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Open-ended Working Group of the Parties to the Montreal Protocol to integrate the four reports of the Assessment Panels into one synthesis report and to make recommendations on amendments to the Montreal Protocol.

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Report of the Panel for Economic Assessment

EXECUTIVE SUMMARY

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UNEP ECONOMIC PANEL REPORT
Montreal Protocol on Substances that Deplete the Ozone Layer

INTRODUCTION

The Montreal Protocol on Substances that Deplete the Ozone Layer incorporates a procedure to review and possibly amend its control measures. Article 6 of the Protocol specifically directs Parties to assess the control measures provided for in Article 2 on the basis of available scientific, environmental, technical and economic information. The Protocol was signed in Montreal on 16 September 1987 and entered into force on 1 January 1989.

This report is an economic evaluation of the Montreal Protocol prepared by international economic experts on the Economic Assessment Panel.

The terms of reference for the Economic Assessment Panel were determined during the Science Review Meeting and the Technical Workshop convened by UNEP at The Hague, the Netherlands, in October 1988. This report assembles available information on the economic costs and benefits of the Protocol measures. This information will help guide the revision of the Protocol envisaged for early 1990.

The first Conference of the Parties to the Protocol at Helsinki in May 1989 confirmed the membership and terms of reference of the Panel.

The Panel was chaired by George Strongylis of the European Community and had two Vice-Chairmen, Stephen Andersen, U.S.A, responsible for coordination with the Technical Panel, and John Hoffman, U.S.A., responsible for coordination with the Environmental Effects Panel. The list of members of the Panel is in Appendix I. UNEP and the chairmen repeatedly contacted many countries and encouraged them to send experts to the Panel in order to obtain the widest possible international participation.

The Panel met three times: 7 March 1989 in Brussels, Belgium, 21- 22 April 1989 in Washington D.C., U.S.A., and 29-30 May 1989 in Tokyo, Japan.

The Panel report presents historic and current production and consumption patterns and trends of the relevant chemicals affecting the ozone layer. It discusses a framework for a global and national cost-benefit analysis and its limitations, and it reviews the present and expected future technical possibilities for substitution of CFCs and halons in each application area.

ORGANIZATION OF THE REPORT

The report contains eight chapters. Chapter 1 contains the introduction. Chapter 2 presents historic and current production and consumption patterns and trends of chemicals depleting the ozone layer.

Chapter 3 discusses a framework for a global and national cost-benefit analysis and its limitations. It also reviews country studies for the U.S.A., the Nordic countries, and the Netherlands.

Chapter 4 reviews the present and expected future technical alternatives and substitutes for CFCs and halons in each application area. Information from the Technical Options Reports and the Technology Assessment is reviewed for its:

- availability and expected market potential,
- potential for reducing CFC/halon use, and
- energy efficiency and costs.

Furthermore, the chapter presents some example calculations in the refrigeration and solvents areas which indicate the order of magnitude of the costs of replacing CFCs.

The benefits of avoiding ozone depletion are analyzed in Chapter 5. The chapter summarizes the environmental and health effects expected from increased ultra violet radiation. The problems associated with uncertainties of the scientific "dose-response functions" and the difficulties of quantifying the benefits are discussed. Some estimates made in Japan are also included.

Chapter 6 discusses the issue of technology transfer which is important to consumer nations and especially to developing countries.

Chapter 7 includes a review of industry policies around the world as they were known by June 1989.

Chapter 8 summarizes the findings of the Economic Review Panel. The principle under which the Panel has operated has been that of consensus on all issues brought before it. In their deliberations the Panel members have sought to act as the representatives of all the countries that could not participate directly in the review.

Consumption of CFCs and Halons

In the absence of regulation such as the Montreal Protocol, demand for products and services based on CFCs and halons would continue to grow, especially in developing countries.

North America, Europe and Japan are responsible for about 80 percent of total consumption of controlled chemicals. The per capita consumption in developed economies is in many cases more than 10 times the per capita consumption in the developing nations.

Assessment Framework

There are significant health, agricultural, productivity and environmental benefits from the elimination of CFC and halon emissions. However, only very few of these benefits can be quantified in economic terms.

Assessments of the costs of reducing or eliminating CFCs and halons must consider a variety of factors. These include capital costs, research and development costs, operational costs (such as energy and labour costs), and safety and toxicity risks.

Differences in stages of national development and in the extent of development of CFC and halon producing and using industries from country to country result in very different transition costs for each country.

The development of new options for replacing CFCs and halons is progressing very rapidly. A static cost analysis based on current knowledge therefore might overestimate the costs and underestimate the reduction in use achievable in the transition to CFC-free technologies.

Several national studies have been conducted and these have concluded that substantial reductions of CFC and halon use are technically and economically feasible. These studies estimate that benefits coming from avoiding ozone depletion will be higher than costs.

