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**REPORT OF THE FIRST MEETING OF THE EXPERT GROUP
ON THE PRODUCTION OF SUBSTITUTES
FOR OZONE-DEPLETING SUBSTANCES**

EXECUTIVE SUMMARY

The Expert Group on the Production of Substitutes for Ozone-Depleting Substances, which was established according to the Terms of Reference approved by the Executive Committee, held its first meeting on 13-14 September 1995 in Montreal, Canada. The Group started off their two day deliberations with an overview of the current global production of ODSs and substitutes, with emphasis on the situation in Article 5 producing countries. It then followed its Terms of Reference and examined a wide range of technical issues with strategic and policy implications.

The Expert Group concluded the first meeting with a set of recommendations to the Executive Committee and also identified a number of issues for further study. These recommendations and issues are presented at the end of this report.

Introduction

1. The Expert Group on the Production of Substitutes for Ozone-Depleting Substances (here-in-after referred to as the Expert Group) held its first meeting on 13-14 September 1995 in Montreal, Canada. It was recalled that the Executive Committee had approved at its Fifteenth Meeting (December 1994) the terms of reference of the Expert Group (UNEP/OzL.Pro/ExCom/15/45 Annex III).

2. Extensive efforts were made to constitute a professionally competent and balanced representative group according to the terms of reference. As follow-up to the request of the Fund Secretariat at the 15th Meeting for two nominations each from Article 5 countries and non-Article 5 countries of production sector experts, the Secretariat also approached countries which might have an interest in nominating experts to the Group. In addition to the official nominees from Governments, a number of independent experts were added to the list to cover and reinforce the spectrum of expertise needed for the Expert Group. Representatives from the World Bank, which was currently involved in projects in the production sector, were also invited. Annex I is the Composition of the Expert Group.

3. The Expert Group started off the two-day meeting with a quick overview of the current global production of ODSs and substitutes, focusing on the situation in Article 5 producing countries. It then followed its terms of reference and examined a wide range of technical issues with strategic and policy implications. The discussions covered nearly all the issues included in the Preliminary List of Issues to be Reviewed by the Expert Group¹ but were not limited to it. On many issues there was a convergence of views from the Group members and the result was a straight forward recommendation to the Executive Committee. In other situations there was a range of views, mainly because there was not enough information available to make firm conclusions. The Group felt that the issues of concern were important enough to warrant further study. These are reflected in the Report as issues for further study.

Implementation Strategy for Phase-out in the Production Sector

4. The Expert Group strongly believed that in terms of implementation strategy for the phase-out in the production sector the sectoral approach was preferable to the project-by-project approach. By the sectoral approach a total funding requirement to eliminate entire sectors of ODS production capacity (e.g. CFCs) would be worked out on the basis of a ceiling of ODS production of an Article 5 country. The Government and the Multilateral Fund could then agree on a lump-sum to represent the total amount of incremental cost compensation the country would receive from the Multilateral Fund for the commitment from the Government of phasing out the entire ODS production in the sector. Concurrently an action plan with phase out implementation schedule should be prepared. The agreed funding would be disbursed in tranches according to milestones of phase-out in line with the action plan to be monitored and evaluated by the Multilateral Fund.

5. The Expert Group concluded that advantages of the sectoral approach as compared to the project-by-project approach were, among other things:

¹ Appendix A of UNEP/OzL.Pro/ExCom/15/45 Annex III.

- Projects in the production sector would be enterprise specific and offered little chance for generalization and standardization. The project-by-project approach would require extensive, complex and sensitive analyzing tasks in order to appraise and approve each individual project;
- Many of the complex issues associated with individual project level analysis could be avoided if an holistic approach was followed, with the potential of achieving rationalization and savings. A case in point was the potential benefit of dealing as a package with a project request on Halon 1301 production shut-down and another request on setting up new production facility for HCFC-22. Since HCFC-22 was an intermediate chemical in the production of halons, the shut-down of Halon 1301 could release some existing production capacity for HCFC-22, thus, rationalization of cost could be achieved; and
- This approach would increase the involvement of the Article 5 Government in the management of the phase out action plan and give more responsibility to the Government.

6. The Expert Group examined methodologies for calculation of the lump sum under the sectoral approach:

- (a) Methodology One: uses the costs of shutting down the existing ODSs producing plants for calculating the lump sum; and
- (b) Methodology Two: proposes that the calculation should be based on using a combination of costs of shutting down the existing ODSs plants and erecting substitute producing facilities.

