protocol, it was agreed not only that the (western and eastern) industrialized countries (Annex B countries) would reduce emissions of six GHGs by a total of 5.2% (vis-à-vis 1990 levels) during the period 2008–2012 (whereby individual countries would reduce by various amounts), but also that they would use specific measures to accomplish this reduction.

The most important of the so-called flexible instruments delineated in the protocol is the Emissions Trading Mechanism, which allows the Annex B countries to exceed their stipulated national emission budgets during the period 2008–2012 and buy the additional emissions rights (permits) they need in order to do so on in the international emissions rights market, or to not fully exploit their budgets and sell their surplus emissions rights. In this way, differences between countries in the costs of avoiding emissions can be exploited so that the objective of a global reduction can be achieved as cost-effectively as possible. At the same time, it will be possible for the industrialized countries to meet their commitment to reduce emissions by a

total of 5.2% because any particular country can only increase its emissions budget by buying additional emissions rights if another country reduces its emissions budget by selling emissions rights.

The Council welcomes the introduction of flexible instruments in climate policy. It is of the opinion, however, that it is imperative that the parties to the protocol coordinate with respect to establishing some basic rules so that a functional and efficient trading system can be set up and linked to the Clean Development Mechanism, and so that undesirable ecological impacts and free-riding can be avoided. Further, with regard to the regulatory approach used by the IPPC directive, these instruments need to be coordinated with directive, since it requires, inter alia, that every plant operator use energy efficiently.

Emissions Trading

30.* The Council is of the opinion that the Emissions Trading Mechanism is an instrument for which there is basically no substitute because it is the superior instrument, especially as concerns its ability to target particular emissions, its economic efficiency and its usability in the international context. The international discussion about the design of an emissions trading system has concentrated on the issue of trading in 'hot air', on developing trade regulations in the form of sanction mechanisms and on creating transparency.

There are several reasons for placing emphasis on national reduction measures rather than on unlimited international emissions trading: the flexibility mechanisms are specified as being 'supplemental to domestic actions', there are large amounts of tradable 'hot air' and, last but not least, the developing countries, who are to be included in the protocol in the long term, are sceptical of international trading. The EU's proposal to generally restrict trading involves problems, because it is almost impossible to set a limit on trading that will do justice to the various commitments of all of the parties to the protocol when their various business-as-usual scenarios are not taken into account. The Council thus proposes that, rather than making all countries subject to the same general constraints, each and every Annex B country should be allowed to specify its own voluntary emissions reduction target, which should be higher, the easier the relative sacrifice of the individual country when its emissions budget is compared with its business-as-usual scenario for the same period of time. The EU countries could, in

keeping with their special concerns, assume a pioneering role in this respect by being the first to introduce their own voluntary reduction targets into the negotiations.

In spite of the emphasis given the criterion of 'supplementarity', it should nevertheless be pointed out that, even in the case of unlimited trading in 'hot air', it would still be necessary for most of the industrialized countries to make a great effort to meet commitments if business-as-usual scenarios were used.

Further, appropriate design of the trading rules, in particular, is crucial for effective and functional market mechanisms. The Council is thus of the opinion that regulations pertaining to effective sanctions and transparent, non-discriminatory trading are essential.

The Clean Development Mechanism

31.* In order to prevent the Clean Development Mechanism (or CDM projects in developing countries) from creating a difficult-to-control 'loophole' for acquiring additional emissions rights which would undermine the emissions framework for the Annex B countries, the Council would like to call for clear and uniform guidelines for determining the emissions reductions for individual projects, or for determining individually comparable reference situations (without CDM projects).

Gains for *global* climate protection can only be ensured and the danger of the emissions trading system being undermined can only be precluded if foreign projects are required to bring about additional climate protection effects that would not have come about in the business-as-usual case.

Compatibility of Emissions Trading with the German Ecological Tax

32.* These two instruments are only compatible with each other if the same criteria are used as the basis for assessing taxes and tradable permits, and if the taxable entity is identical with the entity requiring (a) permit(s). First of all, a decision needs to be made as to whether the ecological tax should be emissions based or the tax should be completely replaced by an emissions trading system.

2.2.4 Eco-Audits

33.* German and EU environmental policies generally use regulatory instruments, but economic instruments and voluntary instruments are increasingly being used or at least proposed. An important constituent of this instrument mix is the eco-audit as specified in the EC Eco-Audit Regulation (EMAS), i.e., an instrument with which firms can voluntarily improve their environmental performance. Apart from a few exceptions, this instrument has, however, not been able to establish itself. Approximately 75% of all EMAS registered firms are in Germany. On the other hand, the number of ISO 14001 certified firms is continually increasing. Previously, this was basically the case in other countries, but it is increasingly also becoming the case in Germany. Many firms feel that neither the cost reductions nor the deregulation or substitution measures already implemented or promised justify their further participation in EMAS. Now that the Environmental Code (Book I) has not been passed, the draft of the regulation for providing monitoring relief for registered firms has been shelved; thus, any new incentives to participate in EMAS are not to be expected. Currently, however, the relevant ISO committee is considering upgrading the ISO norm and possibly integrating some of the elements of EMAS (ISO 14001+).

34.* The activities of the DAU-Deutsche Akkreditierungs- und Zulassungsgesellschaft für Umweltgutachter mbH, the institution that licenses and monitors EMAS verifiers, has, according to prevailing opinion, proved itself and proved that the system functions. The monitoring activities of the DAU have not led to the suspension of licences. They also indicate that, in the greater majority of cases, the validation of environmental statements has been conducted in accordance with EMAS requirements. The system established in Germany ensures to a sufficient degree that the performance of EMAS is appropriately monitored. The Council would nevertheless like to propose that the Environmental Audit Law be amended such that it would give DAU personnel the right to enter site premises within the framework of witness audits.

35.* An amendment of the EMAS Directive is being drawn up based on previous experience. The European Commission's draft of the amendment preserves the basic elements of the directive. Participation in EMAS will continue to be voluntary. The Commission did not take the opportunity to clearly make legal compliance assessment a prerequisite for registration. In view of the controversy about compliance assessment in the member states, it would have been very important to clearly require it in the directive. The Commission also intends to make

the amended directive compatible with ISO 14001. The Council welcomes this because the integration of ISO 14001 elements into EMAS will bring about the structural approximation of the two systems to each other, thus preventing duplication of effort. The amendment originally prescribed annual validation, but because of widespread criticism it was watered down by allowing compliance with a guideline that has yet to be passed rather than with the basic amendment itself. The draft also provides for the introduction of an EMAS logo in order to increase familiarity with EMAS. This logo may not be used on products, but may be used in conjunction with information about products, activities and services. In addition to using a logo, familiarity with EMAS is to be increased through promotion activities, as it is customer familiarity with EMAS that provides firms with an important incentive to participate in EMAS. It is still not clear, however, whether the amended directive will continue, as called for by the European Parliament, to contain a technological standard. The Council is of the opinion that this is absolutely necessary, since otherwise there is no way of ensuring that the environmental performance of audited firms is sufficiently high.

36.* In spite of the above-mentioned problems, the Council is of the opinion that amendment activities should be continued. The ongoing discussion about environmental management systems has shown that firms obviously want these systems, and that only a sophisticated system is suited to providing firms with the medium-term relief needed to provide sufficient incentives to install and maintain environmental management systems. Even though EMAS may not be able to successfully compete with ISO 14001, it has nevertheless been able to provide important impulses to upgrade ISO 14001. If EMAS does not gain general acceptance in Germany, and especially if it does not do so in the other member states, the Council recommends integrating the basic elements of EMAS into a higher ISO 14001 standard (i.e., ISO 14001+). In the opinion of the Council, this would not only aid but also accelerate the introduction of environmental management systems worldwide. Further, using uniformly high-quality criteria for environmental management systems would be of special importance for sustainable development.

2.2.5 Privatization and Liberalization of Environmentally Related Infrastructure Tasks: The Example of the Water Supply Sector

37.* The privatization and liberalization of environmentally related infrastructure services has been becoming more important in the public debate and in matters of the practical supply of such services since the beginning of the 1990s, and yet the environmental relevancy of infrastructure services does not preclude their being privatized and being made subject to competition, as the privatization of the power and natural gas markets has shown. A greater opening of markets would also seem to be desirable in the waste management sector if compliance with environmental policy objectives could be ensured by choosing a suitable framework. Recently, there has also been a trend towards privatization and more competition in the water supply and waste water management sectors.

38.* The are many reasons for the privatization tendencies in water supply sector in Germany. Many municipalities are overextended and do not have the funds for necessary investments. The sale of shares in municipal enterprises is one way of filling budget gaps, but there are complaints about the high prices and poor efficiency of municipal enterprises. The large municipal enterprises complain about their poor competitiveness and that their legal status often does not allow them to participate in international water supply tendering. Unlike in Germany, water supply and waste water management services in France and Great Britain are provided primarily, in the context of normal business activity, by private firms. It is feared that the municipal enterprises in Germany will have difficulties in maintaining their market share vis-à-vis large suppliers of such services in other EU member states and the United States in a market that is increasingly characterized by competition for new service areas.

39.* The often-heard argument against privatization of the water supply and waste water management sectors is that water supply and waste water management are necessary public services, and private firms which provide such services will not protect the environment and resources, prevent epidemics and maintain the landscape as well as public-service enterprises which serve the welfare of the community. Further, it is feared that water supply and waste water management service firms would exploit their de facto monopoly by charging prices that are too high and by providing poor service. Municipalities (districts) fear that, as a result of privatization, they would no longer be able to exercise control over the provision of water supply and waste management services.

40.* National and international experiences with providing water supply and waste water management services have shown that privatization could provide numerous opportunities to deal with current problems needing to be dealt with. Bringing in private firms would, inter alia, help to ensure that infrastructure investments that are necessary from an environmental policy point of view are actually made. Privatizing public water supply and waste water management services would also make German providers of such services fit for international competition. In view of the relevancy of this area of infrastructure to the environment, as well as in view of the (current) lack of competition between the providers of such services, whether or not privatization will be able to be considered a success will depend, to a great extent, on whether a suitable regulatory framework for environmental and health protection is chosen, as well as on what costs and prices will be.

The risks inherent in privatization should, in the opinion of the Council, be taken seriously, but given appropriate regulation they can be controlled. An important component of such regulation is monitoring compliance with the existing framework of ecological regulations which prescribe environmental policy and health policy standards for water supply and waste water management service providers. These relate to limiting water extraction, the quality of drinking water and the quality of treated waste water. As long as compliance with the environmental policy framework is ensured, the providers of such services will be able to pursue their own objectives without forsaking ecological objectives. Infrastructure maintenance can be ensured by prescribing which investments to make. In this context, it would be advantageous, as part of a complete privatization, to separate plant and facility operations from environmental policy monitoring functions.

The preconditions for being able to exploit the opportunities provided by privatization can be created, inter alia, by replacing the tax privileges granted public waste management enterprises with a reduced-rate tax. Synergy effects engendered by consolidating water supply and waste water management services in one enterprise would also tend to be better exploited.

41.* The general assumption that privatized water supply and waste water management service enterprises would be more efficient than public enterprises is not automatically the case because of the (current) lack of product competition. To prevent a public monopoly

from merely being replaced by a private monopoly, a suitable regulatory framework must be chosen that will provide incentives for cost reductions which are passed on to the consumer in the form of lower prices.

The most suitable way of revealing and exploiting the potential for cost reductions would seem be to call for tenders to provide water supply services. This would provide a clear division of responsibilities between public authorities as the regulators and private enterprises as the operators of installations. Municipalities could use contracts to maintain control over water supply services without having to bear any business risks. Using this system, the largest potential for cost reductions would be in supply areas where new installations are being planned. When tenders are called for, the incumbent municipal enterprise should have to submit a statement of what it would cost if it were to continue to provide the services in question. The private enterprise should only be given the contract if it can actually operate at lesser cost. Municipal enterprises should, however, in the opinion of the Council, should not be allowed to operate outside of their own municipalities even if this puts them at a competitive disadvantage vis-à-vis private suppliers.

Since only a system that is based on competition can fully reveal and exploit the potential for cost reductions, the Council recommends examining the competitive system being discussed in Great Britain for water supply and waste water management services (supply area competition, competition through sharing water distribution systems) and making the limits of such a system transparent.

2.2.6 Environmental Protection and Export Credits

42.* For some time now, reforming the way in which foreign trade is promoted has been on the political agenda. In this context, the coalition agreement states that the provision of export credit guarantees should be made more dependent on ecological, social and development policy factors. Further, reforming the way in which export credit guarantees are provided is currently a topic of discussion at both national and international levels: At the national level, Germany made changes to its export credit guarantee system in the mid-1990s. At the international level, the environmentally relevant aspects of international trade promotion instruments are being discussed at the EU level as well as within the framework of the OECD,

and the World Bank and the European Bank for Reconstruction and Development (ERBD) have developed internal review procedures that are the most stringent in the world.

The Council welcomes these efforts to reform the export credit guarantee system and is of the opinion that, when allocating funds, foreign trade promotion instruments should be used such that environmental policy objectives are taken into account to a greater extent than has previously been the case. Although the provision of export credit guarantees must, for the most part, be based on economic criteria and the guarantees should not be transformed into an environmental protection policy instrument, trade policy must nevertheless be pursued in a manner that is in line with Agenda 21 principles. The Council is of course well aware that reforming the export credit guarantee system is best accomplished in an international context: if Germany were to make a solo effort to reform the system, German firms would immediately be put at a competitive disadvantage vis-à-vis firms in other export countries who do not provide their export credit guarantees using criteria similar to those used in Germany. In this context, the Council would like to point out that Canada and the United States have already assumed a pioneering role: the US Oversees Private Investment Corporation (OPIC), the US Export-Import Bank (Eximbank) and the Canadian Export Development Corporation have established new guidelines that incorporate far-reaching environmental criteria.

The Council calls upon the government to see to it that Germany as an important export country steps up efforts within the framework of the EU to bring about a reform of the export credit guarantee system, whereby the EU Directive on Harmonization of the Main Provisions concerning Export Credit Insurance for Transactions with Medium and Long-Term Cover (98/29/EC) can serve as the basis for this reform. This directive should not only contain uniform coverage definitions and regulations, it should also contain environmentally related criteria for providing export credit guarantees.

In the national context, it would be possible to prescribe an environmentally related review procedure for the export credit guarantees provided by Hermes. The first part of the review procedure should consist of a screening process which, while taking into account the number of guarantees provided, would identify projects that are environmentally, or especially environmentally, relevant. The ERBD already uses such a review procedure. Whenever environmental impacts are deemed possible, a qualified review procedure should be used. In

cases that are of particular environmental relevance, an environmental impact analysis should be conducted. The expertise of development aid institutions and subordinate federal agencies such as the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, the Umweltbundesamt (the Federal Environmental Agency), the Bundesamt für Naturschutz (the Federal Agency for Nature Conservation) and the Deutsches hydrologische Institut could also be exploited to a greater extent in dealing with such projects. The draft of the Environmental Code submitted by the Independent Expert Commission on the Environmental Code provides for such a procedure: insofar as public funds are used within the framework of financial development cooperation to finance projects, the projects should not pose a risk to human health or to the environment. The draft of the Environmental Code also proposes making the promotion of projects dependent on conducting environmental impact analyses, at least in cases in which a similar domestic project would be required to undergo an environmental impact analysis.

Such an environmentally related review procedure requires, however, that environmental standards and criteria exist which can be used when allocating funds and which ideally could be used EU-wide, since such a procedure would only seem to be useful if it could be applied by all the member states of the EU. As concerns this, proposals should be developed at the national level, which could then be voted on EU-wide. The first step in doing so would be to establish that projects that are environmentally questionable should not be promoted. Further, the guidelines for promoting projects need to be changed such that determining the acceptability of the risks involved is based not only on assessing economic and political risks, as is currently the case, but also on assessing ecological risks. The explanatory notes on the applications for export credit guarantees should also be specified, and qualitative goals should be established as regards the ecological aspects of project descriptions. In doing so, one could draw on the guidelines established by the EDC, OPIC and Eximbank. In addition, proposals should be drawn up for establishing a list of project types which should not be promoted for environmental reasons, whereby one œuld draw on the experience of the World Bank and the OECD.

Compliance with international environmental agreements (the Montreal Protocol, the Kyoto Protocol) should also be an important criterion used in granting credits.

2.3 Environmental Policy Dimensions of Eastern Enlargement of the European Union

43.* Eastern enlargement of the European Union is motivated politically and economically, but not environmentally. Nevertheless, the environmental policy dimension of eastern enlargement has been receiving particular attention during the preparations for accession negotiations. Germany has a special responsibility in the process of eastern enlargement because it is the economically most powerful member country in the EU and because it has historical ties to some of the applicant countries. In addition, because of its geographical proximity to the applicant countries, Germany has a strong interest in them environmentally, socially and economically. Thus, Germany must, by necessity, be actively involved in the process of eastern enlargement.

In order to aid the applicant countries in approximating to EU legislation, the EU has, in the framework of its preaccession strategy, established numerous financial and technical instruments specifically for use in the area of environmental policy. Nevertheless, the applicant countries are having particularly great difficulties in approximating to EU environmental legislation. The reason for this is not only that investment costs in the sewage disposal, drinking water supply, air quality management and waste management sectors in particular are high, but also that national environmental agencies lack sufficient human, financial and technical resources.

Although the accession of the applicant countries to the EU will undoubtedly engender high environmentally related costs for both the EU and the applicant countries, the Council would like to recommend that the discussions in the EU about their accession should not concentrate on the costs of their accession; rather, they should point out to a greater extent the economic or environmental benefits that would accrue from accession. Acceptance among the general public of the upcoming enlargement could be improved by doing so.

Optimizing the Preaccession Strategy at the EU Level and the Bilateral Level

44.* The preaccession process adopted by the EU is, in the opinion of the Council, basically to be judged positively. The advantages of this strategy are that it allows the applicant

countries to profit from the experience of the member states in establishing efficient administrative structures, that it allows the institutions and authorities to approximate to EU legislation and that it allows specific knowledge derived from implementing and enforcing various EU directives to be transferred. Furthermore, the competitive process of applying for accession partnerships allows innovative approaches and regulatory models to be developed.

Against the background of the beginning of accession negotiations concerning the environment, cooperation between the member states and the applicant countries should, as a compliment to the EU's activities, be intensified. Currently, however, the opposite is happening. Present bilateral programmes between the member states and the applicant countries (in Germany the Transform Programme) are coming to an end. In order to avoid making the same mistakes that have been made by the EU in the past, and in order to enable the applicant countries to profit from the experiences of the incumbent member states, the bilateral exchange of experiences with respect to adopting and implementing EU laws should thus be intensified. Further, a discussion between the member states and the applicant countries of measures and instruments for implementing directives which allow the member states more individual scope with respect to implementation should be initiated. In addition to the member states providing information about their experiences to the applicant countries, the flow of information in the opposite direction, i.e., from the applicant countries to the member states, about the environmental situation in the former countries and about their progress in approximating to EU legislation should be improved. This is necessary, inter alia, as regards granting technical and financial aid.

45.* The preparations for accession are being determined by the European Commission, and they have, so far, not been very transparent. In preparing for the accession negotiations, transparency and a steady flow of information about problems and disparities in the process of approximating to EU legislation are, however, of essential importance, particularly for the member states. In the framework of the current preparations for accession, the applicant countries could be included to a greater extent in selected political processes in the EU. This could have a positive effect on the ability and willingness of these countries to integrate into the EU and would acquaint them early on with the way things are done in the EU. Uncertainty about EU laws due to, for example, lengthy legislation processes, as in the case of the Water Framework Directive, and information deficits that occur during the development of technical

directives, as in the case of the IPPC Directive, could be reduced. In this context, it would be useful for the applicant countries to deepen the cooperation between the IMPEL and IMPELAC networks.

46.* With respect to the upcoming accession negotiations, one should not question the requirement that the applicant countries must be in compliance with the complete acquis communautaire. In practice, however, one must assume that temporary, and possibly even permanent compliance waivers, will be agreed upon in the negotiations, particularly in the area of environment. In view of this, the member states must make sure that temporary waivers are only granted when there is a verifiable reason for doing so and when the applicant countries can credibly guarantee compliance by a certain deadline. In such cases, a detailed schedule for coming into compliance should be set and compliance progress should be reviewed regularly. In view of the numerous and/or long waivers that are to be expected, the progress reports regularly made by the European Commission as part of the preparations for accession could be superseded, after accession, by compliance reports made a by central supervisory authority. Further, in view of the fact that the European Commission is overloaded with respect to supervising the implementation of EU legislation, it should consider, in the opinion of the Council, delegating its supervision tasks to other institutions—in the area of environment, for example, to the European Environment Agency.

47.* The Council would like to point out, however, that one cannot, for example, expect the applicant countries to conscientiously attempt to come into compliance and to resolutely tackle particularly serious implementation problems in the environmental area when the member states do not resolutely tackle problems in this area either.

Establishing and Reforming Environmental Policy Institutions and Structures

48.* Since EU environmental policy can only function as a complement to the environmental policies of the member states and since EU aid provided during the accession preparations is primarily intended to help applicant countries to approximate their national legislation to the EU law, the member states should help to bilaterally establish coherent national environmental policies in the applicant countries. Thus, the aid previously provided within the framework of UNECE programmes to the applicant countries by the OECD and the World Bank for the purpose of establishing and implementing national environmental action plans should be continued by the member states. Further, the member states can play an important role in the development of new non-governmental structures in the applicant countries. To help in developing such structures, the member states could provide support for central and eastern European environmental networks, such as for the Regional Environmental Centre, which already receives support from Germany, and trade associations and trade unions in member states could cooperate with those in applicant countries. This would gradually ensure that environmental considerations are taken into account in economic and political fields of activity. Continued development of the national environmental councils, which would thus promote environmental policy advising in the applicant countries, could also contribute substantially to establishing coherent national environmental policies. This could be done, inter alia, within the framework of the network of European environmental councils.

49.* Moreover, as regards establishing administrative authorities and, in this context, as particularly regards establishing viable regional authorities, the experiences of those member states in which regions are vested with broad implementational powers could also be helpful. To implement and enforce EU legislation, administrative authorities need to be regionalized and the resources available for local implementation need to be strengthened.

50.* Whereas the applicant countries need to establish national environmental policies, the EU needs, above all, to reform its institutional structures. EU-level decision-making procedures are constantly being criticized because they are complicated, and the EU has done little to rectify this situation. The Council has thus often recommended that these procedures be replaced by simple majority procedures, that the unanimity principle be abandoned in central environmental policy areas (e.g., transport and energy policy, land use

policy) and that the European Parliament be given greater co-decision rights and the right to initiate legislation. Simple majority procedures can, however, be problematic for countries that are policy leaders because the applicant countries, like the countries that joined the EU as part of the southern enlargement, tend to lag behind the member states in the area of environmental policy. The change in the distribution of power between the countries that are environmental policy leaders and those that are more of an environmental policy brake that anything else will tend to make it more difficult to tighten up environmental standards or establish new regulations. On the other hand, this points out, in the opinion of the Council, the central importance of having a harmonization strategy that provides the member states with greater scope to establish more sophisticated measures.

51.* Integrating environmental policy considerations into other policy areas is one of the central tasks of EU (environmental) policy. Experience in the old member states has shown that integrating environmental policy considerations into other policy areas is a difficult and lengthy process. Thus, the preconditions in the applicant countries for integrating environmental policy considerations into other policy areas should be improved as quickly as possible, especially since accession to the EU will accelerate structural change in the applicant countries. Structural change is having effects that, from an environmental policy point of view, are positive, for example, the emergence of a viable services sector, but it is also engendering negative trends as concerns, for example, transportation, consumption, waste avoidance, and land and resource use. As the causes of increasing environmental impairment due to the increased consumption and use of resources engendered by welfare gains are already discernibly structural, alternative strategies and concepts, for example, for sustainable transportation development, differentiated land use and waste management that is more market-oriented, will be required. Such alternative strategies and concepts have in part been proposed, but policy-makers have yet to avail themselves of the proposed strategies and concepts. To change this situation, those member states that are environmental policy leaders will have to promote these strategies and concepts better and introduce them into decision-making processes both at the EU level and the bilateral level.

It would also be helpful to draw on the various 'best practice' examples of cross-sector cooperation between ministries and administrations, on integrated legislative procedures and on integrated permitting procedures. Further, the preconditions necessary to implement and

further develop cross-sector EU legislation, such as the IPPC Directive, the strategic EIA Directive or the proposed Water Framework Directive, need to be created.

52.* The integration of environmental concerns is especially important in the area of transport. As a result of the expected accession of almost all of the Central and Eastern European countries to the EU economic area, Germany will become the preferred transit land between Eastern and Western Europe. The ecological burdens that this will engender and the general lack of viable transport policy concepts to deal with these burdens are problems that need to be given the priority attention of national policy-makers. Without a sustainable and viable policy for the future for building and improving transport systems, for example, by moving goods transport off the roads and onto the railways, the Council is afraid that the undesirable trends of recent decades will continue. The Council thus calls for the development, in the member states as well as in the Central and Eastern European countries, of transport policies that are based on ecological modernization criteria, especially as concerns goods transport. To achieve this, however, huge investments in modernizing rail transport infrastructure (railway lines, transhipment facilities, goods waggons) will be necessary not only in the above countries but also in Germany.

53.* Further, a reform of CAP which goes beyond Agenda 2000 is necessary. Such a reform would provide the opportunity to go beyond the conclusions of the Berlin Summit, and the Councils considers doing so to be absolutely necessary, by not applying the same quantitatively oriented agricultural policy to the agricultural practices in the applicant countries as is currently used in the EU. Indeed, the way needs to be paved strategically to making the CAP environmentally friendlier rather than giving priority to short-term budget considerations. Developments in the EU concerning environmentally friendlier agriculture, such as remunerating farmers for countryside stewardship activities, should be taken in account now during the agricultural reforms in the applicant countries.

54.* Such strategies would have considerable positive effects with regard to protecting the relatively virgin natural areas and the valuable cultural landscapes in Central and Eastern Europe. Otherwise, there is a great danger that, as of 2002, the EU will subsidize the building of infrastructure in the applicant countries that will destroy the natural and cultural landscapes that are to be included in the NATURA 2000 network (an EU network) as of 2004. Thus,

the Council is of the opinion that it is imperative to expedite preparations for expanding the NATURA 2000 network to the applicant countries. One of the preconditions for this is that the applicant countries be given the financial and technical support to enable them to draw up reference lists of areas in accordance with the Habitats Directive (Council Directive 92/43) as well as to gather data on species and habitats.

55.* With regard to the use of instruments, the German Council of Environmental Advisors is of the opinion that eastern enlargement provides options. The instruments for financing investments in the environmental area, such as PHARE and LIFE, have been augmented with such special instruments as ISPA and SAPARD. These instruments are intended to gradually introduce the applicant states to using the Structural Funds. In preparing the applicant countries for these funds, it is imperative that conditions be stipulated for granting funds so that funded projects do not have negative environmental effects, or so that such effects are kept to a minimum. Environmental impact assessments should not only be made mandatory, but the manner in which they are carried out should be carefully monitored. Further, one should consider lowering the minimum amounts that assistance-worthy projects can receive within the framework of ISPA, and providing more opportunities to put together packages of small ISPA projects.

In view of the fact that there is a lack of budgetary means and that environmental policy is low on the political priority list, the special environmental funds continue to be an instrument that can be used to finance investments in the environmental area.

56.* Support provided the applicant countries, to help them in approximating to EU legislation and in establishing a national administration, includes funding provided in the environmental sector by PHARE for *twinning projects*. Even if (since funds are limited) it seems necessary, to a certain extent, to concentrate for the time being on the main formal prerequisites for accession, the twinning projects should go beyond dealing with physical administrative infrastructure and also be used for other purposes, for example, to develop environmental strategies in the applicant countries.

