Decision -/CP.9

Technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol

The Conference of the Parties,

Recalling its decision 21/CP.7,

Having considered the relevant recommendations of the Subsidiary Body for Scientific and Technological Advice,

1. *Recommends* that the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, at its first session, adopt draft decision -/CMP.1 (*Technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol*) below;

2. *Requests* the secretariat to establish a process to enable expert review teams to gain experience with the methods for adjustments during the inventory review process in the period 2003–2005 using real inventory data of Parties, subject to the consent of the Party concerned.

Draft decision -/CMP.1

Technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol

The Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol,

Having considered decisions 21/CP.7, 23/CP.7 and -/CP.9 (*Technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol*),

1. *Adopts* the technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol contained in document FCCC/SBSTA/2003/10/Add.2, pages 11–27 (hereinafter referred to as technical guidance) and decides to incorporate it in the annex of draft decision -/CMP.1 (*Good practice guidance and adjustments under Article 5, paragraph 2, of the Kyoto Protocol*);

2. *Requests* that lead reviewers, as defined in paragraphs 36–42 of the guidelines for review under Article 8 of the Kyoto Protocol (decision 23/CP.7), collectively consider and make recommendations on:

(a) Means to improve the consistent application, by expert review teams, of the technical guidance, especially the approaches to ensure conservativeness of adjusted estimates;

(b) The development and regular update of the information in the inventory review resources listed in annex I to the technical guidance;

(c) Means to ensure a common approach in applying the provisions of paragraph 52 of the technical guidance and to limit the flexibility given to the expert review teams in this regard, if considered necessary;

(d) Updating, as appropriate, the table of conservativeness factors included in annex III to the technical guidance, including the underlying construction and structure of the uncertainty bands of that table;

3. *Requests* the secretariat to include any recommendations from the collective consideration of the lead reviewers in their annual report, referred to in paragraph 40 of the guidelines under Article 8 of the Kyoto Protocol, to the Subsidiary Body for Scientific and Technological Advice for its consideration;

4. *Requests* the Subsidiary Body for Scientific and Technological Advice, following the consideration of the report referred to in paragraph 3 above, to take any appropriate action pursuant to the recommendations from lead reviewers referred to in paragraph 2 (c) and (d) above;

5. *Requests* the secretariat, following the collective recommendation of lead reviewers, to regularly update the information in the inventory review resources listed in annex I to the technical guidance;

6. *Requests* the secretariat to archive information on adjustments contained in review reports and other relevant information, and make it available and easily accessible for expert review teams;

7. *Decides* that with respect to any adjustments applied retroactively in accordance with paragraph 11 of the technical guidance, only the adjustment applied for the inventory year under review shall be relevant for the eligibility requirement laid out in paragraph 3 (e) of draft decision -/CMP.1 (*Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol*) attached to decision 22/CP.7.

TECHNICAL GUIDANCE ON METHODOLOGIES FOR ADJUSTMENTS UNDER ARTICLE 5, PARAGRAPH 2, OF THE KYOTO PROTOCOL

I. OBJECTIVE

1. The objective of this technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol[1] is:

(a) To provide for adjusted estimates that fully meet the requirements of decision -/CMP.1 (*Good practice guidance and adjustments under Article 5, paragraph 2, of the Kyoto Protocol*) attached to decision 21/CP.7;[2]

(b) To ensure that adjustments are applied consistently,[3] comparably and transparently, taking into account the time frames provided in the guidelines for review under Article 8, and that, as far as possible, similar methods are used for similar problems across all inventories subject to adjustments under Article 8.

GENERAL APPROACH

2. This technical guidance establishes general and specific procedures and methods for use by expert review teams to calculate adjustments.[4] These procedures and methods are supplemented by inventory review resources listed in annex I to this technical guidance, which will also facilitate consistency in calculation of adjustments by expert review teams.

A. Procedures

3. The calculation and application of adjustments shall follow paragraphs 3–11 of decision -/CMP.1 (Good *practice guidance and adjustments under Article 5, paragraph 2, of the Kyoto Protocol*) attached to decision 21/CP.7.

4. Adjustments shall be applied, taking into account section II.B below, only when inventory data submitted by Parties included in Annex I to the Convention (Annex I Parties) are found to be incomplete and/or are prepared in a way that is not consistent with the *Revised 1996 IPCC*[5] *Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC Guidelines) as elaborated by the IPCC report entitled *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and any good practice guidance adopted by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP).

5. Expert review teams shall, under their collective responsibility, calculate, document and recommend adjustments in accordance with the provisions for the review of annual inventories under Article 8 and this technical guidance. A compilation of the paragraphs relevant to the timing and reporting of adjustments from these guidelines is included in annex II to this technical guidance.

---

[1] All articles referred to in this technical guidance are those of the Kyoto Protocol. Adjustments under Article 5, paragraph 2, of the Kyoto Protocol are hereinafter referred to as adjustments.

[2] Document FCCC/CP/2001/13/Add.3, pages 12–13.