7. The Expert Group expressed an initial preference on technical grounds for Methodology One, i.e. using the costs of shutting down existing ODS production facilities as the basis for calculation of the lump sum.

8. It was understood however, that irrespective of the methodology employed, the lump sum eventually calculated would enable the concerned Article 5 country to explore various options to have a continued supply of ODS substitutes to the country, taking into account the national industrial strategy.

Technical audits of the production sector on a country basis

9. The Expert Group believed that technical audits of the ODS producing enterprises were necessary for two reasons. First, the sectoral approach as discussed above would require a stock-taking of the current ODS producing industries to work out the sectoral phase out action plan and establish a lump sum cost level to be agreed upon between the Government and the

Multilateral Fund. Second, even if the project-by-project approach were adopted, a baseline scenario of the ODS producing industries was also needed as a context for Fund management to review and approve each eligible project request.

10. The Expert Group agreed that one of the important tasks of the technical audits would be to establish the ODS producing capacity of the country to be considered in the calculation of eligible financing by the Multilateral Fund. The methodology recommended was using the actual production of the country of 1995 and adjusting it against the data of 1996 and 1997 once they become available. At the enterprise level, the same approach should be used to establish the production capacity.

11. The Expert Group prepared the draft terms of reference for these technical audits which is presented as Annex II to this Report.

Transfer of technology

12. The Expert Group examined the issue of transfer of technology of producing ODS substitutes and the development of indigenous technology by Article 5 countries. On the transfer of technology, the Group briefly considered the availability of the concerned technologies and the terms of transfer. Concurrently, the Group also reflected on the financial impact of transfer of technology on the Multilateral Fund.

13. The Expert Group was informed that the concerned ODS substitutes producing technologies including HFC-134a were available for transfer to Article 5 countries at commercial terms. The Expert Group was also informed by one of its members that one European Transnational Corporation (TNC) was ready to provide the technology for production of HFC-134a at no cost to any Article 5 country which would agree to close down its CFC production.

14. On the terms of transfer of technology, the Expert Group felt that it should be left to the enterprises at either end of the transfer to work out a deal fair and favorable to both sides and should not be dictated by Fund management.

15. As for the impact on the Multilateral Fund of transfer of technology, the Expert Group recommended that the Fund liability should be limited to one technology transfer fee per substitute substance per country.

16. The Expert Group felt that the development of indigenous technology by Article 5 countries could be supported by the Multilateral Fund provided it was the preferred choice of the Government concerned over imported technology for the relevant substitute, and provided that the results from such efforts be made available to other Article 5 producing countries at no cost. This could best be dealt with under the sectoral approach, because once a lump sum for the sector was agreed upon, the Governments would have the flexibility to explore the various options for a continued supply of ODS substitutes to the country including the option of developing indigenous technology.

Types of anticipated projects in the production sector

17. The Expert Group anticipated that, on the project level, requests in the production sector would consist of the following categories:

- Shut-down of verifiable ODS production capacities;
- Production of ODSs substitutes;
- Conversion of existing CFC-11/12 manufacturing facilities for the production of HCFC-22, HCFC-141b and HCFC-142b. The Group considered that conversion of CFC 11/12 producing plants to other alternatives would most likely be more costly than establishing new direct process facilities and should not be entertained unless fully justified and examined on a case-by-case basis; and
- Establishing facilities for the processing, purification, storage and distribution of ODS substitutes (e.g. hydrocarbons).

Funding of raw materials and feedstock production

18. The Expert Group examined the eligibility of funding of raw materials and feedstock production by the Fund in the context of the mandate of the Multilateral Fund. The Expert Group did not see the justification of extending the liability of the Fund indefinitely down or up the chemical production chain and recommended that the Fund should not finance any production of feedstock and the cost of raw materials should be dealt with in the calculation of incremental operating costs as was currently the case with the user sectors. As for the duration of calculating incremental operating costs, the Expert Group felt more research was needed to provide a credible recommendation, considering the policy of the Fund of supporting incremental operating costs for up to four years.

Calculation of incremental costs

19. The Expert Group reviewed many of the issues under this subject but did not conclude its discussion because on a few of the major issues further work was needed. However, the Group reiterated its view that under the sectoral approach, many of these issues at the project level could be circumvented.

