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NATIONAL GHG INVENTORIES OF NON-ANNEX I PARTIES FROM LATIN AMERICA AND THE CARIBBEAN: PRELIMINARY SYNTHESIS. METHODOLOGICAL ISSUES.

Working Paper

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I. INTRODUCTION

1. Articles 4.1 and 12.1 of the United Nations Framework Convention on Climate Change require all Parties to the Convention to communicate information to the Conference of the Parties (COP). This provision includes Parties that are not listed in Annex I to the Convention, referred to below as Parties. Article 12.5 specifies that each non-Annex I Party shall make its initial communication within three years of the entry into force of the Convention for that Party, or of the availability of financial resources in accordance with Article4.3. Parties that are least developed countries may make their initial communication at their discretion.

2. This paper covers the information provided by five parties that submitted their initial communication by 1 May 2000 (Argentina, Chile, El Salvador, Mexico and Uruguay). It also covers the national GHG inventory from Paraguay who officially submitted its national GHG inventory[1] to the Convention.

II. INVENTORIES OF ANTHROPOGENIC EMISSIONS AND REMOVALS OF GREENHOUSE GASES

3. Pursuant to Articles 4.1 (a) and 12.1(a), all reporting Parties communicated a national inventory of anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol. As this report thus covers inventory information from only 6 out of 28 non-Annex I Parties of Latin America and the Caribbean, and taking into account the very different and particular national circumstances of those Parties, the analysis presented here does not draw general conclusions on common patterns of the reporting of inventory data by this group of Parties as a whole. The focus is on relevant methodological issues, to provide a general picture of how the data requirements have been addressed by the reporting Parties. The conclusions provided here may also be useful for Parties that are in the process of preparing their initial national communication.

A. Main findings

4. It is encouraging that all Parties followed the IPCC Guidelines to estimate their national inventories, and five of them used the Revised 1996 IPCC Guidelines. However, not all Parties presented the information using the IPCC summary tables. Two of them also submitted the worksheets required by the IPCC. These worksheets provide information for replicating the inventories that were developed with the IPCC default methods and therefore contribute to the transparency of the inventories. The completeness of reporting in terms of IPCC greenhouse gas source categories and major gases (carbon dioxide, methane and nitrous oxide) is approximately at a similar level to that of Annex I Parties.

5. The problems encountered in preparing national inventories are mainly related to the quality and availability of activity data. In some cases, the methods used to estimate greenhouse gas inventories were inadequate, particularly for the Land-use change and forestry (LUCF) sector. Three Parties updated previous inventories with significant improvements in completeness, transparency and quality. This suggests that there is a clear benefit from preparing inventories on a continuing basis, and a need to maintain and enhance national capacity for this purpose. Parties indicated what was needed to improve

[1] In addition, Argentina and Uruguay submitted updates to their national GHG emission inventories.

and update their inventories, particularly the need for financial and technical assistance that would contribute to capacity building.

6. CO_2 emissions and removals from *the energy* and *land-use change and forestry* sectors are generally the most important sources and sinks of greenhouse gas emissions reported by Parties. CH_4 emissions from livestock are the most important source of greenhouse gases for Uruguay, and N_2O from agricultural soils for Paraguay. *Fuel combustion* is the largest source of CO_2 emissions for all reporting Parties, except Paraguay (*where forest and grassland conversion* in the *land-use change and forestry sector is the largest source*). Livestock is the biggest source of CH_4 for all reporting parties. *Land-use change and forestry* constitutes a net sink of CO_2 for Argentina, Chile and Uruguay. For the other reporting Parties *LUCF* constitutes a net source.

7. All Parties followed the IPCC Guidelines to estimate their inventories (see box 1), mostly using the default methods, and five of them used the Revised 1996 IPCC Guidelines, as encouraged by relevant conclusions of the Subsidiary Body for Scientific and Technological Advice (SBSTA). Chile and El Salvador provided national GHG inventories for the year 1994 and Mexico and Paraguay for 1990. In addition, Argentina and Uruguay provided inventory data for both 1990 and 1994. Chile also reported its preliminary inventory for the year 1993.

8. The completeness[2] of reporting in terms of IPCC GHG source categories and major gases (CO_2, CH_4 and N_2O) is approximately the same as that of Annex I Parties. In some sectors, for example *land-use change and forestry*, the degree of completeness exceeded that of Annex I Parties. In other sectors, such as *industrial processes*, the degree of completeness relative to Annex I Parties was lower (see table 1).

9. All Parties reported data on GHG precursors. Only two Parties, Paraguay and Uruguay, reported separately emissions from bunker fuels. Chile, El Salvador, Uruguay and Paraguay provided aggregate GHG emissions estimates in terms of CO_2 equivalent. Chile used IPCC GWP of the year 1994, instead of the year 1995. El Salvador presented aggregates estimates using 20-year time horizon GWPs, instead of 100-year horizon[3]. Only Paraguay reported emissions of SF_6. This Party considers that in 1990 it did not have emissions of HFCs and PFCs. No Party reported these emissions. Argentina and Uruguay provided information on the uncertainty of the source-category estimates (see table 2).

10. Reporting on sectors and subsectors was more comprehensive than required by the UNFCCC guidelines (see paragraph 30 below). For example, most Parties reported CH_4 and/or N_2O emissions from *transport, agricultural soils, waste* and *field burning of agricultural residues* as required by the IPCC Guidelines, although this is not required by the UNFCCC guidelines (see tables 3 and 4).

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[2] Completeness in this document is understood as a measure of the extent to which an inventory covers all sources and sinks, as well as all gases, included in the Revised 1996 IPCC Guidelines. With the exception of HFCs, PFCs and SF_6, the reporting Parties covered the main GHG and IPCC sectors and source categories.

[3] Decision 2/CP.3 reaffirmed that GWP used by Parties should be those provided by the IPCC in its Second Assesment Report based on the effects of GHG over a 100-year time horizon. However, this decision is related to the Kyoto Protocol. The secretariat used these GWPs in this paper for the sake of comparability between all reporting Parties.

11. Paraguay and Uruguay submitted the worksheets according to the IPCC Guidelines for most reported source-categories. Argentina provided the IPCC sectoral reports and a worksheet for *enteric fermentation*. The IPCC worksheets provide information for replicating the inventories of Parties using default methods and, therefore, contribute to the transparency[4] of the inventories.[5] El Salvador, Mexico, Uruguay and Paraguay provided CO_2 fuel combustion estimates obtained using both the IPCC reference and the sectoral approach, according to the IPCC Guidelines (see table 5). Chile mentioned it used both approaches, but the values of the estimates were not reported.

12. The two factors that appear to affect the calibre of GHG inventories the most are:

(a) The availability and quality of activity data; and

(b) The preparation of inventories on a continuous basis by stable national teams.

In cases when inventories were updated, the completeness, transparency and quality improved in the new versions (see table 6). This suggests that there is a clear benefit from preparing inventories on a continuous basis. The ability of Parties to improve and update their inventories appears to be a function of the available financial and technical assistance. All Parties received external support in preparing their GHG inventories.

