



# Global Environment Facility

June 21, 2001

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OPERATIONAL PROGRAM NUMBER 11  
PROMOTING ENVIRONMENTALLY SUSTAINABLE TRANSPORT

## CONVENTION GUIDANCE

11.1 The United Nations Framework Convention on Climate Change (UNFCCC) seeks to stabilize atmospheric greenhouse gas concentrations at levels that would prevent dangerous anthropogenic interference with global climate. At its first meeting, the Conference of the Parties (CoP) of the UNFCCC asked the GEF, then the interim operating entity of the financial mechanism...

...to adopt a mixed strategy wherein projects will be selected with a double set of program priorities as described in paragraph 9(c) of the [GEF] report, that is, if they meet either one of the long-term program priorities or one of the short-term program priorities.

11.2 The CoP also provided the following initial guidance that the GEF, as the interim operating entity of the financial mechanism of the Convention, should support agreed activities in Parties not included in Annex I to the Convention<sup>1</sup> that:

- (a) are country driven and in conformity with, and supportive of, national development priorities;
- (b) are consistent with and supportive of internationally agreed programs of action for sustainable development;
- (c) transfer technology that is environmentally sound and adapted to suit local conditions;
- (d) are sustainable and lead to wider application;
- (e) are cost-effective;
- (f) strive to leverage other funds; and
- (g) mitigate climate change.

## INTRODUCTION

11.3 The Operational Strategy of the GEF in the Climate Change focal area initially emphasized three Operational Programs that address *long-term* program priorities of UNFCCC to *mitigate* climate change. This, the fourth Operational Program in the climate change focal area, promotes the long-term shift towards low emissions and sustainable transport forms. In 1990, the transport sector accounted for a quarter of the world's primary energy use and three-fifths of oil products use. Reduced emissions of greenhouse gases (GHGs) from this sector will be essential for stabilizing GHG concentrations. Widespread shifts towards modes that result in low emissions offer some of the best prospects globally for achieving deep reductions in greenhouse gas emissions over the next century while satisfying a given demand for mobility.

11.4 Transportation systems require long lead times to change because they are interconnected and entail expensive investments in infrastructure. First, there are several links in a fuel chain from fuel production to fuel transport to conversion to distribution to end-use, and

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<sup>1</sup> When the GEF provides assistance outside the Convention's financial mechanism, it will ensure that such assistance is also fully consistent with the guidance provided by the CoP.

ultimately to the service that is desired--mobility. Second, there are several alternative pathways for powering vehicles. For example, fuel cell vehicles can be powered by gasoline, by methanol or by hydrogen, each of which can be produced in several different ways. Finally, each link in the fuel chain has a development sequence from targeted research to full commercialization as described below in paragraph 11.11. A transport system becomes sustainable only when all links in its chain have proved fully commercial and when the related infrastructure has been put in place.<sup>2</sup>

11.5 Both because of the magnitude of greenhouse gas emissions from the transport sector and because of recipient country demands to address those emissions necessitates that GEF respond to curtail greenhouse gas emissions. The complexity of the transport sector coupled with the difficulty in achieving breakthroughs given the realistic level of resources available to GEF to devote to the transport sector necessitate a selective and catalytic approach.

11.6 The structure of this Operational Program follows the logical framework of the existing Programs. There are five levels from starting from resources to activities to outputs to outcomes to program objectives. At each level, we describe the assumptions made and the risks involved in reaching the next level and the indicators we would use to monitor progress. With the provision of GEF *resources* (par. 11.7), Implementing Agencies will carry out certain eligible *activities* (par. 11.10-11) in recipient countries that would produce *outputs* (par. 11.21), which when coupled with other outputs, lead to successful *outcomes* (par. 11.28), which when replicated, achieve the program *objective* (par. 11.33).<sup>3</sup> See Table 1 for a summary description.

## RESOURCES

11.7 Given the long lead times for the development and deployment of transport technologies, as well as the time required for them to come down in costs, time horizons for the achievement of program objectives will typically be on the order of decades. Transportation systems can only be modified significantly on decadal time scales. Analysis of indicative project pipelines and estimates of minimum “critical mass” of support for the various technologies under this program suggest an initial requirement of \$60 million per year in GEF grant resources, gradually increasing to \$100 million per year, over 5 to 10 years as investment demand and absorptive capacity grow and then reducing as the program succeeds in its objective. The GEF will undertake further work on determining the longer term resource requirements. It is clear that as the total amount of financial resources required to change transport systems is very large, the GEF with its limited resources can only play a catalytic role.

