UNITED
NATIONS

A

General Assembly

Distr.
GENERAL

A/AC.237/34
15 July 1993

Original: ENGLISH

INTERGOVERNMENTAL NEGOTIATING COMMITTEE
FOR A FRAMEWORK CONVENTION ON CLIMATE CHANGE
Eighth session
Geneva, 16-27 August 1993
Item 2 (a) of the provisional agenda

# MATTERS RELATING TO COMMITMENTS

# METHODOLOGIES FOR CALCULATIONS/INVENTORIES OF EMISSIONS AND REMOVALS OF GREENHOUSE GASES

Note by the secretariat

CONTENTS


| | Paragraphs | Page |
|---|---|---|
| I. INTRODUCTION | 1 - 10 | 3 |
| A. Committee mandate | 1 | 3 |
| B. Convention provisions | 2 - 3 | 3 |
| C. The respective roles of the IPCC and the Conference of the Parties | 4 - 6 | 3 |
| D. Scope of the note by the secretariat | 7 - 8 | 4 |
| E. Possible action by the Committee | 9 - 10 | 4 |
| II. PROGRESS REPORT BY THE CHAIRMAN OF THE IPCC | 11 - 28 | 5 |
| A. Anthropogenic emissions and removals in the context of the global cycles | 11 - 14 | 5 |
| B. Background | 15 | 5 |
| C. The IPCC Programme | 16 - 24 | 6 |


GE.93-61621

| | Paragraphs | Page |
|---|---|---|
| D. Important features of the IPCC Programme | 25 - 26 | 8 |
| E. Current status and future events | 27 - 28 | 8 |
| III. OBSERVATIONS BY THE SECRETARIAT ON FEATURES OF THE IPCC PROGRAMME | 29 - 37 | 8 |
| A. Categories of sources and sinks | 29 - 30 | 8 |
| B. Reporting recommendations by the IPCC | 31 - 34 | 9 |
| C. Methodologies | 35 - 36 | 9 |
| D. Collection, management and reporting of inventory data | 37 | 10 |
| IV. POSSIBLE ROLES OF THE SUBSIDIARY BODIES ESTABLISHED BY THE CONVENTION | 38 - 41 | 10 |
| V. QUESTIONS FOR CONSIDERATION BY THE COMMITTEE | 42 - 51 | 11 |

Annexes

| | |
|---|---|
| I. Current technical documentation on methodologies | 15 |
| II. Categories of sources and sinks for national greenhouse gas inventories, recommended by the IPCC Programme | 16 |

# I. INTRODUCTION

## A. Committee mandate

1. The work plan adopted by the Committee at its sixth session includes task A.1, "Methodologies for calculations/inventories of emissions and removals of greenhouse gases" (A/AC.237/24, para. 44). This task was assigned to Working Group I. It has further been decided by the Committee that Working Group I will take up this task at the eighth session of the Committee. In this decision, the Committee indicated that the discussion of the subject should include a review of information from the Intergovernmental Panel on Climate Change (IPCC) on the progress of relevant work and that consideration should be given to issues to be addressed by the Committee and the Conference of the Parties (COP) (A/AC.237/31, para. 49). On the same occasion, the Committee decided that the treatment of this subject should include appropriate consideration of the roles of the subsidiary bodies established by the Convention and may involve relevant matters raised in the exchange of letters between the Chairman of the IPCC and the Chairman of the Committee (see documents A/AC.237/29, A/AC.237/30 and A/AC.237/31, paras. 50 and 54).

## B. Convention provisions

2. The development and communication of national inventories of greenhouse gases is a prominent feature of the Convention. This is a commitment undertaken by all Parties (see Articles 4.1(a) and 12.1(a)). The Convention specifies that these inventories are to be prepared using comparable methodologies to be agreed upon by the COP. Moreover, the COP is to promote and guide the development and periodic refinement of such methodologies (see Article 7.2(d)).

3. The first communications including national inventories are to be made by the Parties included in Annex I to the Convention within six months of the entry into force of the Convention. It may be estimated that these communications will be made during the second half of 1994. Consequently, the methodologies will be needed beforehand. The communication of inventories using these methodologies is to be related to the capacities of Parties to produce them and the initial communications by developing country Parties are subject to a different timetable. The frequency of subsequent communications is to be determined by the COP (Article 12.1(a) and 12.5).