13. Most Parties reported on problems encountered when preparing their national inventories, mainly related to the quality or availability of activity data. In some cases, they reported that the methods used to estimate GHG inventories were inadequate, particularly in the LUCF sector, and that default emission factors were not appropriate for their national circumstances (see table 7). The effect of these problems on the quality of the inventories is not clear. In addition to reporting on problems, some Parties identified what is needed to improve their inventories; in particular, they mentioned the need for financial and technical assistance (see table 8).

14. Parties made efforts to improve their inventories and to overcome problems. Some Parties described the application of national procedures similar in nature to *good practices*[6] in developing GHG inventories (see table 9).

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[4] Transparency in this document is understood as a measure of the extent to which the assumptions and methodologies used for an inventory are clearly explained to facilitate replication and assessment of the inventory by users of the reported information. The provision of worksheets by some Parties enhanced the transparency of the inventories. IPCC worksheets provide basically the same inventory information as is included in the common reporting format which will be used by Annex I Parties from the year 2000 onwards (FCCC/SBSTA/1999/6/Add.1).

[5] It should be noted that many Annex I Parties used more complex national methods, which generally improves the quality of their inventories, but when they are not well documented in their communication, the information is less transparent.

[6] The IPCC has developed guidance on *good practices*. This guidance may be available for consideration by the SBSTA at its tweflth session. Guidance on *good practices* may include, *inter alia*, advice on the choice of methodology, emission factors, activity data, and uncertainties, and on a series of quality assessment and quality control procedures which may be applied during the preparation of inventories.

B. Methodological issues

15. The reporting of inventory data by Parties should follow the UNFCCC guidelines[7] and SBSTA conclusions presented in table 10. In almost all cases, Parties demonstrated consistency when following this guidance.

Methods and gases

16. All Parties followed the IPCC Guidelines to estimate their national GHG inventory, and four of them used the Revised 1996 IPCC Guidelines[8] Mexico did not use the 1996 version of the IPCC guidelines because this version was available after Mexico completed its submitted inventory. Generally, Parties used IPCC default methods, but some of them developed their own methodologies and emission factors for specific sectors. All Parties presented emission estimates of the three main greenhouse gases CO_2, CH_4 and N_2O on a gas-by-gas basis. All Parties addressed the ozone precursors (CO, NO_x and NMVOC) and provided CO_2 *land-use change and forestry* estimates which encompass removals. Although not required by the UNFCCC guidelines, estimates of aggregate GHG emissions in terms of CO_2 equivalent using IPCC GWP values were provided by four Parties. The following box summarizes the reporting of inventory data by Parties.

Box 1. Status of reporting of inventory data

Party	Method used	Years	Reporting table[a]	Precursors: CO, NO_x, NMVOC	HFCs, PFCs, SF_6	SO_2	Bunkers	CO_2 equivalent estimates
Argentina	IPCC, 1996	1990, 1994	IPCC Summary 7A	X	[b]	X	X	-
Chile	IPCC, 1996	1994	IPCC Summary 7B	X	0	X	-	X
El Salvador	IPCC, 1996	1994	IPCC Summary 7B	CO, NO_x only	-	-	-	X
Mexico	IPCC	1990	IPCC Summary 7A	X	-	-	-	-
Paraguay	IPCC, 1996	1994	IPCC summary 7B	X	SF_6	-	X	X
Uruguay	IPCC, 1996	1990, 1994	IPCC Summary 7B	X	-	X	X	X

[a] Although some Parties provided similar information than the IPCC summary 7A, it was presented in different tables. and in different parts of the inventory. The IPCC Summary table 7A facilitates the understanding of the inventory.

[b] Argentina included HFC emissions in its 1997 inventory.

[7] References to UNFCCC guidelines are to document FCCC/CP/1996/15/Add.1, decision 10/CP.2, annex: "Guidelines for the preparation of initial communications by Parties not included in Annex I to the convention". The Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories are referred to in this document as the IPCC Guidelines. Text in *italics* indicates source/sink categories of the IPCC Guidelines.

[8] It should be noted that these guidelines were available only as from mid-1997.

17. The degree of completeness in reporting on sectors and subsectors is high (see table 1). All Parties reported the most significant GHG emission source and sink categories, such as CO_2 emissions or removals from *fuel combustion*, *industrial processes* and *land-use change and forestry*, CH_4 emissions from *agriculture* and *waste*, and N_2O from *agricultural soils* and *fuel combustion.*

18. Fully fluorinated compounds,[9] the reporting of which is encouraged by the UNFCCC guidelines, were not reported by most Parties. Also, no Party reported emissions of HFCs. Paraguay reported emissions of SF_6, but informed it did not have emissions from HFCs and PFCs in 1990. Chile reported 0 emissions for HFCs, PFCs and SF_6. The SBSTA,[10] at its fourth session, encouraged Parties to report actual emission estimates of these three types of greenhouse gases (see table 10). Methodologies to estimate emissions of these gases were included in the Revised 1996 IPCC Guidelines for the first time.

19. Estimates of emissions from *international aviation and marine bunker fuels* were reported by Argentina, Paraguay and Uruguay. In conformity with the guidelines, these emissions were reported separately from national totals, and four Parties provided a breakdown into marine and aviation bunkers. One Party (Argentina) provided data on the amount of fuel sold to the market.

20. The UNFCCC guidelines request Parties to make efforts to report the estimated range of uncertainty of their emission estimates, where appropriate. The reporting of uncertainties or quality of data was very limited. Only Uruguay complied with this request. For estimates from the *energy* sector high confidence levels were reported, while for the *land-use change and forestry* sector confidence levels were considered to be medium[11] (see table 2).

Reporting tables

21. All Parties reported their inventories consistently with the UNFCCC guidelines, presenting even more information than the minimum explicitly requested and using more comprehensive tabular formats than table II of those guidelines.[12] As all Parties followed the IPCC Guidelines for estimating their GHG emissions, some of them used the reporting formats of these guidelines: all reporting Parties presented several tables with similar or more information than the IPCC summary 7B. However, except Argentina and Mexico, they did not present a summary table with all source-categories in one table as the table 7A of the IPCC.

22. The use of the IPCC summary table provides for a more thorough reporting of inventory data than the use of table II of the annex to the UNFCCC guidelines. Several individual GHG emissions from different IPCC source categories are not explicitly requested by table II of the UNFCCC

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[9] A fully fluorinated compound is one which contains atoms of fluorine (F) and only one other element (e.g. C, S, N). Thus, perfluorocarbons (PFCs), such as CF_4 and C_2F_6, and sulphur hexafluoride (SF_6) are fully fluorinated compounds, while hydrofluorocarbons (HFCs) are not.

[10] FCCC/SBSTA/1996/20, para. 31.

[11] For confidence levels reported by Annex I Parties, see document FCCC/SBSTA/1998/7, table 14.

[12] See document FCCC/CP/1996/15/Add. 2/page 51

guidelines, which is particularly the case for some significant source categories, such as *waste* and *agricultural soils*. However, all reporting Parties provided emission estimates for many of these source categories (see table 4).

23. The share of emissions from these explicitly unrequested source categories in a Party's total reported GHG emissions could be substantial. If Parties had reported only the source categories explicitly requested by table II of the UNFCCC guidelines, significant shares of Parties' aggregate GHG emissions would not have been reported (see table 4).