[3] In this context, consistency means that the application of adjustments should be consistent across Parties and by all expert review teams.

[4] This technical guidance does not cover the land use, land-use change and forestry (LULUCF) sector, guidance for which will be completed, in accordance with decision 21/CP.7, after completion of the IPCC good practice guidance on LULUCF.

[5] Intergovernmental Panel on Climate Change.

6. The expert review team should collectively decide on the methodological approach for calculation of any adjustment, including relevant components of the adjustment method (such as data sources, drivers[6] and clusters[7] used).

7. Expert review teams should apply the appropriate adjustment method, selected from table 1, in a simple manner, given the limited time available for the calculation of adjustments according to the provisions for the review of annual inventories in the guidelines for review under Article 8 (see paragraph 3 of annex II).

8. Expert review teams should apply this technical guidance in a consistent and comparable manner and, as far as possible, use similar methods for similar problems across all inventories reviewed under Article 8, taking into account the provisions for obtaining conservative estimates, as described in paragraph 47 below.

9. To enhance consistency in the application of adjustments for any given Party, the same adjustment method should be used, whenever possible, in cases where the same inventory problem was adjusted in an earlier year (e.g. for the base year or for an earlier year of the commitment period). This provision applies to both the basic adjustment method,[8] and the main components used in the calculation of the adjustment, as appropriate, such as the source of international data, drivers, clusters and any other inventory parameter used.

10. Adjustments should be applied only for individual inventory years, specifically, the base year[9] or the latest year of the commitment period under review, and not for an entire time series or group of years, except for cases described in paragraph 11 below.

11. Adjustments should not be retroactively applied for any year preceding the inventory year subject to review, except in cases where recalculated estimates for previous commitment period years were submitted by the Party together with the inventory information of the inventory year subject to review. Where the Party submits recalculated estimates for commitment period years prior to the inventory year subject to review, adjustments may be applied retrospectively for those estimates that have not yet been reviewed, if the provisions of paragraph 4 above apply to these recalculated estimates.

12. The selection of data and other components required for an adjustment method should take into account the time series for any such component.

13. Even if some aspects of a particular case are not fully covered by this technical guidance, the experts calculating the adjustment shall adhere to paragraphs 3–11 of decision -/CMP.1 (*Good practice guidance and* adjustments *under Article 5, paragraph 2, of the Kyoto Protocol*) and, as closely as possible, to this technical guidance.

Applicability of adjustments

14. In considering the need for an adjustment, expert review teams should adhere to standard inventory review approaches, which also include assessment of the time series for a given estimate.

---

[6] For the purpose of this technical guidance, *driver* refers to indicative data other than activity data or other inventory parameters used in the calculation of emission estimates, that are correlated with emissions, such as gross domestic product (GDP), population, associated production data, wells drilled, GDP per capita. The criteria for selecting drivers for the purpose of adjustments are given in paragraph 36.

[7] For the purpose of this technical guidance, *cluster* refers to inventory-related data from a group of countries. The criteria for selecting clusters for the purpose of adjustments are given in paragraph 35.

[8] For the purpose of this technical guidance, basic adjustment methods are those methods that provide an emission estimate before the application of a conservativeness factor described in section III.D below.

[9] Adjustments to the base year, if any, will only be applied during the initial review under Article 8 for the purpose of establishing the Party's assigned amount.

15. If the expert review team finds that an estimate submitted by a Party leads to an underestimation of emissions in the base year, or an overestimation of emissions in a year of the commitment period, the adjustment calculated in accordance with paragraph 49 below should not be applied, if such a calculation would result in an adjusted estimate with a value for the base year that is higher than the original estimate submitted by the Party or a value for a year of the commitment period that is lower than the original estimate.

16. An adjustment procedure should be initiated if the information provided by the Party is not sufficiently transparent, taking into account the provisions of paragraph 4 above.

17. If the expert review team identifies a deviation from the IPCC Guidelines as elaborated by the IPCC good practice guidance that is caused by the allocation of estimates to a wrong source category, adjustments should be applied only if reallocation to the correct source category affects total emissions from sources included in Annex A to the Kyoto Protocol.[10]

METHODS AND CONSERVATIVENESS

18. In general, expert review teams shall calculate each adjustment at the level at which the problem is identified, e.g. the IPCC source category level or for the specific component in question. If the problem is limited to only one IPCC source category, only the estimate for that source should be adjusted. Similarly, if only one component of a given estimate is problematic (such as inconsistent, incorrect or misapplied emission factors or other inventory parameters, or activity data), the review team should replace only that component in calculating the adjusted estimate.

19. If the necessary input data or parameters are not available at the IPCC source category level at which the problem is identified, or the problem involves more than one component of an emission estimation method used by the Party, or the complexity of the methodology used does not allow replacing only the problematic component in question, more aggregate data should be used as the basis for the adjustment. However, expert review teams should make every effort to make the adjustment at the levels at which the problems were identified, in order to avoid making data that do not qualify for an adjustment subject to the adjustment.