11.8 A critical assumption here is that the measures identified under this *program* will have security of funding and long-term commitment of continuing support from GEF and other financiers.

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<sup>2</sup> While significant changes in transport infrastructure are expensive and take a long time, all countries can undertake several cost-effective demand-side measures, such as traffic avoidance and modal shifts to public transport, to manage and reduce demand for mobility relatively quickly and with less resources.

<sup>3</sup> To give more emphasis to activities that GEF will finance, this sequence is presented in reverse of the usual order.

## GEF ACTIVITIES

11.9 For cost-effectiveness, the scope of activities covered by the Operational Program needs to be limited to those measures that provide a significant opportunity of reduction in GHG emissions and to those technologies whose costs will drop significantly with economies of scale in manufacture. However, to reduce the portfolio risks and to widen the geographical coverage, the scope of the measures covered cannot be too narrow. After consultation with STAP, IAs and with interested NGOs, the following measures were selected for initial emphasis:<sup>4</sup>

11.10 For reasons mentioned in paragraph 11.9 above, the scope of this program will initially emphasize and promote the following measures in *ground transport* :

- (a) Modal shifts to more efficient and less polluting forms of public and freight transport through measures such as traffic management and avoidance and increased use of cleaner fuels;
- (b) Non-motorized transport;
- (c) Fuel-cell or battery operated 2- and 3-wheelers designed to carry more than one person;
- (d) (Hydrogen)-powered fuel cell or battery-operated vehicles for public transport and goods delivery;
- (e) Internal combustion engine-electric hybrid buses; and
- (f) Advanced technologies for converting biomass feedstock to liquid fuels.

By promoting shifts towards these measures, GEF will accelerate either their development, their deployment or their full commercialization.<sup>5</sup>

11.11 GEF finances all activities, including project preparation, on an agreed incremental cost basis. For each of the measures listed in paragraph 11.10, the types of activities that can be financed include strategic planning, targeted research, training, capacity building, technical assistance, demonstration projects, investments, market transforming activities to achieve full commercialization and dissemination of lessons learned that lead to replication of successful GEF-financed measures. The following describes in brief the types of activities that GEF will finance on an incremental cost basis in this Operational Program:

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<sup>4</sup> Following considerations were important in the selections of measures for initial emphasis:

- (a) extent to which basic RD&D has already been done (for technologies where the markets are both in recipient and developed countries) or significant prior operational experience exists; and the size of remaining technological barriers and risks;
- (b) extent to which the primary market is in the recipient countries because of resource endowment, market conditions and potential for that technology, when commercial, to reduce greenhouse gas emissions. This therefore makes support for electric cars ineligible for GEF financing under this operation program.
- (c) technology's current cost and prospects for education in cost of the technology in question; the contribution that GEF financing can make to cost reductions and to making the "measure" independently economic when GEF support has ended. This make urban mass transit systems ineligible for financing; and
- (d) multiple domestic benefits from the technology (safety, air quality, easing congestion, etc.) and the possibility to influence multiple transport systems.

<sup>5</sup> Cost effective measures that merely increase the efficiency of current systems, which continue to be based on fossil-fuels, should be justified as short-term response measures projects.

- (a) Integrated **strategic urban, land-use and transportation planning** to set out plausible development paths to environmental sustainability;
- (b) **Targeted research** on integrating information on country resource endowment with that on the cost-effectiveness of potential applications; on potential costs and benefits of selected measures, including on techniques for estimating fuel savings, and on adaptation to local conditions;
- (c) **Training, capacity-building and technical assistance** for reducing uncertainties about costs, performance, and benefits; for strengthening local capabilities and institutions to operate, manage, maintain, and evaluate eligible sustainable transport measures (paragraph 11.10); for identifying, planning, implementing and integrating follow-on projects. Such measures also include institutional strengthening to adopt supportive regulatory frameworks, and financial evaluations.
- (d) **Demonstration Projects** with clear benefits, such as reduced uncertainties about costs, performance and market acceptance. Demonstrations can also help in the resolution of institutional issues associated with a new technology, and with the development of maintenance and service infrastructure.
- (e) **Investment** in the most promising applications conforming with Operational Program guidance. Cost reductions will be accomplished by promoting technology transfers, joint ventures, local manufacturing, learning by doing, and achieving economies of scale.
- (f) **Market Transformations to achieve full commercialization**, including the use of innovative non-grant financing modalities, and
- (g) **Dissemination** of learning and experience to lead to wider application of sustainable transport measures.

