5 September 2001

ENGLISH ONLY

UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

SUBSIDIARY BODY FOR SCIENTIFIC AND TECHNOLOGICAL ADVICE
Fifteenth session
Marrakesh, 29 October - 9 November 2001
Item 4 (a) of the provisional agenda

METHODOLOGICAL ISSUES

ONGOING ACTIVITIES ON REPORTING AND REVIEW OF GREENHOUSE GAS INVENTORIES FROM PARTIES INCLUDED IN ANNEX I TO THE CONVENTION (IMPLEMENTING DECISIONS 3/CP.5 AND 6/CP.5)

Experience with using the good practice guidance in preparing the 2001 inventories by Annex I Parties

Submissions from Parties

Note by the secretariat

1. At its twelfth session, the Subsidiary Body for Scientific and Technological Advice invited Annex I Parties to submit information on their experience with using the Intergovernmental Panel on Climate Change report on Good Practice and Uncertainty Management in National Greenhouse Gas Inventories in preparing their 2001 inventory submission by 15 August 2001, to be considered by the SBSTA at its fifteenth session (FCCC/SBSTA/2000/5, para. 40 (e)).

2. Seven such submissions have been received.* In accordance with the procedure for miscellaneous documents, these submissions are attached and reproduced in the language in which they were received and without formal editing.

* In order to make these submissions available on electronic systems, including the World Wide Web, these submissions have been electronically imported. The secretariat has made every effort to ensure the correct reproduction of the texts as submitted.

CONTENTS

PAPER NO. 1: AUSTRALIA

The 12th session of the Subsidiary Body for Scientific and Technological Advice invited Parties included in Annex I to the Convention, to submit information on their experience with using the good practice guidance in preparing their 2001 inventory submissions by 15 August [Document FCCC/SBSTA/2000/5, paragraph 40(e)]. This submission is Australia's response to this request. This submission should be read in the context of Australia's other submissions to the UNFCCC on the use of the Good Practice Guidance and the preparation of inventories.

Australia has evaluated our current domestic practices against the Good Practice Guidance and determined a number of areas for action. The size of the task is substantial, while some aspects of Good Practice may be implemented readily others require further investigation or the development of expertise to fully implement. Overall Australia believes we are on track to have fully implemented Good Practice in the preparation of the 2003 inventory submission as requested by the SBSTA.

In compilation of Australia's 2001 inventory submission we have targeted good practice in Quality Assurance/Quality Control (QA/QC) and quantification of uncertainty, while developing a schedule to review the methodologies and documentation processes for key source categories over the next 2 years. In addition, to improve the overall quality of Australia's inventory in terms of processing, documentation, archiving and reporting we have commenced development of a database to compile the National Greenhouse Gas Inventory (NGGI).

In evaluating the Good Practice report Australia has identified some possible difficulties in implementing some of the QA/QC and verification checks outlined in the report because of problems in accessing required information.

The activities being undertaken by Australia and the concerns we have about the implementation of Good Practice are detailed in the following sections.

1. Activities Undertaken for the 2001 Submission

1.1 Key Source Analysis

Australia has undertaken an analysis of key source categories using a variation of the Tier 1 Level and Trends assessment approaches suggested in the IPCC Good Practice report. Australia undertook this initial key source analysis to identify source categories that should be the priority for review against good practice principles. As our approach will be to target an entire source category for review rather than a particular fuel type or gas, we used a much finer disaggregation of source categories than suggested and did not disaggregate these by fuel type or greenhouse gas.

Using this approach Australia has 39 key source categories. Thirty-two key source categories were identified through the level assessment with a further seven identified through the trends analysis. A key source analysis of Australia's 1998 NGGI undertaken by the UNFCCC Secretariat identified only 14 key sources using the Good Practice Tier 1 level assessment. Of these 14 key sources, CO_2 from Stationary combustion was identified three times (for coal, gas

and oil) and fugitive emissions from oil and gas operations were identified twice (for CH_4 and CO_2).

1.2 Quantifying Uncertainties

Qualitative expert assessments have been the main means of estimating uncertainty in the past. In line with good practice, Australia has begun implementing quantitative assessments of uncertainty using Monte Carlo analysis. As the expert consultants responsible for compiling the Australian inventory have varying degrees of experience with Monte Carlo analysis and uncertainty estimation we are currently undergoing a process of capacity building.