24. Although not requested by the UNFCCC guidelines, Paraguay and Uruguay also provided IPCC worksheets (see table 5), which provide detailed calculations for the estimation of GHG emissions as well as numerical information on aggregate emission factors and activity data for inventories using IPCC default methods. The provision of these worksheets contributes substantially to the transparency of the inventories.

25. In addition, five Parties estimated their fuel combustion emissions using both the reference and the sectoral approach, as requested by the IPCC Guidelines (see table 5). This is a useful self-verification procedure which greatly improves the transparency of the inventories. However, the usefulness of applying both approaches would be enhanced if the identified differences were explained by Parties. For most Parties, the range of difference between the results obtained with the two approaches was of similar magnitude to the differences reported by Annex I Parties which made this comparison.[13]

26. Table II of the UNFCCC guidelines requests Parties to describe assumptions and methods, and the values of emission coefficients, where these differ from IPCC default methods and coefficients. This request allows for a more transparent reporting of inventory information by Parties. For most of the sectors, Parties used the default emission factors provided in the IPCC Guidelines. Some Parties mentioned they used in some cases national emission factors in order to better reflect their national circumstances. However, these emission factors were not reported in the inventory.

27. The source of the activity data used for the emission estimates of the different sectors and source categories was referenced by almost all Parties, even though this information is not explicitly requested by the UNFCCC guidelines. Generally, Parties indicated that activity data were obtained from national sources, such as national statistics provided by the respective ministries, municipalities, regions and agencies, or from industrial facilities. In some cases, reference to international statistics was made, for example to statistics of the Food and Agriculture Organization of the United Nations (FAO) by Uruguay.

Methodological problems identified by Parties

28. Five Parties explicitly identified problems in preparing their national inventories (see table 7). Most of the problems relate to the lack of activity data for estimation of emissions in some sectors or unavailability of activity data that suit the needs for reporting in line with the IPCC Guidelines. Uruguay,

[13] See document FCCC/SBSTA/1998/7, table 3.

Chile and Paraguay reported problems related to the lack or limitations of the current IPCC methodology for estimation of emissions in some sectors, particularly *Land-Use Change and Forestry*. Uruguay explicitly stated that, for some source categories, the use of IPCC default emission factors was not appropriate for their national circumstances and that the lack of national emission factors in these cases could affect the accuracy of the estimates.

Methodological issues identified during the compilation and synthesis

29. In addition to the difficulties mentioned by Parties, other issues were also identified during the process of compiling the inventory information of the initial national communications:

(a) Different values of emission estimates for the same sector or source categories in tables at different places of the communication;

(b) In some cases, it was not clear whether certain source categories were not reported because they were not relevant for the country or had not been estimated for other reasons. Parties did not use appropriate notation keys suggested by the IPCC Guidelines;

(c) Some Parties changed the format of the IPCC summary tables or did not include the precursors;

(d) In the *land-use change and forestry* sector, some inconsistencies were found in the reporting of estimates of biomass during a deforestation process, namely the fractions of biomass burned on site, burned off site and left to decay. In addition, there was no clear indication as to the time-frame of the activity data used in some source categories, such as *forest and grassland conversion* and *abandonment of managed lands*; and

(e) CH_4 and N_2O emissions of energy biomass burning were not included in the tables.

A useful tool to overcome some of these difficulties could be the IPCC software,[14] which facilitates the accurate reporting of inventory data.

Methodological problems encountered in the use of UNFCCC guidelines

30. Parties provided the best available data in their national GHG inventories, a task which was facilitated by the existence of the IPCC and UNFCCC guidelines. However, some common problems with the use of these latter guidelines[15] were identified:

(a) The minimum information requirements of table II of the annex to the UNFCCC guidelines do not facilitate a complete and disaggregated reporting of GHG emissions by sources and removals by sinks;

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[14] Greenhouse Gas Inventory Software for the Workbook - Instrumentation Manual 1996.

[15] See decision 12/CP.4, para. 7(b).

(b) Although the UNFCC guidelines mention that the IPCCC Guidelines should be used, they do not explicitly encourage Parties to apply the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, as appropriate and to the extent possible, as urged in relevant SBSTA conclusions adopted after adoption of decision 10/CP.2 (see table 1); and

(c) The UNFCCC guidelines encourage Parties to include in their national inventories information on fully fluorinated compounds, which cover, *inter alia*, PFC and SF_6 emissions. The reporting of HFC emissions is not covered by this encouragement. In addition, there is no specification as to the reporting of actual or potential emissions of these substances. However, conclusions adopted by the SBSTA at its fourth session, encourage Parties to report explicitly actual emissions of HFCs, PFCs and SF_6 (FCCC/SBSTA/1996/20, paragraph 31).

C. Issues related to the preparation of inventories

Institutional arrangements

31. A description of the existing institutional arrangements relevant to the preparation of national inventories on a continuing basis[16] was provided by all reporting Parties. In most cases, these arrangements consist of inter-institutional committees or agencies, or teams of national experts from different sectors, both from the public and from the private sector, and universities coordinated by a leading national institution or ministry.

Improvements, needs and support received

32. Four Parties identified areas for further improvement of inventory data (see table 8), which mainly address problems identified in paragraph 28 above. Argentina, Mexico, and Uruguay mentioned the need for financial and technical assistance to improve their inventories. In addition, Parties draw attention to the importance of continuous collection of data and/or the establishment of databases appropriate to the requirements of IPCC reporting.

33. In addition to the identification of areas for further improvement of inventory data, Parties made their own efforts to improve the quality of their emission estimates. Some Parties described the application of some elements, which might be related to *good practices*, while preparing their national inventory. For example, some of them compared estimates obtained using the IPCC methodology or default emission factors with estimates obtained using their own methods, models and/or national or regional emission factors. El Salvador invited an external third party to revise its inventory as requested under the quality assurance procedures included in the *good practices* guidance. It should be noted that the guidance on *good practices* under development by the IPCC may be relevant to the preparation of inventories by Parties, and may help solve the problems related to, *inter alia*, emission factors and activity data in a comprehensive way (see table 9).

34. Improvements in the completeness, transparency and quality of the inventories were recognized in

[16] See decision 10/CP.2, annex, para. 4.

the inventories of Parties which updated their previously submitted inventory data (see table 6). In some cases, problems identified by a given Party in its initial inventory were overcome in the later inventory. This suggests that by preparing the GHG inventories on a continuing basis, the reporting and quality of inventory data can be improved and some of the difficulties overcome.

35. The technical and financial support received by reporting non-Annex I Parties constituted a key element in the preparation of the national inventories. All Parties received support from the GEF and its implementing agencies for the development of enabling activities, which included the preparation of their national inventories in the context of their national communications.[17] It should be noted that most reporting Parties also received in addition technical and financial assistance for preparing inventories through bilateral or multilateral channels, mainly from the United States Country Study Program and/or the CC: Train[18] . This fact also underlines the close relationship that exists among the quality of the inventories, their preparation on a continuing basis and the need for adequate resources and financial and technical support to prepare them.