11.12 For project activities to lead to successful project outputs, several assumptions are expected to hold and several risks are expected to be minimized. Assumptions and risks are two sides of the same coin. As assumption not met turns into a risk that can cause project or program failure. Most risks can be addressed and minimized with appropriate project design and preparatory work, but not all. Certain risks, as shown below, are exogenous to the project and apply at a different level and are common to all operational programs in climate change. These risks can only be acknowledged but can not be addressed in individual projects or even programs.

11.13 GEF activities under this Operational Program will address identified national priorities and needs, and build upon previous GEF, bilateral, and multilateral experience. National Communications to the UNFCCC and the several on-going GEF enabling activity projects will be particularly helpful in identifying project ideas and national priorities.

11.14 GEF assistance will provide more **sustainable** benefits in those markets where there is a conducive recipient country environment—where there are no severe energy price and other distortions against environmentally sustainable transportation systems. A macroeconomic and policy environment that allows and encourages fair competition is desirable for promoting the

sustainability of low-emission transport measures, which should not be penalized by special taxes or by subsidies provided to competing technologies or modes. To enhance sustainability, the activities included in par. 11.10 are those that also provide multiple domestic benefits.

11.15 It is one of ten basic operational principles for GEF that its projects will provide for consultation with, and participation as appropriate of, the beneficiaries and affected groups of people. GEF has adopted a policy of public involvement establishes guidelines for information dissemination, consultation, and stakeholder participation in projects financed by the GEF.<sup>6</sup> While the forms and degree of participation will vary, user participation is envisaged for all projects. Project proposals will document therefore the presence of local support, the lack of local constituencies' opposition, and the highlight the possibility of using existing infrastructure to the extent possible.

11.16 The cost-effectiveness of GEF activities will be higher where:

- (a) the resource base is near the project site (e.g., in biomass conversion projects);
- (b) stakeholders participate in the technology development and commercialization;
- (c) the project can mobilize complementary domestic, bilateral, multilateral, and private sector co-financing in support of project objectives;
- (d) the technologies can be introduced in commercial environments as opposed to purely demonstration environments;
- (e) project structures assign technological and operational risks to those parties best able to control and mitigate them;
- (f) there are economic incentives for continued operations rather than a need for subsidizing recurrent costs; and
- (g) environmental controls and safeguards are possible, e.g., on recycling and safe handling of lead-acid batteries.

11.17 When a demonstration project is executed for a specific business enterprise, conditions for competition may be distorted between this particular enterprise and other enterprises in the same industry. This risk can be minimized by a sufficiently broad specification of the technology, by an open bidding process for procurement, and by working with consortiums.

11.18 One of the risks with technology promotion programs worldwide, experience has shown, is that "surprises" are common. There is always a risk of selecting measures that fail to become least-cost in wide enough applications. This risk is controlled by choosing technologies that participate in multiple transport systems, so that the country can flexibly adapt to unanticipated technological and economic changes. For example, the electric motor technology is used in hybrid buses, in fuel cell buses and in 2- and 3-wheelers. To minimize the risk of continuing to support a technology with no medium-term prospect of market acceptance or country commitment, the scope above will not be fixed indefinitely but will be reviewed and modified on the basis of new information and experience in the portfolio. While the above sustainable

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<sup>6</sup> See *Public Involvement in GEF-Financed Projects*

transport options are expected to attract the bulk of initial GEF funding under this program, an application of a technology could be removed from this program (for example, upon reaching market goals). Likewise, this program will maintain flexibility to consider new applications as technological breakthroughs bring other promising solutions to the forefront.