## C. The respective roles of the IPCC and the Conference of the Parties

4. The IPCC is identified in the Convention as a source of objective scientific and technical advice in the context of the interim arrangements (Article 21.2). The IPCC is working on a methodology for national inventories of greenhouse gases comprising both emissions and removals. 1/ The results of the IPCC Programme are expected to receive formal approval by the IPCC in mid-1994. Meanwhile, the Programme outputs are to be reviewed and are subject to modification.

5. The IPCC Programme is expected to result in a methodology, incorporating the best available scientific knowledge, that may be used by all Parties, including by those included in Annex I to the Convention in their communications to the Conference of the Parties at its first session (COP I). This Programme is the only systematic work on methodologies that is currently under way in the international community. Consequently, it is expected that the COP will wish to draw upon the results of the IPCC Programme in adopting comparable methodologies for inventories of greenhouse gases, at least for the initial phase of the implementation of the Convention.

6. The COP may also consider the possible role of the IPCC in the further development of inventory methodologies and decide how best to provide guidance to such development, taking into account the roles and competence of the subsidiary bodies established by the Convention.

### D. Scope of the note by the secretariat

7. The intention of this note is to support a discussion on inventory methodologies in the Committee, along the lines indicated at its seventh session and as further elaborated above. The note is based on the presumption that the Committee will not wish to take up purely technical aspects of the approach being pursued by the IPCC Programme but will wish to focus on policy-related questions. This note has been prepared in consultation with the Chairman and the Secretary of the IPCC, drawing on inputs from the IPCC process and on publicly circulated materials emanating from that process. The main source materials are listed in annex I. In most cases, these are working documents and have not been formally reviewed or approved by the IPCC. This documentation is available for interested delegates, from the sources indicated in annex I. It will also be presented during the eighth session of the Committee, when delegates will have the opportunity of meeting IPCC experts.

8. The second section of this note consists of a progress report on the IPCC Programme that was provided to the secretariat by the Chairman of the IPCC for the information of the Committee at its eighth session. Section III contains comments by the secretariat on salient features of the IPCC Programme. Section IV comments on the possible roles of the subsidiary bodies established by the Convention in relation to inventory methodologies. Section V puts forward certain questions which it may be useful for the Committee to consider as a prelude to reaching conclusions that might be fed back to the IPCC. 2/

### E. Possible action by the Committee

9. It is suggested that the Committee, in dealing with this task at its eighth session, may wish to take note of the report by the Chairman of the IPCC on the progress of the IPCC Programme on inventory methodologies and consider what contribution it might make to the orientation of this work, so that the results may correspond as closely as possible to the requirements of the Convention. The Committee may also address policy questions that are not adequately dealt with in the current IPCC Programme.

10. Furthermore, in pursuing this task at future sessions, the Committee may be able to provide advice to the COP concerning the organization of work on the further development of inventory methodologies.

## II. PROGRESS REPORT BY THE CHAIRMAN OF THE IPCC 3/

### A. Anthropogenic emissions and removals in the context of the global cycles

11. Before describing the present status of the work of the IPCC on developing a comparable methodology or methodologies for the compilation of national inventories of emissions and removals, it is important to view this work in its broader context. The work is being carried out by the science working group (Working Group I) of the IPCC in collaboration with the Organisation for Economic Co-operation and Development (OECD) and is based on the latter's preliminary efforts.

12. Increases in concentrations of greenhouse gases in the atmosphere depend on their net emissions, that is, the difference between emissions and removals, occurring either naturally or due to human intervention. The removal is by sinks but not all of these are covered by national inventories, for example, one of the sinks is photochemical dissociation for some greenhouse gases (methane, nitrous oxide, ozone and chlorofluorocarbons). The direct emissions from industry, traffic, etc., are comparably easy to assess. Human-induced emissions and removals due to agriculture, forestry, changing land-use, etc., are difficult to estimate and also often not easy to separate from what would be occurring if man were not interfering. The development of comparable methodologies for assessing human-induced emissions and removals is a complex and difficult undertaking.