For the 1999 NGGI consultants were required to develop quantitative uncertainty estimates for at least two key source categories. The Agriculture sector is currently the only sector to have all uncertainties estimated using Monte Carlo, hence we are not yet able to produce an estimate of uncertainty for the total inventory or for trends. It will be another 2 years before a full analysis of the inventory uncertainties is possible.

1.3 Quality Assurance and Quality Control

To meet good practice requirements Australia has begun to formalise and document our current QA/QC procedures. As the inventory agency responsible for coordinating QA/QC activities, the Australian Greenhouse Office (AGO) has developed a draft QA/QC plan. The final plan will outline the QA/QC activities undertaken at all stages of inventory preparation and the process and schedule to review all source categories.

The expert consultants who compile the sector emission estimates are now required to complete the IPCC Good Practice Tier 1 General Inventory level QC procedures. The consultants provide the AGO with documentation outlining which checks where undertaken on what source categories. Tier 2 QC procedures, such as emission comparisons and reference calculations for the energy sector, are also undertaken.

Australia continues to make basic Tier 1 QA checks with the inventory sent to State and Commonwealth government agencies for review prior to submission. In addition, more extensive expert peer reviews (Tier 2 QA) will be undertaken as part of the overall process to ensure compliance with good practice.

2. Additional activities being undertaken to support Good Practice

2.1 Sector Reviews

Many of the good practice principles for the selection and documentation of methodologies were used in developing the Australian methodologies for the estimation of greenhouse gas emissions and sinks. The Australian methodologies were developed by expert working groups and were reviewed by a wide range of professional experts in research institutions, governments and industry groups prior to being accepted. The methodologies have also been extensively documented in a series of sector based workbooks.

Although the Australian sector methodologies are broadly consistent with good practice, areas for improvement have been identified. To ensure Australia is compliant with good practice we have commenced a program to:

- review methodologies and data sources;
- quantify uncertainty;
- complete QA/QC checks as appropriate; and
- ensure complete and transparent documentation and reporting.

As time and resources are limited it will not be possible to review all source categories before the 2003 inventory submission. Australia will review the key source categories as a priority. A comprehensive review of the Livestock and Stationary Combustion source categories has commenced.

2.2 Inventory Database

Australia has commenced the development of an integrated and centralised database to compile the National Greenhouse Gas Inventory (NGGI). This database will have a significant impact on the quality and data management aspects of the NGGI compilation process. It will preserve the integrity of greenhouse gas emissions data and information, and with the coupling of the AGO Inventory Quality Assurance Program to the database the quality of output will be of very high standard. This database will centralise all data and information associated with inventory compilation.

3. Areas of difficulty

The Good Practice report suggests a number of possible QA/QC and verification checks on inventory data and emission estimates. Australia would like to note that much of the information needed to undertake all these checks is not available or easily accessible. Parties cannot be expected to implement all checks discussed in Good Practice.

Two areas that may cause particular problems are:

- comparing emissions or activity data with independently compiled datasets or direct measurement data of a suitable quality. Generally these datasets are either not available or are not truly independent. For example data supplied to the IEA and the FAO come from the same source as that used to compile the NGGI.

- comparing emission factors with the IPCC defaults or the implied emission factors of other countries and explaining large differences. This can be extremely difficult as the IPCC Guidelines rarely provide information about the circumstances under which the emission factor was developed and many of the source documents are difficult to access. Accessing information about other countries emission factors and methodologies is also difficult. It is hoped that in the long term, the emission factor database being developed by the IPCC will address this problem.

PAPER NO. 2: BELGIUM

(ON BEHALF OF THE EUROPEAN COMMUNITY AND ITS MEMBER STATES AND CROATIA, BULGARIA, CZECH REPUBLIC, ESTONIA, LITHUANIA, LATVIA, HUNGARY, POLAND, ROMANIA, SLOVAKIA AND SLOVENIA)

Belgium, on behalf of the European Community and its Member States and Croatia, Bulgaria, Czech Republic, Estonia, Lithuania, Latvia, Hungary, Poland, Romania, Slovakia and Slovenia, welcomes the opportunity to send its views and experiences with using the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (referred to below as Good Practice Guidance), in accordance with the request of the Subsidiary Body for Scientific and Technological Advice at its twelfth session (see document FCCC/SBSTA/2000/5, page 15, para. 40 (e)).