D. Presentation of results

36. Tables A.1 to A.8 in the annex to this document summarize inventory data for CO_2, CH_4, N_2O, ozone precursors and international bunkers. In some instances, estimates have been converted into CO_2 equivalent estimates using 1995 IPCC global warming potentials based on the effects of the GHG over 100-year time horizon, in order to facilitate comparison of inventory results. Such a presentation shows, for example, the relative contribution of the different greenhouse gases and the different sectors to a Party's total greenhouse gas emissions.[19]

Emissions by sources and removals by sinks

37. The reporting Parties represent a net source of GHG emissions. No one Party has sinks in *land-use change and forestry* that exceed total CO_2 emissions.[20]

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[17] Parties may wish to refer to document FCCC/SBI/1999/INF.7, which provides information on activities to facilitate the provision of technical and financial support for the preparation of national communications for non-Annex I Parties, and to document FCCC/SBI/1999/INF.8 on information on relevant actions by the GEF.

[18] Parties also received assistance from the Netherlands Climate Change Studies Assistance Programme, the Canadian Government, the CC: TRAIN of the United Nations Institute for Training and Research (UNITAR) and from the National Communications Support Program/GEF/UNDP/UNEP.

[19] It should be noted that four out of the six Parties considered here used CO_2 equivalent estimates to assess the relative contribution of each individual greenhouse gas or sector to their aggregate GHG emissions.

[20] In view of the different role of the *land-use change and forestry* sector in the different Parties - in some, this sector offsets total emissions, while in others it is a large source of emissions - and the request by the IPCC Guidelines to provide net emissions or removals in the different source categories of this sector, the term "total CO_2 emissions" in this document denotes the sum of CO_2 emissions from all sectors except CO_2 emissions and removals from *land-use change and forestry*. This facilitates the presentation of the data in a consistent and comparable manner. Nevertheless, the magnitude of CO_2 *land-use change and forestry* emissions and removals is shown in relation to Parties' total CO_2 and aggregate GHG emissions.

Aggregate GHG emissions expressed in terms of CO_2 equivalent[21]

38. CO_2 was the most important GHG for four Parties (Argentina, Chile, EL Salvador and Mexico). For these Parties CH_4 was the second largest contributor to aggregate GHG, except El Salvador for which N_2O constituted the second largest contributor. For Uruguay CH_4 was the most important GHG and for Paraguay N_2O. The relative importance of the individual GHGs did not display the same pattern for these two Parties; for example, in Paraguay and Uruguay CO_2 had the smallest share of aggregate GHG emissions (18 and 14 per cent, respectively).

39. *Energy*, *agriculture* and *land-use change and forestry* constituted the largest sources of GHG emissions for the reporting Parties. Removals by sinks from *land-use change and forestry* were also large, offsetting emissions from this sector for all reporting Parties except El Salvador, Mexico and Paraguay. The *energy* sector as a whole was the largest source of GHG emissions for most Parties, while *agriculture* was the most important source for Uruguay and Paraguay and *land-use change and forestry* for El Salavador. In Mexico, *land-use change and forestry* constituted the second largest source of GHG emissions. Chile also has large emissions from *land-use change and forestry* but they were offset by large removals in the same sector.

40. *Fuel combustion* in the *energy* sector was found to be the largest source of total CO_2 emissions for all Parties, except El Salvador and Paraguay. The *land-use change and forestry* sector as a whole constituted a net sink for Argentina, Chile and Uruguay. However, for El Salvador, Mexico and Paraguay the emissions exceeded the total removal. This subsector was also a significant source of CO_2 emissions for Argentina and Chile which offset the Parties' total sink capacity. It is evident, that deforestation is an important source of emissions for some of the reporting Parties. *Transport* was the most important source for Argentina, Chile, El Salvador, Paraguay and Uruguay within the *fuel combustion*, but for Mexico *Energy industries* was the largest source. *Transport* was the second important source for this later Party. CO_2 emissions from international bunker fuels were reported only by Argentina, Paraguay and Uruguay.[22]

41. *Agriculture* was the most significant source of CH_4 emissions for all reporting Parties. In the agricultural sector, livestock was the most important subsector for all reporting Parties. *Agriculture* was found to be the most important source of N_2O emissions for all, due to the large contribution of *agricultural soils*.

E. Current trends

42. In addition to the inventory data for the year 1994 or 1990 requested by the UNFCCC guidelines, two Parties, Argentina and Uruguay, provided a complete GHG emission inventory for both 1990 and 1994, allowing for a preliminary analysis of the trends of GHG emissions in these

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[21] Aggregate GHG emission estimates given in this document represent the sum of total CO_2, CH_4 and N_2O emissions expressed in CO_2 equivalent, using IPCC 1995 GWP values. Total CO_2 emissions are calculated in line with the definition given in footnote 19.

[22] According to the UNFCCC and IPCC Guidelines these emissions are not accounted for in national GHG emissions.

countries.

43. Total CO_2 emissions (excluding *land-use change and forestry*) increased over the 1990 to 1994 period for Argentina and Uruguay, because CO_2 emissions from *fuel combustion* increased. Trends in CO_2 emissions differed if the *land-use change and forestry* sector was included in total CO_2 emissions: the increase in total CO_2 emissions was then significantly higher in Argentina, while in Uruguay a 42 per cent decrease could be noted, due to the developments in this sector.[23]

44. Total CH_4 emissions rose from 1990 to 1994 for 13 per cent for Argentina and 11 per cent for Uruguay. Total N_2O emissions increased in Argentina and Uruguay compared to 1990 levels (58 and 3 per cent).

[23] For Uruguay, the *land-use change and forestry* sector was a net CO_2 emitter in 1990, while in 1994 it was a net sink. The Party explained that this change in the pattern of net emissions from this sector was a consequence of an implemented policy.

Tables

Table 1. Completeness of reporting according to the IPCC Guidelines (1990 and/or 1994)