13. In addition, an analysis of past increases and estimates of future increases of atmospheric greenhouse gas concentrations requires the consideration of all processes that are both natural and human-induced. Such analyses are essential in order to judge the adequacy of the methodologies being developed. The Chairman of the IPCC, in his presentations to the Committee, has repeatedly emphasized the difficulties inherent in this task and has pointed out that until the observed increase of carbon dioxide in the atmosphere can be reconciled with estimates of its emissions by sources and removals by sinks, estimates of human-induced $CO_2$ emissions must be considered incomplete.

14. This situation is the reason why the IPCC is proceeding carefully and wishes to analyse the first round of data that the IPCC methodology will yield, as well as checking on the overall consistency of the data against the best knowledge of the biogeochemical cycles that regulate the atmospheric concentrations of greenhouse gases. This analysis will begin later in 1993 and perhaps lead to a workshop in February or March 1994. It is hoped that this will permit the calculation of uncertainties of the estimates of emissions and removals and thereby provide solid ground for the use of such data by the COP.

## B. Background

15. Around the time of the Second World Climate Conference (Geneva, 1990), it was becoming evident that a standard methodology for the compilation of national emissions inventories was likely to be required under a future climate convention. Under the auspices of the OECD and the International Energy Agency (IEA), an initial compendium of methods covering all greenhouse gases (except those which are dealt with under the Montreal Protocol on Substances that Deplete the Ozone Layer) was compiled. This document was discussed in depth at a meeting of experts including representatives of many non-OECD countries, held in Paris in February, 1991. In a slightly modified form this document, known as "the draft methodology" was subsequently adopted by the fifth session of the IPCC (Geneva, March 1991), as the starting point for the IPCC guidelines for the compilation of national inventories of greenhouse gas emissions and removals.

## C. The IPCC Programme

16. Responsibility for furthering the development of the methodology was given to Working Group I of the IPCC, with assistance from OECD and IEA. The overall objectives of this programme are:

(a) to develop and refine an internationally agreed default methodology for calculating and reporting national emissions and removals, namely, a methodology that is easy to use and available to any country that wishes to use it;

(b) to promote widespread use of the methodology by IPCC member countries, through various technical cooperation activities; and

(c) to establish procedures and a data management system for the collection, review and reporting of national data.

17. The chief tool for improvement of individual calculation procedures is the expert group. Each group deals with a specific gas and source category (such as methane from coal mining) and its members are drawn from as wide a geographical range of experts as possible. Each calculation procedure specifies the functional form for a calculation, but particular values of "activity data" and "emission factors" need to be specified by the user. Default values (that is, simple values in the absence of detailed information) of factors for emissions or removals which are relevant to the country or region are being improved using outputs from expert groups, as well as from country studies and regional workshops.

18. Recognizing that inventories are of removals as well as emissions, a letter has recently been circulated to all IPCC countries requesting help in the identification of human-influenced sinks that might be included in the methodology.

19. Every effort has been made to involve as many IPCC countries as possible in every stage of the IPCC Programme. Immediately following the decision of the fifth session of the IPCC to develop the guidelines, all IPCC countries were formally requested to submit any inventory information which they had available, irrespective of the methodology used. The purpose of this exercise was to gain an overall picture of the status of the inventory work in different countries. Over 30 countries so far have submitted such information.

20. Representatives of 41 countries (and 12 intergovernmental and non-governmental organizations) attended a workshop at Geneva in December 1991 to discuss and suggest improvements to the draft methodology. The workshop, inter alia, recommended that the presentation of the method needed to be simplified, and as a result, the IPCC guidelines will appear in two forms: a simplified workbook (containing all available software modules) and a reference manual. Using the simplified workbook alone, it will be possible to compile a national inventory. The reference manual will contain detailed background information and a bibliography so that, for example, the origin of a particular emission factor can be traced.

21. All IPCC countries have been asked to nominate a technical point of contact for inventory studies. These points of contact have been used to review draft material; for example, a prototype software package for calculating $CO_2$ emissions from energy was circulated to national IPCC technical contacts and their comments used in revising the software. Some national technical points of contact have also contributed to expert groups convened to consider specific methodologies (for example, $CO_2$ from land-use change) and to recommend improvements.

22. The IPCC and OECD are cooperating with the United Nations Environment Programme in its programme of country studies in 11 developing countries: Costa Rica, Venezuela, Poland, Uganda, Tanzania, the Gambia, Senegal, Morocco, Nigeria, Mexico and China. These studies, the outcome of which will be national inventories prepared according to the draft IPCC method, will help build national capacity in inventory compilation and provide field tests of the methodology which will lead to its further improvement.