57.* In spite of the insufficient framework in the applicant countries, it is worth considering using market-oriented instruments in the accession process. Doing so could reduce the costs

of accession and shorten the transition periods. It could also provide valuable experience, both for the applicant countries and for the current member states, in using such instruments. The Council has often spoken out in favour of introducing taxes at the EU level, especially EU-wide CO_2 taxes. Alternatively, it would be useful to go a step further and establish a European CO_2 permit market (as a preliminary stage to establishing a worldwide market). This market could draw, to begin with, on the experience with tradable emission permits (joint implementation) currently being used in connection with implementing the Kyoto Protocol. Because the costs of avoiding environmentally damaging emissions in Northern and Western Europe differ considerably from those in Central and Eastern Europe, this market could also serve as a model outside the area of application of the Kyoto Protocol.

58.* Optimizing the preaccession strategy and further developing the instruments it uses will not, however, be able, solely, to resolve the future problems of an expanding European Union. Because the EU is continually being enlarged and because this causes differences with respect to environmental problems and socioeconomic and cultural factors to become ever greater, the member states have for some time been discussing how to design a future harmonization strategy, a strategy that must take different requirements and preconditions into account without damaging the common institutional framework of the EU or the EU Single Market.

This has become additionally important, as the Maastricht Treaty strengthened the subsidiarity principle, which serves to promote a useful division of labour between the EU and its member states. As the Council interprets the subsidiarity principle, it means that not everything that the European Commission wishes to regulate needs to be regulated at the EU level. On the contrary, important environmental protection policy areas, especially those pertaining to regional problems, can remain completely within the competence of the member states.

A more highly differentiated harmonization strategy could grant compliance waivers to particular member states (differentiated regulation). The problems involved with temporary waivers in connection with accession were discussed above, but they are also of a general nature. Both environmental policy leaders and stragglers could profit from providing greater differentiation in standards through the use of compliance waivers. Being able to deviate from European environmental standards to higher standards would give countries with active and

progressive environmental policies the opportunity to maintain and increase their comparatively high level of environmental protection, while being able to deviate to lower standards would make it easier for countries with little capacity for taking environmental action to implement EU environmental standards.

The Amsterdam Treaty and to some degree also EU secondary legislation provide for such waivers. However, the Council would like to point out that the increased use of waivers also involves risks. Thus, it is imperative that waivers which allow a lower level of environmental protection have clearly established expiration dates, and that the reasons for their being granted, for example, unreasonably high costs for government agencies or for firms, be reviewed at regular intervals and, if necessary, the waivers changed. Only such a restrictive practice as this can prevent temporary waivers from becoming de facto permanent waivers. Moreover, one has to be fully aware that this would jeopardize attaining a uniform level of environmental protection in the EU as well as the ability the to maintain the uniformity of the Single Market. In the opinion of the Council, this means that temporary waivers, or, to begin with, permanent waivers, should be granted with great care and only after case-by-case review. Under no circumstances should waivers become the norm.

A further option for effecting more differentiated regulation is provided by the 'closer cooperation' instrument established by the Amsterdam Treaty. In spite of doubts about whether this instrument is actually practicable, the Council deems it to be, on the whole, an integration-friendlier option than countries 'going it on their own'.

Finally, one could also establish uniform environmental standards while allowing no exemptions, but nevertheless allow member states a relatively large amount of scope in implementing the standards (*differentiated implementation*). This could be accomplished by establishing certain forms of participation, by using market-oriented instruments (taxes, permits, etc.), by using voluntary agreements or by issuing framework directives which allow the member states more individual scope with respect to implementation. This approach, however, depends largely on having sophisticated non-governmental, administrative and technical frameworks which do not yet exist to a sufficient extent in the applicant countries. A further problem is that EU environmental law does not provide much scope for the use of market-oriented instruments. The Council is of the opinion that a strategy that would allow the

member states greater scope in implementing environmental standards is a basically medium-term or long-term option which, however, in view of the upcoming accession of the Central and Eastern European countries, should be seriously considered.

2.4 Views on Environmental Policy Areas

59.* The traditional media-based approach used in environment policy is inadequate for a number of reasons. For one, this approach does not take into account that pollution can be transferred from one medium to another, which is especially important as concerns the air-soil-water pollution pathway. Further, the effects of interactions between media, for example, on the food chain, are ignored. Since it is important to take into account the cumulative contamination of humans, animals and plants accruing from parallel pollution in various media, an integrated ecosystem approach is undoubtedly a suitable approach for a problem-based environmental policy. This approach necessitates establishing an integrated, cross-sectoral environmental monitoring system that monitors the environment holistically.

However, such an approach has to be judged more critically with respect to the addressees of measures. Often, an environmental policy that is based on polluter groups and which monitors the total pollution attributable to individual groups is considered to constitute largely an integrated environmental policy. The Council presented its views on this in Chapter 1. It recommends a policy that identifies and assesses individual environmental problems and then relates the polluter groups to the various problems and the available instruments (if necessary, when designing measures). This does not preclude subjecting polluter groups that cause complex environmental problems to special assessment as long as the policy remains true to the concept that environmental problems are not polluter-group-specific. It is in this sense that the Council devotes itself (for example, in this report) to environmental problems in the forestry and energy sectors.

The call to use an integrated, ecosystem approach in environmental policy and environmental monitoring is not unproblematic, because this approach is subject to numerous technical and institutional constraints. The regulatory structure of current environmental law, the competences of government agencies that are based on this law, administrative traditions, policy and expert networks and experiences are frequently related to environmental media

and media-specific sources of pollution. Thus, 'path dependencies' have developed. In view of the complex interactions involved, the call to use a general ecosystem approach runs the risk of overloading the capacity of environmental policy to deal with problems. The Council would thus like to point out that, for reasons of practicability (namely the need to make concrete assessments and implement measures), a media-based approach will have to continue to serve as the basis for further, necessary, considerations. This is the case as concerns both establishing objectives and choosing measures. Currently, most of the objectives in the area of environmental policy are exclusively media-oriented. Often, various pollutants and their effects are given special attention. The assessment of environmental problems must also initially be based on whether media merit and/or need to be protected and on protecting natural entities that depend on the media. Transfer problems, interactions and cumulative pollution can at first be taken into account using this basis; however, this still remains to be done. The same goes for measures. Thus, in the end, airborne inputs into soils and waters, for example, have to be reduced at their sources, which means reduction measures and their implementation have to remain in the air quality policy area. This is especially so as concerns diffuse inputs, such as secondary air pollutants. However, to protect, inter alia, surface waters and groundwater, necessary emission reduction amounts have to be specified more often than has previously been the case and then implemented in the air quality policy area. The considerable inputs into surface waters and groundwater which have been caused by agriculture and which continue to pollute waters and restrict their use for drinking water production can only be reduced by developing land use strategies that incorporate soil and water protection. The cumulative contamination of natural entities via numerous input pathways also needs to be taken into account. This requires an ecosytem-oriented awareness of problems and better cooperation between the responsible government agencies at all levels, but it does not require that environmental policy be radically redirected.

Accordingly, in the following subsections, the Council deals with the classic environmental media, namely water, soil/land and air, as well as with nature conservation, waste management, hazardous substances and genetic engineering (whereby, in the latter three, a polluter- and/or user-based approach is used). In these subsections the Council uses a different organizational principle than was used in previous reports. Instead of presenting a situation analysis and then evaluating the measures that have been taken, the Council now uses

environmental quality and environmental action objectives to evaluate the measures that have been taken. In doing so, the Council considers, to a greater extent than in the past, linkages between the environmental media and pollution of these media.

2.4.1 Nature Conservation

Responsibilities and Objectives of Nature Conservation

60.* The World Conservation Union (IUCN) has defined three basic areas of responsibility concerning nature conservation:

- preservation of the most important ecological processes and life-preserving systems,
- protection of genetic diversity and wildlife species,
- sustainable utilization of all species and ecosystems with the objective of carefully using all natural resources with a view to the needs of future generations.

The objectives of the Federal Nature Conservation Act (Article 1, paragraph 1) basically agree with these areas of responsibility. They target comprehensive nature conservation which goes far beyond protecting unique or extraordinary natural goods. The Federal Nature Conservation Act neither narrows nature conservation down to the traditional areas of responsibility of species and biotope protection, as is the case nowadays in public awareness and in practice, nor does it give priority to any one of the above-mentioned areas of responsibility. Moreover, the development of sound strategies to preserve natural goods in order to enable their continuing utilization is intrinsic to nature conservation.

State of Nature and Landscapes

61.* The Council has repeatedly pointed out that the state of nature and landscapes in Germany continues to be cause for concern. This is particularly true as regards their continuing endangerment due to direct interventions into nature and landscapes, due to nutrient and pollution inputs and due to the loss of natural and near-natural habitats and the concomitant loss of species. The state of nature and landscapes is still at variance with the principle of sustainable development. The Council bases this statement on the *Erhaltung der biologischen Vielfalt* (Protection of Biological Diversity) report published by the Federal

Agency for Nature Conservation. The report is the first to provide a comprehensive situation analysis, to acknowledge achievements in the areas of nature conservation and biological diversity, and to show where there are deficits in these areas in Germany.

Nature Conservation in Urban Areas

62.* The most important responsibility of nature conservation has to be to conserve nature over as wide an area as possible. However, this basic concept of nature conservation can be sensibly complemented by implementing well-targeted nature conservation in urban areas. In doing so, smaller areas then also become particularly significant.

The Federal Nature Conservation Act, the nature conservation laws in the *Länder* and the Federal Building Code all mandate protecting, caring for and developing nature in urban areas, too. They further mandate that nature conservation and landscape care are to be taken account of when deciding on public and private concerns pertaining to spatial intervention in urban areas. However, the responsibilities and objectives of nature conservation in urban areas differ from those of open areas with regard to priorities, concreteness and means of implementation. Long-term nature conservation can also be ensured if an awareness that human beings are part of nature and thus subject to nature is maintained and cultivated in built-up areas. This will help to develop a responsible awareness of the essential interrelationships in nature. The aim of urban nature conservation is to encourage the population in urban areas to become interested in and to understand ecological issues, the endangerment of biological diversity and environmentally sustainable behaviour and also to firmly establish nature conservation as a concept in all societal groups. In doing so, urban nature conservation is mainly concerned with the sociocultural and health needs of urban populations: it takes into account the space and recreation needs of the urban population, while ensuring healthy living conditions, especially as regards urban climate and air hygiene. The objectives of species and biotope protection are of a lesser priority.

Conclusions and Recommendations for Nature Conservation Policy

63.* In the area of nature and landscape conservation, there have been, much more so than in any other environmental policy area, heated debates about objectives and their necessary justification, whereby the same old objectives have been reformulated and renamed over and

over and again. At the same time, the situation with respect to nature and the landscape is stagnating or continuing to worsen. The Council has ascertained that the objective of sustainably reversing the trend as regards the extent of the endangerment of indigenous plant and animal species has not been achieved. The objectives of designating 10% to 15% of unsettled areas as priority conservation areas and of establishing a network of the main protected biotopes have not been achieved either.

If the objective of maintaining biological diversity, an objective that is now internationally recognized, is to be taken seriously, nature conservation objectives will have to be implemented country-wide and with regard to all human activities in order to counter the endangerment of species and habitats. This will require the political willingness to accord protecting our natural heritage the same importance as is naturally accorded protecting our cultural heritage.

Nature conservation must not be limited to establishing nature reserves, establishing biotope networks or sporadically establishing support programmes. Minimum ecological standards also have to observed in areas that are used intensively. When formulating conservation objectives, various types of natural endowments and their conservation potential, as well as the various uses of these endowments, have to be taken into account. Areas with a high biodiversity potential require a greater proportion of protected land. The main concern in maintaining biological diversity must be to maintain area-wide the ability of ecosystems to function, or if necessary to restore their ability to function. This entails maintaining biological diversity and especially habitat diversity, including the diversity of biotic and abiotic habitat endowments, as well as maintaining the diversity of crops and livestock. This includes maintaining the dynamic processes in nature and landscapes that have been neglected in the past.

Future measures should focus on containing the levelling out of diversity in nature and the landscape, including containing the number of interventions into the hydrological balance of landscapes. Further, the ongoing input of nutrients and pollutants, mechanical cultivation of land and energy use need to be limited, as these activities in particular impair nutrient balance, pollute surface waters, groundwater and the oceans, and cause erosion and soil compaction.

In order to achieve these objectives, nature conservation efforts will have to depend, especially as concerns the intensity of land use, on the cooperation of agriculture and forestry.

Nature Conservation Priority Areas and Biotope Networks

64.* In order to implement the sustainable development model, nature conservation should, in the opinion of the Council, enjoy absolute priority on about 10% to 15% of the surface area of Germany; 5% of this surface area should be completely protected, that is, should be left to nature's own dynamics. If the size of the areas involved is large enough, they should be turned into national parks. Of the areas used for forestry, 5% of the completely protected areas, 10% of the near-natural nature conservation priority areas and 2% to 4% of the near-natural forest edges should be set aside as a forest biotope network. These are only rough figures that can, and must, fluctuate enormously from region to region depending on natural endowment, area diversity and area uses. Nature conservation priority areas should be selected such that they adequately include habitat types and species especially meriting protection. There has, however, been a lack of efforts to do so. Whereas the Federal Ministry of the Environment, in its draft of an environmental policy priority programme, plans to implement NATURA 2000 by 2020, the Council deems 2004, the date specified by the Habitats Directive (Council Directive 92/43) to be a more suitable date. The areas that are to be protected should be designated as priority areas at the regional planning level in order to provide for their later designation as protected areas.

The establishment of priority conservation areas in urban areas is also an essential nature conservation objective. Unlike such areas in the countryside, however, these areas serve to improve the quality of life for urban dwellers by improving the quality of local environmental conditions and the quality of urban air as well as by providing recreational opportunities, whereby the objectives of protecting species and biotopes are of lesser importance.

Area Selection and Notification

65.* In establishing large protected areas such as national parks and large nature reserves, biosphere reserves, landscape conservation areas and conservation-oriented countryside

parks certain priorities have to be set. Area diversity and the large diversity of species and biotic communities can only be sufficiently captured in large areas. Dynamic processes require that various development phases take place repeatedly and parallel to each other in various areas. When the size of a protected area is reduced, the spectrum of species in the area changes from being a spectrum of specialists to being a spectrum of migratory generalists. The IUCN has set a minimum limit for national and international reserves of 1,000 hectares, and for wildlife preserves of 10,000 hectares. The size of the area thus depends on the natural entity to be protected.

The core areas to be protected should be selected according to the basic principles of representativity with respect to natural area type and natural endowments and should be networked to form a biotope network. The data base with which to be able to evaluate areas in most of the regions in Germany as regards habitats and species of general interest is incomplete, obsolete or non-existent. These data gaps should be closed as soon as possible. The directive-compliant evaluation and selection of areas cannot be left completely to the *Länder*; the German government should participate in evaluating and selecting areas so that interrelationships over the wider area of biogeographical regions and the protection requirements of these regions can be better taken into account.

66.* In order to be able to identify the ecological interrelationships, the network status of complex structures and the biodiversity in landscapes, the Council recommends that the biotope maps of the *Länder* be revised at regular intervals. These maps should also be further developed in order to comply with new requirements resulting from implementation of the Habitats Directive (i.e., the establishment of a coherent network of conservation areas).

The Council considers the impulses that EU environmental policy and especially the Habitats Directive provide for environmental policy to be extremely important as regards achieving these objectives. Too few of the changes that need to be made to national environmental and nature conservation legislation in order to implement these objectives have been made. There are deficits, for example, as regards taking the natural entities requiring protection into account for which Germany carries a special responsibility, and as regards protection status and proposing areas for designation as protected areas.

Numerous Central European habitat types in Germany which are protected by the Habitats Directive and for which Germany carries a special responsibility because of international agreements it has signed are, from a protection point of view, clearly underrepresented on the proposal lists. The Council thus recommends that a suitably large area of the particularly polymorphous beech forest communities that occur in Germany be set aside as a national park.

In the interest of better weighting, the Council recommends that the biotopes, ecosystems and landscapes, as well as their uses, that are typical of Central Europe be given greater consideration, as they are underrepresented on the site proposal lists. Further, biotope types that are in danger of disappearing and that are protected in Germany pursuant to Section 20c of the Federal Nature Conservation Act but that have not been included in the Habitats Directive should be included in the NATURA 2000 network. With regard to such biotopes types, Germany should work towards having the directive amended.

The selection of habitats pursuant to the Habitats Directive and the procedure for notifying them to the EU should be based solely on conservation criteria and should not be limited to existing protected habitats. As regards this, the Council sees a considerable lack of knowledge and sensitivity among policy-makers and the public at large, which is impeding acceptance of the implementation of the Habitats Directive. Protection in the sense of the Habitats Directive does not mean all types of human activities are precluded or that protected areas always have to be totally protected (see Section 19b, paragraph 4, of the Federal Conservation Law (5)). Rather, areas should be protected and networked to an extent that is commensurate with the purpose of protecting or networking them (using a graduated system of protection levels), which in many cases means that uses of particular areas can and should be maintained. In order to take the dynamics of landscapes and the preservation of processes into account, the Council thinks it even possible and desirable to partially rotate protection and network levels from area to area at regular intervals, thus allowing various uses. Using such a rotating system for NATURA 2000 sites could greatly increase farmers' acceptance of the Habitats Directive. The remuneration of countryside stewardship activities within the framework of Agenda 2000 should increasingly be redirected to NATURA 2000 sites.

To coordinate the notification procedure and site assessment and to compile status reports, a sufficiently staffed and funded institution needs to be established, for example, as part of the Federal Agency for Nature Conservation.

In order to effectively implement the Habitats Directive and the Bird Directive, it is especially necessary that the *Länder* compile their long overdue site lists in accordance with the above-mentioned criteria in order to check the rampant loss of habitats and biological diversity. This would prevent the European Court from ruling that Germany is delinquent in implementing the directive and would also prevent national legal squabbling.

To implement the Habitats Directive, Section 19a, paragraph 2, number 8, and Section 19e of the Federal Nature Conservation Act should be amended. Plans and projects that do not require approval according the Federal Air Pollution Control and Noise Abatement Act, or do not require any government agency decision or notification, should also be made subject to assessment as to whether they are compatible with the preservation objectives of the Habitats Directive, or the Bird Directive if it is to be expected that they will impact heavily on protected bird habitats.

67.* Further, the Council recommends that the German government should, at the EU level, work towards having the Bird Directive integrated into the Habitats Directive. In view of the strong linkages between the objectives of these two directives, integrating the Bird Directive into the Habitats Directive would seem to be expedient; only the special requirements of bird protection, i.e., those pertaining to migration, would have to taken account of by adapting the Habitats Directive. This would simplify EU legislation and interpretational problems resulting from the interplay of the two directives with national legislation could be eliminated. All wetlands of international importance according to the Ramsar Convention should be included in the NATURA 2000 sites.

In addition, the Council would like to point out that the Habitats Directive applies only to impacts on ecologically valuable areas engendered by plans and projects (Article 6). This does not go far enough for purposes of nature conservation, as it does not sufficiently provide for comprehensive protection from diffuse inputs. A new EU directive, Council Directive 1999/30/EC, sets adequate limit values for sulphur dioxide and nitrogen oxide inputs in order

to protect ecosytems, but limit values for other diffuse inputs, in particular the ammonium inputs from agriculture, are still missing. Thus, the Council would like to see the directive amended as soon as possible.

Nature Conservation in Urban Areas

68.* Urban areas are humans' primary habitat and have to meet humans' varied needs. Urban nature conservation is oriented towards the sociocultural and health needs of urban dwellers; its objective is to provide urban environments that meet human needs and provide a high quality of life. This includes, in particular, meeting the increasing open space needs and recreational needs of urban dwellers and providing a healthy urban climate and good air quality.

As in rural areas, protecting particular areas is also an important conservation instrument used in urban areas. Areas which provide important ecological variety need to be maintained and kept free of development.

69.* The Council recommends paying greater attention, within the framework of land zoning and unused or derelict land recycling, to the ecologically important potential of unused or derelict land in urban areas. Suitable derelict industrial land could be used to a greater extent as air quality and urban climate compensatory areas, as publicly accessible green open areas, as study areas for research and teaching or possibly as urban nature conservation areas. To do so, derelict land in all urban areas would have to be identified and assessed.

70.* Building and regional planning legislation does not take the requirements of sustainable urban development adequately into account. The Council would welcome the following:

- concrete definitions of sustainability, especially with respect to the principles of regional planning,
- secured funding for compensatory pools,
- establishment of practicable quality criteria for landscape planning,

- the introduction of obligatory landscape plans to serve as a necessary basis for development planning, as well as the introduction of integration, participation and supervision regulations.

The Council is, however, of the opinion that experience with the new Building and Regional Planning Act of 1998 should first be gathered and assessed before any further basic changes are made.

71.* Once again, the Council would like to request that settlement structure concepts and regional planning instruments be assessed as concerns their ability to contribute to sustainable urban and regional development and that they be coordinated cross-departmentally in keeping with the objective of sustainability, because, in the past, apart from exceptions in landscape planing, systematic assessment of the effectivity and efficiency of regional and environmental plans and their implementation has been neglected. The uncertainties involved in implementing the new Building and Regional Planning Act make such assessment all the more urgent. Another reason for such assessment is the empirically proven fact, as far as preparatory development planning is concerned, that regional and environmental plans do not, for the most part, meet legal requirements. Further, the possible introduction of strategic EIA would require such assessment.

72.* What is especially urgent is (1) better assessment of whether environmental and landscape concerns have been taken into account in regional plans and in legally binding development plans, even beyond the reporting period prescribed by the Building Code, and (2) the continuation of assessment of preparatory development plans based on the new act.

The Federal Nature Conservation Act and Other Legal Aspects

73.* The Council is in favour of abolishing the compensation scheme provided for by Section 3b of the Federal Natural Conservation Act for use restrictions in agriculture and forestry. Instead of compensating farmers and forest owners for not using their farms and forests, they should be provided with a new means of earning income by remunerating them for ecological services. With regard to the compensation scheme provided for by the Water Management Act, a scheme which is similar to the scheme provided for by the Federal Natural Conservation Act, the Council has already come out against granting farmers and forest

owners privileges as concerns water protection, since the economic disadvantages engendered by use restrictions (e.g., pesticide and fertilizer application restrictions) do not outweigh the social responsibilities incurred by owning property, and thus compensating farmers and forest owners for just using their property in a manner that is site-appropriate and groundwater friendly is not justifiable. Neither is the argument justifiable that they should be given preferential treatment because they depend upon the land and because large amounts of the land in Germany (83.5%) are used for agriculture and forestry. The Council is well aware of the fact that effective nature conservation is only possible if farmers and forest owners cooperate and that promoting their acceptance of conservation measures is expedient and necessary. However, this can be accomplished better by using a comprehensive concept that links agriculture and forestry with environmental protection rather than by paying selective compensation payments for refraining from using agricultural land and forests for conservation reasons. This is all the more the case as Section 3b of the Federal Natural Conservation Act is based on 'best agricultural practice', which as it is currently understood does not take nature conservation criteria (including those that derive from the site location) adequately into account; nor is it in line with what is technically possible. The Council would once again like to recommend that, using an operable system of distinguishing between socially responsible use restrictions and genuine (additional) ecological services, regulatory taxes (e.g., a nitrogen tax to reduce nutrient inputs from mineral fertilizers) or transferable licences be used to limit natural resource use and that farmers and forest owners be remunerated for the ecological services they provide.

74.* With regard to the planned simplification and uniformization of structural improvement programmes, rural areas must be given much greater attention in order to help to maintain biological diversity and to promote sustainable land use. In this context, it will be necessary to orient the Gemeinschaftsaufgabe zur Verbesserung der Agrarstruktur und des Küstenschutzes (Joint Task for the Improvement of Agricultural Structure and Protection of the Seacoasts) more towards the requirements and objectives of nature conservation. For example, areas in which environmental services are performed pursuant to the Habitats Directive should receive greater funding within the framework of this joint task.

Nature Conservation and Environmental Monitoring

75.* The Council welcomes the draft of the interdepartmental agreement on data exchange between the federal government and the governments of the *Länder*, which provides the basis for obligatory nature reserve and biological diversity reporting. This will eliminate several of the deficits the Council has repeated called attention to (e.g., multiple listing of areas, lack of biotope data). Nevertheless, there are still deficits with respect to (1) taking account of the total, and especially the used, landscape, (2) including other land users, such as farmers and forest owners, in the data to be exchanged and (3) evaluating conservation-relevant promotion programmes. One still has the impression that nature conservation policy can be reduced to protecting special areas and species.

76.* The Council is following with concern the slow progress being made in establishing a cross-media environmental monitoring system. It welcomes the fact that the Federal Agency for Nature Conservation and the Nature-Conservation-Oriented Environmental Monitoring Working Group have finally begun working on giving the nature and landscape sector greater competences. The deficits with respect to the continuous collection of data on changes in biological diversity, to the quality of protected areas, to progress in biotope networking, to the state of used landscapes and the extent of their developmental potential, and to nature conservation measures need to be corrected quickly. In doing so, priority attention should be given to collecting core nature conservation data and the data that the German government requires to fulfil its international reporting obligations (particularly as concerns valuable biotopes and species for which Germany carries a responsibility and as concerns the establishment of a coherent network of NATURA 2000 sites). The collection of such data should be prescribed by amending the Federal Nature Conservation Act.

The system of spot sampling of ecological areas which has been developed by the Federal Statistical Office together with the Federal Agency for Nature Conservation, and which is based primarily on statistical representativity criteria, cannot provide the ecological data required for reporting purposes in the nature conservation sector, namely data on biogeographical regions, representative parts of landscapes, biotope types, particularly sensitive species or biotope networking.

77.* In order to collect data on changes in cultivated landscapes, data which are not are a primary concern of nature conservation monitoring, continuous monitoring of ecosystems

should be conducted at a few selected sites. This monitoring should, however, be based on nature conservation requirements rather than on statistical representativity criteria. Thus, it would not be subject to the limitations posed by the objects being monitored or by monitoring times, as is the case with spot sampling.

All nature-conservation-related monitoring data should be input into the general and cross-media federal environmental monitoring database, as the Council has repeatedly requested. The nature and landscape sector, which is still lacking funds, needs to be allocated funds commensurate with those allocated other environmental sectors so that it can deal with problems adequately.

The *Nature Data* of the Federal Agency for Nature Conservation should not only continue to be used as the basis for regular nature conservation reporting but should also be further developed.

2.4.2 Soil Protection

78.* Soil protection receives little attention although natural soil functions are increasingly being considerably impaired through land use, large inputs of nutrients and pollutive substances, erosion and historical site contamination, and although soil protection is an essential component of effective environmental protection. Soil protection must henceforth be accorded the same importance, at least, as air quality control, water protection and nature conservation.

Soil protection, especially the maintenance of its functions, was topicalized at the political level in the 1985 *Bodenschutzkonzeption der Bundesregierung* (Soil Protection Concept of the German Government). In this concept, soil protection was, for the first time, declared to be a interdisciplinary, cross-cutting environmental protection task and a comprehensive catalogue of soil protection objectives was drawn up. The concept was thus the first important step in the direction of comprehensive soil protection. Subsequently, numerous further soil protection objectives have been developed at both national and EU levels, objectives which specify the tasks and foci of action of soil protection quantitatively, qualitatively and temporally. The Federal Soil Protection Act of 1998 and the Federal Soil Protection and Contaminated Site Regulation of 1999 now make it possible to accord soil protection suitable importance in all areas of environmental protection policy.

The Contaminated Site Problem

79.* After the especially intensive efforts at remediating contaminated sites in the early 1990s, a certain disillusionment has set in which, depending a person's point of view, is referred to as either 'remediation minimalism' or 'remediation realism'.