A. Choice of methods

20. If an emission estimate needs to be adjusted,[11] the expert review team should choose one of the basic adjustment methods in this technical guidance for the calculation of an estimate for purposes of adjustment.

21. In choosing the basic adjustment method and the input data that are appropriate for a specific adjustment case, expert review teams should, in general, follow the methods listed in priority order in table 1, as appropriate, unless otherwise indicated in the sector-specific elements included in chapter IV. If the requirements for the highest priority adjustment method according to the table are not available, the next preferred adjustment method should be used.

22. If a consistent time series of estimates prepared in accordance with the IPCC good practice guidance is available and no more than two years' estimates are missing, a simple extrapolation of this time series would be the most appropriate adjustment method.

[10] If the reallocation will not have such effect, reallocation is recommended to the Party as part of the review of annual inventories under Article 8.

[11] For example, if an emission estimate is missing, if the emission estimation method used by the Party was not in conformity with the IPCC Guidelines as elaborated by the IPCC good practice guidance, or if there is a problem with more than one component (emission factor, activity data or other parameter) of the emission estimation method used by the Party.

23. If an adjustment is triggered by lack of transparency, and this lack of transparency precludes the expert review team from assessing possible cases of over- or underestimation or from assessing the cause of the potential deviation from the IPCC Guidelines as elaborated by the IPCC good practice guidance (such as inappropriate activity data, emission factors or methods), expert review teams should also apply the basic adjustment methods in the order of priority listed in table 1.

24. In the exceptional case where none of the basic adjustment methods listed in table 1 is suitable for a given adjustment case, expert review teams may use other adjustment methods. If adjustment methods other than those included in this technical guidance are applied, expert review teams should report the reason for not using any of the basic adjustment methods of this technical guidance and should justify why they consider the method chosen as appropriate.

Table 1. Basic adjustment methods to obtain an emission estimate (in order of priority)

	Basic adjustment method	Requirements/applicability
1	Default IPCC tier 1	Obtain activity data and emission factor following the prioritizations indicated in paragraphs 29 and 30 below
2	Extrapolation of emissions	Only for a missing/inappropriate estimate for the year in question if a consistent time series of emission estimates is available
3	Extrapolation/interpolation of emissions based on a driver	Only for a missing/inappropriate estimate for the year in question if a consistent time series of emission estimates and a corresponding driver are available
4	Correlation of emissions between source categories or gases within an inventory	Emission estimate for the gas/source category that is correlated to the emissions that need adjustment
5	Average emission rate from a cluster of countries based on a driver	Driver for the country in question and emission rate per driver for a cluster of countries

Note: The methods in this table are those methods that provide an emission estimate before the application of a conservativeness factor described in section III.D below. Further details on the basic adjustment methods listed in this table are given in section III.C below.

B. Choice of data and other components

25. In choosing any input data for calculating an adjustment, expert review teams should give, as appropriate, preference to the national data available in the respective Party's inventory submission or made available by the Party before or during the review, provided that these data were not the cause for the adjustment.

26. Expert review teams should not conduct time-consuming searches for national data that have not been made available to the review team by the Party, or generate new country-specific data.

27. If national data as indicated in paragraph 25 above are not available or are not deemed suitable for the respective adjustment case, expert review teams should select data from the recommended international data sources included in the inventory review resources listed in annex I.

28. The international data sources to be included in the inventory review resources listed in annex I should meet most of the following criteria:

(a) The organizations that make the data available are recognized intergovernmental organizations (e.g. United Nations, International Energy Agency (IEA));

(b) The data are regularly updated, maintained and disseminated;

(c) The data are originally generated by the countries themselves (national statistics);

(d) The data are widely applicable to Annex I Parties;

(e) The data are easily accessible by the secretariat and expert review teams (e.g. through Internet or CD-ROM), in a timely manner and at reasonable cost;

(f) Sufficient information is available to assess the applicability of activity data, drivers or emission factors (e.g. descriptions of how the data are collected, which definitions are used, geographic coverage).

1. Choice of activity data

29. If the calculation of an adjustment requires the use or replacement of activity data, e.g. either as input to the IPCC tier 1 default methodology or because the activity data are the cause of the adjustment, and if no national data are available, expert review teams should use, in order of preference:

(a) Recommended international data sources as included in the inventory review resources listed in annex I;

(b) Extrapolation (interpolation) methods if the international data sources do not provide data for the year in question, in which case the activity data should be obtained as follows (in order of preference):

(i) Extrapolation (interpolation) of national activity data, if these data are available as required in paragraph 25 above, and were collected in accordance with the IPCC good practice guidance;

(ii) Extrapolation (interpolation) of data from recommended international data sources included in the inventory review resources listed in annex I;

(iii) Extrapolation (interpolation) using drivers or surrogate data from the inventory review resources listed in annex I.

(c) Activity data based on appropriate drivers (e.g. activity data per capita) from cluster of countries following the provisions of paragraphs 31–34 below.