23. The IPCC has maintained close links with the current "Regional Study on Global Environmental Issues" of the Asian Development Bank which involves eight countries in Asia and the Pacific region. A component of these country studies has been a compilation of a preliminary national inventory, that in many cases uses the draft IPCC methodology as the default methodology.

24. In order to further promote a two-way exchange of information, the IPCC Programme contemplates, funds permitting, a series of regional training workshops at which national representatives can receive detailed instructions and gain experience in the use of the draft methodology. In this context, a workshop was held in Sao Paulo (Brazil) in March 1993. Feedback from these workshops is used to further improve both the draft methodology and associated training material.

### D. Important features of the IPCC Programme

25. The guidelines offer a default methodology, available to any country that wishes to use it. Countries which already have an established and comparable methodology are expected to continue to use their own, and an important component of the IPCC Programme is the establishment of correspondence between the IPCC method and other existing methods. The guidelines will include a section on reporting recommendations which will describe the additional, supporting documentation that should accompany a national inventory.

26. As part of the Programme, detailed specifications are being drawn up for a central database for the collection, management and reporting of national inventories. The main purpose of the system as far as the IPCC is concerned is to improve the inventory methodologies by enabling comparison of the detailed national estimates ("bottom-up") with global or regional ("top-down") estimates derived independently. Furthermore, the system aims to ensure comparability and transparency of inventories.

### E. Current status and future events

27. Work has begun on the layout and technical editing of the simplified workbook. Editing of the workbook is scheduled to be completed in September 1993; subsequent printing and translation depend upon the availability of funds. The reference manual should be edited in parallel with the workbook, but again, this work has not started owing to lack of funds. If adequate funds become available, then both the draft workbook and reference manual could be ready for widespread review by the end of 1993. Further regional training workshops are planned for Central and Eastern Europe (September or October 1993), for Asia (to be conducted with the United Nations Development Programme and its proposed series of country studies) and Africa (dates and places to be decided).

28. A presentation of the IPCC Programme and methodology will be given during the eighth session of the Committee.

## III. OBSERVATIONS OF THE SECRETARIAT ON FEATURES OF THE IPCC PROGRAMME

### A. Categories of sources and sinks

29. The heart of the inventory methodology lies in the reporting of estimates of emissions and removals of particular gases according to specifically designed source and sink categories. One of the criteria for designing inventories is that these should provide countries with a basis for developing policies and measures, and for reporting on their effects, in relation to Article 4.1 of the Convention; thus they should allow for the identification of sectors including energy, transport, industry, agriculture, forestry and waste management. The list reproduced in annex II is proposed by the IPCC in response to this requirement. It has not yet been formally adopted. The list does not show all existing subdivisions of categories: further subdivisions may occur, as appropriate.

30. As noted earlier, Parties to the Convention are to communicate inventories to the extent their capacities permit. The use of categories of sources and sinks provides a means of addressing this concern since it allows a country to report emission estimates at different levels of source category aggregation, depending on its capabilities and the availability of data. Additional groupings to those proposed by the IPCC methodology may be used, provided they are adequately defined and described, and demonstrably compatible with the basic structure of categories of sources and sinks.

## B. Reporting recommendations by the IPCC

31. As recommended by the IPCC, carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), carbon monoxide (CO), nitrogen oxides ($NO_x$) and non-methane volatile organic compounds (NMVOC) should be included in national inventories. 4/

32. The year 1988 was initially chosen as the "common" reporting year for which inventories should be developed because of the availability of data in countries. For forestry and agricultural activities, it is recommended to use a three-year average, and to acknowledge fluctuations from year to year due to economic, climatic or other variables wherever annual values are required. Countries that may have experienced extraordinary circumstances of any nature that affected emissions during that year are invited to report accordingly and provide estimates for proximate years. Now, however, in view of Article 4.2(b) of the Convention, the IPCC has sent a letter to Governments encouraging them to supply inventories for 1990, and indeed several countries had already done so.

33. It should be noted in this regard that Article 4.6 of the Convention provides for the COP to allow Parties included in Annex I undergoing the process of transition to a market economy a certain degree of flexibility in their implementation of Article 4.2. This provision envisages flexibility with regard to the base year for establishing a reference for emission levels.