According to current data, there are about 325,000 non-military sites suspected of contamination and about 10,000 military sites. By November 1998, the *Länder* had reported having either begun or completed assessment of 53,000 sites. This is only one-sixth of all suspected sites.

The Council therefore sees a considerable need for action with respect to the problem posed by contaminated sites. Thus, the various aspects of this problem and current developments in attempting to resolve this problem are dealt with throughout this report.

Soil Protection Objectives

80.* The basic objective of soil protection as established in the Federal Soil Protection Act is to protect soil functions by maintaining or restoring soil performance and by maintaining or restoring the ability of soil to sustain all types of uses. Thus, dangers to soils as well as dangers deriving from soils need to be avoided. In the case of contaminated sites, soil damage that has already occurred has to be remediated. Further, soils should be protected not merely by avoiding particular dangers but by taking long-term precautionary measures. A further basic objective as stated in an environmental policy priority plan drawn up by the Federal Environment Ministry is to secure and promote the functions of land or landscapes in sustaining life and providing habitats for plants, animals and humans, and thus secure and promote biological diversity.

The Federal Soil Protection Act and the Federal Soil Protection and Contaminated Sites Regulation

81.* The Council expressly welcomes the adoption of the Federal Soil Protection Act, which aims to protect soil functions and requires, for the first time, that uniform assessment criteria be used throughout the country. It puts an end to legal differences with respect to contaminated sites and provides legal security with respect to remediation obligations. However, the Council would also like to point out that in order to be able to protect soils throughout the country in a precautionary manner the act will need to be changed considerably.

The provisions of the Federal Soil Protection Act are delineated in detail in the Federal Soil Protection and Contaminated Sites Regulation.

The Council would like to point out that several important items have not been dealt with to any great extent in this regulation or have not been included in the regulation at all, for example, physical soil damage, and thus the Council recommends that it be amended soon. The regulation does not address impacts on soil organisms or impacts on soils as habitats

either: it does not contain any provisions regarding assessment of such impacts or regarding designing measures to restore or promote the habitat function of soils.

Neither does the regulation address the problem of soil acidification and the effects that this has on soils themselves as well as on downstream ecosystem compartments (i.e., groundwater). In the opinion of the Council the regulation should contain provisions regarding assessment criteria which can be used in taking precautionary measures against soil acidification processes that exceed what is normal in humid climates, and which can be used to assess the detrimental changes in soils that result from acidification.

82.* The core element of the Federal Soil Protection and Contaminated Sites Regulation is constituted by the screening and cleanup standards for assessing the dangers the contaminated soil can pose to humans, food and feed crops, and groundwater. The Council welcomes the establishment of these guide values. These values provide a criterion as regards substance concentrations for deciding whether the need for remediation is indicated. The regulation specifies values for substances that are especially important with respect to contaminated sites and contaminated soil. However, it does not list values for all relevant substances.

Thus, the lists of values should be further developed; i.e., in addition to adding further substances to the lists, they should be revised regularly in order to take account of new knowledge about the toxicity of substances, their mobility in the root zone, their bio-availability, their ability to accumulate in organisms and their degradability in soils.

The regulator has complied with the Council's call to make public the data, assumptions and conventions used to establish limit values. The documenting of screening and cleanup values has set a standard that should also set an example for other areas in environmental regulation.

Conclusions and Recommendations with respect to Soil Protection Policy and Contaminated Sites

Environmentally Friendly Land Use and Impervious Land Cover

Assessment of the Objectives of Environmentally Friendly Land Use

83.* In view of the fact that there is a continuing increase in land consumption and the spread of impervious land cover, the Council is of the opinion that one of the most pressing tasks of

soil protection policy should be to turn around the daily trend to cover ever greater areas of soil with impervious surfaces and structures. The present increase in land consumption attributable solely to settlement and transport infrastructure construction amounts to about 120 hectares per day, which is far from the objective the Federal Ministry of the Environment lists in its draft of a priority programme, namely 30 hectares per day. And even 30 hectares per day is too much in the long term in the opinion of the Council. Nonetheless, it will require a great amount of effort to reduce the daily increase in land consumption to only 30 hectares per day, and doing so will have a considerable impact on construction and settlement development, on production, and on occupational and recreational pursuits. The Council would like to point out that that even if land consumption could be reduced to 30 hectares per day by 2020, the amount of land consumed and the amount of soil covered with impervious surfaces and structures by then would be clearly inconsistent with the central objectives of sustainable soil, nature, climate and biodiversity protection. This is all the more the case as there has also been an increase in land consumption for purposes other than settlement and transport infrastructure (i.e., surface mining, wind energy parks, recreational and leisure purposes, watersheds, agriculture and forestry). The Council thus maintains that it is not enough to merely slow down this trend; in the long term the objective will have to be zero growth. The objective of reducing land consumption to 30 hectares per day can only serve as an intermediate objective.

Approaches to Reducing Land Consumption and Impervious Land Cover

84.* The priority objective when reducing land consumption has to be to reduce the amount of impervious land cover, the intention being to turn around the trend in land consumption. Open areas and especially valuable soils need to be protected, as far as possible, from the spread of impervious land cover. New impervious land cover should be restricted to built up areas. Further, it is important, albeit not a priority, to remove existing impervious land cover.

These quantitative objectives can be achieved, for example, by building on previously built-upon surfaces (land recycling), by better utilizing or expanding existing structures without using additional land (e.g., by converting attics into living space, adding storeys to buildings, building above streets, increasing building density), economizing on land consumption when designating new land for development and when developing new land, increasing the building

density in inner-urban areas rather than building in peripheral areas, reducing the need for transport infrastructure by implementing the concept of new urbanism (i.e., by using mixed use zoning to put places of residence and workplaces, inter alia, closer together), by remediating contaminated sites rather than designating new land for development, and by keeping impervious land cover around existing buildings to a minimum (e.g., fewer peripheral structures, less paving). From a qualitative point of view, areas with less important or less sensitive soils could be given priority over other areas as regards of new development.

85.* The most promising approach for implementing these qualitative objectives is, in the opinion of the Council, to *improve planning-related regulations* in order to prevent legal provisions for minimizing land consumption and the amount of impervious land cover from continuing to be ignored. In addition, zoning regulations should be supported through *the use of economic instruments.* The price of land has been continuously increasing, but this scarcity signal has not been strong enough to encourage the economical use of land for living or production purposes or to discourage urban sprawl. Economic instruments should thus be used to make wasteful use of land and the use of unnecessary impervious land cover unattractive. Making land use more expensive would reduce the demand for land and thus engender more economical use of land. This would help to enforce legislation pertaining to using land more economically and to using less impervious land cover.

In the opinion of the Council, *tradable land consumption rights* are the ecologically most effective and economically most efficient instrument to reduce land consumption and the use of impervious land cover. This instrument could be used to exercise basic control over land consumption by determining, at regular intervals, the amount of land that may be covered with impervious surfaces and structures, thus creating a framework for determining maximum allowable land consumption. More specific control of land use could then be achieved at municipal levels by levying *impervious land cover taxes*. In addition, municipalities could be given an additional incentive to pursue a land consumption minimization policy by providing payments within the framework of *'ecologized' financial equalization* at the municipal level. Land consumption control using economic instruments should also be coupled with *abolishing incentives* that impact negatively on land consumption and the construction of impervious land cover and by *including incentives to reduce land consumption* in existing taxes.

Supplementing Regional Planning Instruments

86.* To reduce land consumption, land-use-relevant legislation that does not contain land consumption clauses should be amended such that it provides for economical and prudent land use and minimizes the construction of impervious land cover (as in, for example, Section 1a, paragraph 1, of the Building Code and Section 2, paragraph 2 of the Regional Planning Act). This would allow land consumption and impervious surface construction to be taken better into account in permitting procedures pertaining to infrastructure projects. Instead of making the above-proposed amendments, it would also be possible to activate or concretize the intervention provision of Section 8 of the Federal Nature Conservation Act as regards planning conducted by sectoral authorities (sectoral ministries, departments, agencies) in order to remedy the problems with this provision as regards containing the spread of impervious land cover.

Tradable Development Area Designation Rights

87.* Tradable development area designation rights could be used to regulate the designation of development areas by municipalities (districts). The idea behind this instrument is that the *Länder* could use it to determine the maximum amount of land that can be designated as development land. Each and every municipality would be given an allotment of such rights for free. If a particular municipality required additional rights, it could buy them at an exchange that would be established by the *Land* (state). Rights which were not needed could be sold to other municipalities. Further, they would be valid only for a specific length of time. So that regional planning objectives could not be counteracted, it would probably be recommendable to differentiate between markets according to type of development, whereby centrally located towns or cities and rural areas would constitute two separate markets. In this way, an increase in development designations in rural areas could be prevented. The revenue that the *Land* generated from selling area designation rights could be used for municipality financial equalization purposes.

The Council deems this instrument to be a suitable instrument with which to efficiently be able to pursue a much-needed policy of limiting land expansion. The Council is of the opinion that this instrument has a definite advantage over the present system in that it would ensure

achievement of quantitative objectives and in that it would allow decentral coordination of municipal development designations via the marketplace. In addition, this instrument would provide incentives to avoid designating new development land, incentives to designate smaller tracts and incentives to intensify the use of previously designated land. The task of planning, on the other hand, would be to concentrate on providing clear environmental policy and regional planning objectives.

88.* Some have claimed that tradable development area designation rights are constitutionally questionable. Those who make this claim maintain that, by basically transferring land use planning to a supralocal administrative level, the planning scope of municipalities would be limited to an extent that would constitute an excessive limitation of the planning competence guaranteed them by Article 28, paragraph 2, of the Basic Law. However, even though local development planning is indeed a matter of municipal autonomy and this would undoubtedly be restricted by establishing maximum amounts of designatable land, the right of municipalities to be autonomous is, as guaranteed by the Basic Law, nevertheless not an absolute right. It can be legally restricted as long as this does not effect the basic character of municipal administration in any basic way and does not undermine municipal autonomy, and this would not seem to be the case as concerns the proposed designation rights system. Admittedly, establishing the amount of designatable development land on a *Land*-wide basis would deprive municipalities of their power to designate such land, but, within this framework, the municipalities would still retain their scope to pursue their own development policies, especially since they would be allocated a certain amount of designation rights for free. Further, municipalities could purchase additional rights in order to pursue their development policies should they require additional land.

Impervious Land Cover Tax

89.* Within the framework of tradable development area designation rights, specific control over permissible land development could be exercised at the landowner level by levying an impervious land cover tax, which could be used to provide incentives to minimize new impervious land cover or to remove existing impervious land cover. Experts have proposed using a split tax for new and existing impervious land cover: whereas new impervious land cover would be subject to a one-off tax, existing impervious land cover would be subject to

an annual tax. The revenue generated by this system could be used to promote the removal of existing impervious land cover.

This system would motivate investors to avoid or minimize the construction of new impervious land cover by adding storeys to existing buildings rather than building new buildings, by building buildings that cover a minimal amount of land, by reducing floor space in homes and businesses, and by reducing impervious land cover in peripheral areas. The Council is of the opinion that government properties should also be subject to the tax. This would create regulatory incentives as long as revenues did not flow into the same budget as the one used to pay the tax. It would not have a direct effect on *Land* (state) construction projects, as the *Land* would receive the revenue from the tax, but the tax would at least indirectly put the *Land* under a certain amount of pressure.

Taxing existing impervious land cover would provide an incentive to remove street, car park, yard, etc., paving, whereby the amount of cover to be removed could be determined by the tax rate. Landowners would compare the costs incurred by the tax to the costs of possibly removing their impervious land cover (labour and material costs, costs of disposing of demolition debris, opportunity costs of having no impervious land cover).

The Council deems the proposed tax to be fundamentally suited to reducing the spread of new impervious land cover as well as to reducing amounts of existing impervious land cover. The tax rate should be based on environmental policy objectives pertaining to impervious land cover. Further, when introducing tradable development area designation rights and impervious land cover taxes at the same time, they would have to be coordinated.

Requirements Pertaining to Removal of Impervious Land Cover

90.* The Council is of the opinion that current legislation does not provide an adequate basis for bringing about the removal of impervious land cover. For one, municipalities could be held responsible for compensation (see Section 179, paragraph 3, of the Building Code) if they required removal of impervious land cover, and thus they would hesitate to do so. Further, municipalities would frequently not be very interested in requiring such, not least because conflicts and legal disputes with citizens would be inevitable. Thus the power to order the removal of impervious land cover as embodied in the Building Code (sections 177 and 179)

and the Federal Soil Protection Act (Section 5) will seldom be used. For this reason, among other reasons, the Council deems the impervious land cover tax to be far superior to regulatory measures for bringing about the removal of impervious land cover. Should the tax favoured by the Council not be used, the regulatory instruments with which to bring about removal would first have to be improved.

Since the removal of impervious land cover must take account the habitat functions of soil, the Council recommends making use of the power embodied in the Federal Soil Protection Act (Section 5) as soon as possible to establish requirements, in the Federal Soil Protection Regulation, for the removal of such land cover. In this regulation, the preconditions necessary to be able to require removal, as well as the criteria for deciding whether to require removal, should be specified in detail. Further, it would be helpful to specify the applicability of removal orders pursuant to Section 5 of Federal Soil Protection Act and how it relates to removal measures that can be taken pursuant to other legislation, and in doing so establish uniform assessment criteria (e.g., concerning the performance of soils that are to be protected or rehabilitated).

Further, the Council would like to point out that, when deciding whether to remove impervious surfaces or structures, the intended use of the land after the removal of such surfaces or structures needs to be considered along with the characteristics of the covered land/soils. Intended uses or certain characteristics could pose risks to soil functions and to other environmental compartments (e.g., groundwater). The benefits of removing impervious land cover should be assessed on a case-by-case basis and balanced against possible risks of contamination.

Ecological Financial Equalization

91.* The objective of reducing impervious land cover can be supported by using a suitably adapted version of the ecological financial equalization system proposed by the Council in the past. Whereas equalization payments serve distributional policy objectives in particular, tied grants can be used for specific regulatory purposes. Equalization payments could be used to compensate municipalities for income losses that result from the designation of open space. Tied grants could be used to used to help to implement regional policy land use objectives by

rewarding municipalities for changing their land designation practices or development plans so as to protect soils. In this context, municipalities could be rewarded for implementing impervious land cover removal programmes, measures that motivate land use economy, etc.

Flanking Instruments with Which to Reduce Land Consumption and Impervious Land Cover

92.* The Council has repeatedly called for greater use of market instruments in environmental policy and recommended that the complete fiscal system be systematically reviewed, that ways and means of redesigning the system to make it environmentally friendly be sought, and that ecologically counterproductive privileges be abolished. In addition to introducing new environmental taxes, the elements of a sustainable, environmentally friendly fiscal reform are:

- abolishing or reforming tax subsidies that have ecologically negative effects,
- building incentives into existing taxes to motivate environmentally friendly behaviour,
- increasing existing environmentally motivated tax subsidies and taxes.

These elements can be used to directly or indirectly control land use expansion and impervious land cover as well as to support the above instruments.

Reforming Tax Subsidies That Have Ecologically Negative Effects

93.* The development policies of the federal and *Länder* governments concerning land and infrastructure development support provide extensive tax subsidies that have a negative ecological effect with respect to land consumption. They contribute considerably to the excessive spread of impervious land cover and thus measures to control this spread should start with these subsidies.

The development subsidies provided by the federal and *Länder* governments should be reviewed to determine whether they run counter to the objective of using land economically. The granting of house construction premia, government funds for highway and waterway construction, and urban development subsidies could all be made dependent on whether the projects they finance use land economically. It would also be possible to grant bonuses to projects that do use land economically. Further, it would seem advisable to assess the land-

use-development-related instruments used by the governments to prevent development policies with different objectives from running counter to each other. Businesses and factories, for example, should not be granted the often considerable economic development subsidies that they are in order to build greenfield facilities when subsidies for land recycling are small or non-existent.

Building Incentives into Existing Taxes to Motivate Environmentally Friendly Behaviour

94.* Numerous proposal have been put forward for building incentives into existing taxes to motivate environmentally friendly behaviour, for example, reforming the land tax with a view to introducing a development land tax, land value tax or land size tax, or changing it into a land use tax.

95.* The basis of assessment for the land tax, which is provided for by federal legislation and levied by municipalities, is the standard value of land and buildings. Whether land is used economically or not is irrelevant as regards this tax. The tax does make land more expensive, but it does not provide any real incentive to use land economically. The tax was never intended to have this effect. However, complementing the land tax with a development land tax would provide an incentive to build on development land rather than hoard it for speculation purposes, so that people would no longer have to build in the hinterlands for lack of available building land in more proximate areas.

96.* The proposal to change the land tax into a land use tax correlates the degree of impairment that land use causes nature with various tax brackets such that the tax rate is higher, the higher the degree of impairment and thus the higher the tax bracket. The right to determine the assessment rate remains with the municipalities. The land use tax is intended to provide incentives to use land with existing impervious surfaces and structures more intensively, to remove such surfaces and structures, to restrict the spread of such surfaces and structures, and to use open land in a manner that is environmentally friendly. However, if the land use tax were revenue-neutral, the resulting tax rate would not provide much of an incentive to avoid constructing new impervious surfaces and structures. A further problem with using such a tax is that it also addresses numerous other environmental problems (e.g., ecological land management, impairment of the landscape and the local climate due to higher

buildings) without being specifically tailored to implementing environmental policy objectives pertaining to these problems.

Increasing Existing Environmentally Motivated Tax Subsidies and Taxes

97.* Existing environmental-policy-motivated tax subsidies, municipal sewerage fees and environmentally related compensatory fees collected by the *Länder* can be used to control , at least indirectly, land consumption and the spread of impervious land cover.

Since, in some *Länder*, municipal sewerage fees are not charged dependent on the amount of impervious land cover on the land being serviced, the *Länder* in which this is not the case should themselves charge fees that are. The Council would like to point out, however, that the fees should not be based on ecological objectives, but rather on the actual cost of disposing of the runoff from impervious land cover. The use of supporting instruments will still be necessary to control land consumption.

98.* In order to better implement the objective of the environmentally related compensatory charges, higher charges need to be set. In addition to the costs of rehabilitating biotopes (material costs), the charges should take into account the loss of environmental functions during development (time charge), rehabilitation risk (value charge) and diminution of the nature conservation value (value charge). Compensatory measures implemented by the developer could, dependent on their quality and comprehensiveness, be deducted from the charges due. The charges collected would be put into a fund which would be used to fund government measures to establish new biotopes for precautionary purposes. This would take into account that establishing mature biotopes is only possible over a long period of time. If development times are so long that biotopes would not be able to be rehabilitated, setting prohibitively high charges could be justified.

Improving Municipal Cooperation

99.* A further promising approach would appear to be, in the opinion of the Council, to improve cooperation between municipalities with respect to designating and zoning plots in order to prevent sprawl, habitat fragmentation and further land consumption. Better cooperation could help to limit land consumption to certain areas.

Assessment of Instruments with Which to Reduce Land Consumption and Impervious Land Cover

100.* The Council is of the opinion that a system of tradable development area rights, an impervious land cover tax and the 'ecologization' of the municipal (district) financial equalization system for the purpose of controlling land consumption are extremely important instruments. In addition, government land-use-related revenues and expenditures should be reviewed in order to determine whether they could be used to provide incentives for land use economy. On the other hand, such other instruments as reforming tax subsidies that have ecologically negative benefits, building incentives into existing taxes to motivate environmentally friendly behaviour and increasing existing environmentally motivated tax subsidies and taxes are, in the opinion of the Council, of lesser importance, fulfilling a complementary function at best. This is either because it is difficult to specifically target a reduction in land consumption and impervious land cover with these instruments or because it is more difficult than with the other instruments. Nevertheless, they should be reviewed for their ability to fulfil a complementary function.

The Council is of the opinion that there are deficits in the current discussion of soil protection instruments, especially as concerns coordinating the instruments; for example, instruments that can specifically target the same objective are treated separately. Difficulties in estimating the effects of individual instruments or instruments used in concert can be dealt with in a step-by-step manner.

The Council is aware, with regard to its proposals, that the introduction of new fees and taxes would cause costs to increase, especially the costs of building on new land. Further, the proposed instruments would have considerable effects in the long term on lifestyles, work habits and leisure activities. On the other hand, the Council would like to point out that there is no real alternative to the proposed instruments that could turn around the trend in land use expansion within the foreseeable future.

Reducing Soil Erosion and Soil Compaction

101.* Comprehensive protection of soils as a non-renewable resource includes protecting soils from erosion and compaction. Thus, the Federal Soil Protection Regulation should be

amended to specifically provide for wind erosion protection. It should also be amended to address on-site damage. It would be practical to differentiate between on-site and off-site damage that is likely to occur, or already has, as a result of erosion (e.g., diminished production and protection functions) or long-term compaction. Research on determining guide values and developing practical aids for, inter alia, monitoring purposes needs to be stepped up. Further, the regulation should be amended to provide for measures to remediate erosion or compaction damage and to specify means of preventing such damage, especially such means as are part of good agricultural practice (e.g., mulch sowing, use of filter strips, varying use of land). The principles of good agricultural practice should be specified in detail and made binding.

Currently there is very little data on the physical properties of soils (especially with respect to erosion and compaction). The Council sees considerable need to conduct soil surveys and calls for uniform surveys to be conducted on a nationwide basis.

Reducing Pollution That Causes Acidification and Eutrophication

102.* Anthropogenic soil acidification and eutrophication resulting from the atmospheric deposition of pollutants or from the direct input of substances still pose an resolved and pressing problem. Considerable efforts will be necessary to reduce inputs of substances that cause soil acidification and eutrophication. As concerns the pollution of soils resulting from atmospheric deposition, the Council refers the reader to its recommendations regarding avoidance and reduction measures in Subsection 2.4.4.

In order to protect soils against acidification and eutrophication, the Council recommends that provisions for precautionary and preventative measures dealing with these phenomena be added to the Federal Soil Protection Regulation. Within the framework of precautionary measures, using criteria for assessing pollutant loading above and beyond critical loads should be considered. The Council would like to point out, however, that the critical load concept suffers from certain limitations, since it takes neither historical land uses and contamination nor time factors adequately into account. This problem needs to be remedied. In doing so, coupled reaction and transport models need to be used at the landscape level in order to take

adequate account of the interactions, including land-use-engendered interactions, that take place in natural spaces.

103.* In view of the deficits of regulatory law in specifying site-consistent requirements for the agricultural use of substances which cause eutrophication (especially the use of fertilizers), the Council has repeatedly called for the introduction of a fertilizer tax in conjunction with rebates paid from the tax revenue to reduce the nutrient inputs stemming from agriculture. By taxing mineral nitrogen fertilizer, the marginal costs of using fertilizers would be increased. The purpose of this is to motivate farmers to use less fertilizer and to promote extensification. The effectiveness of the tax depends heavily on the type of crop being cultivated and on soil conditions at any given site. Because the tax would bring about an across-the-board increase in the costs of using mineral nitrogen fertilizer, nitrogen inputs stemming from agriculture would be reduced, but soil protection objectives would nevertheless not be achieved because the tax is geographically indiscriminate. Therefore, to pursue site-specific objectives, complementary measures would have to be used (e.g., management requirements, designation of protected areas). In addition, the environmentally friendly use of chemical fertilizers on farms with large numbers of livestock should be promoted in a manner that goes beyond the provisions of the Fertilizer Regulation by using stocking rates or fertilizer use records. Nevertheless, the Council will continue to recommend introducing a nitrogen tax as long as regulatory law does not require adherence to site-specific maximum tolerable positive nitrogen balance levels and as long as adherence is not efficiently monitored. The Fertilizer Regulation should be amended along these lines. A blanket clause should be added that, in cases where maximum permissible nutrient levels are exceeded, would allow maximum tolerable positive nitrogen balance levels to be set using the critical load concept and would allow requiring farmers to submit rotation schemes.

Sustainable Soil Use in Agriculture and Forestry

104.* The Council deems one of the important tasks of soil protection policy to be to further develop the Federal Soil Protection Act. In particular, the part of the act pertaining to agricultural soil use (Section 17) should be further developed. The Council recommends changing Section 17 along the lines of Section 7 to allow the responsible government agency to issue regulations with which to implement precautionary obligations. The principles of good

agricultural practice could then, if necessary, be legally enforced and the danger that precautionary obligations with respect soil use could be ignored could be countered.

105.* Further, the Council urgently recommends providing agriculture and forestry with a stronger ecological orientation as regards soil use. In doing so, fertilizer legislation can no longer ignore soil protection concerns. This legislation should be further developed such that it comprehensively takes account of soil protection concerns regarding the application of fertilizers.

106.* When amending Section 17 of the Federal Soil Protection Act to grant the responsible agency the authority to issue regulations with which to implement precautionary obligations, a provision enabling the issuance of regulations (similar to the provisions in Section 7, clause 2, and Section 8, paragraph 2, of the Federal Soil Protection Act) should also be added so that precautionary agricultural soil use requirements can be written into the Federal Soil Protection Regulation. Uncertainties concerning assessment and the acceptability of demands placed on farmers could thus be avoided.

Extending the Biowaste Regulation and the Sewage Sludge Regulation

107.* The application of biowaste compost to farm and garden land is, in the opinion of the Council, generally a welcome practice as regards sustainable waste management and soil protection, since this practice returns organic substances (humus) and nutrients to soils. The Council would like to criticize the fact that the important areas in which biowastes are widely used to produce new layers of topsoil, namely agriculture, gardening and recultivation, are not dealt with in the Biowaste Regulation. The risks that are thus posed to soils by the excessive accumulation of pollutants in topsoils (e.g., heavy metals, persistent organic pollutants) and to groundwater or percolation water by the excessive supply of nutrients (in particular nitrogen and phosphorus) in topsoils remain, which could lead to impairment of soil functions or a conflict with the precautionary principle as embodied in the Federal Soil Protection Act.

In view of the fact that pollutants have ecotoxicological effects in soils, an assessment concept that takes account of habitat functions should be added to the Federal Soil Protection Act when extending the Biowaste Regulation and the Sewage Sludge Regulation to include the areas of agriculture and recultivation. In doing so, effects on microorganisms as well as on soil

fauna should be taken into account. The pollutants that cause ecotoxicological effects in soils, in particular heavy metals and persistent organic pollutants, should also be taken into account.

108.* Further, the Council deems that it is necessary to dispel uncertainties as concerns interpreting the principles of good agricultural practice set forth in Section 17, paragraph 2, of the Federal Soil Protection Act. The problem with this section is that it does not specify in detail and comprehensively what constitutes good agricultural practice. The stipulation contained therein to maintain site-specific humus content in soils (paragraph 2, number 7), for example, is particularly lacking in substance because there is as yet no generally recognized definition of site-specific humus content. Nor do the principles of good agricultural practice drawn up by the Federal Ministry of Agriculture provide any clarification, as they do not provide a definition either. The Council thus sees a great need for further research to close knowledge gaps concerning, inter alia, desirable (optimal or tolerable) site-specific humus content, because the requirements set forth in Section 7 and Section 17, paragraph 1, clause 1, of the Federal Soil Protection Act cannot be complied with before a definition of what constitutes site-specific humus content is provided.

Soil Information Management

109.* The Council has repeatedly called for the establishment of a country-wide soil information system as well as for soil status reports to be drawn up at regular intervals. In establishing the provisions in Section 21, paragraph 4, of the Federal Soil Protection Act, legislators have, however, only partially, and insufficiently, responded to this call. The Council criticizes the approach taken by legislators because they have left it to the discretion of the *Länder* to establish such a system; it would like to draw attention to the fact that Section 342 of the Draft Environmental Code, which it considers to contain exemplary provisions, and which mandates that the *Länder* establish a soil information system and, as necessary components thereof, continuous monitoring areas and soil survey maps. In view of the great importance of such soil information systems for precautionary and 'after-the-fact' soil protection, and for planning, the Council would like to call upon the legislature to not merely trust in the willingness of the *Länder* to establish a system, but rather to transform the discretion currently provided for in the Federal Soil Protection Act (Section 21, paragraph 4) into a legal obligation.