The Costs of Technical Substitution

With the exception of some foam products, CFCs and halons constitute only a small part of the final consumer price.

Technical options to phase out production and use of CFCs within the next 10 to 15 years and to phase-down the production and use of halons have been identified by the UNEP Technical Panel. The Technical Options Reports estimate the approximate costs and the eventual problems of transition to CFC- and halon-free technologies for each application. Detailed estimates of the changeover costs, however, cannot at present be made for many potential options. Consequently, global cost estimates are difficult to make with accuracy.

Different technical options will be available in the short, medium and long term. The actual costs of each of these options will depend on the outcome of technical development and the speed with which they are adopted.

Analysis of options in the domestic refrigerator sector demonstrates that the costs of reducing CFC and halon use vary greatly. Net costs increase if less energy efficient options are selected, while net cost savings can be achieved if the most energy saving options are selected. The ability to achieve maximum energy and cost savings will depend on the resources and the time available to review and test options and re-design products.

An example of a solvent replacement option demonstrates that some technical options are interdependent in implementation. This means that a technical option that is cost effective when used alone may not be economically justified when other technical changes are undertaken.

There has been a rapid increase in the availability of technologies to reduce CFC and halon use. These new technologies have generally lower costs and increase the capability to reduce total use.

The total costs for the world of reducing or phasing out CFCs and halons cannot be precisely estimated at this time. However, current evidence suggests that net costs for the first 50% of the global reduction will be low. Cost estimates for the remaining reduction--mainly in the fields of industrial refrigeration, rigid foam, solvents and halons--vary widely and depend mainly on the availability of drop-in substitutes, reengineering costs of equipment and products, and the (higher) price and energy efficiency of the substitutes.

the time-path for phasing-out CFCs is critical with respect to costs. A too rapid transition may raise costs due to capital abandonment. Individual governments and industries face significant opportunities to save money if the best reduction strategy is chosen.

Economic/Environmental Benefits of Reduced CFC/Halon Use

Reducing the use of CFCs and halons could have enormous beneficial impacts on human health and the environment. In many instances, the current state of scientific knowledge makes it very difficult to quantify the magnitude of many of these impacts. Nevertheless, scientific evidence is mounting that predicts stratospheric ozone depletion will cause increased levels of skin cancer, cataracts, immune suppression and other health effects plus effects on plants and animals.

In attempting to value these impacts there are many issues associated with proper valuation procedures varying from one region of the world to another and between people alive today and generations to come. These issues make it inherently difficult, if not impossible, to assign a monetary worth to the harmful impacts avoided as a result of reduced CFC and halon use.

Not withstanding the problems of quantifying the benefits, the basic conclusion is that the monetary value of the benefits is undoubtedly much greater than the costs of CFC and halon reductions.

However, some developing nations may not have sufficient resources to make the change to new ozone-safe technologies or may have other economic, environmental, or human health concerns that are more immediate and pressing than protection of the ozone layer.

Technology Transfer

Global diffusion of CFC and halon replacement technology (including recovery and recycling) is crucial for protecting the ozone layer and is in the interest of both developed and developing countries alike.

Priority should be given to reducing demand by CFC/halon using industries. This can be accomplished in many ways, e.g. through a tax on production or use, restrictions on productions, public education, or regulation of the use of CFCs and halons.

Developed countries may also assist in activities to educate people on the importance of ozone layer protection and may provide information to guide industries toward phase-out of CFCs.

Current information and financial resources of developing countries are inadequate for adoption of CFC replacement technologies and for defining and implementing the national options for the transition to CFC-free technologies.

Some CFC replacement technologies will be adopted in the usual course of economic growth but at a slow rate. Development assistance will be required in other cases.

Means are needed to implement the Montreal Protocol commitment to prevent the transfer of discarded CFC/halon producing and CFC/halon using technologies to developing countries.

Developed countries that have signed the Protocol may choose different methods to financially assist developing countries. These methods vary from increasing overseas development assistance, to raising funds by charging for CFC use or contributing a small percentage of their GNP as a contribution to an international fund. Substantial financing can be generated using any of these techniques. These arrangements can be bilateral or as a contribution to an international fund.

Multilateral development institutions include organizations such as the World Bank, the Inter-American Development Bank, the Asian Development Bank and the African Development Bank. By virtue of their development activities and established connections with developing countries these institutions can play a crucial role in facilitating the transfer of technology needed during the transition period. Special funding mechanisms or arrangements are needed for this purpose because currently available resources are already strained as a result of the world debt problem and the dire economic situation of many countries. Such institutions should be urged to develop internal guidelines in support of explicit policies to facilitate the implementation of the Montreal Protocol.

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