20. Under shut-down of ODS producing facilities, cost items considered incremental could include lost profit, and rehabilitation of displaced work force. Cost of demolition could be assumed to be zero since it would basically be offset by the scrap value of the old plant. However the number of years to be used to calculate the lost profit should be examined, whether it should be the remaining life of the plant or it should be a fixed number of years across the board. And for labour rehabilitation some norms should be developed on the manpower to be compensated for based on international industry norms. The Expert Group believed that whatever was decided upon by the Executive Committee, it should be applied consistently.

21. The Expert Group discussed two methods of calculating incremental costs for projects involving the production of ODS alternatives. The first was the method that was currently used by the Multilateral Fund for the user sectors, which focused on the cost differentials between the baseline scenario and converted production. The second method would consider the profit

stream differentials between the pre versus the post conversion situations. Since there were significant effects at the enterprise level, significant risks of double-counting and insufficient information to make an informed choice, the Expert Group decided to study it further.

SUMMARY OF RECOMMENDATIONS AND ISSUES

Recommendations

1. The Expert Group recommended adopting the sectoral approach in implementing the phase-out in the ODS production sector.
2. The Expert Group recommended that technical audits of the ODS production sector be carried out on a country basis.
3. The Expert Group also recommended that ODS phase out capacity to be considered in the calculation of eligible financing by the Fund should be based on the actual production of the country in 1995 and be adjusted against 1996 and 1997 data once they become available.
4. The ODS substitutes producing technologies were available for transfer to Article 5 countries at commercial terms. The terms of such transfer should be left to enterprises engaged in such business. The liability of the Fund should be limited to one technology transfer fee per substitute substance per country.
5. Development of indigenous technologies by Article 5 countries should be supported by the Multilateral Fund provided it was the preferred choice of the Government concerned over imported technology for the relevant substitute. Technologies developed through such support should be made available to the other Article 5 producing countries at no cost.
6. The Expert Group recommended that the Fund should not finance the feedstock production and the costs of raw materials should be considered in the calculation of incremental operating costs.
7. Under the shut-down of ODS producing facilities, the Expert Group recommended that eligible incremental cost items should include lost profit and rehabilitation of displaced labour. Cost of demolition should be offset by the scrap value of the old plant.

Issues to be studied

1. Methodology for calculating the lump sum funding level for the sectoral approach, bearing in mind the initial preference of the Expert Group for using shut-down costs as the basis for calculating the lump sum funding level.
2. The Executive Committee might want to approve the draft terms of reference for the technical audits in Annex II and decide the agency to implement them.
3. The duration of the eligible incremental operating costs should be studied further.
4. The number of years to be used for calculation of lost profit; the manpower to be compensated for according to international industry norms.

5. For projects involving the production of ODS alternatives, the two methods of calculating incremental costs should be further examined, bearing in mind the risk of double-counting.

ANNEX I
COMPOSITION OF THE EXPERT GROUP¹

NAME	STATUS	AFFILIATION	FIELD OF EXPERTISE (SPECIALIZATION)
Mr. Kangsheng Ding	Official nominee from China	Deputy Director of ODS Alternative E&T Center MCI People's Republic of China	Chemical engineering specialist in CFCs and halons
Mr. Klaus Meyersen	Official nominee from European Community	Corporate Process Moderation, Germany	Specialist on CFC technologies
Mr. A.V. Rama Rao	Official nominee from India	Director of Indian Institute of Chemical Technology (IICT) India	Chemical engineering specialist in CFCs
Mr. Tony Vogelsberg	Official nominee from USA	Environmental Manager Fluoroproducts Division DuPont Company USA	Industrial specialist on CFC alternatives
Mr. Valery Barabanov ²	Independent	Association of Applied Chemistry Russian Federation	CFC production technology specialist
Mr. Robert Hoch	Independent	Consultant	Process technology and economics
Mr. John Oxley	Independent	Consultant (formerly with UNIDO)	Chemical process engineering
Mr. Ramanadin	Independent	Consultant	Specialist in CFC/alternatives chemistry
Mr. Alan M. Sinclair	Independent	Consultant	Chemical process engineering
Mr. Michael Harris	World Bank Consultant	External Relations Manager ICI Klea U.K.	Industrial specialist on CFC alternatives

¹ The World Bank was the only implementing agency invited to this meeting, since it is the only agency currently involved in the production sector. The other implementing agencies may be involved in future meetings of the Expert Group, when the need arises.