2. Choice of emission factors or other inventory parameters

30. If the calculation of an adjustment requires the use or replacement of an emission factor or other inventory parameter, e.g. either as input to the IPCC tier 1 default methodology or because the emission factor or other inventory parameter itself is the cause of the adjustment, the expert review team should use, in order of preference:

(a) IPCC default values from the IPCC good practice guidance, the IPCC Guidelines or other recommended international data sources included in the inventory review resources listed in annex I, and consistent with the IPCC good practice guidance. If emission factors from other international data sources are used, the expert review team should, in the review report, justify and document the reason for their use;

(b) Extrapolation (interpolation) of the national emission factor, implied emission factor or other inventory parameter from earlier years as reported in the common reporting format (CRF) or national inventory report if the factor in question was prepared in accordance with the IPCC good practice guidance;

(c) Average implied emission factor or other inventory parameter from a cluster of countries obtained as described in paragraphs 31–34 below.

3. Choice of drivers and clusters

31. If the calculation of an adjustment requires the use of a driver, the expert review team should use the recommended drivers as included in the inventory review resources listed in annex I.

32. If an average inventory parameter from a cluster of countries is used, expert review teams should follow the recommended approaches and tools for clustering of inventory data as included in the inventory review resources listed in annex I. The inclusion in the inventory review resources listed in annex I of drivers and approaches and tools for clustering of inventory data should be subject to guidance by lead reviewers in accordance with the provisions of annex I.

33. Expert review teams should report the reason for the use of drivers and clusters and demonstrate the appropriateness of the cluster and/or the correlation between the driver and the emissions. The use of drivers or approaches and tools for clustering of inventory data other than those recommended in the inventory review resources listed in annex I should be explained and justified.

34. When using an average inventory parameter from a cluster of countries, assumptions made in choosing the cluster should be documented, as should how the given inventory average parameter compares with the default parameter or range provided in the IPCC good practice guidance or IPCC Guidelines, where available. Similarly, when clustering is related to the use of a driver (application of an average driver-based emission rate) from a cluster of countries, assumptions made for the composition of the cluster and the established relationship with the driver should be documented.

35. The clusters[12] to be used in the adjustment process should, to the extent possible, be selected according to the following criteria, taking into account expert judgement:

(a) Only Annex I Parties that have undergone an individual review, and for which the relevant data were deemed accurate during the review process and for which no adjustment to any inventory parameter of the gases or source categories concerned was made, should be included. Inventory data from the Party subject to adjustment should be excluded from the cluster;

[12] Because of the need to use reviewed data from other countries, clustering will only be possible for one year prior to the year in question. This implies that clustering would have to be combined with extrapolation techniques.

(b) The cluster should cover a minimum number of countries, as specified in the recommended approaches and tools for clustering of inventory data;

(c) The grouping of countries into clusters should, to the extent possible, take into account similar national circumstances. National circumstances could relate to, inter alia, climatic conditions, economic development, operation or management practices, types of oil and gas activity, or the age of equipment or installations and their technical features, depending on the source category in question.

36. The drivers to be used in the adjustment process should, to the extent possible, be selected according to the following criteria:

(a) The driver shall be adequately correlated with the emissions concerned;

(b) The significance of the relationship between the driver used and the emissions calculated needs to be demonstrated, taking into account national circumstances.

C. Details and variations on the basic adjustment methods

37. The following section provides further guidance on the application of the basic adjustment methods described in section III.A above. Because this section covers possible variations of those methods, the numbering and ordering do not match the list in table 1.

1. Default IPCC tier 1 methods

38. This basic adjustment method refers to default IPCC tier 1 methods as described in the IPCC Guidelines and as elaborated by the IPCC good practice guidance. If this adjustment method is used, the IPCC good practice guidance should always be consulted before the IPCC Guidelines. This adjustment method will only be applicable if activity data are available from national sources in accordance with paragraph 25 above or from international data sources as described in paragraph 27 above, or are obtained as described in paragraph 29 above. An emission factor or other inventory parameter as required by the method and obtained as described in paragraph 30 above should be used.

2. Extrapolation and interpolation methods

39. If extrapolation and/or interpolation methods are used, the expert review team should follow the guidance on trend extrapolation and interpolation provided in the IPCC good practice guidance, section 7.3.2.2.

40. *Extrapolation of emission estimates* is applicable if inventory estimates are missing or not prepared in accordance with the IPCC good practice guidance for the beginning (base year) and/or the end (latest inventory year) of the time series, and reviewed and time-series-consistent values are available for most years of the time series.

41. *Extrapolation of inventory parameters* (e.g. activity data): in addition to applying extrapolation methods to emission estimates it may be necessary to use extrapolation at the level of activity data, emission factors or other inventory parameters, depending on the circumstances (see paragraphs 29 and 30 above).

42. *Extrapolation of emissions using drivers or surrogate data* can be applied if inventory estimates are available for some years (at a minimum for all years but two) of the time series but are missing or not prepared in accordance with the IPCC good practice guidance for the required year (base year and/or latest inventory year). The emissions need to be strongly correlated with other well-known and more readily available indicative data (drivers).