GHG source category	CO_2		CH_4		N_2O	
	Reporting Parties	% of total	Reporting Parties	% of total	Reporting Parties	% of total
I.A. Fuel combustion	**6**	**100*(100)***	**6**	**100*(100)***	**6**	**100*(100)***
1. Energy industries	6	100*(91)*	6	100*(79)*	5	83*(82)*
2. Manufacturing industries and construction	6	100*(91)*	6	100*(82)*	4	66*(74)*
3. Transport	6	100*(94)*	6	100*(91)*	5	83*(85)*
4. Small combustion	6	100*(94)*	6	100*(85)*	4	66*(76)*
5. Other	4	66*(68)*	4	66*(41)*	3	50*(32)*
6. Biomass burning	4	66(32)	1	16*(29)*	0	*(18)*
I.B. Fugitive fuel emissions	**1**	**13*(53)***	**3**	**50*(88)***	**0**	*(9)*
1. Solid fuels	0	*(15)*	3	50*(71)*		
2. Oil and natural gas	1	13*(47)*	3	50*(82)*	0	*(9)*
II. Industrial processes	**6**	**100*(100)***	**2**	**33*(53)***	**2**	**33*(79)***
A. Mineral products	6	100*(68)*	1	16*(0)*		
B. Chemical industry	1	16*(32)*	2	33*(24)*	2	33*(50)*
C. Metal production	3	50*(50)*	0	*(18)*	0	*(3)*
D. Other production	1	16*(32)*	1	16*(3)*	1	16*(3)*
III. Solvent use	0	*(21)*	0		0	*(26)*
IV. Agriculture	**0**	*(12)*	**6**	**100*(100)***	**6**	**100*(100)***
A. Enteric fermentation			6	100*(97)*		
B. Manure management			3	50*(91)*	2	33*(15)*
C. Rice cultivation			0	*(35)*	0	*(9)*
D. Agricultural soils	0	*(12)*	0	*(21)*	6	100*(85)*
E. Prescribed burning of savannas			2	33*(3)*	2	33*(3)*
F. Field burning of agricultural residues			5	83*(38)*	6	100*(24)*
G. Other						
V. Land-use change and forestry	**6**	**100*(91)***	**3**	**50*(44)***	**3**	**50*(41)***
A. Changes in forest and other woody biomass stock	6	100*(88)*		*(3)*	1	16*(6)*
B. Forest and grassland conversion	4	66*(32)*	1	16*(26)*	2	33*(15)*
C. Abandonment of managed lands	3	50*(7)*				
D. CO_2 emissions and removals from soils	2	33*(9)*				
E. Other	1	16*(15)*		*(15)*	1	*16(15)*
VI. Waste	**0**	***(41)***	**6**	**100*(97)***	**3**	**50*(53)***
A. Solid waste disposal on land	0	*(15)*	6	100*(97)*	2	33(0)
B. Waste-water handling	0	*(3)*	5	83*(74)*	2	*33(24)*
C. Waste incineration	0	*(32)*	0	*(35)*	0	*(41)*
D. Other			1	16*(6)*	1	16*(0)*
VII. Other	0	*(3)*				
International bunker	**3**	**50*(71)***	**3**	**50*(35)***	**2**	**33*(35)***

Notes:

Sources reported as not occurring (NO) were considered as reported in this table. Sources reported as NE (not estimated) or NA (not applicable) were not considered as reported.

IPCC sectors or source categories reported by 80 per cent or more of the reporting non-Annex I Parties are given in shaded cells. The values given in italics and in parentheses indicate the percentage of reporting by Annex I Parties, for purposes of comparison. These values are taken from document FCCC/SBSTA/1998/7, table 18.

Table 2. Confidence levels[a] of emission estimates

Gas and source	Argentina	Uruguay
CO_2		
Fuel combustion	M	H
Industrial processes	M	H
Land-use change and forestry	M - L	M
CH_4		
Fuel combustion	M	L
Fugitive fuel emissions	L	L
Livestock	M	M
Other agriculture	M	M
Waste	M	M
N_2O		
Fuel combustion	M	M
Chemical industry	M	
Agricultural soils		M

[a] The secretariat uses the term "confidence levels" in compiling data provided by Parties using different terms: uncertainties, error range, accuracy, etc. Confidence levels are given in per cent. For Parties that reported on uncertainties qualitatively the following codes were used: High (H); medium (M); low (L).

Table 3. Coverage of IPCC sectors, subsectors and source categories not explicitly requested by the UNFCCC guidelines

Sector	CO_2	CH_4	N_2O
Energy	Total fugitive fuel emissions *- Solid fuels* *-Oil and natural gas*	*- Energy industries* *- Manufacturing industries and construction* *- Transport* *- Small combustion*	*- Manufacturing industries and construction* *- Transport* *- Small combustion* *- Other (fuel combustion)* Total fugitive fuel emissions *- Solid fuels* *- Oil and natural gas*
Industrial processes	No split of industrial process emissions into subsectors is requested. Reporting of national totals of industrial processes is only requested for CO_2 and N_2O emissions.		
Agriculture		*- Manure management* *- Agricultural soils* *- Field burning of agricultural residues*	*- Manure management* *- Agricultural soils* *- Prescribed burning of savannas* *- Field burning of agricultural residues*
Land-use change and forestry	*- CO_2 emissions and removals from soils* *- Other land-use change and forestry*	Total land-use change and forestry *- Forest and grassland conversion* *- Other land-use change and forestry*	Total land-use change and forestry *- Forest and grassland conversion* *- Other land-use change and forestry*
Waste	Total Waste *- Solid waste disposal on land* *- Waste incineration* *- Other waste*	Total waste *- Solid waste disposal on land* *- Waste-water handling* *- Waste incineration* *- Other waste*	Total waste *- Waste-water handling* *- Waste incineration* *- Other waste*
Memo items	International bunkers CO_2 emissions from biomass	International bunkers	International bunkers

Note:

Subsectors and source categories to be reported according to the IPCC Guidelines but that are not explicitly requested by table II in the annex to the UNFCCC guidelines are given in *italics*. The table also indicates the IPCC sectors and subsectors for which no totals are requested in table II of the annex of the UNFCCC guidelines. Shaded cells indicate that emission estimates from these sectors, subsectors and source categories were reported by more than 80 per cent of the reporting Parties, even though this information was not explicitly requested by the table in the UNFCCC guidelines.

Table 4. Share of IPCC source categories not requested by the UNFCCC guidelines in total emissions

Party	CO_2	CH_4	N_2O	Aggregate GHG in CO_2 equivalent
	(per cent of total)	(per cent of total)	(per cent of total)	(per cent of total)
Argentina 1990	1	14	100	**5.9**
1994	1	19	98	**7.9**
Chile	0	46	97	**24**
El Salvador	0.5	40	96	**35**
Mexico	0	24	99.5	**5.6**
Paraguay	0	36	100	**59**
Uruguay 1990	0	10	100	**40.7**
1994	0	10	100	**39.2**

Note:

The percentages given in the last column of this table represent the share of GHG emissions obtained from the IPCC source categories not explicitly included in table II of the UNFCCC guidelines in aggregate GHG emissions in CO_2 equivalent. The respective shares in each of the gas totals are also shown.

Table 5. Status of reporting using the IPCC reporting framework

Party	IPCC sectoral information							Comparison with reference approach (CO_2 fuel combustion) [a]	
	Sectoral reports	Worksheets[b]					Standard data tables		Difference (%)
		E	IP	A	LUCF	W			
Argentina	X	-	-	4-1 (CH_4)	-	-	E and IP	-	-
Chile	-	-	-	-	-	-	-	X	No reported
El Salvador								X	+6
Mexico	-	-	-	-	-	-	-	X	+4.9
Uruguay	X	1-1, 1-2, 1-3, 1-4, 1-5, 1-7, 1-8, 1-9	2-1, 2-2, 2-5, 2-9, 2-12, 2-13	4-1, 4-2, 4-3, 4-4, 4-5	5-1, 5-5	6-1, 6-2, 6-3, 6-4	-	X	+6.5 (1990) +1.2 (1994)
Paraguay	X	1-1, 1-2, 1-3, 1-4, 1-5, 1-7, 1-8, 1-9	2-1, 2-2, 2-4, 2-5, 2-9, 2-10, 2-11,2-13, 2.15	4-1, 4-2, 4-3, 4-4, 4-5	5-1, 5-2, 5.3	6-1, 6-2, 6-3, 6-4	-	X	3.7

Notes:

The following abbreviations have been used:
E: Energy **LUCF:** Land-use change and forestry **A:** Agriculture
IP: Industrial processes **W:** Waste

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[a] Comparison of CO_2 emission estimates from *fuel combustion* with those obtained using the IPCC reference approach. Differences as a percentage relative to the estimates obtained with the sectoral approach, which are set at 100 per cent in this table. For El Salvador, Mexico, Paraguay and Uruguay the difference given in this column was calculated by the secretariat based on the numerical data provided in the communications. Chile did not report the values of estimates using the different methods.