11.19 Another key assumption is that transport chains can effectively be modified. Despite some limited experience gained by the Implementing Agencies from transport projects in the pilot phase, assistance for transport is a new endeavor for the GEF and comes with the risk associated with any new endeavor. This risk will be minimized through structured learning from experience. The history of transportation systems teaches us that the dominance of the internal combustion engine was not predictable during the early part of this century, but a few fortuitous events and positive feedback ensured its later ubiquity. This Operational Program attempts to facilitate “virtuous cycles” to achieve commitment to sustainable transportation measures.

11.20 The success of these activities would be monitored by appropriate performance indicators of quality (e.g., indicators of the use of best practices) and of efficiency with which the inputs were used. The effectiveness of particular activities in capacity building, institutional strengthening, information dissemination, etc., would be monitored by performance indicators appropriate to that activity (project completion reports, use of best practices, and of efficient use of resources).

## **PROJECT OUTPUTS**

11.21 The direct outputs of GEF-supported projects will be the technical success of the activities supported. The monitoring indicator would depend on the technology being supported, for example, by the gallons of biomass-based liquid fuels produced, number of fuel cell buses or electric 2- and 3-wheelers produced, the number of passenger-kilometers traveled, ton-kilometers carried, changes in modal split and market shares of new clean technologies, and greenhouse gas emissions avoided.

11.22 Currently most GEF projects typically consist of two or three activities of the type listed in paragraph 11.11. However, successful completion of all those activities is required for a transport measure to become sustainable and entrenched. There are at least five major risks that combined outputs of projects in this Operational Program and other activities will not yield the desired outcome of the entire measure becoming fully commercially viable.

11.23 The first risk in obtaining project outputs from GEF-financed activities stems from the critical assumption that funding will continue for a long enough period to ensure that all the different activities in the sequence specified in paragraph 11.11 are addressed. Project selection will ascertain that each investment is domestically beneficial and economically sustainable.

11.24 The second risk is that either through misidentification or neglect, not all the elements of a sustainable transport infrastructure would be made commercial or put in place. This risk can be reduced by ensuring that GEF supports activities only where an appropriate overall transport plan sets out how sustainable transport will be developed. GEF would support the development of such plans by financing the incremental costs of enhancing strategic transport or urban

planning specifically to build in this additional long-term dimension. This risk can further be reduced by seeking activities that individually will be commercially sustainable after the GEF support has ended, i.e., independently of when other elements succeed. This would be achieved by ensuring that the activity produced other additional domestic benefits for the community, providing reasons sufficient to sustain it. The additional domestic benefits include, among others, reduction of congestion and pollution, creation of new industries, opportunity for technological leadership and exports. For example, there may be situations where battery powered electric three- wheelers would provide sufficient benefits in the form of reduced local pollution and increased opportunities for local manufacture, that once an industry to produce them had been established, it would survive.

11.25 The activities would be coordinated with past, ongoing, and prospective work of the Implementing Agencies (in both their GEF and non-GEF capacities) and other executing agencies to avoid duplication and to ensure cost-effectiveness. Primary coordination is required between UNDP, UNEP, and the World Bank to ensure that targeted research address information gaps on technology status and suitability; and that technical assistance, capacity-building, pre-investment, and pilot demonstration activities fit with follow-on investment priorities. Work has also to be coordinated with bilateral, multilateral agencies, and governments, as they provide the resources for baseline funding.

11.26 This Operational Program allows for “phasing”, i.e., temporary support and financing of measures that may not result in *immediate* GHG emission reductions, but which facilitate commitment to a long-term sustainable solution. There is therefore a risk that a lasting commitment to a low-GHG measure may not be obtained. For example, temporary support of gasoline powered fuel-cell vehicles is justifiable since it could promote a sustainable solution when hydrogen is ultimately derived from non-fossil sources. Hydrogen for use in fuel cell vehicles could be produced initially from fossil-fuels. Nonetheless, having converted a distributed non-point source problem to a point source problem offers the possibility of easier carbon sequestration.

11.27 The fifth risk is inherent in all of the GEF’s Operational Programs in climate change, is the continued challenge from competing and currently entrenched technologies. For example, continued low international oil prices, a marked reduction in prices of internal combustion engines, or a substantial increase in their efficiencies, will reduce the economic potential of the transportation measures supported in this operational program.