Establishing a legal obligation must, however, go hand in hand with clearly defining the objectives that the government would like to achieve with respect to the soil information system. In order to prevent misuse of the information, there needs to be previous agreement on what the government may do with the information provided by the *Länder*, and to what extent it may do so. Further, concepts concerning how to use this information will need to be developed and there will need to be agreement between the government and the *Länder* governments on how to evaluate the information.

110.* The Council would thus like to suggest that the government should be clearer about the planned or expected benefits that the provision of information by the *Länder* would have on the federal soil information system in order to justify the extensive transfer of data involved and to be able to further develop the elements of the system so that they are compatible with objectives. Moreover, an important element of the system is the funding of the data transfer. Given the present restraint of the government in funding the transfer, only a incomplete body of data can be maintained.

111.* There is a definite information deficit as regards continuous soil monitoring areas, because most of the areas used for monitoring purposes are not adequately representative of areas throughout the country, and there are too few of the ones that are to provide national coverage. The Council would like to point out that representative areas have to be used if the point data collected is to be reliably extrapolated to areal values. The Council thus welcomes efforts that have been undertaken to assess the representativity of monitoring areas and, with respect to these efforts, would like to call for existing gaps in data on soils at sites that are representative to be closed.

Establishing an International Soil Protection Convention

112.* The Council is in favour of establishing an internationally binding soil protection convention as has been proposed by the German Advisory Council on Global Change (WBGU). Optimally, such a convention should be established within the framework of the United Nations in a manner similar to the Framework Convention on Climate Change and the Convention to Combat Desertification and Drought. The *Übereinkommen zum nachhaltigen Umgang mit Böden (Bodenkonvention)* (Agreement on Sustainable Use of

Soils (Soil Convention)), which is a proposal drawn up by numerous German scientists and which the Council deems to constitute a step in the right direction, could be used as the basis of negotiations. This proposal focuses on precautionary soil protection, which, in the opinion of the Council, is justified, because precautionary soil protection needs to be promoted at the international level, or rather even needs to be made known as being something necessary.

Contaminated Sites

113.* The Federal Soil Protection Act and its concomitant administrative regulations constitute a uniform basis for remediating contaminated sites, but still need to be improved substantially. This is especially the case as regards taking account of ecotoxicological and ecological concerns when assessing remediation needs and determining the remediation techniques to be used.

114.* In view of the large number of suspected sites, the available remediation methods need to be evaluated as to whether they would be better suited to remediating large numbers of sites comparatively cursorily such that follow-up remediation is warranted or to remediating small numbers of sites thoroughly such that little follow-up remediation is warranted. The government prefers to remediate as many sites as possible. The remediation methods favoured by the Council, although developed and tested in pilot projects, have not been used sufficiently often since passage of the Federal Soil Protection Act. Excavation, storage somewhere else, covering over or stalling and biding time are the dominant remediation methods. Off-site soil decontamination facilities are generally working at less than capacity. Current investigations of the efficiency of natural purification processes in the ground should be used to evaluate the usability and reliability of remediation methods and if necessary to take legal measures. The guiding criteria should be the ability to monitor, forecast and strike a balance.

115.* Since appropriate measures and, in particular, since suitable funding for thorough remediation are missing, the contaminated sites problem will not really be resolved or even mitigated in the foreseeable future. Also, the dominant remediation method (landfilling), the use of mere containment measures and biding time will only postpone dealing with the problem. Further, the Council would like to urge that adequate funding be found to deal with

the still pressing problem of contaminated sites. In this context the Council would once again like to suggest that private development companies be allowed to remediate contaminated sites and develop them for new uses. A rigorous policy of land recycling should be used to check urban sprawl, whereby a parallel policy of urban renewal may also be advisable in order to provide incentives for private investors.

2.4.3 Water Protection and Sustainable Water Use

116.* Water quality in Germany has been increasingly improved through sophisticated environmental policy measures and the extensive use of technology. Protecting water quality entails protecting surface waters as well as groundwater. In spite of the overall good quality of water in Germany, there are nevertheless great differences in quality between the various water compartments, such as flowing waters, still waters, the North Sea and the Baltic Sea, and groundwater. The Council analyses the damage that pollution and structural intervention do to these compartments and assesses the measures taken to mitigate the damage.

Objectives of Water Protection

117.* The main objective of water protection is to protect waters that are of 'good ecological quality' or to restore them to this state. Such waters serve to maintain or regenerate typical natural biotic communities and ecosystems. In order to achieve this goal, the negative impacts of pollution must be avoided or lessened and minimum requirements concerning the physical structure of surface water systems must be met. These means of achieving this objective are also in line with the requirements set forth by the European Council in its current draft of the so-called Water Resources Framework Directive, which establishes the overall framework for the quality of European waters.

The Council welcomes the fact that the government and the *Länder* governments, via the Water Working Group of the *Länder* (LAWA), and together with the Federal Environmental Agency, have been able to establish an integrated approach which considers surface waters and groundwater to constitute a single entity, and have been able to do so also at the EU protection policy level. To be able to establish and ecosystem approach, the interactions between waters and other environmental media will, using the approaches taken by pure water protection policy, have to be taken into account to a greater extent.

Surface Waters

118.* Even though considerable progress has been made in protecting water and in treating sewage, nutrient and pollutant loads transported into coastal waters by rivers are still too high. The causes of this are not only point pollution stemming from sewage treatment plants and industrial installations, but also non-point pollution stemming from agriculture. Measures to improve water quality must therefore give priority to viewing and improving the compositional quality of surface waters and their ecological quality in a holistic manner, and should, when doing so, include adjacent land areas. In particular, increased attention needs to paid to bringing about near-natural states and near-natural development of surface waters, floodplains, banks, and flows in order to improve the ability of surface waters purify themselves and to improve their compositional quality. Further, water should be kept in its natural retention areas for as long as possible in order to reduce the occurrence of high water and surging. Surface water systems should not serve primarily to drain catchment areas.

Soil erosion caused by agriculture and the use of fertilizers and pesticides should be reduced by improving agriculture and by practising sustainable, site-appropriate agriculture. The progress made in establishing sustainable agriculture is, in the opinion of the Council, not sufficient. Unfertilized, permanent grasslands along rivers and streams and adequately wide, near-natural, fertilizer- and pesticide-free riparian belts need to be maintained as buffer zones to protect waters. Water-protection-oriented agriculture and measures taken to re-establish near-natural surface waters need to be monitored to ensure effectiveness or success. By providing farmers with better advice on how to use pesticides, with a view to changing certain practices and stopping pesticides from getting into sewers, the input of pesticides into surface waters could be reduced considerably. For further aspects of sustainable agriculture the Council refers the reader to its special report entitled *Concepts of Sustainable Use of Rural Areas* (1996).

119.* The data on the pollution of rivers and streams with pesticides resulting from the production of pesticides and their use in agriculture are not adequate. The Council recommends expanding and coordinating pesticide pollution measurement programmes so that polluters can be better determined and appropriate reduction measures can be taken.

120.* As the Council has repeatedly emphasized, the description and assessment of rivers and streams needs to be improved. The EU Water Resources Framework Directive, which mandates the 'good ecological quality' of surface waters, is a step in this direction. However, suspended matter and the pollutants concentrated in sediments should be included in the regular parameters.

The water quality atlas planned by LAWA for the year 2000 will map biological water quality, chemical-physical water quality, water quality as regards suspended matter, and the quality of the structure of surface water systems. The Council welcomes the preliminary work done by the LAWA and the Federal Environmental Agency in establishing various parameters and quality objectives. In this context, it would like to point out once again that, in addition to the characterizing water quality holistically, use-related objectives need to be formulated and implemented. Without such objectives, neither the quality of surface waters nor the measures taken to protect them can be assessed. In highly urbanized areas, for example, it will frequently no longer be possible to bring about the optimal structure of surface water systems, and, thus, in such areas, at least good water quality and unhindered flows should be ensured.

Further, the Council welcomes the efforts of the LAWA and the Federal Environmental Agency in differentiating, in the new water quality atlas, between quality objectives concerning drinking water and quality objectives concerning aquatic communities.

121.* In addition, the Council recommends that all new development programmes that impact on water quality be assessed in order to better ascertain progress made in protecting water and the necessity of taking additional measures.

122.* The new and more sophisticated way of viewing rivers and streams requires that the remaining natural rivers and streams be protected from interventions affecting river and stream morphology and water regimes. For environmental and transport policy reasons, the Council opposes further development of rivers into high-capacity waterways, especially since transport needs can be satisfied by existing canal systems. The engineering of the middle and upper Elbe, as well as the retention stairs being built in the Saale and Havel are not justifiable.

123.* The continued occurrence of high water and flooding prove that technology cannot provide absolute protection from these phenomena. As the Council has previously

emphasized, more attention has to paid to retaining water by maintaining or restoring near-natural surface water systems, by removing impervious surfaces, by avoiding soil compaction and by improving rainwater infiltration. On the other hand, concentrations of industrial installations which can cause serious damage to surface waters in areas subject to floods should be avoided to the greatest extent possible.

Sewage Treatment

124.* The Council would like to point out that it will still require a great amount of effort to level out the differences between the western German *Länder* and the eastern German *Länder* with respect to urban sewage treatment. The proportion of sewage system connections, the proportion of sewage treated and the level of treatment provided by treatment facilities in the eastern German *Länder* are below standards. Germany is likely to be facing proceedings in the European Court because the European Commission considers Saxony and Saxony-Anhalt to be out of compliance with the Urban Waste Water Treatment Directive for 'sensitive areas', i.e., areas at risk of becoming eutrophic. The main priority in this context is the elimination of phosphorus and nitrogen from urban sewage. In order to improve the situation in the eastern German *Länder*, the experience of the western German *Länder* in sewage treatment matters should be drawn upon. In the latter *Länder*, step-by-step objectives based on certain time frames and population sizes have brought about the recognized progress achieved in the last thirty years.

Groundwater

125.* The Council presented its views on groundwater protection in detail in its special report entitled *Countrywide Groundwater Protection* (1998). A systematic data capture and assessment approach of the type used in the groundwater units concept presented in this report can be used to describe the current state of environmental systems, and to determine, for example, the composition of groundwater and assess the risks posed to groundwater composition by anthropogenic activities.

The Council would like to point once again that the countrywide protection of groundwater as a resource is only possible if pursued in unison with soil protection. For this reason, the Council would here like to repeat its calls for soil protection to be improved, since soil

protection is the most important contributing factor in achieving the quality objective 'groundwater should suffer as little anthropogenic impact as possible'.

On the Water Resources Framework Directive

126.* Agreement on the text of the draft of the Water Resources Framework Directive was reached only after a controversial and prolonged negotiation process in the European Council, and difficult negotiations in the European Parliament are still to come. Thus, the passing of the directive can be considered to be one of the successes of European water protection policy. The Council welcomes the fact that the directive embraces a strategic concept that combines emission reductions with water-quality-related requirements. However, the directive suffers from a number of deficits and provides an unacceptable number of loopholes which can be used circumvent the objective of sustainable water protection. In the opinion of the Council, it is imperative that the considerable uncertainties involved in defining 'considerably altered water body' or 'good ecological potential' need to be adequately addressed and the assessment and discretionary scope of member states as provided for by the exemptions specified in Article 4, paragraphs 3-6, need to be limited and tied to uniform, generally binding criteria which are valid throughout the EU. The vagueness of the exemptions in Article 4, paragraphs 3-6, of the draft allow member states to circumvent environmental objectives and implementation deadlines at will, which, from the point of view of water protection policy, is unacceptable. Thus the exemptions need to be made clearer.

However, it will be difficult to deal with the shortcomings of the directive through renegotiation in the course of the coming years because various issues will encounter considerable resistance on the part of individual member states. Nevertheless, the German government should not capitulate in the face of the these difficulties; rather, it should attempt to further expedite establishing the objective of sustainable water protection at the EU level. Eliminating the shortcomings of the directive is imperative because it will provide the basis for EU water protection policy for the next 20 to 30 years, and shortcomings in this basis would have serious effects on the state of water protection in the EU.

127.* Too avoid burdening water management agencies exclusively with implementing management plans provided for by Article 13 of the directive, the Council recommends not

using the criteria specified in sections 36 and 36b of the Federal Water Management Act when implementing the plans, but rather criteria based on what is absolutely necessary to protect and manage waters.

On Flood Protection

128.* The improved flood protection instruments provided for in the sixth amendment of the Federal Water Management Act seem, in the opinion of the Council, to be suitable, for the time being, for providing effective protection from flooding. The Council is of the opinion that the problems with flood protection lie elsewhere, namely in the fact that the *Länder* have not made good use of the scope given them by the new amendment. Thus, there are still implementational deficits, for example, with respect to establishing flood areas or safeguarding retention areas under regional planning laws in the *Länder* or the Federal Building Code. The Council recommends that the Federal Water Management Act not be amended anew until the process of implementation has shown whether the act can help to stop further river intervention projects, to help stop the destruction of retention areas and to help to bring about the restoration of retention areas. In view of the problems inherent in pursuing different flood prevention policies in the various *Länder*, efforts to establish a nationwide flood management policy should be stepped up.

Voluntary Agreements

129.* The Council still deems voluntary agreements concerning water protection (e.g., EDTA, APEO and textile chemicals) to be a viable means of reducing water pollution in the long term and thus welcomes current efforts to establish such agreements. It would like to point out, however, that measures for evaluating and monitoring these agreements are not adequate, since volume balances can only be determined using business year balances and sporadic spot checks suffer from numerous uncertainty problems. The Council thus recommends improving evaluation and monitoring measures in order to increase the credibility of system overall.

North Sea and Baltic Sea

130.* The situations and developmental tendencies in the marine ecosystems in the North Sea and Baltic Sea continue to be a cause of great concern, even though some progress has been made in these areas. In addition to the lack of funding and insufficient staffing of the responsible ministries and government agencies, a lack of political willingness to take action is often responsible for the failure of protection concepts.

In addition to *Länder* agencies, the following federal German ministries are responsible for marine environmental protection and marine nature conservation:

- the Ministry of Transport (together with the Federal Agency for Marine Transport and Hydrography)
- the Ministry of Agriculture (together with the Federal Fisheries Research Institute)
- the Ministry of the Environment (together with the Federal Nature Conservation Agency and the Federal Environmental Agency)
- the Ministry of Research.

The Council considers it necessary to improve coordination between responsible and cooperating departments at all levels if the efficiency of environmental protection and nature conservation measures is to be increased. To accomplish this, one particular ministry or upper-level federal agency should be made responsible for coordination tasks.

131.* Protecting biological diversity in marine ecosystems can only be accomplished through international cooperation based on protection concepts involving establishing sufficiently large preserves that are representative of particular marine environments. Anthropogenic point and non-point nutrient and pollution inputs via rivers and the atmosphere pose significant risks to the biological diversity in the North Sea and the Baltic Sea. The Council would like, with all urgency, to repeat its call to further reduce the input of nutrients into these seas. Further, measures to reduce anthropogenic pollution of marine ecosystems must continue to be based on the precautionary principle.

Large transborder or international preserves should be established in coastal waters as well as in the oceans. The establishment of such preserves, especially in the oceans, is a controversial issue. The Council would like to emphasize their importance, however, as rare or endangered habitats that function as refuge, regeneration and network habitats. In order for these preserves to fulfil their purpose, the various requirements of protected species as concerns habitat size will have to be taken into account. The Council would like to urge that all of the marine preserves planned for the North Sea and the Baltic, as well as other special areas that function as network or regeneration habitats, be established immediately, especially within the framework of implementing the Habitats Directive. In addition, those areas which serve to implement international agreements are of great importance.

Current beginning programmes for integrated management of coastal areas which take account of environmental, nature conservation and nature use concerns (e.g., protecting biological diversity, soil and groundwater protection, coastline protection, tourism and recreation, agriculture, urban and transport infrastructure development) need to be expanded and promoted. The success of planned nature conservation measures, in some cases measures that restrict use, depends crucially on acceptance of the measures amongst the population, and especially amongst those whose use of coastal areas is affected. It is thus imperative to involve the population in these measures by providing information and promoting communication between all groups in the population.

132.* The Council would like to repeat its call for a for a far-reaching amendment of the Federal Nature Conservation Act, especially as concerns effectively protecting marine ecosystems. In doing so, marine conservation must be given special consideration, especially as concerns adapting criteria for protected areas and, if necessary, creating new protected area categories.

133.* In order to maintain the biological diversity of marine ecosystems the Council would like to call for all proven non-sustainable uses of marine resources to be stopped, especially uses that run counter to current nature conservation measures. Concepts for using marine biological resources should be based on the principle of ecological sustainability. Fishing that is solely economically oriented can cause considerable damage to marine ecosystems, which, in the end, impacts negatively on fish harvests. Such damage is caused by overfishing resulting

from fishing quotas and fishing-method-related bycatch quotas that are too high. Further, such damage is caused by ecologically unsustainable fishing methods that disturb the sea bottom, thus destroying benthic fauna and flora (e.g., beam trawling). Practising ecologically sustainable fishing requires detailed biological knowledge about the species involved and their habitats. This requirement underlines the need to monitor marine ecosystems continuously. Based on the monitoring results, recommendations for ecologically sustainable fishing can be made and used for sustainable fishing management.

2.4.4 Climate Protection and Air Pollution Control

134.* Environmental problems having to do with the atmosphere are generally interrelated, and measures to resolve particular problems generally have effects on problems other than those primarily targeted. Nevertheless, environmental policy approaches to dealing with such problems continue to deal with them too singularly. Intramedia interactions, such as between the greenhouse effect and ozone holes, as well as intermedia interaction, such as groundwater pollution caused by secondary air pollutants transported from the air to soils to groundwater, are not taken sufficiently into account. The intermedia interactions, in particular, require that objectives take account of all media, not just air, but that measures be taken in the area of air pollution control. Initial attempts to do so have recently been made in European and German climate protection and air pollution control policies.

On Climate Protection Objectives

135.* Article 2 of the United Nations Framework Convention On Climate Change (1992) states the objective of climate protection is 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'.

The most important greenhouse gases (GHGs) released into the atmosphere by anthropogenic activities are carbon dioxide (CO_2), methane (CH_4), dinitrogen oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

The convention’s objective requires that anthropogenic global warming be limited, because of the limited natural capacity of ecosystems to adapt, to less than 1° C per century. Based on

this requirement, climate models can be used to derive maximum allowable concentrations of CHGs and the corresponding maximum allowable annual global emissions, whereby the latter indicate that global CO_2 emissions need to be reduced considerably.

The German government has established a climate protection action objective of reducing national CO_2 emissions to 25% below 1990 levels by the year 2005.

136.* The German climate protection objective is in line with relevant research findings. However, the relevant actors did not participate in establishing the objective, nor were reduction possibilities systematically ascertained, at least not until after the objective had been established. The objective was not legitimated by societal consensus until 1996/97, when the Federal Ministry of the Environment drew up its priority programme, i.e., not until six years after the cabinet decision to reduce GHG emissions. It is thus understandable that in Germany in the early 1990s a great deal of attention was given to the controversy over the usefulness of the objective and over the reduction level it specifies, and that thus ways and means of creating a framework from early on with which to change the behaviour of individuals and industry and thus to begin to bring about structural changes leading towards a reduction in CO_2 emissions were ignored.

Deficits in Implementing Climate Protection Objectives

137.* The current societal consensus about the climate protection objective does not, however, guarantee that it will be achieved. According to recent estimates, CO_2 emissions in Germany fell by 15.5% between 1990 and 1999. Most of the reduction was due to German reunification and had little to do with specific climate protection measures. Since the one-off effect of German reunification, only negligible reductions have been achieved.

With the exception of PFCs, German emissions of the CHGs pertinent to the Kyoto Protocol have either remained at previous levels or have increased greatly. Germany is thus not on the reduction path it needs to be on in order to achieve its reduction objective by 2005. If anything, the discrepancy between the emissions situation and the climate protection objective will continue to widen if additional efforts are not undertaken. Further, the cessation of atomic energy production in Germany will increasingly exacerbate the problem.

Since it is urgent that the high risk of anthropogenic climate changes be mitigated for precautionary reasons and since the German climate protection objective sets an example in the international climate negotiations, the Council welcomes the fact that the government is adhering to its 25% objective.

The basic reason for the slow progress in reducing emissions of GHGs is, in the opinion of the Council, that the reduction objective was not tied to a sound and comprehensive strategy with which to achieve the objective. That there was no strategy is borne out by the study *Politikszenarien für den Klimaschutz* (Climate Protection Policy Scenarios), which evaluated the measures taken by the government before it issued its first climate protection report. According to the study, only nine of 116 measures taken contributed in any substantial way to achieving the objective. The majority of the measures had little effect; one measure actually had a counterproductive effect.

Without measures that go further than the previous ones, the climate protection objective will not be attainable. The Council thus recommends that absolute priority be given to developing a climate protection strategy that will ensure a long-term reduction in GHGs above and beyond 2005. The danger that Germany may discredit the role it has played in the climate negotiations and that this could cause setbacks with regard to international climate protection is, in the opinion of the Council, only a danger if Germany does not develop such a strategy and fails miserably in achieving its own objective.

On the Objectives for Reducing Other Air Pollutants

138.* Because individual air pollutants contribute to various environmental problems in the atmosphere as well as in other media, it is imperative that an approach be used that incorporates all relevant environmental sectors in establishing objectives, and that coordinates the assessment of impacts and measures. EU air pollution control policy has begun using such an integrative approach, but the Council is nevertheless of the opinion that climate protection, in particular, is not sufficiently integrated into the establishment of objectives and the development of measures in other sectors, neither at the EU level nor at national levels, and thus the Council would like to call for further integration of climate protection and classic air pollution control.

139.* Priority objectives concerned with acidifying pollutants and ozone precursors have already been established in international agreements, which, because of the cross-border transport of pollutants, are more effective in combating environmental problems than national efforts are. Integrating economic and political considerations generally dilutes scientifically based requirements, but nevertheless ensures that the obligations to reduce emissions entered upon in the framework of international agreements are technically and economically reasonable. That this can cause agreements to fall short of what is feasible is demonstrated by the EU acidification strategy and the proposal of a directive on national maximum emission limits for particular air pollutants that is based on this strategy.

On the Integration of Climate Protection and Air Pollution Control

140.* The emission paths for some of the more important air pollutants show that there have been considerable reductions even though objectives for SO_2, NO_X and VOCs have not been achieved. A considerable proportion of these reductions have, however, been offset by continued increases in the volume of transit traffic. In view of the fact that there are deficits in achieving objectives and that the annual emission reduction rates are decreasing, the Council recommends that a new, extensive measures package be developed which would especially target transport (NO_X, VOCs), stationary energy conversion (SO_2) and the use of solvents (VOCs), which would be compatible with climate protection measures, and which would also bring about a reduction in GHG emissions.

141.* The most important emissions of air pollutants are caused primarily by using fossil fuels. Since traditional emission control technologies cannot be used to reduce CO_2 emissions caused by using fossil fuels and since we have attained a level of general technological development which makes setting stricter limit values or requiring further emission reductions extremely expensive, a combined climate protection and air pollution control strategy should consist of the following four elements, listed in order of priority:

- Reducing the use of fuels without impairing economic productivity. This can be achieved, inter alia, by implementing measures to save energy, use energy rationally, reduce traffic volumes and inform the public at large as concerns the measures. These measure should

also be applied to renewable energies, since the construction of renewable energy conversion facilities and the delivery of the converted energy also cause emissions.

- Reducing the generation of pollutants during energy conversion. In order to accomplish this, it will be necessary, while compromising the quality of energy provision services as little as possible, to increase the efficiency of energy conversion, to substitute low-carbon and low-sulphur fuels for high-carbon and high-sulphur fuels, and to substitute low-emission processes for high-emission processes. Further, new technologies that are more efficient and that use thermodynamic principles to further reduce the generation of nitrogen oxides in the combustion chambers in power plants and engines have to be developed and used.

- Promoting renewable energies, technologies that use energy rationally and save energy, and technologies that allow integrated prevention and control of pollution, and doing so in accordance with their potential to contribute to pollutant prevention and energy provision, with their developmental maturity and with the pollutant prevention costs they incur. The responsibility for introducing new, ready-to-use technologies must lie with the developer.

- Further developing existing end-of-pipe pollution control technologies (which the Council deems to have the lowest priority of the combined strategy elements listed here). Measures that require retrofitting of old industrial installations and of old cars could have a considerable effect.

Linking the Combined Strategy to Other Policy Areas

142.* Climate protection is the main component of sustainability policy. A combined climate protection and air pollution control strategy must thus ensure economic and social sustainability as well as ecological sustainability. This can only be accomplished by integrating the combined climate protection and air pollution control strategy into such other policy areas as industry, labour, transport and housing. Existing transport structures in Germany are not only responsible for a large proportion of the emissions of air pollutants, they use land and cause noise and other health hazards, which burdens both the environment and society additionally. Thus, integrating climate protection into transport policy could potentially increase efficiency considerably. Short-term measures should be used to increase the

competitiveness of traffic and transport systems that cause the least environmental stress. Medium and long-term measures should be used to restructure Germany's transport structures and implement new urbanism concepts in German cities and towns. As regards allocating the external costs of transport infrastructure and environmental damage, which is a basic precondition for these measures, the Council refers the reader to its *1996 Environmental Report*.

Economic Aspects of Implementing Effective Climate Protection Policy Measures

143.* An economic assessment of climate protection measures must differentiate between micro- and macroeconomic costs. Climate policy decision-makers, who make the decisions concerning the comprehensiveness and scheduling of climate protection measures, take a basically macroeconomic perspective when assessing policy options. As regards costs, the interesting question is, to what extent are climate policy objectives compatible with other macroeconomic objectives such as increasing employment or the gross national product? The great range of macroeconomic effects of climate policy ascertained in studies pertaining to this question reflects the fact that there is considerable variation in the way climate policy measures are embedded macroeconomically in the models used. For example, the effect of a CO_2 tax on employment depends largely on the assumptions made with respect to the reactions of unions and management in a particular model. Thus, the macroeconomic effects of climate policy are not the result of the policy per se, but rather of the economic policy framework in which individual measures are embedded.

None of the macroeconomic studies take account of the external costs avoided by pursuing a climate policy. Since, however, the primary benefit of climate policy lies in the avoided external costs, which have to be weighed against the costs, this aspect should at least be taken into account qualitatively. The difficulties in doing so lie in scientific uncertainties about which discounting method to use and how to assess ecosystems or even death in terms of money. The range of the estimated external costs, which is from DM30 to DM1,000 per tonne of CO_2 emitted, is an expression of these difficulties.

In addition to reducing GHGs, CO_2-specific measures further lessen the environmental damage caused by other air pollutants. The concomitant reduction in external costs should thus be added to the external costs avoided by implementing climate policy measures.

144.* However, climate policy measures can be macroeconomically viable without being microeconomically viable. The reason for this is that measures can fail to pass on higher energy or emission prices to every consecutive polluter in a chain of polluters. To nevertheless assist the implementation of macroeconomically viable measures, complementary pricing instruments will have to be used.

145.* Further, there are numerous emission reduction options whose concomitant investment costs would be amortized within a relatively short time and would thus have micro- and macroeconomic benefits. Various estimates of the so-called no-regret potential indicate that about 20% of German CO_2 emissions could be avoided using such measures. The Council thus calls for a priority policy of realizing the no-regret potential. Emissions pricing could contribute considerably to implementing such a policy.