[b] In some cases, the numeration of worksheets refers to the Revised 1996 IPCC Guidelines, while in others, numeration refers to the 1995 version of those guidelines. A few Parties also added worksheets which are not part of the IPCC Guidelines.

[c] Standard data table without including values for emission factors.

Table 6. Improvements introduced in updates[a] of inventories

Party	Improvements
Argentina	1. Inclusion of additional sectors: *land-use change and forestry, agricultural soils, savanna burning, burning of agricultural residues* 2. Improvements in basic information. 3. CH_4 emissions from *enteric fermentation* and *manure management*: recalculated using the tier 2 IPCC methodology (instead of tier 1) 4. Improvements in the reporting: - *Industrial processes*: detailed description of calculation method used - *Oil and natural gas*: Calculations to estimate *fugitive fuel* emissions - *Agriculture*: worksheet 4-1 provided; description of methodology used to estimate CH_4 emissions from *rice cultivation* - *Waste*: description of methodology used to estimate CH_4 emissions from *solid waste* and *waste water* (domestic and industrial) 5. Use of the 1996 IPCC Guidelines
Chile	Inclusion of industrial processes and solvent use in inventory of year 1994. Setting of the basis needed for preparing a higher quality inventory.
Mexico	Updates were made regarding: - Energy generation - *Agriculture* (improved methods to gather the data for CH_4 emissions from livestock) - *Land-use change and forestry* (more precise estimates due to better knowledge of deforestation rates and carbon sequestration from administrated and abandoned lands)
Uruguay	1. Use of 1996 IPCC Guidelines 2. Changes in methodologies: - *Fuel combustion*: new tier 1 method (CO_2 and non-CO_2), new tier 2 for aviation; difference between the sectoral and the reference approach has diminished as a consequence of improvements in methodologies - *Industrial processes*: new method for calc production and use of acetylene gas - *Agriculture*: modified method to estimate CH_4 from *rice cultivation* - *Land-use change and forestry*: method to estimate change in carbon content in soils used for crops, grassland and pasture - *Waste*: new classification for disposal sites, new CH_4 correction factor 3. Changes in activity data: revision of energy balance; availability of data for production, import, export and stock change of lubricants; updated population data available(*waste*)

Table 7. Problems encountered by the Parties in the preparation of GHG emission inventories

Party	Type of problem			Affected sectors, subsectors, source categories and gases
	Activity data	Emission factors	Methods	
Argentina	X			Agricultural soils, savanna burning, field burning of agricultural residues, and land-use change and forestry
Chile	X		X	IPCC method for LUCF does not fit national circumstances; Sources of activity data are national for energy, industry and solvent use but regional for LUCF, agriculture and waste. It is needed homogenization between these sources.
El Salvador	X		X	Activity data for LUCF no very reliable; method for LUCF very complex for Non- Annex I Parties
Paraguay	X			The lack of reliable activity data for LUCF cause to use many assumptions
Uruguay	X	X	X	Energy, industrial processes, agriculture, land-use change and forestry (non-CO_2), waste (CO_2, N_2O)

Table 8. Identification of areas for further improvement in the preparation of GHG emission inventories by Parties

Party	Areas for further improvement
Argentina	Identification of country-specific emission factors (in particular for *transport*) Research on contribution of mining activities to total GHG emissions Need to establish a statistical system which provides basic information on GHG emitting activities
Chile	Development of a software for archiving, processing and updating relevant data to prepare the national inventory.
Mexico	Inclusion of *solvents* and some *industrial processes* sources Establishment of procedures for the annual preparation of the inventory
Uruguay	Improvement of the quality, collection and processing of data Identification of local emission factors

Table 9. Examples of *good practices* applied by Parties in the GHG inventories

Party	Use of country-specific methods or models	Comparison of estimates obtained using national and IPCC default methods	Use of national and/or regional emission factors
Argentina	Rice cultivation Method based on the thermic regime of the soil during the cultivation period	Rice cultivation Difference: around 1 %	
Chile	Land-use change and forestry Development of a national method for estimation emissions and removals		Land-use change and forestry Use of own coefficients
	Development of a system for archiving the inventory information		
El Salvador	Subdue its national inventory to a review by a third party		
Mexico	Land-use change and forestry: Creation of a model which follows the counting procedure of the IPCC, allowing more flexibility regarding changing parameters using multiple estimations and sensitivity analysis		Land-use change and forestry: Use of own emission factors where local information was available
Uruguay	Waste water Calculation based on quantities of waste water treated anaerobically		

Table 10. Paragraphs of UNFCCC guidelines and SBSTA conclusions relevant to the reporting of inventory data

UNFCCC guidelines (decision 10/CP.2, annex):	
Paragraph 8	The Guidelines for the National Greenhouse Gas Inventories and Technical Guidelines for Assessing Climate Change Impacts and Adaptation or the simplified default methodologies adopted by the Intergovernmental Panel on Climate Change (IPCC) should be used by non-Annex I Parties, as appropriate and to the extent possible, in the fulfilment of their commitments under the Convention.
Paragraph 9	Information should be provided the following greenhouse gases: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), to the extent the Party's capacities permit. In addition, Parties are encouraged to include in their national inventories the fully-fluorinated compounds, as appropriate. Other greenhouse gases included in the IPCC methodology may be included at the discretion of the Parties. Emissions from bunker fuels should be reported separately from national emissions.
Paragraph 10	Parties should strive to present the best available data in a table (see table II below), to the extent their capacities permit, and try to identify the areas where the data may be further improved in future communications through national capacity building.
Paragraph 14	Non-Annex I Parties should provide the best available data in their inventory. To this end such data should be provided for the year 1994. Alternatively, non-Annex I Parties may provide such data for the year 1990.
SBSTA conclusions: The SBSTA, at its fourth session, recalled decision 10/CP.2, and encouraged non-Annex I Parties to apply the Revised 1996 Guidelines, as appropriate and to the extent possible, in communicating their national greenhouse gas inventories (FCCC/SBSTA/1996/20, paragraph 30 (b)). Also at its fourth session, the SBSTA encouraged Parties to report actual emissions of HFCs, PFCs and SF_6, given that these better reflect the real releases to the atmosphere and encouraged Parties which are not in a position to report actual figures to report potential emissions (FCCC/SBSTA/1996/20, paragraph 31).	

Annex

INVENTORIES - TABLES, 1990 AND 1994

General notes

1. Numerical data on inventories of GHG emissions and removals as well as on projections are included in the tables below. The inventory tables contain information provided by the 6 non-Annex I Parties from Latin America and the Caribbean that officially submitted inventory data in their initial national communications, updates to those communications[1] or a natural GHG inventory only, as in the case of Paraguay.

2. The inventory tables (A.1 to A.8) provide information for both 1990 and 1994, as reported by the Parties, in a consistent and comparable manner for individual non-Annex I Parties, although varying in the degree of coverage in various tables. This is due to differences in the coverage of years and sectors in the national communications.