## **EXPECTED OUTCOMES**

11.28 A successful outcome is one when *all* the elements in a selected sustainable transportation measure are put in place and become commercially viable.

11.29 The assumption that expected *outcomes* in this Operational Program will result in achieving the program objective concerns **replication**. Widespread replication of the general approach in this Operational Program in most other countries will take place once it has been shown to be successful in some. As these selected transport measures become increasingly

competitive in recipient countries, GEF will achieve its programmatic objective of more significant mitigation.

11.30 There is a risk that replication will not be adequate to achieve significant GHG mitigation because the cost of a sustainable transport measure will prove to be prohibitively high in some countries. This risk will be controlled by providing initial support only for cost-effective prospects, and subsequent support for others only when the costs of technological options have substantially reduced.<sup>7</sup>

11.31 Additional bonus programmatic benefits in reduction of GHG emissions could result when a successful engagement in one sustainable transportation system is replicated in other systems. Therefore, to the degree possible, the GEF would support activities that participate in multiple systems and would assist with dissemination of this learning and experience. (For example, successful commercial introduction of fuel cells in buses could be replicated in locomotives.)

11.32 Monitorable indicators of expected outcomes of technological diffusion, engagement or succession are market share of the technologies, or riderships in specified applications financed by the GEF. The indicator of programmatic cost-effectiveness of the use of GEF resources would be the increase in market share (above what it would have been) per unit expenditure of GEF resources. The overall financial sustainability of industries created will also provide indicators of successful outcomes.

## **PROGRAM OBJECTIVE**

11.33 The overall objective of all Operational Programs in the climate change focal area is to reduce the risk of climate change by reducing net GHG emissions from anthropogenic sources and by protecting and enhancing removal of such gases by sinks. Reducing emissions from the transport sector will be fundamental to stabilizing GHGs at levels that will prevent serious anthropogenic interference with the climate system. The specific objective of this Operational Program is to reduce GHG emissions from *ground transport* sources in recipient countries. The objective will be achieved by facilitating recipient countries' commitment to adopt sustainable low-GHG transport measures, and disengagement from unsustainable measures common in many parts of the world. To date, the commercially viable application of these sustainable measures has been slower than desirable from the perspective of mitigating climate change because one, they are more expensive, and two, the substantial external costs (such as pollution, noise, congestion, accidents, and greenhouse gas emissions) of prevalent technologies are seldom reflected adequately in current price signals.

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<sup>7</sup> For example, those countries that have not invested in major infrastructure for gasoline distribution could move more rapidly to cost-effective electric alternatives. In other countries where such an infrastructure exists, gasoline could be used initially for electric vehicles with fuel cells fitted with reformers, so that a commitment to electric vehicles could be made without having to write off major investments in petroleum distribution. A later switch to non-petroleum fuels can be made more gradually, and would be driven by the demand from large installed base of fuel cells.

11.34 The programmatic global benefits will result from the combined effects of the commitment to sustainable transport technologies and their continuous deployment in several specified markets. These benefits can be estimated by the amounts of greenhouse gas emissions that were avoided as a result of this deployment. Programmatic benefits also can result from structured learning from projects implemented. The effectiveness of this learning is estimated by more qualitative performance indicators.

11.35 Each GEF project proposal document will show how the activities will be coordinated and risks addressed. It will also elucidate the prospects for sustainability and replicability.