43. *Interpolation* is applicable for calculating an adjustment for a given inventory year provided that reviewed values of the adjacent years are available. As adjustments will be undertaken on individual inventory years, this method would most likely be applied in exceptional cases only, but could be

applicable to activity data, emission factors or other inventory parameters, depending on the circumstances.

3. Adjustment methods based on correlation of emissions between source categories or gases

44. *Correlation of emissions between source categories or gases within an inventory* could in some cases be used to estimate emissions of a specific gas or from a specific source category. For example, CH_4 and N_2O emissions from fuel combustion activities could be calculated from CO_2 emissions, if available.

4. Adjustment methods based on clustering of countries

45. *Application of average inventory parameters from a cluster of countries* with comparable national circumstances for the sector in question could be used to correct any inventory parameter (e.g. emission factor) that was found not to be in accordance with IPCC good practice guidance, or as input to the IPCC tier 1 method. The inventory review resources listed in annex I provide recommended approaches and tools for clustering inventory data. If an adjustment has to be made for a given country, expert review teams should assign the Party in question to the cluster of countries to which it would most likely belong according to its national circumstances.

46. *Application of an average driver-based emission rate from a cluster of countries* can be used if an emission estimate is missing entirely or was not prepared in accordance with the IPCC good practice guidance, but data for a parameter driving the emissions from that source are available for the country in question. The estimate is derived by establishing a relationship between emissions and an appropriate driver for the cluster of countries with comparable national circumstances, and applying this relationship to the Party in question. If data for the driver are not available for the year in question, the driver should be extrapolated as described in paragraph 42 above.

D. Conservative approach

47. The choice of adjustment methods and application of the inventory parameters relevant to the calculation of adjustments should result in conservative emission estimates, in that emission estimates for the base year are not overestimated and emission estimates for a year of the commitment period are not underestimated relative to the likely true value of the emissions of the Party concerned.

48. As a principle to achieve conservative estimates, the calculation of an adjustment for a commitment period year should not result in an emission estimate that is lower than that originally submitted by the Party, and an adjustment for an estimate of the base year should not result in an emission estimate that is higher than the originally submitted estimate.

49. To ensure conservativeness for the purpose of adjustments, a conservativeness factor should be applied to the specific component of the emission estimation method used by the Party or to the emission estimate generated by the basic adjustment methods described in section III.A of this technical guidance. For illustration purposes, this approach may be expressed as:

M x CF = Adjusted estimate

Where M is the component of an emission estimation method used by a Party, or the emission estimate generated by a basic adjustment method in this technical guidance, and CF is the conservativeness factor.

50. The conservativeness factor should be selected from the table of conservativeness factors provided in annex III to this technical guidance. In the case that the table does not provide a conservativeness factor for a given source category, a conservativeness factor for a source category with similar characteristics should be used.

51. For cases where only one component of an emission estimation method used by a Party is replaced, the expert review team should apply the conservativeness factor to that component, in accordance with paragraph 18 above. In other cases, the expert review team should apply the conservativeness factor to the emission estimate generated by the basic adjustment method, in accordance with paragraph 20 above.

52. If, exceptionally, an expert review team considers that, in its expert judgement, the estimate generated by applying the basic approach referred to in paragraph 49 above is not conservative or is overly conservative for the Party concerned,[13] the expert review team may use an alternative approach for applying conservativeness, and, where applicable, in accordance with the provisions of paragraphs 18 and 24 above. The expert review team shall justify and document the technical reason for its decision, and for its choice of the alternative approach used, and include this information in the review report.

SECTOR-SPECIFIC ELEMENTS

53. When calculating adjustments, expert review teams should follow the provisions of chapter III taking into account the sector-specific elements given below, as appropriate. The provisions of this chapter apply to the calculation of the adjustments before applying the conservativeness factor described in section III.D above.

A. Fuel combustion

54. When adjusting CO_2 emissions from one or several disaggregated IPCC source categories, care should be taken that total CO_2 emissions are in accordance with the total fuel consumption, which is generally better known than the fuel consumption in each of the disaggregated IPCC source categories.

55. In the event that total CO_2 emissions from fuel combustion need to be adjusted, the reference approach is the preferred option for calculating an adjustment. Reference approach estimates should preferably be taken from the Party. If this is not considered appropriate, emission estimates from the IEA can be used.

56. If an N_2O emission factor from road transport needs to be replaced, increased use of catalytic converters leading to increased emission factors should be taken into account when calculating an adjustment.

[13] That is, the expert review team believes that the likely true value of the emissions from a source for a year of the commitment period is higher or much lower than the adjusted estimate generated, or the true value of the emissions from a source in the base year is lower or much higher than the adjusted estimate generated, taking into account any guidance from lead reviewers on this matter.

B. Industrial processes

57. The expert review team should consider the possibility of double counting (for instance, the use of lime in iron and steel production) and avoid any double counting through the application of adjustments.

58. If adjusting HFC, PFC and SF_6 estimates from the consumption of halocarbons and SF_6, consideration should be given to the uncertainty of sales figures (e.g. for sales of these chemicals to the foam blowing industry) and other parameters (such as the composition of the mix in coolants) as given in the IPCC good practice guidance.