34. Comparability and transparency depend on the availability of thorough documentation on the statistics and methods used, and definitions of specified activities, as well as other relevant assumptions. Any difference in methods and assumptions from those of the IPCC default method should be described.

## C. Methodologies

35. All the methods developed for estimating sources and sinks from the categories as indicated in annex II still present important technical and scientific difficulties, which are being addressed by the IPCC. In this regard, the current situation may be summarized as follows:

(1) for some categories, advanced methods and good data leading to satisfactory results are available (for example, when calculating $CO_2$ emissions from fuel combustion);

(2) for other categories, although good methods are available, lack of, or uncertain, data leads to a lesser degree of confidence in results (for example, when calculating emissions from many $CH_4$ sources);

(3) for the remaining categories, a scientific basis is not yet available to define methodologies with confidence (for example, for calculating $N_2O$ emissions from soils or for calculating removals by sinks). It should be noted that the current version of the methodology assumes that land-use change and afforestation are the most significant sinks. However, other sinks might be important and, as indicated in paragraph 18, efforts are being made to identify them for possible inclusion in the methodology. 5/

36. One issue not adequately dealt with in international discussions at present is the allocation of emissions from international marine and aviation bunkers. In the present "$CO_2$ Emissions from Energy Combustion Module", consumption of bunker fuels is included in national emissions but noted as a separate subtotal to allow for future adjustment, if necessary, to be decided by the COP.

### D. Collection, management and reporting of inventory data

37. As paragraph 26 above implies, a central database for the collection, management and reporting of national inventories will advance scientific understanding of the role of greenhouse gases in atmospheric cycles and of the relationship between observed atmospheric changes and anthropogenic emissions sources and sinks, as well as improving the quality of data. Although the system is being developed on behalf of the IPCC, it is the hope of its developers that it may be useful to the COP once the process for reviewing information and its concomitant requirements have been defined. Therefore, its conceptual design places emphasis on flexibility, user-friendliness and compatibility.

## IV. POSSIBLE ROLES OF THE SUBSIDIARY BODIES ESTABLISHED BY THE CONVENTION

38. Methodologies for inventories should be adequate, that is, based on the latest scientific and technical knowledge, and resulting data should meet the needs of the provisions of the Convention and its Parties. Technical matters such as emission factors, accuracy of data sources and assumptions, inclusion of additional gases, criteria for transparency, comparability and consistency as well as comparison of reported emission and removal levels against information from other sources, will need to be reviewed. The inventories should also reflect results from joint implementation activities, estimated according to criteria to be developed by the COP (see document A/AC.237/35). As a result, ways of improving the methodologies and their outputs will evolve, especially as far as aggregation of inventory data to establish global trends and evaluation of effectiveness of measures are concerned. The practicability of such methodologies should be evaluated and Parties that experience difficulty in using them should be given guidance. It should be noted that practicability has various implications, for example, relating to user-friendliness or the ability to assess the overall aggregated effects of measures taken to limit greenhouse gas emissions. Given its mandate (Article 9), the Subsidiary Body for Scientific and Technological Advice (SBSTA) is competent to carry out the above-mentioned tasks and may draw upon other bodies such as the IPCC.

39. Inventories will constitute a major part of the information communicated by the Parties that is to be considered by the Subsidiary Body for Implementation (SBI) (Article 10). Data contained in inventories will have to provide that body with the means to assess the overall aggregated effects of the steps taken by the Parties and to review the adequacy of commitments taken by Parties included in Annex I. Reviews of criteria for transparency, consistency and comparability, as well as checking that national data submitted duly take all this into account, may involve the SBI.

40. The central database system being developed by the IPCC may be of relevance to both subsidiary bodies established by the Convention. Therefore close cooperation between the subsidiary bodies and the IPCC might be envisaged (see para. 46 below).

41. It should be noted that to have a comprehensive picture of global emissions and removals of gases that affect climate, emission figures of halocarbons (such as chlorofluorocarbons and carbon tetrachloride) and their substitutes, as well as sulphur oxides would have to be considered when assessing global developments. Some of these gases are monitored through other international agreements, namely, the Montreal Protocol for halocarbons, and the protocols to the Convention on Long-Range Transboundary Air Pollution for sulphur compounds, the latter also providing control of nitrogen oxides. The SBSTA could advise on the treatment of gases not included in national inventories under the Convention.