On the Individual Measures

German Industry's Voluntary Climate Protection Agreement

146.* Specific CO_2 emissions have been reduced considerably in some branches of German industry since 1990. Whether this has been due to climate protection measures is, however, questionable. In 1997, there was a considerable increase in absolute emissions that was caused by an economic upturn and poor weather. The effectiveness of the voluntary climate protection efforts taken by German industry as a result of the voluntary agreement it entered upon in 1995/96 is controversial. The monitoring findings of the Rheinisch-Westfälisches Institut für Wirtschaftsforschung indicate that the voluntary agreement in its present form does not contribute appreciably to protecting the climate.

The Council maintains that only the reduction of actual emissions is important with respect to protecting the climate and recommends that, when further developing the agreement, only the absolute emissions of the participating branches of industry be used as the basis and target parameters. For the same reason, data should not be cleaned up either. Instead, basis and

target parameters should be related to a period of time of several years rather than to a point in time. Averaging the data would level out seasonal and short-term business cycle fluctuations and involve fewer uncertainties than transforming the data. The requirement that emission reductions should be the result of rigorous effort should be replaced by a gradual tightening of target levels. On the whole, these proposals could weaken the agreement, but the fact that it would be more specific and more effective would compensate for this.

The Council is of the opinion that, should future monitoring reports not be able to demonstrate the agreement is effective in reducing emissions, it should by replaced by reinstating the Heat Utilization Regulation.

The Energy Conservation Regulation

147.* The Energy Conservation Regulation, as a consolidation of the Third Thermal Insulation Regulation and the Heating Systems Regulation, is intended to reduce energy use primarily in new buildings. The Council welcomes the central idea in the draft of the regulation, but recommends that several changes be made before the regulation is passed. The maximum levels for primary energy use, heating energy use and heat use should be based on building space rather than on the ratio of building surface area to building space, as this would favour less stringent requirements and sectionalized building design. The simplified procedure for small residential buildings should not be included in the final version of the draft, since it runs counter to the comprehensive nature of the draft, limits design scope, does not bring about any simplification of construction planning and could push prices up. The preference given to electrical heating in various parts of the draft makes no sense from a primary energy and ecological point of view and should thus not be included in the final version of the draft either. Further, it will be necessary to implement the Energy Conservation Regulation more efficiently than was the case with the Third Thermal Insulation Regulation.

The Council would like to point out that the greater potential to save energy is not in the easy-to-regulate new buildings sector but rather in the difficult-to-regulate existing buildings sector. Proof of energy needs and general heating cost levels could be used as instruments in this sector, together with promotion and information measures, to contribute considerably to reducing emissions.

The 100,000 Roofs Programme

148.* The 100,000 roofs programme is intended to promote installation of photovoltaic systems that provide a certain maximum installed output. Given the contribution that photovoltaic systems can make to supplying energy in Germany in the foreseeable future and given the cost of using such systems to reduce CO_2 generation, promoting such systems cannot contribute appreciably to protecting the climate. At best, promoting photovoltaic systems could create jobs. Further, there is a danger that promoting photovoltaic systems could adversely affect the ability of other technologies which currently provide a greater CO_2 reduction potential at lower prices to compete in the marketplace. On the other hand, photovoltaic systems could be used effectively and economically in areas with greater amounts of solar radiation (near the equator) or on islands. The Council recommends that the promotion and use of such photovoltaic systems be made dependent on the potential of such systems to contribute to supplying energy and on cost of using such systems to reduce CO_2 generation, and that their use be coordinated within a sustainability strategy.

Controlling Summer Smog

149.* In view of the fact that peak ozone levels decreased during the 1990s and in view of recent research, the Council considers amending the Ozone Law inappropriate as it would for the most part have no effect. Instead, nitrogen oxide and hydrocarbon emissions need to be permanently reduced, and this needs to be done in Europe as well as elsewhere.

The Council is of the opinion that long-term measures to reduce traffic volumes and to re-route traffic are urgently needed to reduce nitrogen oxide emissions. These measures should be augmented by requiring emission control systems on diesel vehicles and the retrofitting of old vehicles with such systems. Conserving and using energy rationally by increasing engine efficiency would also contribute to reducing emissions. However, in view of the reductions already attained and the costs involved, the Council is not of the opinion that the requirements specified in the 13th Federal Air Pollution Control and Noise Abatement Regulation currently need to be made more stringent.

150.* As concerns hydrocarbon emissions, emissions stemming from the production of solvents and their use in industry and households need to be drastically reduced. In doing so,

special attention should be given to solvents with a high potential to form ozone. Further, hydrocarbon emissions from two-wheeled vehicle engines need to be limited.

Hazardous Substances Accident Regulation

151.* In April 1998, the Hazardous Substances Accident Regulation was amended such that it now provides for equal treatment of people within and without industrial installations. Additional changes will have to made as a result of the Seveso II Directive, which refers only to the presence of particular hazardous substances in particular quantities in 'establishments', whereas the Hazardous Substances Accident Regulation refers to particular types of industrial installations. Thus the regulation will have to be extended to include installations not subject to licensing requirements, as well as ancillary and infrastructure facilities. This will provide for a holistic approach which is per se useful. However, while including whole installation sites rather than just installations, the Seveso II Directive also increased qualifying quantities of hazardous substances, whereby individual hazardous substances were often not explicitly named but merely implicitly included in categories of dangerous substances. The directive thus weakens hazardous substances accident prevention policy.

Three *Länder* drafted a bill which proposed implementing the Seveso II Directive on a one-to-one basis, whereby the current regulation would be repealed, whereas the government, in its own bill, favoured keeping the current regulation and augmenting it with those requirements in the Seveso II Directive which are more stringent. It is estimated that, were the Seveso II Directive to be implemented on a one-to-one basis, more than half of the 8,000 accident-relevant installations would no longer be subject to any kind of hazardous substances accident prevention regulation.

The Bundesrat passed the government's bill, but only after making far-reaching changes, so that it now closely resembles the bill drafted by the *Länder*. The catalogue of hazardous substances in the bill was shortened by about 90%. Further, the installation-related provisions were almost completely deleted, the consequence being that small industrial sites on which only one installation is operated, as well as large sites on which various installations belonging to various operators are operated, will no longer be subject to hazardous substances accident prevention regulation. In the opinion of the Council, this will lower the level of protection

against hazardous substances accidents considerably. Even though all the implications of the new legislation are not yet clear, the Council maintains that a sophisticated regulation that does not fall short of the previous one is needed. Further, the Council recommends that the three administrative regulations pertaining to hazardous substances accidents be merged and extended so that the regulation can be implemented better and uniformly.

The Non-Road Mobile Machinery Directive

152.* In addition to existing regulations pertaining to internal combustion engines in motor vehicles, the Non-Road Mobile Machinery Directive contains provisions pertaining to emissions from internal combustion engines installed in non-road mobile machinery. It delineates a detailed engine-type approval procedure and specifies limit values for emissions from diesel engines which will reduce particulate emissions by about 67%. The Council supports this extensive approach to establishing emission ceilings, but considers it necessary to also address petrol engines and tractor engines.

The 21st Federal Air Pollution Control and Noise Abatement Regulation: Reducing Petrol Refuelling Emissions at Petrol Stations

153.* The 21st Federal Air Pollution Control and Noise Abatement Regulation prescribes retrofitting of petrol pumps with vapour recovery systems in order to reduce emissions (hydrocarbons and benzene) resulting from refuelling vehicles. Currently such systems suffer from frequent malfunctions or fail to function at all, whereby the failure goes unnoticed. With reference to the 51st European Conference of Environmental Ministers, the Council recommends that all petrol stations required to have vapour recovery systems be equipped with equipment that runs quick tests on these systems at regular intervals, and that they be equipped, within a specified period, with automatic monitoring systems. This could be accomplished within the framework of voluntary agreements entered upon by oil companies.

On Implementing EU Air Pollution Control Policy and the Future of the German Technical Directive on Clean Air

154.* The German Technical Directive on Clean Air (1st Federal Air Pollution Control and Noise Abatement Administrative Regulation) contains air pollution control provisions

pertaining to the permitting of installations. The last time it was revised was in 1986. Thus, it no longer reflects current technological knowledge nor the technological state of the art. It has also been partly obsoleted by EU air pollution control directives issued in the interim. In addition, a number of regulations have been passed to transpose EU regulations and these regulations cannot be integrated into the Technical Directive on Clean Air for legal reasons. Further, the number of such regulations will continue to increase.

The Council thus recommends combining revision of the Technical Directive on Clean Air with transposing EU directives to produce a statutory instrument in which all administrative regulations are combined and then coordinating time frames and other elements with the proposed subsidiary directives of the Ambient Air Quality Framework Directive.

Ambient quality standards should, in addition to being used to protect human health and prevent nuisances, also be used to protect ecosystems. To accomplish this, the ambient quality standards in the EU air pollution control directives will have to be implemented, new toxicological and ecotoxicological knowledge pertaining to the substances specified in the Technical Directive on Clean Air will have to be integrated into the directive, and substances that have not yet been regulated will have to be assessed to ascertain whether they should be subject to ambient quality and emission standards. Using the procedure specified in the Technical Directive on Clean Air for determining the size of dispersion areas and for estimating the amount of additional pollution caused by a particular installation leads to underestimation of both. The Council thus recommends that permitting procedures be based on pollution dispersal. In doing so, special account should be taken of areas in which pollution can have particularly serious impacts because humans spend a great deal of time in these areas or because especially sensitive ecosystems are located in these areas.

Fuel Quality

155.* Directive 98/70/EC provides for the introduction of new fuel quality standards, to be introduced in two stages, the latter of which begins in 2005. It specifies new maximum content levels for sulphur, benzene and aromatics, and is thus an important step in the right direction. A comparison of the new fuel specifications with fuel specifications in California, Japan and

parts of Scandinavia shows, however, that the sulphur and aromatics content of fuels could have been reduced even more. As a result, petrol-saving engines will not be marketable until 2005, when the sulphur content of fuels is to be reduced to 50ppm. Establishing the maximum content level for aromatics at 35% tapped the important potential for reducing benzene, which is carcinogenic, only partially. Against the background of the proposal for a directive on benzene and carbon monoxide in the air, a more stringent level would have been desirable.

The Council welcomes the decision to provide tax subsides to promote low-sulphur and sulphur-free fuels, but would like to point out these will not be provided until fairly late. Reducing the content of aromatics should be given greater attention at both national and EU levels. Further, the sulphur content of fuels used on ships and barges should also be reduced.

Limit Values for Motor Vehicle Emissions

156.* Directive 98/69/EC provides for the introduction of successively more stringent limit values for motor vehicle emissions until 2008. The number of motor vehicles that already complied with the more stringent Euro 3 or Euro 4 standard when the Euro 2 standard entered into force indicates that the limit values could have been more stringent overall. Further, the hydrocarbon and nitrogen oxide limit values are still lower for diesel vehicles than for petrol vehicles. Even the limit values to be introduced in 2005 will not necessitate fitting all diesel vehicles with pollution control systems. The Council deems this to be giving diesel vehicles unjustifiable preferential treatment and calls for further steps to be taken in developing EU limit values for motor vehicle emissions.

Diesel Particulate Emissions

157.* New research has shown that the carcinogenic potential of diesel engine emissions is still far greater than the carcinogenic potential of petrol engine emissions. A considerable reduction in diesel particulate emissions could be achieved by using high-performance particle filters that can remove particles of all sizes. Nevertheless, the Euro 4 standard merely limits PM10 particles, which, moreover, could be achieved in many cases without using filters. The Council supports legally requiring high-performance particle filters as standard on all diesel vehicles. In keeping with this, EU limit values for diesel particulate emissions, inter alia, should be further developed. In the meantime, granting tax subsidies to the owners of diesel vehicles equipped with particle filters should be taken into consideration and the European Commission should be urged to authorize the granting of such subsidies.

Fuel Consumption

158.* In view of the proportion of national CO_2 emissions caused by motor vehicles, it is particularly important to reduce motor vehicle fuel consumption. Against this background, the European Association of Automobile Manufacturers has agreed to reduce the average CO_2 emissions on new motor vehicles to 140 g/km by 2008. Apart from the shortcomings of voluntary agreements with respect to determining fuel consumption values, the reductions in consumption achieved so far cast doubt on whether consumption objectives can be achieved, even though the technological potential for reducing consumption far exceeds the reductions specified in the voluntary agreement. The Council considers it necessary to complement this agreement at the national level by drastically reducing traffic volumes and by specifically including CO_2 emissions in the emission-based motor vehicle tax system.

2.4.5 Waste Management

On the General Situation as regards Waste Management Policy and on Its Objectives

159.* If one compares the general situation as regards to waste management policy now with the situation in the late 1980s, one can see that certain progress has been made in reducing waste volumes and in reducing the strain they put on the environment. The gap between the

objectives set and the objectives achieved has not widened; in certain areas, it has been narrowed or even closed. The considerable deficits as regards the number of waste treatment facilities for domestic wastes and for wastes requiring special surveillance have been eliminated for the most part. The current waste treatment facilities use state-of-the-art technology and are operated and maintained such that they pose virtually no serious threat to the environment. These improvements have helped to lessen the general public's fears with respect to the building and operating of new waste treatment and waste disposal facilities and have put debates over such facilities back on a more objective footing.

160.* This does not mean, however, that the waste management policy of the 1990s ushered in a completely new era in waste management. The numerous new regulations of the 1990s made an important contribution to resolving waste management problems. However, since the Technical Directive on Domestic Waste still has not been implemented due to a transitional period for implementation ending in 2005 (i.e., residual waste incineration or treatment of waste in mechanical-biological facilities followed by thermal recycling of the residual waste has not yet been assured), there are serious gaps in the environmental policy framework for waste management. Further, it has not been possible to gain optimal control of wastes using purely regulatory instruments to make waste generators pay for using the environment. Thus, the Council has put forward a proposal for a more market-oriented waste management policy which would provide greater scope for market and competitive processes. In the long term, this would allow an environmentally and economically appropriate balance between waste avoidance and waste disposal to come about.

On the Situation as regards Waste Disposal

161.* From the situation description of waste recycling and waste disposal, one can infer that waste volumes, with the exception of construction wastes, have no longer been increasing, but rather decreasing. This alone, however, should not be allowed to obscure the fact that the volumes that are produced still engender pollution and structural intervention. One very basic problem is that government waste statistics only provide provisional data up to 1996.

The situation as regards waste disposal is primarily characterized by the fact that waste recycling has gained considerably in significance. This change can be considered to be a

change for the better, as it would seem to be logical to assume that waste recycling is environmentally friendlier than waste disposal. However, only a thorough assessment of all the environmental benefits and risks engendered by the recycling processes actually used, the materials they are used to recycle, and the residual wastes and discharges they produce can provide the information with which to judge whether the recycling course that has been adopted is environmentally friendlier in the long term than controlled disposal. The Council is concerned that too little is known about the long-term effects that recycling may have on the environment and health and recommends that our knowledge about these effects be improved and that suitable precautionary measures then be taken. Volumes of disposed waste have been becoming smaller (in proportion to the volumes being recycled), but considerable volumes of untreated domestic and industrial wastes are still being disposed of in landfills. This type of disposal poses considerable risks to humans and the environment and should thus be ceased as soon as possible.

On Particular Measures

162.* The Council is of the opinion that there is considerable need to reform the Packaging Ordinance and the current system of recycling used packaging. Especially the cost-benefit ratio of recycling plastic packaging needs to be improved. The focus of a reform should be to limit the separate collection and recycling of plastic packaging to large, fairly clean and largely unmixed hollow packaging (especially bottles) and film. Small plastic packaging, on the other hand, should always be collected by municipalities as residual waste and be recycled as energy in waste incineration plants (energy recovery).

However, a quick and comprehensive reform of the Dual System would, from an environmental point of view, only be possible if the Technical Directive on Domestic Waste were implemented on a countrywide basis. Since implementation of the directive is not expected until 2005, the Council recommends gradually switching over to a more cost-effective system.

With this system, small and mixed plastics packaging could only be collected together with residual wastes if municipal (district) waste disposal services had sufficient capacity to recycle such packaging as energy in modern waste incineration plants or if they had contracts with

incineration plants operators who have such capacity. Further, municipal waste disposal services would have to submit annual documentation on the residual waste they recycled as energy. In these cases, the collection of lightweight packaging by the Dual System could be limited to large plastic packaging and tinplate and aluminium packaging. To avoid having to subsidize the recycling/disposal of difficult-to-recycle plastic packaging, Duales System Deutschland AG would continue to charge licence fees. Further, it would reimburse municipalities for the extra costs they incurred by having to dispose of plastic packaging, whereby reimbursement payments would have to correspond exactly to the extra costs incurred by municipalities and would not be allowed to exceed the residual waste fees they collect. Because of the cost-savings that could be achieved using this system, the licence fees for the 'Green Dot' could be lowered accordingly.

To implement this system, the Council recommends revising the Packaging Ordinance. The focus of the revision should be to reduce the non-thermal recycling quotas for plastic packaging and to recognize thermal recycling in modern waste incineration plants. On the other hand, the requirement to implement alternative take-back and recycling systems on a countrywide basis should be lifted. Further, complete implementation of the Technical Directive on Domestic Waste, or charging disposal fees, is a central precondition for improving the cost-benefit ratio of recycling plastic packaging. The revised Packaging Ordinance should enter into force before 2002 because between 2002 and 2004 the long-term disposal contracts between Duales System Deutschland AG and private and public disposal services will run out.

163.* After considering the two-way quota stipulated in the Packaging Ordinance, the Council has come to the conclusion that the general assumption that two-way beverage containers are environmentally friendlier than one-way containers, the assumption upon which the minimum quota of 72% stipulated in the Packaging Ordinance is based, is not always a correct assumption. Rather, one can assume that lifting the quotas for certain beverages would have no ecologically significant effect. This is particularly the case as concerns non-carbonated beverages (e.g., fruit juices, wine) which could be sold in composite cartons rather than in two-way glass bottles. Generally, one can also assume that traditional market forces would preserve two-way systems if quotas were lifted. On the other hand, whether introducing a beverage container deposit would promote the use of two-way containers is

questionable. Given the difficulties in designing a quota system in which two-way containers are used for purposes for which they are the ecologically superior type of container, the Council recommends that instruments with which to enforce minimum quotas for two-way beverage containers not be used. The Packaging Ordinance should be revised accordingly and instead of using two-way quotas for all beverage containers, only mere targets for carbonated beverage containers should be used, whereby the targets should be based on the current quotas for carbonated beverages. The government should reserve the right to intervene if the proportion of such containers sold falls significantly short of the particular target (i.e., is 10% to 20% below the target). In this case, the government could levy a tax on one-way carbonated beverage containers. The difference in system cost between two-way and one-way containers is such that promoting the use of two-way containers by levying a tax on carbonated beverage containers would be economically reasonable.

164.* The implementation of both the voluntary agreement on end-of-life motor vehicle take-back and recycling and the End-Of-Life Motor Vehicle Take-Back and Recycling Regulation is faced with numerous problems. This is especially the case as concerns environmentally friendly dismantling of end-of-life vehicles (ELVs), fluid recovery from ELVs, ELV abandonment and effective reporting on objective attainment. The regulation also provides few additional incentives for manufacturers to design cars so that they are easier to recycle. On the other hand, it does attempt to provide incentives to recycle vehicle shredder residue in an environmentally friendly manner. In this area of ELV management, implementation problems which are difficult to resolve using regulatory instruments can at least be temporarily sidestepped by shifting the responsibility for disposal. In view of the recycling quotas specified in the relevant EU directive proposal, it would also seem advisable to start looking for ways and means of recycling as soon as possible.

Data published recently by the Federal Statistical Office (FSO) indicate, however, that the number of cars shredded in Germany has declined rapidly since the early 1990s. Barely one-sixth of the 3.14 million motor vehicles taken out of service in 1996 have been shredded. Although certainly not all the vehicles taken out of service in Germany are ELVs and although there are no reliable data on what has happened to these vehicles, the FSO's data indicate that there are considerable loopholes in the voluntary regulatory system and in the flanking End-of-Life Motor Vehicle Tack-Back and Recycling Regulation. The reason for this is that

the last owner of a vehicle can merely state where the vehicle is rather than having to supply proof of recycling, as required by the regulation. To be able to implement the voluntary agreement, we need to know what happens to vehicles that are taken out service. The Council sees considerable need to take action in this regard. Further, when the regulation is revised (which it is to be), the requirements as concerns supplying proof of what has happened to vehicles taken out of service need to made more stringent so that actual ways and means of disposing of ELVs can be better monitored.

165.* It has been somewhat more than a year since the Battery Regulation entered into force, and although the regulation stipulates a take-back obligation, expectations concerning better collection of batteries and the occurrence of fewer batteries in domestic waste have yet to be met. The Council favours using a deposit scheme for noxious batteries only, rather than a take-back scheme for all batteries, and is of the opinion that less noxious batteries can be disposed of as residual waste if the residual waste is incinerated before being disposed of.

166.* The Council is of the opinion that the Biowaste Regulation needs to be revised in order to close regulatory loopholes and to protect all soils effectively. In revising the regulation, the dissimilar requirements regarding documentation of heavy metal content will have to be lifted. The Council decries the fact that the use of biowaste composts in house and hobby gardens, in agriculture, and in recultivation has not been regulated and calls for this to be taken account of if and when the regulation is revised.

167.* The Council stands by its previous call for environmentally friendly recycling and *disposal* of all *scrap electrical and electronic components* containing noxious substances. It thus welcomes the current draft proposing comprehensive regulation pertaining to the environmentally friendly recycling and disposal of scrap electronic components. In particular, the provision in the draft that would make electrical and electronic appliance and device manufacturers pay for the costs of component disposal could bring about environmentally friendlier disposal of components and could provide manufacturers with incentives to use less noxious, reusable or recyclable materials and to make electrical and electronic appliances and devices that live longer. In view of the fact that the executive has been working on the draft for almost a decade and that, since the early 1990s, extensive investments have been made in

providing facilities to recycle scrap electronic components, the draft should be adopted as soon as possible.

168.* The Council saw no reason in its 1998 Environmental Report to propose that the requirements of the Technical Directive on Domestic Waste with regard to the organic incineration residue parameter (the 'ignition loss' parameter) be revised, since better parameters are not available. Given new knowledge, the Council deems that deviating from the criteria for determining the suitability of residues for landfilling cannot be justified. The Council thus stands by its call for the present version of the Technical Directive on Domestic Waste to be implemented within the prescribed period of time. Any deviation from this version is neither ecologically nor economically justified. Because of the ongoing debate about the directive, the Council recommends that a further empowerment provision be added to the Product Recycling and Waste Management Act and then, based on this provision, that a statutory instrument be adopted which regulates the disposal of domestic wastes. The Council recommends further that a special disposal charge be introduced in order to implement the Domestic Waste Technical Directive rigorously. In order to do so, however, waste recycling requirements finally need to be clearly specified. The Council thus supports efforts to bring this about, as this would help to ensure effective implementation of the directive by stopping seeming recycling of wastes. It could also defuse the ongoing controversy, as concerns non-domestic wastes, over the distinction between wastes that are to be recycled and those that are to be disposed of. The Council is sceptical of efforts to define this distinction using the Technical Directive on Recycling. Further, technical directives have, as the Technical Directive on Domestic Waste has demonstrated, not always proved themselves because of their limited legal bindingness. The Council thus favours transforming the directive into a statutory instrument.

169.* Trends indicate that grate firing has become the dominant method of *thermal waste recycling and disposal*. The introduction of a minimum incineration temperature requirement for this method is a positive development. The requirement in the Technical Directive on Domestic Waste regarding organic content in wastes can easily be met using incineration. On the other hand, the inorganic pollutants contained in the residues and the extent to which these pollutants are transferred to the environment are cause to give the long-term behaviour of residues greater attention.

Of the alternatives to grate firing, the Thermo-Select process has reached a state of development high enough for one incineration plant to be given approval to use the process for regular operations. Other alternatives which do not produce residues with organic content, but rather recyclable substances, have, however, encountered marketing and legal problems.

Co-firing of wastes in power plants and industrial installations does not generally, in the opinion of the Council, give preferential treatment to co-fired wastes as regards emissions. Actual emissions are also no reason for concern. Nevertheless, there is, in the opinion of Council, an imbalance between the technological state of the art prescribed for co-firing and the technological state of the art prescribed for incineration. Power plants, cement works, steel mills and other installations requiring a permit should also be made subject to the requirements of the 17th Federal Air Pollution Control and Noise Abatement Regulation.

In principle, mechanical-biological waste treatment facilities should, as regards their diffuse emissions, also have to comply with the emission ceilings specified in the 17th Federal Air Pollution Control and Noise Abatement Regulation. Thus, such facilities should be encapsulated (i.e., housed) and their emissions should be drawn off and treated. Further, in view of recent research, the Council stands by its criteria for the final deposition of residual waste. The ecological standards of the Technical Directive on Domestic Waste should not be made less stringent.

2.4.6 Hazardous Substances and Health Risks

170.* The Council has dealt with various important health risks in its special report entitled *Umwelt und Gesundheit* (The Environment and Health). In addition to the topics dealt with there, the Council deals in this report with other hazardous substances and health risks, such as persistent organic pollutants, volatile organic compounds, fine and ultra-fine particles, synthetic mineral fibres, indoor radon emissions and passive smoking.

171.* The main quality objective of chemicals policy is to protect life, human health and the environment against dangers and risks posed by the use of hazardous substances. Apart from environmental objectives that pertain to pollutant input into particular media and which are pursued in the context of these media, the specific environmental quality objective is still the same as stated in 1986 in the *Leitlinien Umweltvorsorge* (Environmental Precaution

Guidelines), namely that inputs of anthropogenic substances are to be gradually and drastically reduced while taking account of their risk potential and the principle of proportionality. With respect to hazardous substances, environmental legislation, however, uses quite different prevention and precautionary concepts ranging from safety margins to threshold levels, to technologically based emission reduction or minimization or even avoidance, to detection limits.

Selected Hazardous Substances: The Situation and Objectives

Persistent Organic Pollutants

172.* Persistent organic pollutants (POPs) are among Germany's and the world's most common environmental pollutants. They are practically without exception of anthropogenic origin. Due to their physico-chemical properties, they degrade only very slowly, if at all, in the various environmental compartments and thus accumulate in the food chain.

As a result of the often very restrictive regulations that have been in effect in Germany for years, the problems POPs pose have been recognized and POP inputs in Germany have been greatly reduced, although contaminated sites and products still contain POPs and although some uses of POPs are still permitted.

At the national level, reliable level monitoring systems that monitor the various environmental compartments, foodstuffs and humans (biomonitoring) need to be secured, optimally on a nationwide basis, since POPs can persist in the environment for years or decades and peak concentrations are reached over and over again in particular localities or species (e.g., fish). Such a monitoring system is particularly important in reducing exposure of the population to POPs, especially to those in contaminated products (foodstuffs, technological products, etc.).

173.* The continued use of POPs in foreign countries and the pollution that their use engenders are still a large problem. In particular, polyhalogenated dibenzodioxins and dibenzofurans, which are often particle borne (e.g., as with flue dust), and the POPs in pesticides, which are deliberately released into the environment, are transported to other countries to an appreciable extent, inter alia, by the air. POPs such as these can thus be

transported to regions in which they have neither been produced nor used. The continuing increase in background concentrations of POPs is thus a worldwide problem.

174.* In addition, in areas affected by malaria in developing countries, DDT is often deemed to be the only effective mosquito pesticide and/or alternative mosquito pesticides are not accessible due to lack of funds. The international activities initiated in the framework of UNEP, activities aimed at establishing binding agreements to ban certain POPs and at promoting information exchange and knowledge transfer, must thus be supported.

Volatile Organic Compounds

175.* Volatile organic compounds (VOCs) are compounds that, because of their number and abundance, are of considerable potential environmental relevance.