C. Agriculture

59. When adjusting emissions from agricultural soils, preference should be given to tier 1.a methods as provided in the IPCC good practice guidance.

60. The expert review team should note that when adjusting emissions from manure management systems, savanna burning, or field burning of agricultural residues, the same activity data should be used for CH_4 as for N_2O.

61. Similarly, consistent livestock data should be used for CH_4 and N_2O emissions from enteric fermentation and manure management, and for N_2O emissions from animal manure applied to soils.

D. Waste

62. Data on populations and/or urban populations, and GDP per capita, could be used in some cases to estimate the volume of solid waste, taking into account national circumstances. Urban population and protein consumption data could be used to obtain activity data to estimate emissions from domestic waste-water handling. Production data associated with the main industries in a specific country could be used as a possible driver to estimate the amount of industrial waste water, taking into account differences in technologies (e.g. emission per unit production).

63. For activity data, a cluster of countries based mainly on waste management practices could be used for estimating certain types of data, such as the waste generation rate, but not for estimating other types of data, such as the amount of waste incinerated or the amount of waste deposited, because these data largely depend on national environmental waste management policies.

64. When adjusting emissions from waste incineration, the applicability of drivers is very limited.

65. When adjusting emissions from solid waste disposal sites or waste-water treatment, the recovery of the methane needs to be considered. For solid waste disposal the expert review team should also take into account that if activity data are constant or increasing and the country used the IPCC tier 1 default method, this will have resulted in a conservative emission estimate.

Annex I

LIST OF INVENTORY REVIEW RESOURCES RELEVANT FOR THE CALCULATION OF ADJUSTMENTS

This annex lists inventory review resources relevant for the calculation of adjustments using the adjustment methods and approaches described in the technical guidance.

The information contained in the inventory review resources listed here will be maintained by the UNFCCC secretariat and made available to expert review teams by electronic means. This information will be updated periodically following the collective recommendation of lead reviewers on ways to improve the review process,[1] including the consistent application of the technical guidance by expert review teams.

A. Resources for supporting the review of GHG inventories

1. Recommendations for improving the technical review of GHG inventories and for applying common approaches in the review by expert review teams (*resulting from meetings of lead reviewers)*

2. Recommended international data sources (*for activity data, drivers and emission factors*)

3. Recommended approaches and tools for clustering of inventory data

4. Recommended drivers (*prepared on the basis of data obtained from external data sources that have adequate correlation with GHG emission estimates*).

B. Specific resources for the calculation of adjustments

1. Information on previous adjustment calculations by expert review teams.

[1] This would also include any guidance for identifying departures from the IPCC good practice guidance.

Annex II

PROVISIONS IN THE GUIDELINES FOR REVIEW UNDER ARTICLE 8 OF THE KYOTO PROTOCOL THAT RELATE TO ADJUSTMENTS

I. TIMING

1. Within the review of the inventory, the expert review team shall list all the problems identified, indicating which would need an adjustment, and send this list to the Annex I Party no later than 25 weeks from the submission due date of the annual inventory. This list should be prepared under the collective responsibility of the expert review team.

2. The Annex I Party shall comment on these questions within six weeks and, where requested by the review team, may provide revised estimates.

3. If adjustments are still needed, the expert review team shall calculate adjustments in accordance with this technical guidance, in consultation with the Party concerned, and shall prepare a draft individual inventory review report which includes, where appropriate, adjusted estimates and related information, within eight weeks of the receipt of the comments on the questions posed, and shall send the draft report to the Party concerned.

4. The Annex I Party shall be provided with four weeks to comment on the draft individual inventory review report and, where appropriate, on whether, and for what reasons, it accepts or rejects the adjustment. If the Party concerned disagrees with the proposed adjustment(s) the expert review team should send the notification from the Party, along with the recommendation of the expert review team, in its final report to the COP/MOP and the Compliance Committee, which will resolve the disagreement in accordance with the procedures and mechanisms on compliance.

II. REPORTING

5. The following information on adjustments shall be reported by the expert review teams in the review reports:

(a) The original estimate, if applicable;

(b) The underlying problem;

(c) The adjusted estimate;

(d) The rationale for the adjustment;[1]

(e) The assumptions, data and methodology used to calculate the adjustment;

(f) A description of how the adjustment is conservative;

(g) The expert review team's identification of possible ways for the Annex I Party to address the underlying problem;

(h) The magnitude of the numerical values relating to an adjusted problem as:

(i) The percentage by which the aggregate adjusted GHG emissions for an Annex I Party exceed the aggregate submitted emissions, defined as aggregate submitted emissions of the gases and from the sources listed in Annex A to the Kyoto Protocol, for any single year;[2]

[1] This includes procedures for selection of the calculation methods used for the adjustments.

[2] "Any single year" refers to the years of the commitment period.