## V. QUESTIONS FOR CONSIDERATION BY THE COMMITTEE

42. The IPCC Programme addresses the technical issues relating to the development of a methodology for national inventories of greenhouse gas emissions and removals. However, in order to prepare for agreement on comparable methodologies in time for COP I, it would be useful for the Committee to consider questions arising from the work of the IPCC relating to national inventories of greenhouse gases. The secretariat has identified some such questions, discussed in the following paragraphs, and in each case some relevant considerations are advanced. These questions are not meant as a critique of the IPCC Programme, but refer to points where this Programme might benefit from input by the Committee. Any conclusions from the Committee's consideration of these questions will be reflected in the report and conveyed to the IPCC.

43. Question 1. **What are the implications if methodologies are not fully developed in time for the first review process under the Convention?** Some guidelines are expected to be finalized by June 1994, others may be available only after COP I. At the present rate of ratifications, Parties included in Annex I should have completed and made available their communications in the second half of 1994. The Committee may wish to consider what the implications are of this transitional situation for the first review of information. In this context, the roles of the subsidiary bodies could be taken up, as appropriate (see documents A/AC.237/33 and A/AC.237/36).

44. Question 2. **Are the requirements for practicability sufficiently taken into account, especially for developing countries?** As described in paragraph 29, the approach taken by the IPCC Programme is built on the principle of categories of sources and sinks, which allows countries to report according to their commitments under Article 4.1, but also takes into account the different levels of sophistication that correspond to the availability of national data, infrastructure, manpower, and so forth. For some gases, simple methods to calculate national emissions and removals are proposed to compensate for the absence of detailed data and methodological know-how. Simplified workbooks providing summaries of all default methods for estimating greenhouse gas emissions and removals will be produced. They will be brief, self-contained, simple instruction manuals providing the necessary information to perform calculations manually and report results. User-friendly computer software will be developed for the most important gases and categories of sources and sinks. The Committee may wish to comment on the adequacy of the approach taken by the IPCC with regard to practicability, especially for developing countries.

45. Question 3. **How can full accessibility to the work of the IPCC be ensured?** Efforts -- of which this note is one -- are being made to increase the information flow between the IPCC Programme and the Committee. The IPCC Programme will be demonstrated during the eighth session of the Committee. Technical documentation is available for interested delegates, who will also have the opportunity of meeting IPCC experts at the session. The secretariat has established close working relationships with the IPCC Technical Support Unit of Working Group I to keep abreast of the progress made by the Programme. Even though a wide network of national experts is involved through the IPCC, members of the Committee may want to make sure that all relevant technical expertise in their countries is taken into account in inventory-related work. The Committee may propose ways to enhance the flow of relevant information from the IPCC to Committee delegations.

46. Question 4. **How can the technical cooperation component be expanded and coordinated with other current training initiatives?** As described in paragraphs 22 to 24, activities of the technical cooperation component of the IPCC Programme include national and regional training workshops and country studies. Efforts are being made to coordinate these capacity-building activities with those carried out by other international organizations and the interim secretariat of the Convention. The Committee may have suggestions to enhance international collaboration concerning training and may also want to encourage bilateral and multilateral donors to provide technical and financial support in order to produce inventories and hold training workshops.

47. Question 5. **Would a system for the central collection, management and reporting of inventory data be of direct use to the COP?** Following up on paragraphs 26, 37 and 39, it can be said that from a scientific/technical point of view, a system for the central collection, management and reporting of inventory data may be used by the SBSTA to assess the state of scientific knowledge relating to climate change and to prepare scientific assessments on the effects of measures taken in the implementation of the Convention. Such a system might also be valuable to the SBI to assess the global effects of steps taken by the Parties pursuant to the Convention, depending on how the information is aggregated for global purposes and how it allows for the tracking of global trends. Furthermore, it would have to satisfy specific requirements under the Convention, such as the provisions on confidentiality. A central system

would indirectly be useful to the COP by providing it with data on which to base overall analyses and assessments of the implementation of the Convention by Parties. If it is felt that such a system is of interest to the COP, the Committee might want to contribute to the development, organization and management of the system. In consideration of this issue, the Committee may wish to address the roles of the SBSTA and the SBI.