**Table 1: Log Frame Matrix for GEF Operational Program Number 11:  
Promoting Environmentally Sustainable Transport**

<b>Level</b>	<b>Description</b>	<b>Assumptions/Risks</b>	<b>Indicators</b>		
<b>Resources</b>	<ul style="list-style-type: none"> <li>Initial allocation of \$60 million per year, gradually increasing to \$100 million per year over 5-10 years. Later, resources will be reduced as the program succeeds in its objectives.</li> </ul>	<ul style="list-style-type: none"> <li>Security of funding and long-term commitment of continuing support from GEF and other financiers.</li> </ul>	<ul style="list-style-type: none"> <li>Amount of annual allocations</li> </ul>		
<b>Activities</b>	<table border="0"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>Strategic urban, land-use and transportation planning</li> <li>Targeted Research</li> <li>Training, capacity building and technical assistance</li> <li>Demonstration Projects</li> <li>Investment Projects</li> <li>Market transformations to full commercialization</li> <li>Dissemination</li> </ul> </td> <td style="vertical-align: top;"> <p align="center"><u>Initial Scope</u></p> <ul style="list-style-type: none"> <li>Modal Shifts to less polluting transport</li> <li>Non-motorized transport</li> <li>Fuel cell or electric 2- and 3-wheelers</li> <li>Fuel cell (hydrogen-powered) buses</li> <li>IC engine-electric hybrid buses</li> <li>Advanced biomass to liquid fuels conversion</li> </ul> </td> </tr> </table>	<ul style="list-style-type: none"> <li>Strategic urban, land-use and transportation planning</li> <li>Targeted Research</li> <li>Training, capacity building and technical assistance</li> <li>Demonstration Projects</li> <li>Investment Projects</li> <li>Market transformations to full commercialization</li> <li>Dissemination</li> </ul>	<p align="center"><u>Initial Scope</u></p> <ul style="list-style-type: none"> <li>Modal Shifts to less polluting transport</li> <li>Non-motorized transport</li> <li>Fuel cell or electric 2- and 3-wheelers</li> <li>Fuel cell (hydrogen-powered) buses</li> <li>IC engine-electric hybrid buses</li> <li>Advanced biomass to liquid fuels conversion</li> </ul>	<ul style="list-style-type: none"> <li>Country-driven projects addressing national priorities</li> <li>Conducive recipient country environment</li> <li>Public involvement</li> <li>Cost-effective use of inputs</li> <li>Minimize distortion of private sector competition</li> <li>Maintain flexibility to revise program</li> <li>Transport systems can be modified</li> </ul>	<ul style="list-style-type: none"> <li>Long-term political commitment</li> <li>Leveraging and co-financing</li> <li>Use of best practices</li> <li>Project completion reports</li> <li>Successful demonstrations</li> <li>Cost-efficiency in the use of resources</li> </ul>
<ul style="list-style-type: none"> <li>Strategic urban, land-use and transportation planning</li> <li>Targeted Research</li> <li>Training, capacity building and technical assistance</li> <li>Demonstration Projects</li> <li>Investment Projects</li> <li>Market transformations to full commercialization</li> <li>Dissemination</li> </ul>	<p align="center"><u>Initial Scope</u></p> <ul style="list-style-type: none"> <li>Modal Shifts to less polluting transport</li> <li>Non-motorized transport</li> <li>Fuel cell or electric 2- and 3-wheelers</li> <li>Fuel cell (hydrogen-powered) buses</li> <li>IC engine-electric hybrid buses</li> <li>Advanced biomass to liquid fuels conversion</li> </ul>				
<b>Outputs</b>	<ul style="list-style-type: none"> <li>Technical success of the activities supported.</li> </ul>	<ul style="list-style-type: none"> <li>Funding continuity to ensure sequential support for all required activities</li> <li>All elements of a sustainable transport infrastructure put in place</li> <li>Coordination between Agencies</li> <li>Phasing is allowed</li> <li>Challenge from currently entrenched technologies</li> </ul>	<ul style="list-style-type: none"> <li>Technical success of the activities supported</li> <li>Amounts, numbers</li> <li>Prices</li> </ul>		
<b>Outcomes</b>	<ul style="list-style-type: none"> <li>All elements in a selected transport system become commercially viable.</li> </ul>	<ul style="list-style-type: none"> <li>Replication in other countries when success demonstrated in some.</li> <li>Costs may to be prohibitively high.</li> <li>Dissemination of success to other transport systems.</li> </ul>	<ul style="list-style-type: none"> <li>Increase in market share</li> <li>Financial sustainability of industries created</li> <li>Indicators of technological succession.</li> </ul>		
<b>Program Objective</b>	<ul style="list-style-type: none"> <li>Reduce greenhouse gases from ground transport systems in recipient countries.</li> </ul>	--	<ul style="list-style-type: none"> <li>GHG emissions avoided directly and indirectly.</li> </ul>		