3. The tables provide inventory data on a gas-by-gas basis for CO_2, CH_4, N_2O, and include information on international bunkers. Information on *land-use change and forestry* is both included in CO_2 and aggregate estimates and presented separately from other CO_2 estimates, in order to facilitate a consistent and comparable presentation of the data. To present aggregate greenhouse gas emissions in a comparable manner the secretariat has used IPCC 1995 global warming potentials (GWPs), based on the effects of GHG over a 100-year time horizon to present information in CO_2 equivalent[2].

4. Figures may differ from those reported in the national communications as a result of rounding during data input and processing, corrections of typographical and calculation errors or omissions, and the presentation (for consistency and comparability) of subtotals and totals not provided in the national communication. Some differences are also due to the fact that, in striving to ensure consistency and comparability, the secretariat has had to convert some of the estimates reported so that they concur with the format of the current IPCC Guidelines for the reporting of greenhouse gas emissions. The footnotes and notes to the tables should be treated as an integral part of the tables.

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[1] Argentina presented final inventories of greenhouse gases for 1990 and 1994 in a report on climate change in Argentina. Uruguay submitted a 1994 inventory and a comparative study of net greenhouse gas emissions for 1990 and 1994.

[2] It should be noted that four out of the six reporting Parties provided CO_2 equivalent estimates.

List of Tables

Explanatory notes

5. Blanks in the tables signify an absence of quantitative information. The secretariat has chosen to leave the spaces blank in order not to complicate the reading of the tables. The figure "zero" appears in the table only when reported as such by Parties. Categories of sources of GHG emissions or their sinks corresponding to the IPCC Guidelines nomenclature are given in *italics*. Details and percentages in tables and figures do not necessarily add to totals, due to rounding.

The following chemical symbols and abbreviations have been used:

CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
HFCs	hydrofluorocarbons
N_2O	nitrous oxide
NO_x	nitrogen oxides
NMVOCs	non-methane volatile organic compounds
PFCs	perfluorocarbons
SF_6	sulphur hexafluoride
SO_2	sulphur dioxide

The following units of weight have been used: Gg gigagram (10^9 grams)

The following other abbreviations have been used:

GHG	greenhouse gas
GWP	global warming potential
LUCF	land-use change and forestry

Table A.1. Aggregate emissions and removals of CO_2, CH_4 and N_2O in CO_2 equivalent[a] by major source/sink category, including and excluding *land-use change and forestry*, 1990 and 1994 (Gigagrams and percentage of total by Party)

	Energy		Industrial processes		Agriculture		Other[b]		Total (exluding LUCF) [c]	Land-use change and forestry [d]	Total (including LUCF) [e]	Percentage of LUCF in total GHG [f]
1990	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**(Gg)**	**(Gg)**	**%**
Argentina	106 907	45.9	6 311	2.7	110 073	47.2	9 692	4.2	232 983	-34 891	198 092	-15.0
Mexico	320 947	82.6	11 621	3.0	39 463	10.2	16 727	4.3	388 758	135 857	524 615	34.9
Paraguay	2 061	3.8	334	0.7	42 994	80.6	7 937	14.9	50 437	3 530	53 979	6.5
Uruguay	3 641	13.2	230	0.8	22 627	81.8	1 155	4.2	27 654	1 972	29 627	7.1
1994												
Argentina	127 125.2	49.1	6 659	2.5	115 443.6	43.6	15 236.5	5.8	264 554.3	-34 178.7	230 375.6	-12.9
Chile	36 014	66.4	479	0.8	13 148	24.2	4 560	8.5	54 623	-27 124	27 499	-98.6
El Salvador	4 759	41.6	490	4.3	5 756	50.4	90.9	3.7	11 900	3 985	15 885	25
Uruguay	3 971	13.3	279	0.9	24 277	81.4	1 288	4.3	29 815	-865	28 950	-2.9

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[a] Aggregate emissions of CO_2, CH_4 and N_2O in terms of CO_2 equivalent using 1995 IPCC global warming potentials based on the effects of GHG over a 100-year time horizon..

[b] Includes *waste* and non-CO_2 (CH_4 and N_2O) *land-use change and forestry* emissions.

[c] Sum of aggregate GHG emissions (CO_2, CH_4 and N_2O in CO_2 equivalent) from all sectors, excluding CO_2 *land-use change and forestry* emissions /removals. This total is set at 100 per cent in this table.

[d] Total net CO_2 emissions or removals from *land-use change and forestry*.

[e] Sum of aggregate GHG emissions (CO_2, CH_4 and N_2O in CO_2 equivalent) from all sectors, including CO_2 *land-use change*
and forestry emissions /removals.

[f] Percentage increase or decrease in aggregate GHG emissions with the inclusion of *land-use change and forestry*.

Table A.2. Anthropogenic CO_2 emissions and removals by source/sink category, 1990 and 1994 (Gigagrams and percentage of total by Party)

	Fuel combustion [a]		Industrial processes		Other [b]		Total (excluding LUCF) [c]	Land-use change and forestry [d]	Total (including LUCF) [e]	Percentage of LUCF in total CO_2 [f]
1990	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**(Gg)**	**(Gg)**	**%**
Argentina	98 484	89.4	6 099	6.0	4 638	4.6	101 585	- 34 891	66 694	-34.3
Mexico	297 011	96.2	11 621	3.8			308 632	135 857	444 489	44.0
Paraguay	1 937	85.2	334	14.8			2 271	3 530	5 801	155
Uruguay	3 608	94.0	230	6.0			3 838	1 972	5 810	51.4
1994										
Argentina	107 567	89.9	6 307	5.3	57 294.8	4.8	119 603	-34 731	84 872	-29
Chile	35 227	94.9	187	5.1			37 097	-29 709	7 387	-80
El Salvador	4 224	89.6	450	10.4			4 714	4 649	8 645	98
Uruguay	3 930	93.4	279	6.6			4 210	- 865	3 344	-20.6

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[a] For further details on *fuel combustion* see table A.3.

[b] Includes *fugitive fuel* emissions, *agriculture* and *waste*.

[c] Sum of CO_2 emissions from all sectors, excluding CO_2 *land-use change and forestry* emissions /removals. This total is set at 100 per cent in this table.

[d] Total net CO_2 emissions or removals from *land-use change and forestry*.

[e] Sum of CO_2 emissions from all sectors, including CO_2 *land-use change and forestry* emissions /removals.

[f] Percentage increase or decrease in total CO_2 emissions with the inclusion of *land-use change and forestry*.