The Good Practice Guidance assists countries in producing inventories that are accurate and in which uncertainties are reduced as far as practicable. The EU strongly supports the SBSTA conclusion at its twelfth session that Good Practice guidance should be applied by Annex I Parties to the extent possible for inventories due in 2001 and 2002 and should be used for inventories due in 2003 and beyond.

EU Member States have begun to implement Good Practice and are gaining experience in its use. The EU considers however that it is too early to provide a comprehensive evaluation of its experiences on the use of the Good Practice Guidance for consideration at its fifteenth session. The EU requests that Parties be given the opportunity to provide further views on this issue for consideration at the sixteenth session of the SBSTA.

PAPER NO. 3: BULGARIA

The new guidance set up higher requirements for the inventory as a whole and data collection and estimations as well. For us it is difficult to make a choice between many decisions threes together with national circumstances, primary data and national emission factors.
To implement the guidance appropriately, additional training is necessary for whole aspects of the guidance and there is a need of more staff to be involved.

PAPER NO. 4: JAPAN

INFORMATION ON JAPAN'S EXPERIENCE WITH USING THE GOOD PRACTICE GUIDANCE IN PREPARING JAPAN'S 2001 INVENTORY SUBMISSIONS

General

The Good Practice Guidance was not entirely applied to Japan's inventory submitted in 2001. But, in 1999, the Committee on Methodology for Estimation of Greenhouse Gas Emissions had started and has studied the Good Practice Guidance application to our inventory and some other subjects. As consequence of this study, we recognized some difficulties to apply the guidance to our inventory. Source categories having these difficulties are classified in following. Source categories which contain these difficulties are explained in "Specification".

(1) Source categories in which different parameters from those selected by the decision tree are applied

In some source categories, the estimation with the parameters which are different from those selected by decision tree but similar to them, is considered as accurate as the estimation with them. Therefore, we think the estimation with similar parameters measured and well-documented by each country should be allowed.

(2) Source categories in which default emission factors selected by the decision tree does not reflect our country's situation

Our inventory has some sources which have country specific emission factors, although according to the decision tree the use of default emission factor is determined. On the other hand, some sources' default emission factors cause overestimation in our inventory. In these sources, we think the use of country specific emission factors or default emission factors reflecting our country's situation, such as western Europe's ones, should be allowed.

(3) Source categories in which it is difficult to apply estimation method indicated in the Guidance

In some sources the method selected by the decision tree is not applied and in other sources the emissions are not estimated because of lack of proper activity data. The government of Japan is to study moreover this problem including the possibility to apply these methods indicated in the Guidance.

Specification

(1) Source categories in which different parameters from those selected by the decision tree are applied

- Figure 4.2 Decision Tree for CH4 Emissions from Enteric Fermentation

In this source category, we don't apply the method of which the application is required by the Guidance. The decision tree indicates that, "Box2" should be used for emissions from cattle and "Box1" should be used for emissions from horse, sheep, goat and swine and that the emission from cattle should be estimated using "Net Energy" and "Methane Conversion Factor". But, our country specific emission factor is calculated with "Dry Matter Intake" and other measurement data. We think estimation with our country specific emission factor should be allowed to assure sufficient accuracy.

- Figure 4.3 Decision Tree for CH4 Emissions from Manure Management

In this source category, we don't apply the method of which the application is required by the Guidance. The decision tree indicates that "Box3" should be used for emissions from cattle, "Box2" should be used for emissions from swine and poultry, and "Box1" should be used for emissions from horse, sheep and goat. But, in our inventory, emission factors of each system calculated with many measurement data in Japan are used, and all parameters described in the guidance are not used. We think the application of parameters reflecting each country's situation should be allowed.

- Figure 4.4 Decision Tree for N2O Emissions from Manure Management

The Same as "Figure 4.3".

- Figure 4.7 Decision Tree for Direct N2O Emissions from Agricultural Soils

In this source category, we estimate only emissions from synthetic fertilizer and report emissions from other sources as "NE". The decision tree indicates that "Box5" should be used for emissions from synthetic fertilizer, "Box1" should be used for emissions from animal manure, nitrogen fixed by N-fixing crops, crop residue and organic soils. But, we estimate the emissions with country specific emission factors, not using all the parameters described in the Guidance. We think the application of the parameter reflecting each country's situation should be allowed.