(ii) The sum of the numerical values of the percentages calculated in paragraph 5 (h) above for all years of the commitment period for which the review has been conducted;

(i) The number of reviews that identified and adjusted the problem previously, and the percentage that the key source category contributed to the aggregate submitted emissions, defined as aggregate submitted emissions of the gases and from the sources listed in Annex A to the Kyoto Protocol;

(j) An indication whether the adjustment was agreed upon by the Annex I Party and the expert review team.

Annex III

TABLE OF CONSERVATIVENESS FACTORS

1. This annex provides a table of conservativeness factors to be used in the calculation of adjustments to ensure that adjusted estimates are conservative, in accordance with paragraph 47 of the technical guidance. These conservativeness factors are provided in two sets: one for use in the calculation of adjustments for a base year estimate and one for the calculation of adjustments for a year of the commitment period. These are provided for activity data, emission factors and emission estimates for each IPCC source category and corresponding gas.

2. When a given source category is not covered in the table, the provision of paragraph 50 of the technical guidance applies, such as for categories "other" under industrial processes, agriculture, waste and the IPCC sector "7 Other".

3. The conservativeness factors in this table will be updated, as required, following the collective recommendation of lead reviewers, subject to approval by the SBSTA.

Background information on the preparation of the table of conservativeness factors

4. The conservativeness factors are derived from uncertainty values and parameters provided in the IPCC good practice guidance, and in some cases are determined by expert judgement for the purpose of this technical guidance, as indicated below:

(a) If the IPCC good practice guidance provides an uncertainty range for a component, this range for that component is used;

(b) If the IPCC good practice guidance provides an uncertainty range for emissions from a particular source or a combined uncertainty range can be calculated from the uncertainty values and/or ranges of the input parameters using the tier 1 method, the range generated by applying the uncertainty value for the source is used;

(c) In cases where the IPCC good practice guidance does not provide an uncertainty range for an estimate or a combined uncertainty range cannot be calculated because necessary information is not available, an assessed uncertainty range determined by expert judgement for the purposes of this technical guidance is used.

5. Different conservativeness factors are provided for use in adjustments to estimate for a base year and for a year of the commitment period. The conservativeness factors are calculated using the 25^{th} and 75^{th} percentiles of the range generated by an uncertainty value for the gas and source for use in an adjustment for the base year, and a year of the commitment period, respectively, assuming a log–normal distribution.

6. The uncertainty values have been grouped into five sets of uncertainty bands, with corresponding conservativeness factors, by assigning a given uncertainty values to a given band. These bands relate to the underlying uncertainties, as follows:

Estimated uncertainty range **(%)**	**Assigned uncertainty band (%)**	**Conservative factor for the base year**	**Conservative factor for a year of the commitment period**
Less than or equal to 10	7	0.98	1.02
Greater than 10 and less than or equal to 30	20	0.94	1.06
Greater than 30 and less than or equal to 50	40	0.89	1.12
Greater than 50 and less than or equal to 100	75	0.82	1.21
Greater than 100	150	0.73	1.37

CONSERVATIVENESS FACTORS FOR ADJUSTMENTS IN BASE YEAR

	Emission factor						Activity data	Emission estimates					
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
1. Energy													
A. Fuel combustion (sectoral approach)													
1. Energy industries	0.98	0.82	0.73				0.98	0.94	0.82	0.73			
2. Manufacturing industries and construction	0.98	0.82	0.73				0.94	0.94	0.73	0.73			
3. Transport (aviation and shipping)	0.98	0.89	0.82				0.82	0.82	0.73	0.73			
3. Transport (road and other)	0.98	0.89	0.82				0.94	0.94	0.89	0.73			
4. Other sectors	0.98	0.82	0.73				0.94	0.94	0.73	0.73			
5. Other	0.98	0.82	0.73				0.82	0.94	0.73	0.73			
Biomass (all fuel combustion sources)	N/A	0.82	0.82				0.82	N/A	0.73	0.73			
Fuel combustion (reference approach)	0.98						0.98	0.98					
B. Fugitive emissions from fuels													
1. Solid fuels	0.73	0.73					0.98	0.73	0.73				
2. Oil and natural gas	0.73	0.73	0.73				0.98	0.73	0.73	0.73			
2. Industrial processes													
A. Mineral products (cement)	0.94						0.98	0.94					
A. Mineral products (all other sources)	0.94						0.82	0.73					
B. Chemical industry	0.98	0.73					0.94	0.94	0.73				
Nitric acid production			0.82				0.94			0.73			
Adipic acid production			0.98				0.94			0.94			
C. Metal production	0.98	0.82			0.82	0.82	0.98	0.94	0.73			0.82	0.82
D. Other production	0.94	0.73	0.82				0.94	0.89	0.73	0.73			
E. Production of halocarbons and SF_6				0.89	0.82	0.82	0.82				0.89	0.82	0.82
F. Consumption of halocarbons and SF_6				0.82	0.82	0.82	0.82				0.82	0.82	0.82
G. Other													
3. Solvent and other product use	0.94		0.94				0.82	0.94		0.94			
4. Agriculture													
A. Enteric fermentation		0.89					0.98		0.89				
B. Manure management		0.89	0.82				0.98		0.89	0.82			
C. Rice cultivation		0.89					0.94		0.89				
D. Agricultural soils	0.82	0.82	0.73				0.82	0.73	0.82	0.73			
CO_2 (liming)	0.98	N/A	N/A				0.82	0.82	N/A	N/A			
N_2O (fertlizer and manure)	N/A	0.82	0.82				0.94	N/A	0.82	0.73			
E. Prescribed burning of savannas	N/A	0.94	0.94				0.82	N/A	0.82	0.82			
F. Field burning of agricultural residues	N/A	0.94	0.94				0.82	N/A	0.82	0.82			
G. Other													
5. Land-use change and forestry[a]													
6. Waste													
A. Solid waste disposal on land	0.89	0.89					0.82	0.73	0.73				
B. Waste-water handling		0.89	0.89				0.98		0.82	0.82			
C. Waste incineration	0.89	0.82	0.89				0.82	0.73	0.73	0.73			
D. Other													
7. Other *(please specify)*													