Comprehensive objectives pertaining to VOC concentrations have been established only to a very limited degree. As concerns the air in homes and flats, objectives have been established that relate primarily to product or material categories (e.g., construction products). As concerns the air in indoor workplaces the MAK (workplace concentration), BAT (biological limit) or TRK (technical reference concentration) limit values have been established. Objectives pertaining to VOCs in outdoor air relate, on the one hand, to total VOC emissions in Germany, and on the other hand, as embodied in the EU VOC Directive, to installations.

176.* Although numerous studies of the problems posed by VOCs have been conducted, there is still a need for further research, especially with respect to the occurrence, behaviour and continuous exposure effects of VOCs and VOC mixtures in areas with low concentrations. The effects of exposure to VOCs and VOC mixtures are not adequately known and thus future research should be directed at determining the effects of these particle-borne compounds. Further, a special problem as concerns outdoor air and indoor air in homes and flats is that it difficult to interpret the studies conducted because of their limited comparability; for example, the term ‘VOC’ is often used to designate only parts of the full spectrum of organic compounds. Finally, the procedures for measuring and analysing VOC concentrations are poorly standardized and validated.

177.* For a number of years, petrol which contains large amounts of oxygen compounds has been sold in the United States and the EU. The main compounds among these compounds are methyl tertiary butyl ether (MBTE), tertiary amyl methyl ether (TAME) and ethanol, which constitute up to 15% of petrol by volume.

Studies of the effects of MBTE on human health are inconclusive and thus further studies need to be conducted. Further, it would seem useful to include other, similar substances that are either currently used as petrol additives or are to be in the near future in order to prevent undesirable developments.

Fine and Ultrafine Particles

178.* Airborne particulate matter can lead to acute and chronic health problems when inhaled. Numerous epidemiological studies have found that high concentrations of fine or ultrafine particles in outdoor air increase the risk of respiratory and cardiac and circulatory illnesses and generally cause increased mortality. Experiments conducted on animals have indicated that not only mineral fibres and quartz dust, but also particles originally considered to be inert, such as carbon particles (pure soot), can cause cancer.

The particles currently of interest are particles with a diameter of less than 0.1 µm, i.e., the so-called ultrafine particles (UFPs), and there is evidence that UFPs have an especially high acute toxicity. Further, UFPs can function as a vehicle for toxic substance transport; such substances which have adsorbed to UFPs can be transported deep into the lungs.

UFPs are produced in particular by combustion and are thus mainly of anthropogenic origin. Motor vehicle exhausts, and especially sooty diesel exhausts, are a significant source of UFPs in outdoor air. According to current measurements, there has been an increase in UFPs in the ambient air in recent years although particulate emissions have decreased. UFPs are also contained in aerosols, but, since they constitute only a small proportion thereof, they are practically ignored in assessments of particulate air pollution.

Synthetic Mineral Fibres

179.* The generic term ‘synthetic mineral fibres’ is used to refer to all inorganic synthetic fibres, such as mineral wool fibres, textile glass fibres and polycrystalline fibres. Health-

relevant fibres are inhalable fibres that are greater than 5 µm in length and smaller than 3µm in diameter and have a length-diameter ratio of greater than three ('WHO fibres'). Synthetic mineral fibres with particular geometric characteristics are thought to be a lung cancer risk factor. In order to protect health, exposure to such fibres must be minimized or other materials must be substituted.

The fibres to which the general population are most likely to be exposed are mineral wool (without ceramic fibres), since mineral wool is used extensively as insulation in houses and buildings. However, when insulation is properly installed, unsafe concentrations of fibres of critical size and shape do not occur in living areas after installation has been completed. There is thus no need to remove such insulation. Measures for handling and disposing of fibres suspected of causing cancer are specified in the Hazardous Substances Regulation and the Technical Guidelines for Hazardous Substances No. 521.

Indoor Radon

180.* The inhalation of radon in indoor air is responsible for about half of the German population's natural exposure to radioactivity. A proposed environmental priority programme recommends reducing indoor radon levels to the values recommended by the European Commission, namely 200 Bq/m^3 in new buildings and 400 Bq/m^3 in old buildings.

It has now been adequately established that high levels of exposure to radon, such as occurs in uranium mines, significantly increase the risk of lung cancer. Also, two recent studies on the lung cancer risk that indoor radon poses to the general population, conducted in various areas in Germany with different geogenic radon levels, have provided further evidence that indoor radon poses such a risk. Compared with other risks, however, the risk posed by radon is small.

Passive Smoking

181.* The most common indoor air pollution in Germany is environmental tobacco smoke (ETS). However, there is no formally established environmental objective pertaining to this type of pollution. Initial quality objectives can derived from measures taken to reduce the risks posed by passive smoking.

Because passive smoking causes cancer, it has be to minimized to some extent by restricting smoking at the workplace, in public buildings and on public transport.

In spite of the fact that indoor air thins out tobacco smoke, passive smokers inhale sufficient amounts of ETS to cause health problems, such as respiratory illnesses in babies and children, cardiac and circulatory illnesses, lung cancer. Inhaling ETS can also exacerbate allergies, including skin allergies. The Senate Committee on Assessment of Hazardous Occupational Substances, in a reassessment, has now classified passive smoking at the workplace as causing cancer.

Conclusions and Recommendations

182.* Progress made in assessing the risks posed by existing substances is unsatisfactory given the discrepancy between the quantitative risk potential of these substances and what is actually known about the risks they pose. In the literature, this discrepancy is referred to as 'toxic ignorance'. The Council would like to point out, however, that in Germany the Beratergremium Umweltrelevante Altstoffe (Advisory Committee on Environmentally Relevant Existing Substances) and the Verband der Chemischen Industrie (Chemical Industry Association) have contributed considerably to narrowing the knowledge gaps.

183.* On the whole, assessment of the risks posed by existing substances needs to expedited and improved. This is a need that the Council has previously addressed, namely in its special report *Umwelt und Gesundheit*. In this report it recommended that a scientifically-based, pragmatic approach be used to assess risk. It emphasized that rather than, as suggested by others, using a 'truncated' assessment approach which would ignore one or two of the essential elements of risk assessment (these being substance characteristics, dose-effect relationships and exposure assessment), a more pragmatic approach should be used which would, if necessary, make do with preliminary data pertaining to these three risk assessment elements and would, based on these data, use the precautionary principle to conduct a summary assessment of risk. The Council welcomes the fact that at the meeting of the EU Council of Ministers of the Environment on June 23/25, 1999, the ministers, after having been intensively briefed by the German presidency, called upon the European Commission to establish a risk assessment approach which targets the main uses of substances or the most

likely exposure paths (i.e., to use a targeted risk assessment approach), to encourage the assessment of substance groupings and to establish risk management measures for particularly hazardous substances based on use patterns and the likelihood of exposure. This last item requires that a summary assessment of risk of the type recommended by the Council be conducted. Further, risk assessment could be decentralized to a greater extent, thus, as with assessment of new substances, leaving assessment up to the EU member states. They would then report their assessments to the EU, which would only become involved in assessment if there were differences in assessments.

184.* The assessment of existing substances suffers from a bottleneck constituted by the lack of exposure data relating to complex use patterns of hazardous substances. Experience with the Existing Substances Regulation has shown that requiring substance manufacturers and importers to provide information on hazardous substances does not suffice to generate data covering all exposure paths and situations. The Council thus welcomes the decision taken by the EU Council of Ministers of the Environment on June 23/25, 1999, to recommend that formulators and industrial users, as well manufacturers and importers, of hazardous substances be required not only to generate but also to assess data on the risks to the public and the environment posed by the part of the life cycle of hazardous substances to which they contribute. By doing so, the idea of supervised self-responsibility upon which EU chemicals policy has been based from the very beginning would be expanded in a manner which is environmentally useful and economically reasonable. Thus, instead of using regulations to expedite risk assessment, voluntary agreements in the EU chemical industry could be used.

185.* By addressing the complete life cycle of products, the concept of integrated product policy for hazardous substances, which admittedly deals more with materials than with pollutants, is taken into account. This concept is concerned with identifying and assessing the dangers and risks that occur throughout the life cycle of a product. Although the Council is of the opinion that primarily environmental problems per se rather than material flows and thus product life cycles should constitute the basis of environmental policy, it nevertheless considers an integrated approach to be a suitable approach, as far as measures are concerned, and depending on the situation, with which to establish priorities and contribute to the consistent regulation of hazardous substances.

186.* It is not enough to assess risks summarily for the time being according to the precautionary principle; appropriate restrictions or bans are also needed. This is where there is a considerable discrepancy between the limited risk model currently used within the framework of the Principles of Risk Assessment Regulation (1488/94/EC) and the Restrictions on Marketing and Use of Dangerous Substances Directive (76/769/EEC) and the more extensive objectives established within the framework of the conventions on protecting the Northeast Atlantic and the Baltic, which aim to reduce, quantitatively, inputs of especially hazardous substances into these waters. The Council would like to point out that, in spite of the fact that the precautionary principle has been recognized since the Maastricht Treaty, the Principles of Risk Assessment Regulation (1488/94/EC) practically proscribes precautionary measures because it does not provide for preliminary assessment of data and the establishment of restrictions based on this assessment when data are thin, but rather merely provides for further data to be generated. In spite of the fact that some progress has been made, in particular as a result of the 14th amendment of the Restrictions on Marketing and Use of Dangerous Substances Directive (76/769/EEC), the ability to regulate existing substances by means of restrictions and bans falls short of environmental policy needs. This is still the case even if one considers that merely the suspicion that a substance is considerably hazardous can suffice to give rise to efforts to find substitutes, and that, once these have been found, use of the substance declines.

187.* The deficits in regulating hazardous substances are, apart from the above-mentioned knowledge gaps, attributable to the limited scope of the member states leading in the regulation of such substances to force harmonization at the EU level by taking unilateral action, and to the subjugation of EU decisions with respect to restrictions and bans to the rigorous cost-benefit justifications of the Single Market Directorate-General. As concerns the latter, the Council pointed out in its special report entitled *Umwelt und Gesundheit* that using cost-benefit analyses in regulating hazardous substances in order to protect health involves methodological difficulties. It also pointed out, however, that non-formalized cost-benefit estimates are not only useful for setting priorities but also for gaining acceptance of restrictions and bans. This speaks against recent efforts to base chemicals regulation on cost-effectiveness estimates and to limit the use of cost-benefit estimates to cases in which even the most cost-effective regulation alternative engenders 'extreme economic costs'.

188.* As regards assessment of new substances, the Council pointed out early on that, with respect to testing, the basic set of tests constitutes an acceptable compromise between what is economically and administratively feasible and what is environmentally reasonable. It also pointed out, however, that excluding complete categories of substance effects (e.g., chronic toxicity) from basic testing constitutes a considerable deficit. Recent studies suggest that the combined effects of more than one substance should be included in basic and phased testing. Thus, substance manufacturers should be required, during basic testing, to provide information on the suspected combined effects of substances likely to be used such that they are coterminous in time and space. In any case, additional testing requirements should include testing of combined effects.

189.* As regards basic research, current attempts to develop green chemistry should be followed closely. In the past the Council has expressed reservations about the chlorine chemistry which dominates the chemicals industry, and would like to express them once again. Development of alternative chemistries that would at least diminish the amounts of organo-chlorine solvents used in the chemicals industry is still far off; nevertheless, they would diminish the risks involved in the production of chemicals considerably and should thus be promoted intensively.

190.* Recent efforts to regulate biocides have focused primarily on wood preservatives and anti-fouling products. In 1999 the International Maritime Organization imposed a general ban on anti-fouling products, to become effective on January 1, 2003, and has recommended making it compulsory to remove tin-organic anti-fouling products from ships as of January 1, 2008. As regards this, the Council recommends establishing a binding convention. Traces of TBT found in clothing textiles, fish and mussels give cause to prohibit currently permissible uses of TBT as soon as possible. The Council welcomes the government's initiatives in this regard.

191.* As regards persistent organic pollutants (POPs), the main question is what concentrations or doses are harmful for humans. In spite of the numerous studies conducted with a view to answering this question, it has not been possible to provide a reliable answer because toxicological data is sketchy. Studies indicate, however, that even exposure to low doses over sufficiently long periods of time can be harmful to humans due to bioaccumulation.

POPs have been identified as a global problem for humans and the environment. They are released by a number of stationary, mobile and diffuse sources and can spread over wide areas. In particular, polyhalogenated dibenzodioxins and dibenzofurans, which are often particle borne (e.g., as with flue dust), and the POPs in pesticides, which are deliberately released into the environment, are transported to an appreciable extent, inter alia, by the air. POPs such as these can thus be transported to regions in which they have neither been produced nor used. The POPs problem can thus only be tackled if countries agree to cooperate in doing so. Initial efforts in this direction have established the POPs Protocol, the POPs Convention and the PIC Convention. However, the applicability of these international agreements has to be extended.

192.* Although emissions of VOCs (except methane) have been declining in recent years, they are, because of their number and abundance, nevertheless of considerable environmental relevance. The WHO definition of VOCs divides them into categories according to their boiling points. However, this definition is often not used, so that the results of studies on VOCs are not comparable. Further, in the opinion of the Council, there is a need to establish sufficiently founded threshold values for indoor VOCs which can be used as guide values in intervention and remediation strategies.

Efforts to adequately assess the risks posed by oxygenated petrol should be stepped up. In assessing these risks, the amounts of MBTE and similar compounds used in petrol need to be taken into account. Then it will have to be decided whether to use a guide value to assess outdoor air quality and, if necessary, whether to use bans.

193.* For many pollutants, it is not possible to establish a threshold value at which they have harmful effects. This is the case not only with carcinogenic substances, but also with fine and ultrafine particles, which are not only suspected of causing cancer, but are also known to have other harmful effects. Epidemiological studies indicate that there is a close relationship between high particle burdens and negative health effects, even at particle levels below the limit values and without there being a noticeable effect threshold. Recent experimental studies indicate that particularly UFPs are much more toxic than previously thought. The main source of UFPs is motor vehicle emissions, especially emissions of diesel soot. Experimental studies have shown that diesel soot is carcinogenic; epidemiological studies have shown that

occupational exposure to diesel soot increases lung cancer risk. The greatest reduction in carcinogenic vehicle emissions can be achieved by using particle filters to reduce particles in diesel emissions. Implementation of the Euro 4 emissions standard together with particle filters would reduce the potential harmful effects of vehicle emissions markedly. The Council thus calls for particle filters to be legally required equipment on all vehicles with diesel engines.

The PM10 particle ceilings to become effective in the EU in 2005 constitute a stringent standard. These ceilings cannot currently be complied with throughout the EU, and thus additional measures with which to reduce PM10 particle emissions need to be taken. Representative estimates of exposure to fine particles and UFPs are currently not available because of the lack of data. Ceilings for inhalable particles (e.g., PM2.5) would be desirable, but they cannot be set until sufficient exposure data are available and further epidemiological studies have been conducted. Further research is required with regard to effect mechanisms, effect thresholds and the relationship between particle characteristics and health effects.

194.* Mineral fibres are indispensable as a means of saving energy, as there are currently no substitutes. Thus, the development of methods for producing less inhalable and less bioresistant fibres should be promoted.

195.* Exposure of the population to radon depends heavily on geogenic radon levels and on the structural characteristics of buildings. In areas with high radon levels, private measures taken to reduce individual exposure can minimize the risk of lung cancer. The government should provide information about radon and assist in determining radon problems.

Since radon is a naturally occurring gas, the only way to protect oneself from its effects is to avoid exposure to it. In areas where geological radon release is high, vapour barriers or ventilation systems in foundations can be used to prevent radon from collecting in houses and buildings. Radon measurements have to be conducted in such areas, and, if necessary, houses and buildings need to be remediated.

196.* To reduce the risks of passive smoking, the Council calls for the establishment of blanket regulations to protect non-smokers. Smoking should not be allowed in train stations, at bus stops and in public buildings. Hotel and restaurants should be required to provide

acceptable non-smoking areas. Further, smoking should be generally proscribed at workplaces where there are no areas where non-smokers can take refuge.

197.* Radon, smoking, diesel soot, some VOCs and possibly also particles and mineral fibres small enough to be inhaled into the alveoli are lung cancer risk factors. Since the means of treating lung cancer are not at all effective—only 5% of people with lung cancer live longer than five years—particular efforts need to be taken to prevent its occurrence. The extent to which familiar syncarcinogenic effects at the workplace (e.g., ETS, radon, asbestos, quartz) also cause cancer at low exposure rates in the general environment is currently not known and should be the object of future research.

2.4.7 Genetic Engineering

198.* Genetic engineering legislation is currently in a reorientation phase. Directive 98/81/EC, which amends the Directive on the Contained Use of Genetically Modified Micro-Organisms, classifies genetic engineering in a consistent manner according to the risks it involves, and exempts genetic engineering which has been proven to be safe for humans and the environment. However, the directive's annexes need to be further developed. The most important issue for environmental policy, the issue of releasing genetically modified organisms into the environment, has been left unresolved. The BSE scandal and the overall more critical stance of the member states have helped, in the debate on amending the EU Release Directive, to motivate the European Commission, with the consent of most of the member states, to back off its previous line of cautious deregulation and propose tighter release requirements. The precautionary principle is now to be expressly embodied in the scope and objectives of the directive (Article 1) and in the general obligations of the directive (Article 6), which the Council welcomes. Ways and means of deregulating should, however, also be taken advantage of. A de facto moratorium on granting release approval is not acceptable constitutionally.

199.* In Germany, genetically modified plants have been released into the environment in 414 places. Originally, release projects aimed at improving crops by making them herbicide-tolerant and pest-resistant. Increasingly, however, crops are being engineered to give them new physiological characteristics.

Field research has been conducted on comparing transgenic with non-transgenic crops, on pollen dispersion, on weeds and seed banks, on rhizospheres and soil bacteria, on retention periods and degradability of transgenes in soils, population densities and species of pollinating insects. Field research conducted as part of release projects needs to be gathered, examined and indexed so that it can be used in implementing the Genetic Engineering Act. The establishment of a long-term ecological monitoring programme to monitor selected genetically modified organisms and their impacts on the environment, the integration of this programme into the general ecological monitoring system and the establishment of a central authority to coordinate the monitoring of transgenic organisms need to be expedited. As the number of release projects is continuing to increase, the Council would like to renew its call for establishment of a gene register.

200.* The Council welcomes that the amendment of the Directive on the Deliberate Release of Genetically Modified Organisms requires anyone granted approval to market genetically modified organisms to establish a monitoring programme (which can be of various designs).

201.* The EU Council of Environmental Ministers have agreed to coordinate the Council Regulation on Novel Foods and Novel Food Ingredients more closely with the Release Directive as concerns precautionary aspects, risk assessment criteria, post-approval monitoring and labelling. The Council welcomes this agreement, which will clarify the regulation as well as make it more stringent. The regulation is still not clear on various aspects of labelling genetically modified foods (what to label and scope and type of labelling). Particular labelling problems involve uncertain country of origin, mixing of foodstuffs and contaminants.

202.* EC Regulation 1139/98 contains labelling requirements for approved genetically modified soya beans and maize, requirements which set a precedent for a general regulation, but which only resolve some of the problems involved. Two crucial questions remain open: how to establish the de minimis threshold (tolerance level) for adventitious material derived from genetically modified soya beans and maize and what methods to use in establishing the list of materials not subject to labelling requirements. In a regulation amending Regulation 1139/98, the European Commission has recently established a tolerance level of 1% for adventitious contamination of individual food ingredients.

Contrary to previous law, genetically modified food additives and flavourings will be subject to labelling requirements as of 2000. This will provide better consumer protection even though some gaps still remain. In particular, the de minimis threshold problem is also a problem here.

203.* As genetically modified foodstuffs can pose an allergy problem, the Council once again calls for methods of testing transgenic foodstuff ingredients for allergenicity to be improved and used in order to exclude allergenic risks. If allergenicity information were included on labels, determining whether to include allergens that pose an unspecifiable risk would, however, be a source of controversy, especially as concerns a de minimis threshold; with respect to allergens, a 'tolerance level' of 1% is not acceptable. A further labelling problem is posed by the shear number of allergens.

3 Environmental Protection in Selected Problem Areas

3.1 Sustainable Forestry

204.* Forests are the potentially dominant form of vegetation in large parts of Europe. Humans intervened in forest ecosystems early on in European history and thus changed them. In Central Europe, these interventions, which began in the Middle Ages, have shaped the landscape. Thus, the forest landscapes of today are the result of long-term and intensive human intervention. The complex effects that historical land use has had on biological diversity and biotic communities have still not been sufficiently investigated. Reconstructions indicate, however, that historical land use engendered considerable differentiation in the ecosystem spectrum and increased biological diversity. Nevertheless, as a result of the intensification of land use, ecosystem diversity and biological diversity have been decreasing for some time now.

Against the background of this observation and the topicality of biological diversity, the Council addresses the topic of sustainable forestry in this section. The Council has been prompted to do so in particular by the current debate on ecological forest restructuring and climate protection. Further, the Council addresses the somewhat controversial debate on forest decline, whereby the Council wishes to stress the importance of forests and the various ways in which they protect environmental media.

In doing so, the Council would like to emphasize that the use, protective and recreational functions served by forests are given equal priority by the Federal Forest Act. The term 'protective function' is generally understood to mean protection of fauna and flora in the broadest sense. From the point of view of nature conservation, this is too narrow a definition because it does not take account of the importance of forests as ecosytems, nor of their importance for biotope networks covering whole landscapes. Nonetheless, the ecological aspects of forestry have been receiving greater attention.

3.1.1. Functions of Forests

Use Functions

205.* Forestry has been practised in Germany for only about 200 years. German forests were, however, used intensively and were heavily impacted upon by humans before the advent of forestry. Human interventions in forests have, over time, increased as a result of population increase, increased land use and technological progress. In the course of time, forests have served continually changing uses which have not been limited to wood. Forests are used primarily as/for:

- timber stocks and logging,
- wood/biomass production,
- hunting, and
- recreation.

Protection Functions

206.* Forests and woods serve a number of important protective and regulatory functions for soils, waters, the climate and the biosphere. They can be classified according to their protective functions as:

- forests which protect water quantity and quality,

- forests which protect against the destructive forces of water,
- forests which protect coastlines,
- forests which protect land/soils,
- forests which protect against soil deposition,
- forests which protect against avalanches,
- forests which protect the climate,
- forests which protect against noise,
- forests which protect particular wild animals and plants,
- forests which protect particular geobiocoenoses.

207.* As an option with which to achieve CO_2 reduction targets, the Kyoto Protocol to the United Nations Framework Convention on Climate Change provides for CO_2 sequestration measures that are based on forests' function as CO_2 sinks. Afforestation can help, albeit only for a certain time due to the life cycle of trees, to reduce the anthropogenic increase in CO_2 in the atmosphere. This option, namely using forests as CO_2 sinks, is unimportant for Germany's objective of reducing CO_2 emissions to 25% below 1990 levels by the year 2005, because Germany has too little surface area to accommodate large afforestation projects.

Nature Conservation Functions

208.* Nature conservation in forests requires the development of sound strategies to maintain the usability of natural goods and to protect nature comprehensively and in a manner that goes beyond protecting unique or outstanding natural goods by safeguarding the productive capacities of nature per se.

The Council endorses a nature conservation strategy that provides for forests in which various forest functions are promoted in an integrative manner as well as for forests in which one particular function is given priority over other functions.

This strategy differentiates between three categories of forest which are based on different weightings of forest functions and which constitute the leading objectives as concerns nature conservation and the sustainable use of forests:

- All forest functions in a particular area are given equal priority. Forests in such an area are used for near-natural forestry (integrative uses).

- One function is given priority over other functions in a particular area. Forests in such an area are used for recreation in areas near conurbations, for watershed purposes, or as national forests with special conservation objectives (priority uses).

- One function has absolute priority over all others in a particular area. Forests in such an area are closed to all uses and serve to protect natural processes (totally protected nature reserves).

In setting priorities with regard to forest functions, regional an local features have to be taken into account. Specification of the minimum ecological requirements for safeguarding regulatory, protective and habitat functions is necessary for all three categories.

3.1.2 A New Old Model: Sustainable Forestry

209.* Of all types of land use management, forestry is the most long-term type. Sustainability, i.e., sustainable development, is a concept derived in part from forestry practices. In order to be able to better realize the sustainability called for by policy-makers, the German forestry sector has established the multifunctional forest use model. Although it is agreed that the

theoretical equal priorities model can only be put into practice to a limited extent, the Council nevertheless endorses the multifunctional forest use model, especially because of the diversity of forest sites in Germany. By doing so, the Council is emphasizing the need for site-appropriate, near-natural forestry strategies. Nevertheless, it would like to point out that not all forest functions are automatically engendered to equal extents or to the societally desirable extent as complementary products of forestry activities. In the current discussion of forest functions, a useful approach is beginning to emerge which differentiates between services rendered by forests and forestry services. The former obtain intrinsically with or without forestry activities; the latter obtain as a result of qualitative or quantitative changes made to forests by forestry activities in order to satisfy society's use needs. Which are specifically which will, in the end, be determined by the legal framework pertaining to property rights.

210.* The objective of sustainable forestry should be to avoid impairing the services rendered by forests to the greatest extent possible. The differentiation between forest services and forestry services is crucial for environmental policy interventions and should, in the opinion of the Council, be specified using the concept of 'proper forestry practices'. In this context, the Council opposes specifying particular forestry services for particular forest ownership categories because ownership can change (even in the case of national or municipal forests), thus changing objectives such that they are no longer, or only partially, achievable due to the long-term nature of forestry measures.

211.* The Council is expressly for not viewing forestry and nature conservation as being antithetic activities but rather for integrating them to the greatest extent possible. It is, however, aware of the fact that there are currently a number of controversies about the relationship between forestry and nature conservation, for example, with respect to planning and administrative issues as well as with respect to forest management concepts. These controversies need to be resolved adequately, taking into account changes in society's expectations due to changes in general economic conditions and taking into account improvements in knowledge about the dynamics and functioning of forest ecosystems, especially as concerns their importance for whole landscapes and their biotope networks. Overall, greater importance has to be attached to nature conservation concerns than has previously been the case, at least in practice. On the other hand, in this process of finding a

balance, the environmental protection functions of environmental media should not be neglected, and a cross-media approach should be used.

212.* Using forests in a manner that adequately takes account of forestry concerns and nature conservation concerns requires that different kinds of priority area, for example, totally protected nature reserves, be established. In the opinion of the Council, the prerequisite for being able to establish such priority areas in forests and to integrate them spatially is having access to planning information obtained through systematic qualitative and quantitative assessment of areas and their development potential. Such information is provided with respect to wood production by, inter alia, the Federal Inventory of Forests and forest management data reports. Forest function and, in particular, forest biotope mapping projects being conducted in the national forests are beginning to provide information on biotope quality and area distribution. The forest function mapping projects are providing a wealth of spatial information, but, because of methodological deficits, they need to be augmented by appropriate surveys before they can be used in implementing nature conservation objectives. In this context, the Council calls for the development of sound parameters for assessing the state and development potential of forests. The integration of the data from the nature conservation surveys and the findings of forest ecosystem research into forestry planning and the operations components of forestry management plans constitutes an important step in implementing integrated forestry concepts which take nature conservation concerns into account.

213.* As regards implementing nature conservation concerns, the Council would like to point out that dividing the forestry sector up into a management subsector and a regulatory subsector would seem to be justified if the ecological level of good forestry practice could be clearly and legally specified and enforced. From a scientific or sectoral point of view, government responsibilities with regard to forestry and nature conservation overlap and involve conflicting objectives. In order to resolve this problem the Council recommends that government responsibilities and use interests be completely separated. In the long term, this would mean establishing a forestry administration which only dealt with government responsibilities. Since it would thus no longer have to deal with conflicting objectives, it could accord forestry and nature conservation interests equal priority. Competence conflicts between forestry and nature conservation interests would thus largely be avoided. With this

concept, all of the national forests could be successively privatized or at least be privately managed.