48. Question 6. **Should emissions from international marine and aviation bunkers be included in national inventories?** As explained in paragraph 36, the allocation of these emissions among nations has been identified as being problematic. The Committee may therefore consider whether a procedure for allocating such emissions among countries should be established by the COP and, if so, to recommend what that procedure should be.

49. Question 7. **What are the implications of uncertainty before specific categories of sources and sinks can be taken as a basis for policy-making?** Poor record-keeping, lack of statistical information, and limited understanding of the nature and magnitude of sources and sinks lead to overestimating or underestimating emissions. The issue of uncertainty and inaccuracy of inventory data is raised in sections II and III. Uncertainties in emission figures will have to be taken into account when assessing progress towards the objective of the Convention. The IPCC guidelines will provide guidance to minimize and quantify uncertainties in estimating sources and sinks, as far as possible. The Committee may specifically consider the implications of uncertainty for measuring the effectiveness of measures undertaken pursuant to Article 4.2(a) and (b) and when considering criteria for joint implementation.

50. Question 8. **How frequently can national inventories be reported?** The text of the Convention states that inventories shall be periodically updated. However, as inventories are part of the package of information that Parties will communicate in response to Article 12, the frequency of inventory updates cannot be considered in isolation and will have to take into account differentiated timetables as set out in Article 12.5. Yearly inventories are technically feasible but time-consuming and costly; from this perspective differentiated timetables for categories of sources and sinks could be practical. The Committee may therefore consider with what frequency the COP would need to receive these inventories to carry out its tasks.

51. Question 9. **Does the Committee see a need to shift priorities for the next phase of the IPCC Programme?** Efforts have been made to satisfy the requirements for comparable and internationally acceptable methodologies based on the best available scientific knowledge. Proposed reporting conventions and guidelines will provide a language for the comparison of methodologically diverse national estimates and ensure transparency, as countries have the option to prepare their inventories using either the methodology proposed by the IPCC or their own estimation method. The dynamics of the Programme allows for constant improvements in the necessary baseline data and in estimation and reporting methods. The Committee may wish to give an opinion on the approach taken by the IPCC and, if necessary, indicate additional requirements for consideration by the Panel. The Committee may consider whether it sees a need to shift priority for the next phase of the Programme. Suggestions for areas of work could include improvement of the accuracy of methodologies and of the expression of uncertainty, as well as the use of national inventory data to improve global emissions estimates. For example, the letter from the Chairman of the Committee to the Chairman of the IPCC places particular

emphasis on sinks: this matter has already been taken up by the IPCC (see paragraph 18). It should however be realized that the ability of the IPCC to respond to the Committee may be subject to resource constraints.

- - - - -

Notes

1/ The programme of the IPCC on the development of a methodology for national inventories of greenhouse gas emissions and removals, is usually referred to by the IPCC as the "Programme on the Development of a Methodology for National Inventories of Net Greenhouse Gas Emissions". It is referred to in this note as "the IPCC Programme".

2/ Methodologies to evaluate the effectiveness of measures to limit emissions and enhance the removals of greenhouse gases, as referred to in Article 7.2 (d), and which will rely on inventory data, are discussed in document A/AC.237/36 on review of information.

3/ Progress report submitted on 5 July 1993 by the Chairman of the IPCC to the Executive Secretary for the information of the Committee.

4/ See annex II.

5/ It is important to distinguish between sinks and reservoirs; see Article 1 of the Convention (on definitions). Reservoirs are not included in the IPCC methodology.

Annex I

CURRENT TECHNICAL DOCUMENTATION ON METHODOLOGIES*

1. Intergovernmental Panel on Climate Change. Proceedings of a workshop on national inventories of greenhouse gas emissions and sinks, Geneva, 5-6 December 1991.

2. _____. IPCC guidelines for preparation and reporting national inventories of net greenhouse gas emissions, vol. I: simplified workbook and software. Prepared by the IPCC/OECD Joint Work Programme, Working Group I secretariat, August 1992.

3. _____. Progress report on the IPCC/OECD programme on the development of a methodology for national inventories of net greenhouse gas emissions, IPCC-VIII/Doc. 10, eighth session, Harare, Zimbabwe, 11-13 November 1992.