- Figure 4.9 Decision Tree for CH4 Emissions from Rice Production

In this source category, we don't apply the method of which the application is required by the Guidance. According to the decision tree, "Box3" should be used for emissions from this source. But in our inventory, emission factors calculated with many measurement data in Japan are used, and all the parameters described in the Guidance are not used. We think the application of parameter reflecting each country's situation should be allowed.

- Figure 5.1 Decision Tree for CH4 Emissions from Solid Waste Disposal Sites

In this source category, we don't apply the method of which the application is required by the Guidance. According to the decision tree, "Box2" should be used for emissions from this source. But, in our inventory, emission factors calculated with many measurement data in Japan are used, and all the parameters described in the Guidance are not used. We think the application of parameters reflecting each country's situation should be allowed.

(2) Source categories in which default emission factor selected by the decision tree does not reflect our country's situation

- Figure 2.6 Decision Tree for Emissions from Water-borne Navigation

In this source category, we don't apply the method of which the application is required by the Guidance. According to the decision tree, "Box1" with IPCC default value should be used for CO2, CH4 and N2O emissions. But, in our inventory, CO2 emissions are estimated with country specific emission factors which are the same as those from stationary combustion. We think the application of country specific emission factors should be allowed when there are country specific emission factors for CO2 emissions from stationary combustion.

- Figure 2.12 Decision Tree for Natural Gas Systems

According to the decision tree, “Box1” with default value of “Rest of the world”; which includes Japan, should be used for emissions from this source. But, in our inventory, we used the mean value between the highest value of “USA & Canada” and the lowest one of “Western Europe”, because it is considered that these countries’ emission factors reflect the most our country’s situation. (e.g. production: mean value between the lowest value of “Western Europe” and the highest value of “USA & Canada”, flaring: mean value of “USA & Canada”, transportation, storage and refining: the mean value of between the lowest value of “Western Europe” and the highest value of “USA & Canada”.) Considering our country’s situation, it is highly possible that estimation with default value of “Rest of the World” is overestimation. Therefore, we think the use of default value of the region of which the situation is similar to that of Japan (e.g. developed countries such as west-European countries and USA) should be allowed.

- Figure 2.13 Decision Tree for Crude Oil Production and Transport

According to the decision tree, “Box1” with default value of “Rest of the world”; which includes Japan, should be used for emissions from this source. But, in our inventory, we used the the default value of the region of which the situation is similar to that of Japan. (e.g. production: mean value of default value, flaring: mean value of “Oil and Gas Produced - USA & Canada” [because default value of “Rest of the world” is not shown], transportation: the default value) We think the use of default value of the region of which the situation is similar to that of Japan (e.g. developed countries such as west-European countries and USA) should be allowed.

- Figure 4.6 Decision Tree for CH4 and N2O Emissions from Agricultural Residue Burning

According to the decision tree, “Box1” with default value should be used for emissions from this source. But, in our inventory, our country’s specific emission factors, which were calculated based on measurement in Japan, are used. We think that when there are country specific emission factors, they should be allowed, even if this source category is not “key source category” .

(3) Source categories in which it is difficult to apply estimation method indicated in the Good Practice Guidance

- Figure 3.1 Decision Tree for Estimation of CO2 Emissions from Cement Production

According to the decision tree, “Box2” should be used for emissions from this source. But, in our inventory, emissions from this source is estimated with the another method in which consumption amount of limestone is used as activity data, because in Japan the agent of solidification had not been accounted in clinker production amount until 1992. The GOJ is to study moreover this problem including the possibility to apply the method indicated in the Guidance.

- Figure 3.2 Decision Tree for Lime Production

According to the decision tree, “Box1” should be used for emissions from this source. But, in our inventory, emissions from this source are estimated with the another method in which input amount of limestone and dolomite is used for the estimation. To follow the instruction of “Box1”, we should get lime production data type by type. The GOJ is to study moreover this problem including the possibility to apply the method indicated in the Guidance.

- Figure 3.3 Decision Tree for Iron and Steel Industry

According to the decision tree, “Box2” should be used for emissions from this source. But in our inventory, CO2 from coke and charcoal is accounted in energy sector, as it is allowed in “3.1.3.1 Methodological issues” of the Guidance, from the point of view that they play the dual role of fuel and reductant. In consequence, CO2 only from limestone and dolomite is accounted in this source category.