The conservativeness factors for the base year correspond to the 25th percentile of the range generated by the assigned uncertainty values as follows:

Assigned uncertainty	25th percentile
7%	0.98
20%	0.94
40%	0.89
75%	0.82
150%	0.73

N/A: Not applicable, because Parties are either not required to report this source in the greenhouse gas inventories or not required to include it in their national total.

[a] To be included following completion of the IPCC good practice guidance on land use, land-use change and forestry.

CONSERVATIVENESS FACTORS FOR ADJUSTMENTS IN COMMITMENT PERIOD

	Emission factor						Activity data	Emission estimates					
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
1. Energy													
A. Fuel combustion (sectoral approach)													
1. Energy industries	1.02	1.21	1.37				1.02	1.06	1.21	1.37			
2. Manufacturing industries and construction	1.02	1.21	1.37				1.06	1.06	1.37	1.37			
3. Transport (aviation and shipping)	1.02	1.12	1.21				1.21	1.21	1.37	1.37			
3. Transport (road and other)	1.02	1.12	1.21				1.06	1.06	1.12	1.37			
4. Other sectors	1.02	1.21	1.37				1.06	1.06	1.37	1.37			
5. Other	1.02	1.21	1.37				1.21	1.06	1.37	1.37			
Biomass (all fuel combustion sources)	N/A	1.21	1.21				1.21	N/A	1.37	1.37			
Fuel combustion (reference approach)	1.02						1.02	1.02					
B. Fugitive emissions from fuels													
1. Solid fuels	1.37	1.37					1.02	1.37	1.37				
2. Oil and natural gas	1.37	1.37	1.37				1.02	1.37	1.37	1.37			
2. Industrial processes													
A. Mineral products (cement)	1.06						1.02	1.06					
A. Mineral products (all other sources)	1.06						1.21	1.37					
B. Chemical industry	1.02	1.37					1.06	1.06	1.37				
Nitric acid production			1.21				1.06			1.37			
Adipic acid production			1.02				1.06			1.06			
C. Metal production	1.02	1.21			1.21	1.21	1.02	1.06	1.37			1.21	1.21
D. Other production	1.06	1.37	1.21				1.06	1.12	1.37	1.37			
E. Production of halocarbons and SF_6				1.12	1.21	1.21	1.21				1.12	1.21	1.21
F. Consumption of halocarbons and SF_6				1.21	1.21	1.21	1.21				1.21	1.21	1.21
G. Other													
3. Solvent and other product use	1.06		1.06				1.21	1.06		1.06			
4. Agriculture													
A. Enteric fermentation		1.12					1.02		1.12				
B. Manure management		1.12	1.21				1.02		1.12	1.21			
C. Rice cultivation		1.12					1.06		1.12				
D. Agricultural soils	1.21	1.21	1.37				1.21	1.37	1.21	1.37			
CO_2 (liming)	1.02	N/A	N/A				1.21	1.21	N/A	N/A			
N_2O (fertlizer and manure)	N/A	1.21	1.21				1.06	N/A	1.21	1.37			
E. Prescribed burning of savannas	N/A	1.06	1.06				1.21	N/A	1.21	1.21			
F. Field burning of agricultural residues	N/A	1.06	1.06				1.21	N/A	1.21	1.21			
G. Other													
5. Land-use change and forestry[a]													
6. Waste													
A. Solid waste disposal on land	1.12	1.12					1.21	1.37	1.37				
B. Waste-water handling		1.12	1.12				1.02		1.21	1.21			
C. Waste incineration	1.12	1.21	1.12				1.21	1.37	1.37	1.37			
D. Other													
7. Other ***(please specify)***													

The conservativeness factors for the commitment period correspond to the 75th percentile of the range generated by the assigned uncertainty values as follows:

Assigned uncertainty	75th percentile
7%	1.02
20%	1.06
40%	1.12
75%	1.21
150%	1.37

N/A: Not applicable, because Parties are either not required to report this source in the greenhouse gas inventories or not required to include it in their national total.

[a] To be included following completion of the IPCC good practice guidance on land use, land-use change and forestry.