4. _____. Final report from a workshop on national GHG inventories: transparency in estimation and reporting, parts I and II, Bracknell, 1 October 1992. Prepared by the IPCC/OECD Joint Work Programme on National Inventories of Greenhouse Gas Emissions, IPCC Working Group I secretariat, Bracknell, April 1993.

5. _____. Preliminary IPCC national GHG inventories: in-depth review, part III. Paper presented at an IPCC/OECD workshop on national GHG inventories: transparency in estimation and reporting, Bracknell, 1 October 1992. Prepared by the IPCC/OECD Joint Work Programme on National Inventories of Greenhouse Gas Emissions, IPCC Working Group I secretariat, Bracknell, April 1993.

6. Organisation for Economic Co-operation and Development. Estimation of greenhouse gas emissions and sinks. Final report from OECD Experts Meeting, Paris, 18-21 February 1991. Prepared for the Intergovernmental Panel on Climate Change; revised August 1991.

---

*The documents listed may be obtained from:
IPCC national contact addresses or
IPCC secretariat, c/o World Meteorological Organization
Case Postale 2300, 1211 Geneva 2, Switzerland
Telephone: 41 (22) 7308 215/254/284
Fax: 41 (22) 733 1270
Telex: 414199 OMM CH
or
IPCC Working Group I Technical Support Unit
Meteorological Office, Hadley Centre (Rm. H202),
London Road, Bracknell, Berkshire, RG12 25Y, United Kingdom
Telephone: 44 (344) 856615 / 856888
Fax: 44 (344) 856912
Telex: 849801 WEABKA G

Annex II

CATEGORIES OF SOURCES AND SINKS FOR NATIONAL GREENHOUSE GAS INVENTORIES, RECOMMENDED BY THE IPCC PROGRAMME

| Source categories/emissions | $CO_2$ | $CH_4$ | $N_2O$ | $NO_2$ | CO | NMVOC[a] |
|---|---|---|---|---|---|---|
| Total (net) national emission | | | | | | |
| I. All energy (fuel combustion and production, transmission, storage and distribution | | | | | | |
| A. Fuel combustion activities | | | | | | |
| energy and transformation industries | | | | | | |
| industry (ISIC)[b] | | | | | | |
| transport | | | | | | |
| commercial/institutional | | | | | | |
| residential | | | | | | |
| agriculture/forestry | | | | | | |
| other | | | | | | |
| biomass burned for energy[c] | - | | | | | |
| B. Fuel production, transmission, storage and distribution | | | | | | |
| crude oil and natural gas | | | | | | |
| coal mining | - | | - | - | - | |
| II. Other industrial production processes (ISIC) | | | | | | |
| A. Chemicals | - | | | - | - | |
| B. Non-metallic mineral products | | - | - | - | - | - |
| C. Other (ISIC) | - | | - | - | - | |
| III. Solvent and other product use | | | | | | |
| IV. Agriculture | | | | | | |
| A. Enteric fermentation | - | | - | - | - | - |
| B. Animal wastes | - | | - | - | - | - |
| C. Rice cultivation | - | | | - | - | - |
| D. Agricultural soils | - | | | - | - | - |
| E. Agricultural waste burning | - | | | | | |
| F. Savannah burning | | | | | | - |
| V. Land-use change | | | | | | |
| A. Forest clearing | | | | | | - |
| B. Conversion of grasslands to cultivated lands | | - | - | - | - | - |
| C. Plantation establishment | | - | - | - | - | - |
| D. Logging/Managed forests | | - | - | - | - | - |
| E. Abandonment of managed lands | | - | - | - | - | - |
| VI. Public service | | | | | | |
| A. Landfills | - | | - | - | - | - |
| B. Sewage treatment | - | | - | - | - | - |
| C. Other | | | | | | |

Source: IPCC, "Preliminary IPCC national GHG inventories: in-depth review, part III" (Bracknell, 1983) p. 93.
Notes: A hyphen (-) indicates that the item is not applicable.
[a] NMVOC non-methane volatile organic compounds
[b] ISIC International Standard Industrial Classification
[c] CO2 from biomass burning should be estimated but not included in the energy category total. If net CO2 emissions result (that is, from unsustainable bioenergy use), this will appear in the land-use change category.