PAPER NO. 5: MOLDOVA

Concerning the request of SBSTA to Annex I Parties to submit information on their experience with using the good practice guidance in preparing their 2001 inventory the position of our country could be identified following the next views:

- The Republic of Moldova is a Party to the Convention as a developing country and as a non-Annex I country.
- During the process of preparation of the First National Communication of the Republic of Moldova we performed the first National Inventory of the GHG emissions, which covered the period of 1990-1998 years. Currently the national inventory of the direct and indirect GHG emissions is not periodically updated yet.
- The national inventory of the direct and indirect GHG emissions was carried out based on the 1995 and 1996 IPCC Guidelines.
- At the moment the Republic of Moldova is one of the beneficiary countries participating in the regional PDF Block B Project "Capacity Building for Improving National Greenhouse Gas Inventories (Europe and Commonwealth of Independent States Region). The objective of this project is to enable a significant number of countries to improve the quality of their national GHG inventories in the context of non-Annex I national Communications through capacity building, as envisaged by Decisions 10/CP.2, 11/CP.2, 2/CP.4, and 10/CP.5, and Articles 4.1 (a) (b) and 12.1 (a) of the UNFCCC.
- Under the PDF, a Training Package is being developed as a complementary tool to the IPCC *Revised Guidelines* and the "*Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*" (GPG) that provides a set of source-by-source recommendations on how to best implement IPCC methods to improve inventory quality, addressing methods, reporting and documentation, and quality assurance and quality control.
- Although non-Annex I Parties are not required to use the GPG, Republic of Moldova intends to follow it in order to produce an inventory that is transparent, documented, consistent over time, complete, comparable, assessed for uncertainties, subject to quality control and assurance during the activities carried out as part of the Second National Communication.
- As the IPCC published the GPG only in 2000, our inventory experts have not yet relevant experience with using it in preparing national GHG inventory. The participating in the regional PDF Block B Project "Capacity Building for Improving National Greenhouse Gas Inventories (Europe and Commonwealth of Independent States Region) would be a good opportunity for our experts to be trained and train local experts in IPCC Good Practice application. In this sense, the translation and wide dissemination of the good practice guidance among non-Annex I Parties is of great importance as a relevant element of the capacity-building activities.

PAPER NO. 6: NORWAY

Implementation of the Good Practice Guidelines in Norway

The good practice guidance consists of two main parts, the sectorial parts (chapter 1-5) and the general parts (chapter 6-7). So far we have a more broad experience in implementing the general parts than the sectorial parts. The reason is that the final version of the guidance only has been available to us for a very short time. In general we find that the guidance is useful. It is flexible and allows implementation at various levels of ambition. We will here review the experience and progress item by item.

1. Quantifying uncertainty in practice

Norway has published two reports on the assessment of uncertainty in their GHG inventory. The first (Rypdal 1999) focuses on uncertainty in individual input data and makes a simple (Tier 1) type of uncertainty assessment. In Rypdal and Zhang (2000) a more detailed assessment is made (equal to Tier 2). Here the total uncertainty in level and trend is modelled using a "Monte Carlo" type of analysis. Care was taken to specify distribution functions and correlation between input parameters.

The conclusion was that the uncertainty in emission level of all gases is nearly 20 %, while the uncertainty in trend is about 4 percentage points. The largest contributor to the level uncertainty is N_2O from agricultural soil, followed by methane from landfills and PFCs from aluminium production. HFC consumption, N_2O from road traffic and PFC from aluminium production are the main contributors to the trend uncertainty.

Rypdal and Winiwarter (2001) have compared the uncertainty estimates made in a few greenhouse gas emission inventories and conclude that the reported uncertainties not necessarily are comparable. This is particularly true for the source N_2O from agricultural soils (that dominates the uncertainty in all the inventories considered). Norway and UK have applied the uncertainty assessment of N_2O from the Revised 1996 Guidelines, while other countries have used their own assessments. Consequently, Norway and UK report higher overall uncertainties than other countries. Rypdal and Winiwarter (2001) conclude that this probably not reflects real differences in inventory quality.