Adjustment of current institutional frameworks and procedures to the requirements of the international conventions related to forests and signed by Germany is especially important in order to meet these requirements adequately. Adjustment should be based on the cross-cutting character of the conventions, a character which requires the participation of various government sectors—forestry, nature conservation, trade, land use planning, research, and development cooperation—and the development of innovative methods of cross-sectoral cooperation.

3.1.3 On the State of Forests

214.* The problem of forest decline brought about an environmental policy discussion of forests of heretofore unknown intensity. This discussion spawned numerous environmental protection measures as well as intensive research on forest ecosystems. The result was that knowledge about forest ecosystems, especially as pertains to cause and effect relationships, was greatly improved: not only current or recent anthropogenic influences, such as deposition of airborne pollutants, damage forests, historical land uses have also caused considerable ecosystem degradation, degradation which is still having repercussions today. A further result was that the obvious instability of numerous managed forests increasingly became the focus of attention, which, in turn, led to amicable agreements about ecological forest restructuring, but also to such controversial measures as the designation of totally protected nature reserves and the restriction of forest management measures.

215.* In order to characterize the extent, temporal development, and spatial distribution of forest damage in Europe, annual forest damage or forest condition inventories, which are largely based on determining unspecific leaf and needle loss, are conducted. Against the background of the knowledge provided by circa two decades of intensive forest damage or forest ecosystem research, the Council would like to point out that these inventories do not provide sufficient information for the health (vitality) of trees or forest stands to be characterized. New developments include, in particular, damage phenomena which are attributable to nutrition problems. In the context of so-called new types of forest damage,

nutrition problems, as symptomatic reasons for forest damage, have thus been discussed ever since these new types began to occur, whereby the focus of attention has been largely on new type of magnesium deficiency in the fir tree stands at higher altitudes in the lower mountain ranges in Germany.

216.* Since the degradation of forest ecosystems can often have numerous causes, the Council would like to emphasize that rehabilitation measures generally have to go far beyond mere soil amelioration and fertilization measures. Such measures should always be integrated into an overall forest management concept which takes account of nutritional and soil-related and use-related considerations as well as ecological, forest management, and landscape management objectives. Measures should, however, be tailored to suit specific site conditions and should be thus be designed on a case-by-case basis.

Although Germany's forests are recovering unexpectedly and timber volume increase rates are partially higher than they have ever been known to be before, one should not forget that our forests have a long history being used. Increased forestation without increased tree harvesting could cause forests to spread so quickly that they will once again become destabilized. Against this background, the forest restructuring programme takes on an even more important role than the role ascribed to it, for example, by biodiversity research. The Council also calls once again for pollution inputs, and especially nitrogen inputs, into forests to be reduced. Finally, the Council recommends replacing the current forest damage and forest condition inventories, which are largely based on unspecific tree leaf and needle loss parameters, with more comprehensive ecosystem-based state analyses like the one provided for by the EU Level II Programme for monitoring forest stands.

3.1.4 Nature Conservation in Forests

217.* Protecting forests is deemed important in Germany because of the characteristics of its forest sites, overall landscape ecological patterns in Germany and the wide range of biological diversity in Germany, as well as because of Germany's international obligations. The protection of forests as biotopes can be realized, in the opinion of the Council, by bringing forest use into line with particular protection and development objectives, by taking particular

forest care measures, by designating protected areas and by providing blanket legal protection.

The Council recommends further that a framework with which to improve nature conservation in forests be provided by changing the Federal Forests Act such that forest owners are required to perform stewardship activities rather than management activities.

218.* Article 20c of the Federal Nature Conservation Act provides for blanket protection of the following forest biotope types: forests and brushwood on dry and warm sites, fen woodlands, swamp forests and alluvial forests. There are more comprehensive laws and regulations in the *Länder*. In addition, a considerable number of the more than 5,000 nature protection areas, national parks and biosphere reserves are forested, sometimes to a great extent. The level of protection in these areas differs, however, and tree harvesting is allowed in many areas. The establishment of natural forest reserves is a step in the right direction, not only because they are totally protected, but also because forestry administrations have voluntarily participated in designating these reserves.

The Council is of the opinion that it is imperative, for nature conservation reasons, to establish forest reserves within both the German and the EU systems of protected areas, whereby Germany should provide 5% of its forests as totally protected areas, 10% as nature conservation priority areas and 2% to 4% as near-natural forest edges.

219.* The relatively wide range of measures taken to protect forests have, however, not been able to prevent the decline of certain types of forest. The current Red List of endangered forest types in Germany lists more than 67 forest types or variants that are endangered at least at the regional level. Supporting measures, especially planning measures, need to be introduced and implemented in a coordinated fashion.

220.* The Council is of the opinion that it is imperative that measures based on nature conservation concepts and objectives and aimed at maintaining the biological diversity in forests be integrated into forestry practices.

So far, this has been accomplished only to a limited degree. The term ‘biological diversity’ refers, pursuant to the definition in Article 2 of the Convention on Biological Diversity, to the

diversity of species per se as well as the diversity of plants and animals that live in, or are dependent on, forests, and the diversity of forest ecosystems. Current concepts and measures have concentrated on species and populations thereof, and, more often than not, on certain categories of organisms (i.e., attractive and/or endangered species, organisms that live in dead wood). Maintaining diversity within species has (except, to a degree, with respect to certain trees used commercially) not really been deemed a responsibility in its own right. Few concepts for maintaining such diversity have been advanced as of yet; priority thus needs to be given to developing such concepts.

221.* Before measures to maintain the biological diversity of species in commercially used forests can be established, the objectives of forest nature conservation have to be clearly specified. These objectives should relate to forests being as natural as possible, whereby the structural characteristics of natural forests and a wide range of habitats need to be developed and maintained.

222.* The Council would like to point out that there is still considerable need to specify a framework concept for conserving nature in forests. Attempts to do so have so far concentrated too heavily on unforested areas or at best on special types of forest (e.g., field scrub, bog forests).

3.1.5 On the Forest Restructuring Programmes

223.* The model for restructuring forests in the future should not be based on forest ownership and should be a model with which to develop near-natural, highly structured, high-yield forests throughout Germany. The concept upon which to base restructuring objectives should emphasize that the basic approach to using forests commercially should be to consistently observe the 'ecological principle'. The intensity of use needs to be in line with site conditions. To implement this model, the 'naturalness' of forests needs to be assessed on a countrywide basis and restructuring trends need to be determined.

Further, current knowledge about the possibilities, risks and dangers of using forest sites commercially should be sufficient to allow implementation at the regional level of a flexible, differentiated management strategy which complies with near-natural forestry guidelines.

224.* The Council is of the opinion that the restructuring less natural forests into near-natural forests can make an important contribution to achieving nature conservation objectives in all commercially used German forests. Promoting variety in forest composition and age structure and using a variety of forestry measures should contribute considerably to safeguarding and increasing biological diversity in forests (e.g., habitat diversity, biological diversity, genetic diversity).

Nevertheless, the impacts of ecological forest restructuring on biological diversity, forest nature conservation, forestry technology and the economic situation need to be methodically studied. In this context, the Council calls for the initiation or intensification of concomitant ecological research and for the development of scientifically based forecast models. Studies and research should not merely deal with forests, they should also deal adequately with ecosystem impacts on soils and waters. The Council welcomes current approaches taken by the Federal Ministry for Education and Research in evaluating forward-looking forestry measures.

225.* Particularly the unstable pine forests in the northern German lowlands (especially in Lower Saxony and Brandenburg) and the fir forests in the low-mountain areas need to be restructured. Pine stands should be thinned out so that deciduous trees (e.g., beeches, oaks) can be imported and nurtured. Further, the feasibility of making it more attractive for private forest owners to restructure unstable coniferous forests (as deciduous and mixed deciduous/coniferous forests) by providing government restructuring subsidies should be investigated.

226.* The Council recommends using national forestry maps and a standardized determination and assessment of forest ownership within the last ten years as the main basis for planning the planting of new trees and assessing the 'naturalness' of forests. Using this basis, regional and site objectives concerning the selection of tree types could be developed and implemented.

227.* Near-natural forestry attempts to exploit the natural regenerative capacity of forest ecosystems. This capacity should be exploited for economic reasons as well in order to quickly restructure unstable fir stands, for example, when other measures are not as expedient

or suitable (e.g., sowing or planting). However, the Council is of the opinion that it is more important that restructuring measures be environmentally sound and have lasting effects than that they be merely fast; whatever measures are used, they should be site-appropriate.

Forest restructuring measures that are intensive and/or frequent should be viewed very sceptically. Accordingly, restructuring measures require specific medium-term planning. For regeneration to be successful, it is extremely important to manage hoofed game, since it is not currently possible to prevent browsing game from thwarting the regeneration of most types of tree without taking costly tree protection measures. Ensuring that game populations are of a size that forests can tolerate is, in the opinion of the Council, imperative. Populations that are too large not only make it almost impossible to regenerate most tree types, they also drive up the costs of regeneration by damaging young trees, and they endanger stocks of browse plants in the undergrowth. Accordingly, the Council urgently recommends that game populations be regulated throughout Germany's forests by culling appropriate numbers. The 'ecologization' of hunting which Article 29 of the Federal Nature Conservation Act promotes by partially recognizing *Land* hunting associations as nature conservation associations must be effected as soon as possible.

228.* The problem of game populations that are too large has forged alliances between forest owners and nature conservationists, who have attempted to see to it that their interests are given priority over the interests of hunters. Claims have also been made to the effect that hunting serves no real ecological or societal function. Societally recognized forestry requirements are often not met because societal acceptance of hunting is lacking, although hunting is absolutely necessary for near-natural forestry.

229.* Given the current situation, hunting should be clearly subordinated to the priority objective of forced forest restructuring. Since forest restructuring, or the introduction of near-natural forestry, is an objective that is being implemented more or less throughout Germany, proposals that recommend using game zoning to achieve desirable game population densities are not very helpful.

Hunting-related problems almost always require interdisciplinary, overall regional concepts. Focusing exclusively on culling game makes emotions run high. On the other hand, a holistic,

integrative game management approach which includes various forest and game interest groups is recommendable. The training of hunters as pertains to ecological objectives should also be improved, whereby other land users will then also have to become more ecology-minded.

In this context, Section 1, paragraph 2, sentence 2, of the Federal Hunting Act should be amended, in view of the requirements of ecological forestry, to require of hunters that they not only prevent game damage to large trees but also that they also specifically protect attempts to regenerate forests with deciduous and coniferous trees by protecting seedlings and saplings. The amendment could be delineated in administrative regulations issued by the *Länder*, regulations in which action guidelines could be provided.

3.1.6 Remunerating the Forestry Sector for the Environmental and Recreational Services It Provides

230.* The forestry sector is different from other industrial sectors in that it, in addition to producing marketable goods (wood, biomass, berries, mushrooms, hunting, game), provides numerous services that are not marketable. The protective services provided by forests (soil protection, avalanche protection, groundwater protection, CO_2 sequestration, biological diversity preservation, biotope protection) as well as the recreational services provided by forests constitute positive external effects. Since there is no effective means of preventing people from benefiting from these services, they benefit from them free of charge. Forest owners, acting out of their own interest in producing marketable forestry products, provide protective and recreational forest services as complimentary products. However, there are no financial incentives for forest owners to provide further services of the type desired by society or in the extent desired by society.

231.* If one looks closely at the subsidies granted to the forestry sector, it becomes clear that they serve primarily one purpose, namely making forestry more profitable. On the other hand, subsidies provided to the forestry sector to engage in nature conservation activities are insignificant. Although environmental stewardship activities are often engendered as complimentary products of commercial forestry activities and although healthy forestry businesses generally have a positive impact on the environment, it is, for the most part, not

possible using this approach to exercise any influence over commercial forestry with regard to environmental objectives.

The environmental and recreational services provided by forests do not automatically come about as complementary forestry products in the form that society would like them to. Incentives to provide environmental and recreational services that are not complementary products are often not provided or are not provided to a sufficient extent. Further, subsidies are currently cost- or measure-oriented. To bring about a better allocation and a fairer distribution of public funds than is currently the case with transfer payments, the Council recommends basing the remuneration of the forestry sector for the environmental and recreational services it provides more heavily on the specific types of service it provides. In this way, greater influence could be exercised over the type and extent of services provided.

232.* Which environmental and recreational services forest owners should provide free of charge and which services they should be paid for depends in the end on how property rights to forest resources are defined. Services which are deemed by society to be subsumed under the social responsibilities incurred by owning property should be provided by the owner free of charge. The property rights of forest owners are specified, inter alia, by the vague legal terms 'proper forestry practices' (Section 12 of the Federal Forests Act) and 'good forestry practice' (Section 8 of the Federal Nature Conservation Act). The vagueness of these terms is a problem. They need to be specified more clearly in order to be able to properly realize the remuneration system proposed here. The Council recommends developing lists or catalogues in which the relevant environmental objectives and remunerable services are listed. The remunerable services should be determined at the regional level while taking into account the particular potentials of natural areas in the regions.

233.* A strategy for remunerating environmental-quality-objective-oriented services rendered by the forestry sector has to take account of numerous circumstances which make it difficult, but not impossible, to implement. For example, production cycles are much longer than in other industrial sectors. Such a remuneration system has to take account of the fact that particular environmental policy objectives (e.g., objectives relating to forest composition) can only be implemented in the long term and that forest owners require long-term agreements that give them planning security. The evaluation of the environmental services provided by

forest owners could also be rendered difficult by the long production cycles involved. Certain nature conservation objectives, such as the long-term development of completely virgin forests, require that basic regional planning and policy decisions be made and cannot be achieved using purely economic incentives. Further, the ownership structure of forests has to be taken into account.

Forest owners do not need to be remunerated for the CO_2 sequestration services their forests provide, as the CO_2 that forests sequester is released when trees die or when biomass is used for energy generation purposes. Instead, the Council recommends that the use of biomass for energy generation purposes be exempted from the ecological tax because the amount of CO_2 released when biomass is converted into energy merely equals the amount previously sequestered. This would give biomass a relative cost advantage over fossil fuel equal to the tax rate.

234.* In order to implement the remuneration of the forest sector for its ecological services, the Council recommends:

- that the terms ‘proper forestry practices’ and ‘good forestry practice’ be delineated,
- that a forest ecology point system be established,
- that indicators of environmental quality or environmental service provision, as well as procedures for monitoring quality or service provision, be developed,
- that the system of providing compensation for actions performed be gradually replaced by a system which remunerates ecological services rendered,
- that at least a portion of the subsidies given to the forestry sector be reapportioned for remuneration of ecological services rendered by the forestry sector.

3.1.7 Balancing Competing Uses

235.* There are still numerous deficits with respect to implementing a modern, societally balanced forest use concept. One of the reasons for these implementational deficits is the failure to concretize and operationalize the sustainable development model for forest use in

Germany. Thus, there is no societal consensus about what kinds of forest, and what kinds of biological diversity in the forests, are desirable.

What is needed is a societal discourse about the development of objectives and indicators which integrates scientific knowledge about, for example, the dynamics of ecosystems or the relationships that obtain between resource use and economics.

The aim of this discourse should be to increase the willingness of society as a whole to base environmental use on the carrying capacity of ecosystems. Specifically, the framework for government and private activities that impact on forests should be designed such that it ensures the greatest possible near-natural development of forests.

236.* In the last few years an increased number of areas have been designated as nature reserves and national parks, which has triggered an ongoing forest policy discussion. The various and conflicting forest use interests and objectives of nature conservation groups, forest owners and use-oriented associations have often led to intense conflicts over new designations and to forest owners refusing to accept measures that are to be implemented. The policy, legal and administrative framework for dealing with this problem is not adequate and makes balancing interests difficult. A possible way of resolving this problem, apart from using certain compensatory mechanisms, is to hold participative discussions to develop long-term concepts. The Council therefore recommends establishing local fora to promote an exchange between the conflicting interest groups, reconcile conflicting interests and bring about multilateral agreement. The increased used of regulatory instruments is counterproductive in the opinion of the Council.

237.* Forest use conflicts are increasingly occurring, particularly in agglomeration areas. The forest use interests of various groups in society collide in heavily populated areas and this situation needs to be resolved in a manner that will promote sustainable forest use by taking ecological, economic and societal factors into account. The basic conflicts with respect to leisure and recreational forest uses are conflicts between forest use and forest protection as well as conflicts between various groups of users (e.g., athletes, hikers, hunters and forest owners).

The burdens placed on forests by leisure and recreational uses are constituted by the consumption of land for infrastructure facilities, an increase in motor vehicle traffic, an increase in wastes, increased pollution, increased foot traffic damage, increased erosion and increased disturbance of wild animals. In addition, it is feared that leisure and recreational uses impact negatively on biological diversity because they can contribute to the loss of habitats, species and genetic diversity.

Considering these negative impacts on forests makes it evident that leisure and recreational uses of forests need to be governed such that they are ecosystem-compatible and thus in line with the requirements of sustainable forest use. Athletes and recreationists need to be informed through public information campaigns about the consequences of their environmentally unfriendly behaviour in forests in order for them to consciously perceive the problem they pose and modify their behaviour. The information campaign could enlist the services of schools, associations, forestry and nature conservation administrations, and forest owners.

Should forests show clear signs of being overstrained by leisure and recreational uses, measures should be implemented to allow only a certain number of people into a particular forest at any given time. Should especially sensitive and valuable biotopes and refuges for certain species (e.g., capercaillies) be threatened, protection of theses areas using the full range of legal instruments will have to be given top priority. Leisure and recreational uses that are particularly invasive (e.g., mountain biking, mountain climbing) should not be permitted in such areas. Other uses should be assessed with regard to their environmental friendliness and, if necessary, should be prohibited. One should also consider prohibiting people from entering areas that are especially valuable from a nature conservation point of view.

Forests which provide important leisure and recreation services near cities and in popular rural resort areas should be designated as priority areas.

Clearly outlined concepts have to developed to minimize conflicts between various user groups and their interests. For example, separate pathways could be designated for hikers, horse riders and mountain bikers. If such segregation is not feasible, priorities have to be set

based on use analyses. In either case, interest groups should be involved in order to promote an exchange of views and to arrive at a consensus.

Near-natural forestry and forest restructuring should not only improve the stability of forests, their tree composition and their ecological value; they should also have a positive influence on the leisure and recreation services provided by forests. Issues pertaining to the richly varied, aesthetic restructuring of forests, and particularly heavily frequented forests, should not be ignored.

3.1.8 The Need for Further Research

238.* The forest ecosystem research of the last decades has contributed to a much better understanding of our forests. This understanding has changed conceptions of forestry and nature conservation in a basic way. With respect to nature conservation, new knowledge has brought about the realization that naturalness, stability and biological diversity do not necessarily correlate with one another and that dynamics, randomness and even natural catastrophes play a central role in nature. This has thus qualified the traditional concept of forest stability upon which particular types of forest management have been based.

239.* The sciences involved in forest research have not lived up to their new societal responsibilities. This is the not only the case with just the forest sciences; it is the case in the environmental sciences on the whole. Traditional, disciplinary concepts of science still dominate the environmental sector. Really interdisciplinary approaches are the exception. When interdisciplinary approaches are attempted, they generally unravel, leaving separate, sectoral approaches. The extent of the interdisciplinarity achieved thus generally consists in giving single-discipline approaches a wide focus or in conducting joint projects.

240.* Further, there are definite deficits as regards translating scientific findings into practical action recommendations. Germany has a great amount of environmental and forest-related data, but only a small amount of these data have been used as a basis for taking certain actions. There is also no real synopsis of the scientific data on forests.

241.* The conflicts between forestry and nature conservation interests are especially obvious in the areas of administration and planning and thus there is a need to conduct extensive basic

and practical institutional research. In addition to analysing the status quo as extensively and in as much detail as possible, changed societal interests, economic conditions and main objectives, especially EU objectives, need to be analysed. The results of these research efforts should be used to devise methods and procedures that are suitable for describing conflicts and possible ways and means of resolving them.

242.* The Council calls for continued cross-sectoral forest ecosystem research. Process-oriented research which explains mechanistic interactions between forest functions is needed, as well as instruments with which to be able to make better forecasts of forest trends as they pertain not only to individual ecosystems but also to whole landscapes, and in the latter case instruments that take water and substance balance studies, where possible, into account.

3.2 Environmental Protection and Energy Issues

243.* Energy use constitutes one of the most important national and international environmental policy action areas. The Council has therefore repeatedly dealt with energy use in its reports. Although the Council dealt with various particular aspects of energy use in these reports, since the Council's 1981 special report *Energie und Umwelt* (Energy and the Environment), there has been a need to take a comprehensive approach to the energy regime in Germany.

The breakthrough achieved in Kyoto with respect to establishing an agreement with which to resolve the climate problem over the long term, an agreement which has not been implemented at the national level but whose implementation is expected to reduce the emission of GHGs (which is important not only in the climate policy context), underlines this need. In addition, when the new government took office in late 1998, it did so with the announced goal of revamping energy policy. Since then, the government has been negotiating the phaseout of nuclear power and has introduced or implemented numerous bills or laws pertaining to the ecological tax reform, promotion of regenerative energies and the rational use and conservation of energy, all of which the Council has a responsibility to evaluate with respect to sustainability.

3.2.1 Current Energy Structures and Status Quo Forecasts

244.* There are numerous forecasts of worldwide primary energy demand and its concomitant emissions (e.g., European Energy Institute in Grenoble 1999, US Department of Energy 1998, International Energy Agency 1998, World Energy Council 1998).

In spite of assumptions that there is a shortage of crude oil in the traditional oil fields, and in spite of the fact that these assumptions have engendered increases in oil prices and a slight decrease in the use of oil worldwide for energy generation purposes, oil will, according to these forecasts, still be used to satisfy 33% of the total energy demand in 2020 (whereby a greater proportion of the oil used will be non-conventionally produced oil). Coal and natural gas will each be used to satisfy approximately 25% of the demand, renewable energies about 6% and nuclear energy approximately 4% to 5%.

Thus, more than 80% of the primary energy used worldwide in 2020 will still be generated using fossil fuels. Assuming that worldwide primary energy demand will increase at an annual rate of 2.2% to 2.5%, the global emissions caused by energy generation would amount to approximately 39.5 billion tonnes in 2020 (in 1990 they amounted to approximately 21.3 billion tonnes). However, emission trends will differ markedly from region to region. In India and China, for example, CO_2 emissions are expected to more than double by 2010.

245.* In Germany, primary energy use dropped after German reunification in 1990, rose again in 1996 and then dropped again in 1997, 1998 and 1999.

In the last two report years the proportions of the various fuels used in primary energy generation have remained basically the same. Oil is still used the most, followed by natural gas and coal. The drop in primary energy use has affected brown coal the most. On the whole, there has been a slight shift towards using low-carbon fuels (natural gas and renewable energies).

246.* The current status quo forecasts of ESSO AG, Prognos AG and the University of Cologne Energy Institute can be used to evaluate further primary energy use trends. According to these forecasts, nuclear energy use will decrease markedly, even before nuclear energy production is phased out between 2010 and 2020, because some nuclear power plants will have reached the end of their service life. This decrease will be offset primarily by increased use of natural gas and renewable energy sources. Use of the latter, which

accounted for 2.2% of primary energy generation in 1995, could rise to 4% or 5% by 2020, whereby wind power and biomass will be the main sources used.

247.* Forecasts of emission trends indicate CO_2 emissions will decline by 2005 to between 14% and 18% less than 1990 levels. The German reduction target (25% less than in 1990) will not be achievable using business-as-usual policies. The Kyoto target of 21% less than in 1990, which is to be achieved by 2008 to 2012 and which allows more flexibility by including a total of six GHGs, would, however, seem to be achievable.

248.* The status quo forecasts of long-term energy use and its concomitant emissions show how urgently energy use needs to be curbed. If nothing is done politically, worldwide CO_2 emissions will increase by 2020 to levels which are dramatically higher than in 1990. That, according to the forecasts, the overall energy losses caused by retiring the nuclear power plants will primarily be offset by using natural gas, which will not be available in the required amounts over the long term, also gives reason for concern. The greatest increase in the use of particular energy sources will occur in the use of renewable energy sources, but this increase will be on such a low absolute basis that, if no additional measures are taken, it will not even come close to being able to offset the loss of nuclear generated energy.

3.2.2 Adverse Environmental Effects Caused by the Extraction and Conversion of Energy Resources

Adverse Environmental Effects Caused by the Extraction of Energy Resources

249.* The extraction of such energy resources as brown and hard coal, uranium ores, crude oil and natural gas has adverse effects on biotopes and ecosystems. In addition, other environmental goods may also be affected adversely. In spite of measures taken to restore areas affected by resource extraction by recultivating them, renaturating them or otherwise compensating for the effects of resource extraction, the medium- and long-term landscape ecological and environmental geological effects of resource extraction have to be taken into account when assessing the overall effects of resource use. Only then are subsequent, appropriate uses of the landscape possible. In addition, doing so can prevent the occurrence of undesirable ecological trends.

The extraction of energy resources and also neighbouring strata (which is unavoidable with the extraction methods used) results, seen geochemically, in an unnatural, selective concentration of these materials in the environment. When processing and transporting these materials, they manage, within a very short time, to become diffused throughout the complete geo- and biosphere. This anthropogenic differentiation process is a new type of geological activity. As a result, numerous chemical elements enter substance cycles after having been absent from them for sometimes millions of years. This engenders geo- and bioaccumulation of the mobilized elements and their compounds, whereby the original stock of substances is altered qualitatively as well as quantitatively.

Given this situation, the effects of resource processing and use need to taken better into account in resource extraction concepts than has previously been the case. Only by doing so can objective conflicts and use conflicts with major ecosystem functions be avoided. This means that the interactions that obtain between biotic and abiotic processes over time need to be ascertained.

Table 1: The Most Important Environmental Effects Caused by the Extraction of Energy Resources in Germany

	Hard Coal	Brown Coal	Crude Oil and Natural Gas	Uranium
Land Use	– 5,000 km^2, used directly and indirectly: spoil heaps and subsidence – subsequent use of indirectly used land limited, use of directly used land not possible	– 2,270 km^2, used directly for extraction purposes – subsequent use after renaturation extremely limited	– minor, point effects	– 37 km^2 of land currently radioactive and/or contaminated by heavy metals and metalloids
Volumes Extracted	– 80 x 10^6 m^3 coal and spoil annually, extraction ratio 1:2	– 1,2 x 10^9 m^3 coal and spoil annually, extraction ratio 1:5	– –	– 460 million tonnes of spoil – 460 million tonnes of processing residues with high levels of radionuclides, heavy metals and metalloids
Change in Relief	– large areas of subsidence, spoil heaps	– open-pit lakes, spoil heaps	– subsidence (controversial)	– pits, spoil heaps

	Hard Coal	Brown Coal	Crude Oil and Natural Gas	Uranium
Adverse Effects on Surface Waters, Groundwater and Coastal Waters	– discharge of 100 million m^3 of water with high salt content into the Rhine, Ruhr, Lippe and Emscher – change in groundwater level (absolute lowering, relative increase in subsidence areas)	– groundwater lowering over large areas, loss of groundwater amounting to several km^3 – critical water quality in open-pit lakes because of acidic seepage (high salinity, high iron and heavy metal content	– risk of groundwater contamination through use of drilling fluids – discharge into the North Sea of oil and oily process water during extraction, transport and processing, causing damage to the marine environment	– acidic, radionuclide-containing seepage caused by oxidation of pyrite in spoil heaps and by residues of processing acids

	Hard Coal	Brown Coal	Crude Oil and Natural Gas	Uranium
(continued) **Adverse Effects on Surface Waters, Groundwater and Coastal Waters**	– in spoil heaps and spoil areas: release of sulphuric acid, mobilization of aluminium and heavy metal ions, large amounts of easily soluble salts, inputs into surface waters and groundwater		– input into the North Sea of operating materials, antifouling paints, drilling fluids, etc.	– mobilization of radionuclies, heavy metals and metalloids by change in redox potential and by complexing agents in groundwater
Emissions	– climate-relevant methane emissions	– no climate-relevant emissions	– methane emissions during extraction and distribution amounting to max. 2%	– Radon emissions resulting from decay of thorium, causing risk of lung cancer
Site Contamination	– soil contamination at extraction and processing sites resulting from improper handling of operating materials, leaks, specific pollutants, etc.		– surface contamination of installations and of the surrounding area	– low-radioactive wastes

The most important environmental effects caused by the extraction of energy resources in Germany are (see also Table 1):

- land use and habitat loss,
- materials extraction and transport,
- change in relief (subsidence, abandoned pits and open-pit lakes, etc.),
- adverse hydrological/hydrogeological effects,
- chemical pollution of groundwater,
- pollution of coastal waters caused by offshore oil and natural gas extraction,
- emissions of methane and radon,
- contamination of resource extraction sites.