Table A.3. Anthropogenic CO_2 emissions from fuel combustion, 1990 and 1994 (Gigagrams and percentage of total by Party)

	Energy industries		Industry		Transport		Small combustion[a]		Other[b]		Total
1990	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**
Argentina	29 562	32.5	12 705	14.0	27 382	30.1	21 199	23.3			90 848
Mexico	108 473	36.5	64 971	21.9	94 706	31.9	28 861	9.7			297 011
Paraguay	26	1.7	148	7.6	1 620	83.4	143	7.3			1 937[c]
Uruguay	506	14.0	604	16.7	1 481	41.0	1 003	27.8	14	0.4	3 608
1994											
Argentina	31 858	29.6	14 907	13.9	34 716	32.3	24 605	22.9	14.81	1.3	107 567
Chile	8 440	23.9	9 255	26.2	12 695	36	4 050	11.7	787	2.2	35 227
El Salvador	1 304	32	656	16	1 815	46	249	6			4 024[c]
Uruguay	125	3.2	499	12.7	2 177	55.4	1 108	28.2	22	0.6	3 930

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[a] Includes emissions from the source/sink categories: *commercial/institutional*, *residential* and *agricultural/forestry/fishing.*

[b] Includes emissions from all other non-specified *fuel combustion* except for the combustion of *biomass*.

[c] This value was obtained using the sectoral approach. It differs from the value obtained using the reference approach.

Table A.4. Anthropogenic CO_2 emissions and removals[a] from land-use change and forestry by subcategories, 1990 and 1994 (Gigagrams and percentage of total flux from land-use change and forestry[b])

1990	Changes in forest and other woody biomass stock		Forest and grassland conversion		Abandonment of managed lands		Other		Total net emissions or removals
	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)
Argentina	-15 458	25.8	9 646	17.8	-29 079	53.7			-34 891
Mexico	- 31 552	10.5	217 734	72.7	- 50 325	16.8			135 857
Paraguay	-38 539	47.6	42 465	52.4					3 530
Uruguay[c]	1 972	100.0							1 972
1994									
Argentina	-15 458	28.5	9 805	18.0	-29 079	57.2			-34 732
Chile[d]	21 026	29.2	252	0.3	-50 917	70.5			-29 705
El Salvador	4 068	76.5	534.6	10	-718	13.5			3 930
Uruguay[c]	- 865	100.0							- 865

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[a] Negative values in Gg denote removal of CO_2. Positive values denote a net source of emissions.

[b] The given percentages represent the proportion of emissions and removals of this category in relation to the sum of the absolute values of the net emissions in each category. For example, the percentage figure for changes in forest and other woody biomass stocks for Argentina is 31 809/(31 809 + 36 844 + 68 382)*100= 23.2

[c] The Party also provided estimates from CO_2 emissions and removals from soil, but reported them separately from others land-use change and forestry estimates and did not include them in the net national totals of CO_2 , as the uncertainty associated with the default factors used could be significant. This sub-sector was estimated to account for a CO_2 removals of 3357 Gg and 3808 Gg in 1990 and 1994, respectively. If these estimates were included in net national CO_2 totals, the Party showed to be a net sink of CO_2 in 1994.

[d] Party provided a high disaggregation of source-categories under LUCF. In line with the IPCC guidelines, the secretariat allocated them as follows:

(a) Forestry management, clearing, substitutions, flowering and forest fires were allocated under *changes in forest an other woody biomass stock*;
(b) Urbanization was allocated under *forest and grassland conversion*; and
(c) Abandonment of managed land (natural regeneration) under *abandonment of managed land.*

Table A.5. Anthropogenic CH_4 emissions by source category, 1990 and 1994 (Gigagrams and percentage of total by Party)

	Energy				Agriculture						Waste		Other[a]		Total
	Fugitive fuel		Fuel combustion		Livestock[b]		Rice cultivation		Other[c]						
1990	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**
Argentina	467.4	12.8	10.5	0.3	2 716.9	74.5	19.6	0.5	8.4	0.2	396.1	10.9	28.6	0.8	364
Mexico	1 040	28.5	42	1.1	1 749	48.0	35	1.0	9	0.3	526	14.4	241	6.6	3 642
Paraguay			0.01		464	46.5	6	0.5	172	17	236	24	125	12	1003
Uruguay	0	0.0	0	0.1	589	88.7	22	3.3	1	0.1	52	7.8			665
1994															
Argentina	559.5	13.4	29.8	0.7	2 862.3	68.4	37.7	0.9	6.5	0.2	662.2	15.8	28.3	0.6	4 186.3
Chile	41	6.9	33	5.5	313	52.1	6.5	1.1	2.5	0.8	84	14	113	19	593
El Salvador			18	12	83	56	1.6	1.1	3.27	2.2	41.7	28	0.5	0.3	148.5
Uruguay	0	0.0	1	0.1	648	87.9	29	4.0	1	0.1	58	7.9			737

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[a] Includes source/sink categories: *industrial processes* and *land-use change and forestry*.

[b] Includes source/sink categories: *enteric fermentation* and *manure management*.

[c] Includes source/sink categories: *prescribed burning of savannas, field burning of agricultural residues* and *other*.

Table A.6. Anthropogenic N_2O emissions by source category, 1990 and 1994 (Gigagrams and percentage of total by Party)

	Energy				Industrial processes		Agriculture		Other[a]		Total
	Transport		Other[b]								
1990	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**	**%**	**(Gg)**
Argentina	0.72	0.4	3.74	2.1	0.54	0.3	169.13	95.7	2.63	1.5	176.76
Mexico	2.2	18.9	1.7	14.7			5.8	49.4	2.0	17.0	11.8
Paraguay	0.34	0.4	0.06	0.1			95.2	98.4	1.1	1.1	96.7
Uruguay	0.0	0.1	0.0	0.0			31.5	99.1	0.2	0.7	31.8
1994											
Argentina	0.92	0.5	3.77	2	0.57	0.4	175.5	95.6	2.8	1.5	183.6
Chile	1.1	4.7	0.6	2.4	0.8	3.2	20.6	83.7	1.5	6	24.6
El Salvador	0.5[c]	3.7					12.6	95.5	0.11	0.8	13.21
Uruguay	0.1	0.2					32.4	99.1	0.2	0.7	32.7

[a] Includes *land-use change and forestry* and *waste*.

[b] Includes *fugitive fuel emissions* and *fuel combustion* emissions other than *transport*.

[c] Party only provided emission estimate for the whole energy sector. The secretariat allocated it under *transport*.

Table A.7. Anthropogenic emissions of precursor gases, 1990 and 1994 (Gigagrams)

	CO	NO_x	NMVOC
1990	**(Gg)**	**(Gg)**	**(Gg)**
Argentina	2 014	528	626
Mexico	11 033	1 013	801
Paraguay	1.104	110	5
Uruguay [a]	300	30	38
1994			
Argentina	2 329	740	442
Chile	1 921	196	307
El Salvador	512.6	34	
Uruguay [a]	353	39	46

[a] The Party also reported SO_2 estimates for 1990 and 1994 (42 and 33 Gg, respectively).

Table A.8. Anthropogenic emissions of CO_2 from international bunkers, 1990 and 1994 (Gigagrams)

1990	**(Gg)**
Argentina	3280
Mexico	
Paraguay	258
Uruguay[a]	422
1994	
Argentina	2 744
Chile	
El Salvador	
Uruguay[b]	659

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[a] The Party also reported CH_4 and precursor estimates from international bunkers. For NO_x an estimate of 11 Gg was reported, while for the other gases, estimates were approximately zero.

[b] The Party also reported CH_4 N_2O and precursor estimates from international bunkers. For NO_x , CO and SO_2, estimates of 17, 1 and 6 Gg were reported, while for CH_4, N_2O and NMVOC, estimates were approximately zero.