² Mr. Barabanov was unable to attend this first meeting of the Expert Group due to earlier scheduled commitments.

ANNEX II

TERMS OF REFERENCE FOR THE TECHNICAL AUDIT

Purposes of the Field Audit

While the overall objective of the audit process is to provide all the data needed to review sectoral plans, this information will, of course, be plan specific and will further depend on decisions of the Executive Committee regarding compensation for lost profit and on funding of new production capacity. One can, however, visualize that, although preparation and initial analysis can be carried out anywhere, by such means as distribution of questionnaires, meetings with ODS production sector representatives, etc., obtaining certain information to complete the analysis will require a Field Audit. Broadly, there are three purposes to the Field Audit:

- 1) establish utilized (audited) present operating yearly capacity and potential capacity of individual plants and total country production capacity;
- 2) determine production history of individual plants and total country production history; and
- 3) other relevant technical/commercial information on country and market underlying the sectoral plan which is conveniently gathered in the Field.

Function and Responsibilities of Field Audit Team(s)

- Modality of Operation - operate country-by-country, as invited¹;
- Reporting - to the Chief Officer of the Multilateral Fund with input and advice from the Expert Group; and
- Composition - Total of at least three with overlapping skills in fluorine technology, process/project/operations, estimating/economics; in addition, a representative from the Expert Group and local expert, as needed.

Issues to be addressed by field audit team

Capacity

- Assess ability of each site to produce ODS under sustainable conditions, i.e. for a full year, including environmental impact;
- For CFCs, assess potential for conversion of each site to HCFC or HFC production¹;

¹ While delaying Field Audits until after sectoral plans have been submitted could make the Audits more focused and efficient, the time required to complete review of the sectoral plan could be severely extended. (Especially if more than one mission is needed to complete the Field Audit). This is an issue for the Executive Committee to consider.

- Assess site and national availability and cost of chlorocarbons and HF, i.e. size and location of plants.

Production History and Profitability

- Assess production history based on site production and storage records and from local/national sales records, including imports-exports; and
- Collect site cost/profitability data, including cost of labour, number of workers, selling price of products, taxes and subsidies, if any.

Other relevant information

- Collect data from national plan on project supply and demand for ODS and ODS substitutes, HF and chlorocarbons;
- Analyze transport costs for raw materials and products; and
- Evaluate status and availability of national technology for ODS substitutes, together with their estimated production costs and possible scale of production over the next five years.

Analysis of Field Data and Completion of Audit (by Expert Group, subgroup thereof or consultants)

This builds on the information from the Field Audit teams to create the framework to review sectoral plans. Some tasks may be plan specific, and technical information beyond that garnered in the Field Audit may be required, but typical issues include:

- Evaluate ODS production economics for main and/or typical sites, including distribution/transportation costs;
- Compare production data to other sources;
- Compare production data to results of “capacity audit”;
- Evaluate conversion costs, for applicable sites, to HCFC and HFC production, and the resulting production economics and achievable capacities;
- Demand estimate based on Country Programmes and downstream projects;
- Evaluate sectoral plan data for level of detail needed for costing;
- Assess technical feasibility of sectoral plans, reflecting all results of the audit; and
- Cost sectoral plans.

Cost and Duration

¹ Subject to further analysis and verification, including detailed process calculations if necessary. Field Audit should collect data for such analysis and rule out sites for expansion, conversion and/or revamp based on field factors such as, space limitations, limited access to raw materials, etc.

Cost and duration of a Field Audit will be country specific, depending on the number of sites to be visited. These will typically include the principal production centers as well as repositories of national data, and potentially one or more research centers.

Once the number of sites to be visited is fixed, it becomes possible to estimate the duration of the Field Audit. Given the need for access to key people, etc., it is conceivable that a Field Audit may comprise more than one mission. The duration is converted to a cost by multiplying by the Team size and the cost per manday.

Cost of analysis of the data and completion of the audit will also be plan specific, but will certainly involve at a minimum several manweeks of work. It is to be noted also that information on new plant economics and future price projections will be needed and will have to be developed or acquired at additional cost.