Adverse Environmental Effects Caused by the Conversion of Energy Resources

250.* The emissions caused by converting fossil fuels into energy are primarily carbon dioxide, sulphur dioxide, nitrogen oxides, ammoniac, carbon monoxide, nitrous oxide and methane (see Chapter 2.4.4), as well as heavy metals, particulate matter, and simple (e.g., formaldehyde) and complex organic compounds. The most important effect of these emissions on the environment is the anthropogenic greenhouse effect. Other important effects are the acidification of soils and surface waters, eutrophication, depletion of the ozone layer, and toxicological and ecotoxicological pollution. The emissions produced depend to a great extent on the conversion and end-of-pipe emission reduction technologies used.

Natural gas is the best fossil fuel for heating or electricity-generating purposes because it produces the least emissions, especially CO_2 emissions, of all the fossil fuels. It thus seems to be relatively the best suited fuel to offset, in the medium term (i.e., 20–30 years), the energy losses that will be incurred by phasing out nuclear energy production. However, the increased use of natural gas will,

compared with the use of nuclear energy, cause CO_2 emissions to increase considerably. In the long term, renewable energy sources, as well as energy conservation and energy efficiency strategies, will have to be used to fill the gap left by the nuclear energy phaseout.

Adverse Environmental Effects Caused by, and Environmental Risks Associated with, the Use of Nuclear Energy

251.* The use of nuclear energy to generate electricity involves risks inherent in the nuclear fission process itself, as well as the risks posed by operating a nuclear power plant, the risks posed by the radioactive wastes produced, and risks posed by natural catastrophes or sabotage. The main risk is the risk that radioactive substances could be released and taken up elsewhere. These are substances which are produced with great intensity and in great diversity and which must thus be safely encapsulated. Numerous types of radioactivity accumulate during plant operation and can be released to varying degrees over areas of various size as a result of malfunctions or accidents. For environmental and radiation protection purposes, radioactivity has to be safely encapsulated during normal operations, during malfunctions and accidents in the plant, and during temporary and long-term storage of radioactive materials. Risks also come from without, however: aircraft crashes, sabotage and other types of force majeure (e.g., earthquakes), for example, are external risks.

252.* When radioactivity is released, it can threaten the environment and human health through various channels, i.e., exposure both from without and from within is possible. Important criteria for determining risk are the type and intensity of radiation during exposure, chemical and radiotoxicity when incorporated, the possibility of a self-sustaining chain reaction (criticality), generation of heat, and the possibility environmental compartments being contaminated.

In assessing the environmental burdens and risks caused by the use of nuclear energy, one should differentiate between

- risks that are posed by normal nuclear power plant operation as well as by malfunctions and accidents,

- risks posed by the disposal of the nuclear wastes generated by reprocessing, and by the temporary and permanent storage of such wastes, and
- risks posed by the transport of radioactive substances.

There are residual risks in *operating* all nuclear power plants, risks such as the possibility of core meltdowns, which would have disastrous consequences because the plants are not built such that meltdowns could be controlled. Further, as the plants age, such extreme safety risks as corrosion, embrittlement, etc., are certain to occur. Thus the Council calls for the presumable gap between the safety technology in use in plants and the state of the art to be narrowed as quickly as possible.

Further, the system of disposing of radioactive wastes generated during nuclear power plant operation and during reprocessing is still not a satisfactory system. Such wastes pose a potential risk for periods of more than 10,000 years, too long a time to be able to estimate how great their potential risk is.

Scientific studies which were to serve as the basis for choosing suitable repositories for atomic wastes have never been able to determine what constitutes an absolutely safe repository. The Council is thus convinced that there is no ideal repository for (highly) radioactive wastes. A consensus about how to resolve the controversy over the risks posed by long-term storage is nowhere in sight. Thus, it is even more important to decide what criteria to use to determine the long-term safety of repositories and how to weight the criteria within an overall disposal concept. Presumably, disposal of nuclear wastes in repositories will not be able to begin for twenty to thirty years, which is why a decision about the repository site needs to be made before 2010 at the latest.

There needs to be a disclosure of whether current temporary nuclear waste storage capacities will suffice to meet storage needs until an adequate repository is found. The advantages and disadvantages of centralized or decentralized temporary storage also need to be carefully considered. A central temporary storage site would provide economies of scale, especially as

regards controlling risks; on the other hand, decentral sites would distribute the environmental burdens involved and entail fewer transportation risks.

Every stage in the use of nuclear fuels, from their extraction as resource to their disposal as nuclear waste, involves transporting radioactive materials. The potential risks involved in transporting them on the supply side are, on the whole, less serious than the potential risks involved in transporting them on the disposal side, because the materials are more radioactive after being subjected to fission than before. The Council is of the opinion that the risks of allowing threshold values to be exceeded during transport of radioactive wastes should not be taken lightly. Instead, a graduated system of fines or other penalties which are commensurate with the degree to which threshold levels are exceeded and the risks that this poses should be introduced. The Council thus welcomes government plans to harmonize and supplement the regulations pertaining to the transport of hazardous materials. The Council recommends using internationally recognized radioactivity protection principles to assess the risks posed by uneventful (accident-free) transport. With regard to risks caused by transport accidents, the Council recommends that, rather than merely testing prototype containers, the materials testing of individual transport containers during and after manufacture should be improved.

253.* Overall, in evaluating the risks posed by nuclear energy, the Council considers the risks concomitant to the disposal of nuclear wastes to be the most important risks. There are, of course, residual risks involved in operating nuclear power plants, which is why the presumable gap between the safety technology in use in plants and the state of the art must be narrowed as quickly as possible. Nevertheless, the disposal of radioactive wastes which result from the operation of such plants and from the reprocessing of nuclear fuels seems to constitute the more pressing problem. This problem still remains to be resolved; it involves a high damage potential over periods of time that are geological in length. Estimating this damage potential over such a long period is almost impossible. In addition, the Council would like to point out that there are serious time constraints involved in the disposal of nuclear wastes, constraints which are engendered by the high radioactivity of the wastes, by the heat they generate on an ongoing basis, and by the corrosion and microbial degradation of the barrier materials used in disposal.

The Council is of the opinion that, given the characteristics of irradiated fuel rods and the unresolved disposal problem they pose, further use of atomic energy would be irresponsible.

Environmental Impacts of Renewable Energy Use

254.* The criteria which are applied to renewable energy in public and often also in policy discussions are often considerably more stringent, for unwarranted reasons, than the criteria applied to non-renewable energy sources. Discussions of environmental burdens caused by energy production and energy conversion, often point out, in great detail, that renewable energy sources, which are generally low-emission energy sources, cause environmental burdens upstream and downstream on the energy value-added chain, as if conventional (fossil) primary energy sources did not cause similar burdens. For example, they point out that fertilizers are used to produce biomass or that photovoltaics engender waste problems. A close look at the environmental burdens caused by the production and conversion of renewable energy sources shows that they are negligible given the current quantitatively insignificant use of renewable energy sources.

Environmental impairment resulting from the use of renewable energy sources generally occurs gradually and is, moreover, reversible. Further, it can be reduced. Adhering to 'good agricultural practice' in cultivating biomass for energy purposes can contribute immediately to reducing such impairment. Using extensive cultivation methods would contribute even more. Possible impairment of the landscape by wind power plants could be remedied by concentrating them in particular areas and by planning these areas carefully. The production of photocells also produces certain problematic wastes, but this problem is dealt with adequately by existing legal requirements. Since solar panels are generally used in built-up areas or near roads their use is not problematic with respect to landscape protection. The capacity of small hydroelectric power plants should only be increased after carefully considering the effects of doing so on aquatic ecosystems, and if these effects are uncertain their capacities should not be increased at all. Nothing speaks against the recommissioning of old hydroelectric power plants, however, as the streams and rivers that feed old plants have already been heavily engineered.

In contrast to the environmental impairment caused by the use of renewable energy sources, the environmental impairment caused by the extraction of fossil energy sources gives good reason to be more critical about using them, and also about using domestic brown coal.

3.2.3 Energy-Related Environmental Policy Objectives

255.* In designing the future energy regime, general environmental policy and energy supply objectives will play a role. As regards the environmental policy objectives, two sets of objectives are the most important: emission reduction objectives for energy-related pollutants and objectives pertaining to the conflicts that obtain between energy use and soil, water, landscape and nature protection. These conflicts arise primarily in connection with the production and extraction of energy resources. The emission reduction objectives are increasingly focusing on GHG emissions (CO_2, N_2O, CH_4). There is a certain justification in doing so given the successes in reducing emissions of SO_2, NO_X and particulate matter. However, as regards these and other, especially carcinogenic, pollutants there is no reason to sound the all-clear signal. Nonetheless, it is also obvious that the greatest adjustment costs that will be incurred by implementing sustainable energy use will be the adjustment costs incurred by reducing GHG emissions.

3.2.4 Environmental-Policy-Related Energy Policy Objectives

Conserving Energy Resources as an Independent Environmental Policy Goal

256.* As regards energy supply objectives, the Council has concerned itself with the question of what weight to give the objective of conserving energy resources in a future energy regime, and whether this objective justifies government interventions into energy resource markets. Government interventions into energy resource markets are less legitimate than government interventions made necessary by negative external effects in the form of environmental impairment engendered by energy production and conversion, because, unlike in the case with the classic environmental goods, in the case of resources there are markets that generally ensure that specific scarcities are taken account of by producers and consumers. Nonetheless, uncertainty about how comprehensive and efficient the market is with respect to energy resources is sufficient enough to warrant the use of corrective government interventions as subsidiary measures, whereby the use of

technology policy measures to promote the development of technologies that could be sustainably substituted for scarce, non-renewable energy resources is especially warranted. The extent to which this justifies providing subsidies is, however, controversial. The Council thus recommends exercising restraint. It could be useful to subsidize pilot projects in which mature and marketable but relatively unknown technologies could be demonstrated, thus helping to introduce them into the market. However, subsidies for such projects should only be provided for a limited amount of time in order to let it be understood that the production of the technologies involved will not be subsidized by the government on an ongoing basis.

Further, the Council is of the opinion that, in designing the future energy regime, actual environmental objectives should be given priority. According environmental objectives priority is appropriate not only because they are more justifiable, but also because, given the prerogative of the CO_2 reduction target, a policy approach that is primarily concerned with environmental impacts must inevitably concern itself, in the long term, with energy resource conservation and must consider energy conservation strategies extremely important. It should be ensured, however, that such strategies are more efficient than other possible strategies by referencing them to environmental objectives.

Energy Supply Security as a Special Energy Policy Objective

257.* In addition to environmental objectives, the objectives of energy supply security are often given as justification for government interventions into energy markets. These objectives are

1. securing an adequate national supply of primary energy sources with which to generate electricity and

2. securing an uninterrupted supply of electricity.

These objectives are still often used to justify government interventions into energy markets (e.g., crude oil storage policy, hard coal subsidies, regulation of electricity and gas markets). However, one should not overlook the fact that measures used to secure the national energy supply are often at cross-purposes with environmental policy objectives.

The objective of securing the supply of primary energy sources does not currently justify taking any further measures to prevent supply bottlenecks. Instead, existing regulations should reassessed with regard to their suitability and commensurability. Open markets, rather than closed markets, seem to be suited to reducing the risk of possible supply bottlenecks. Free access to primary energy markets and the use of diverse energy sources in power plants contribute crucially to securing the supply of primary energy sources. Subsidizing domestic brown coal is, in the end, ecologically counterproductive, as it obstructs the structural change called for by environmental policy and discourages using resources economically.

Electricity markets should be made more viable using deregulation and re-regulation measures. In competitive electricity markets, consumers would be able to contract for supply services that would meet their own individual needs. The objective of ensuring a reliable electricity supply could be achieved with a liberalized EU internal market much more economically than with area monopolies.

258.* Energy supply policy considers supply security to be a classical reason for intervening into primary and secondary energy markets. For decades, the government has attempted to justify German brown coal subsidies as being necessary to secure domestic primary energy sources. The comparative disadvantage of hard and brown coal is most likely one of the main, but publicly never mentioned, reasons why the government initiated the ecological tax primarily as an electricity tax (and not as an emissions tax, as it had been called upon to do by the Council). Nonetheless, there is a growing body of evidence that direct subsidization of hard coal and the indirect subsidization of hard and brown coal via the electricity tax or the mineral oil tax is not only counterproductive from an environmental policy point of view, but is also no longer justifiable from a supply security point of view, and has not been for some time.

3.2.5 Technological Potentials for Achieving Environmental Policy Objectives

259.* Given existing and foreseeable technological potentials for achieving sophisticated objectives aimed at mitigating environmental stress, in spite of the nuclear energy phaseout, there is, in the opinion of the Council, no reason to be pessimistic about the energy supply. The fact that

the contribution of renewable energies to meeting energy needs is still small and that measures to use energy rationally and to save energy have not yet had the desired effect is due to low energy prices, prices which have even fallen to some extent in real terms. This, together with experience with the two oil price increases in the 1970s, after which oil demand increases became delinked from gross national product growth to an extent previously thought impossible, have understandably given rise to a general, lax attitude that energy prices do not justify exploiting technical potentials to use energy rationally or to conserve energy. In order for these potentials to be better exploited, and thus to mitigate the environmental stress caused by energy production and use, it will have to be made clear that prices will increase and will do so continually. Further, the government will have to announce, in a credible manner, that the environmental costs caused by energy production and use will continue to be covered by continually adding them to energy costs.

The Contribution of Renewable Energies to Meeting (Primary) Energy Needs

260.* Great hopes are placed in renewable energies being able to make an important medium- and long-term contribution to protecting the environment and especially the climate. Eco-accounting reports indicate that renewable energies contribute appreciably to making energy supply structures in Germany more environmentally and climate compatible. Estimates of the technical potential of decentrally used renewable energies in Germany vary considerably according to the assumptions made about technical data, especially data on use efficiency, and about available sites and the spatial and temporal distribution of renewable energy flows.

In estimating this potential one has to differentiate between technical energy production potential, which is subject to technical and structural limitations, and technical final energy use potential, which is additionally subject to demand-side limitations (e.g., seasonal fluctuations in electricity and low-temperature heat demand, and network losses), and these limitations, i.e., losses in potential, have to be factored in. The final use potential can be considerably lower than the production potential particularly because wind and solar energy conversion are irregular and not demand oriented. Taking these differences into account, Kaltschmitt (1999) estimates that the final energy use potential for all renewable energies in Germany to *produce electricity* is between 292

and 355 TWh/a. To put this into proportion, gross energy production in Germany in 1997 was 547.2 Twh/a.

The potential of renewable energies to *provide heat* is only large enough to cover the demand for low-temperature heat, which, for households small users and industry, amounts to about 4600 PJ/a . Higher temperatures can only be achieved by using biomass. Nonetheless, even taking structural and demand-side losses in potential into account, the demand for low-temperature heat could be met almost exclusively by renewable energies.

261.* The economy of the renewable energy use systems currently being discussed depends crucially on the prices of competing energy sources. The generally low prices of conventional energy sources, which result because the external costs of their use are not taken into consideration, prevent technical potentials from being exploited to any great extent. Uncertainty about prices makes it difficult to estimate the profitability of using technologies that do not afford clear profits. Counterproductive subsidies also distort price structures.

262.* To compare the profitability of using the various renewable energy technologies, these technologies can be divided into three groups:

- market-proximate, well-developed technologies already in use, technologies that will be responsible for the greatest increase in the use of renewable energies by 2010: hydroelectric power, wind power, solid biofuels derived from residual wastes;

- technologies that have not yet been widely used or have only been used for demonstration purposes, technologies which, if they were to gain a larger market, would bring about improvements in the state of the art and/or reduce energy prices: solar thermal collectors, biogas technology, energy crop use and geothermics;

- photovoltaics, currently the most expensive, but in many respects, the most proven and most widely used long-term option.

263.* It is expected that renewable energies will be used (given a doubling in energy prices) to meet approximately one-fourth of energy needs within the next 25 years.

Regeneratively produced hydrogen is a long-term option for replacing fossil fuels which is of considerable importance. Thus, research efforts aimed at resolving the problems involved in storing hydrogen should be promoted more intensively, as should efforts to establish the necessary institutional infrastructure for a hydrogen-based energy supply. The latter will require reliable cooperation between the North and the South.

The Contribution of Rational Energy Use and Energy Conservation to the Attainment of Environmental Policy Objectives

264.* Combined heat and power (CHP) production is especially important as regards rational energy use strategies. Producing usable heat and electricity at the same time generally provides for better exploitation of energy sources than separately producing electricity in condensation power plants and heat in heating plants. Nonetheless, not every type of CHP is ecologically and/or economically superior to the separate production of heat and electricity. District heating power plants and district heating supply networks are ecologically and economically efficient, but CHPs used in conjunction with long-distance heating systems are of questionable ecological and economic efficiency because considerable heat is lost in the large long-distance supply networks and because these networks cause high fixed costs. Thus the CHP subsidy protection that municipalities have been asking for is ecologically unjustifiable given the size the of their CHP supply networks. These systems have only been able to survive economically because of the monopolistically distorted price structure established by the large electricity suppliers. Now that this price structure is being corrected by liberalizing the electricity markets, many of these municipal CHP systems have become white elephants, and should, also for ecological reasons, be replaced by smaller CHP systems (e.g., in the form of district heating power plants). Thus, subsides for municipal CHP systems should only be given in order to prevent municipalities from being financially ruined by market adjustments. Moreover, the best way to promote ecologically and economically sustainable municipal CHP systems would be to allow their operators non-discriminatory access to electricity supply grids, because it was the large electricity monopolies' discrimination of the municipal CHP systems that prevented the establishment of small CHP supply systems on an area-wide basis in the first place.

The greatest potential for conserving energy relates to the heating of old buildings. Activating this potential has, however, been hampered by the fact that building and flat owners will only be willing to invest in building insulation and new heating systems when doing so is motivated by appropriate energy pricing.

On Isotope Transmutation

265.* Because Germany is shutting down its nuclear power plants, there has been some discussion of isotope transmutation (i.e., the conversion of unwanted, long-lived radioactive atomic nuclei: transuranium elements, fission products) as a future option which could make a new generation of inherently safe nuclear power plants possible while also making it possible to convert nuclear wastes.

Whether transmutation will, however, contribute to technically resolving the nuclear waste problem and whether it is thus an alternative to the long-term storage of nuclear wastes will not be known until after several decades of intensive research and development work. The special advantage of this new technology is that it would combine waste conversion with the use of thorium stocks in a subcritical breeding process. However, as long as the feasibility of this technology is based only on laboratory experiments and numerous technical problems remain unresolved, its theoretical potential will have to be viewed very sceptically. If research work were to be expedited, it would have to been done within the context of international cooperation.

The gain in safety that this technology would provide with respect to long-term storage would, however, have to be considered, by reactor experts as well as by the public at large, to more than offset the sum of all risks posed by actinide and fission product partitioning, transmutation and transport. Given past experiences with nuclear energy use, one can safely assume that this would not happen. Especially the expansion of reprocessing capacities that would be necessary should be viewed somewhat sceptically. Evaluation of the risks of implementing transmutation technology would have to take all of these activities into account in a comprehensive manner.

3.2.6 On Liberalizing Electricity Markets

266.* In its 1994 and 1996 reports, the Council already called for liberalization of electricity and gas markets. It considers the liberalization of these markets to be a prerequisite for implementing sustainable environmental policies, as it would provide additional scope with respect to policy design. Liberalization of the electricity market is of considerable importance for environmental policy for the following reasons:

First, increased competition would engender greater efficiency in generating and distributing electricity and would thus free up resources that could be used elsewhere, in the area of environmental policy, to increase welfare. To be against the liberalization of the electricity market because concomitant decreases in prices would increase energy consumption would be tantamount to capitulation. The opposite is the case: we need the cheapest supply of electricity possible so that we can afford the most sustainable supply of electricity possible. This means, however, that the liberalization of the electricity market needs to be accompanied to a greater extent by environmental policy flanking measures than has previously been the case.

Second, the decrease in prices engendered by electricity market liberalization would create more scope for the ecological tax reform, not least as concerns mitigating conflicts between emission reduction objectives and price stability and employment objectives.

Finally, liberalization of the electricity market would provide the access to transmission and distribution networks which is a prerequisite for being able to better distribute the electricity produced by regenerative energy and CHP systems. Opening up the electricity market can thus be considered to be a necessary component of a sustainable energy policy.

267.* Overall, the steps taken so far to liberalize the energy market, as well as energy legislation, have not been sufficiently aimed at reorienting the energy market. The Council is of the opinion that current energy legislation is ecologically and economically inadequate for three reasons: First, the Energy Act (EnWG) of 1998 does not provide independent producers of electricity who have no transmission or distribution networks of their own with truly non-discriminatory access to such networks. Second, environmental policy measures with which to compensate for the fall in

electricity prices caused by market liberalization are inadequate. Third, the ways and means provided for in the Energy Act of protecting and promoting renewable energies and CHP systems do not suffice to ensure implementation of environmental and climate protection objectives pertaining to electricity production, and thus do not ensure implementation of one of the act's own objectives.

268.* In view of the above, the Council is of the opinion that the energy reform measures that have been implemented or announced need to be augmented or corrected in three respects:

1. The extent of the opening of electricity market initiated by negotiated access and the Associations Agreement's transmission tariffs is too minimal. The technical and economical complexity of transmission and its costs provides vertically integrated electricity companies with a potential for discrimination that cannot be controlled by regulations. Thus, non-discriminatory access to transmission and distribution grids can only be ensured by institutionally taking away any interest transmission services providers may have in discriminating against electricity producers (in order to sell their own electricity) by de-integrating electricity companies. There are already numerous examples of institutionally independent transmission and distribution grids in other countries. Whether such grids (the details of which are not very important in an environmental policy context) are not possible in Germany because of ownership structures, constitutional problems or prohibitively high transaction costs has yet to be determined. The government should thus seriously assess the feasibility of establishing such grids.

   Should they not be feasible and should negotiated access continue to be used in its present form, then additional measures will need to be taken to more effectively prevent discrimination of electricity providers who have no grid of their own (which includes practically all renewable energy providers as well as most potential district heating power station operators). In particular, a regulatory authority, for example, like the one in the area of telecommunications, should be established whose primary mission would be to promote the ability of alternative electricity providers to compete against the considerable market power of the traditional electricity providers.

2. Environmental policy flanking measures for the liberalization of electricity markets have, on the whole, been too cautious and need to be structured differently. The ecological tax reform, which went into effect in April 1999, will not suffice to allow announced emission targets, especially GHG emission targets, to be achieved by 2010. Thus, achieving these targets will depend on the (additional) measures taken during the next legislature period. In addition, rational energy use investments, energy conservation strategies, technological advances that mitigate environmental stress, and behavioural changes need to be engendered, which can best be accomplished by creating appropriate long-term price expectations.

3. Direct subsidization of renewable energy sources or CHG systems is problematic, in the opinion of the Council, in that it would unnecessarily constrain policy-makers' freedom to choose the adjustment measures needed to achieve actual environmental policy objectives. Nonetheless, the Council considers government subsidization of environmentally friendly electricity generation methods to be necessary as long as the specific pricing of emissions (the optimal solution) is shunned for political reasons. In subsidizing such methods, quantity-based instruments (in the form of a quota system, as already used in some countries) should be given preference over price-based instruments (electricity feed-in or renewable energy legislation). Quota systems can be designed such that they are in line with the principles of free competition. Given the increasing integration of European energy markets, they also have the advantage of being relatively easy to implement in an international framework. With regard to establishing such a system, time limits for subsidies should be stipulated in order to prevent the further development of technologies which have no long-term prospects of being successful in the marketplace.

3.2.7 On Phasing Out Nuclear Energy Use

269.* The Council is of the opinion that continued use of nuclear power would be irresponsible given, inter alia, the largely unresolved problems in disposing of nuclear wastes. In its coalition agreement the government agreed to 'comprehensively phase out nuclear energy use within this legislature period and to make the phaseout legally irreversible', and to do so without

compensating nuclear power plant operators. It has been attempting, in energy consensus talks, to negotiate specific phaseout periods with the operators.

The Council endorses the government's strategy of attempting to negotiate a compensation-free, consensual phaseout agreement with the operators because of the legal uncertainties involved. Based on this agreement, phaseout legislation in which the specifics of the agreement (including phaseout periods) are laid down should be enacted as soon as possible. In the opinion of the Council, the legitimate interests of the nuclear power plant operators, who invested in such plants because they trusted in the immutability of the legal situation at the time, would be taken sufficiently into account by allowing them 25 to 30 years to phase out operations.

270.* In continuing the negotiations, the Council recommends that instead of proposing comprehensive phaseout periods, each of the nineteen plants in operation should be dealt with on its own merits. This does not mean that similar plants cannot be put into general plant categories and dealt with accordingly. If only for reasons of practicability, this is actually recommendable. The Council thus suggests setting up three plant categories, each of which would have a different, but nevertheless somewhat variable, phaseout period. These categories should be based on the safety standards used in the various plants and thus on the risks they pose. Further, they should be based on the size of the population they could put at risk, their temporary storage capacity and the reasonableness of their being shut down quickly. Dealing with the plants on their own merits would take the considerably different safety standards used in the plants better into account than the previously proposed approaches can. Categorizing the plants, although it involves generalization, would still ensure better case-by-case fairness and would thus do justice to the constitutional right of ownership (Article 14 of the Basic Law) better than a comprehensive arrangement would.

271.* After the plants have been categorized, maximum phaseout periods should be specified for each of the three categories.

The phaseout period for the plants in any particular category should, however, not be established unilaterally by the government; rather, it should be left up to the plant operators to determine their own phaseout periods.

The government would merely set the maximum phaseout period for each category, and the plant operators would be able to decide for themselves whether to take advantage of the full phaseout period or to phase out operations before the end of the phaseout period. This would provide the plant operators with a considerable amount of entrepreneurial scope.

This method of freely negotiating phaseout periods within a category should be subject to a limitation, however, this being that phaseout periods should be shorter for individual plants that pose serious safety risks or suffer from serious problems. In this case, poor safety could not be offset by other, above-mentioned criteria, such as high temporary storage capacity or low risk to the population.

272.* On the whole, Germany's strategy for phasing out nuclear energy use should, in the opinion of the Council, be carried out together with and coordinated with other EU countries willing to phase out nuclear energy use, such as Belgium, the Netherlands and Sweden.

273.* In conclusion, the Council would like to point out that nuclear power plants provide two-thirds of Germany's base power. The loss of this power in the medium term will not be able to be offset without building new conventional power plants, causing, in turn, a massive increase in CO_2 emissions, unless adequate climate policy measures are taken in time. The need for climate policy action should, however, not be used as an argument against phasing out nuclear energy use. Rather, parallel to establishing phaseout periods, the framework conditions delineated by the Council need to be brought about in order to secure the energy supply, in spite of the nuclear power plants being shut down, by increasing energy efficiency and by increasing the use of renewable energies.

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