2. Methodological choice and recalculation

Assessment of key sources

Norway has assessed the key sources according to Tier 1 (Rypdal and Flugsrud 2001) and Tier 2 (Rypdal and Zhang 2000). The approaches are compared in Rypdal and Flugsrud (2001). They give qualitatively the same results, the Tier 2 approach (based on modelling and uncertainty estimates) is considered to be most accurate. Results are shown in Table 1 and 2 for the level and trend, respectively.

Table 1. Uncertainty importance elasticity of total level with respect to input parameters. 1990 and 2010. Ranking of the main parameters (uncertainty importance ≥ 0.002).

	1990						2010				
IPCC	**category**	**Fuel**	**A/EF**	**Pollutant**	**Uncertainty importance**	**IPCC**	**category**	**Fuel**	**A/EF**	**Pollutant**	**Uncertainty importance**
4D	Agricultural soils – other	n.a.	EF	N_2O	0.11	4D	Agricultural soils - other	n.a.	EF	N_2O	0.09
4D	Agricultural soils – fertiliser	n.a.	EF	N_2O	0.04	4D	Agricultural soils - fertiliser	n.a.	EF	N_2O	0.03
4D	Agricultural soils – manure	n.a.	EF	N_2O	0.03	4D	Agricultural soils - manure	n.a.	EF	N_2O	0.02
6A	Waste disposal	n.a.	EF	CH_4	0.01	6A	Waste disposal	n.a.	EF	CH_4	0.007
2C3	Aluminium production	n.a.	EF	PFC	0.01	1A	Fuel combustion	Oil	EF	CO_2	0.006
6A	Waste disposal	n.a.	A	n.a.	0.007	6A	Waste disposal	n.a.	A	n.a.	0.005
1A	Fuel combustion	Oil	EF	CO_2	0.005	1A1c	Energy extraction	Natural gas	EF	CO_2	0.006
1A1c	Energy extraction	Natural gas	EF	CO_2	0.004	2F	HFC consumption	n.a.	A+EF	HFCs	0.005
1A3d	Navigation	Oil	A	n.a.	0.004	1A3b	Road traffic	Oil	EF	N_2O	0.005
4A1	Cattle – fermentation	n.a.	EF	CH_4	0.003	1A3d	Navigation	Oil	A	n.a.	0.004
2C2	Ferroalloy production	n.a.	EF	CO_2	0.002	2C3	Aluminium production	n.a.	EF	PFC	0.004
1A1c	Energy extraction	Natural gas	A	n.a.	0.002	1A1c	Energy extraction	Natural gas	A	n.a.	0.003
1A3a	Aviation	Oil	A	n.a.	0.002	1B2a-b	Oil loading	n.a.	EF	CO_2 + CH_4	0.003
1A4a	Service sectors	Oil	A	n.a.	0.002	4A1	Cattle - fermentation	n.a.	EF	CH_4	0.003
1B2a-b	Oil loading	n.a.	EF	CO_2 + CH_4	0.002	1A3a	Aviation	Oil	A	n.a.	0.002
						1A4a	Service sectors	Oil	A	n.a.	0.002
						1A4b	Residential	Oil	A	n.a.	0.002

A= Activity data. EF = Emission factor. Source: Rypdal and Zhang (2000). n.a.= Not Applicable

Table 2. Uncertainty importance elasticity of total trend 1990-2010 with respect to input parameters. 1990 and 2010. Ranking of the main parameters (uncertainty importance elasticity ≥ 0.01 or < -0.01).

IPCC	category	Fuel	A/EF	Pollutant	Uncertainty importance
2F	HFC consumption	n.a.	A+EF	HFCs	+0.02
1A3b	Road transportation	Oil	EF	N_2O	+0.02
2C3	Aluminium production	n.a.	EF	PFC	-0.02
1A1c	Energy extraction	Natural gas	EF	CO_2	+0.01
1A	Fuel combustion	Oil	EF	CO_2	+0.01
1B2a-b	Oil loading	n.a.	EF	$CH_4 + CO_2$	+0.01
6A	Waste disposal	n.a.	EF	CH_4	-0.01
1A1c	Energy extraction	Natural gas	A	n.a.	+0.01
6A	Waste disposal	n.a.	A	n.a.	- 0.01
1A3d	Navigation	Oil	A	n.a.	+0.01
1B2c	Venting	n.a.	A+EF	$CH_4 + CO_2$	-0.00
1B2c	Flaring	Natural gas	EF	CO_2	-0.00

A= Activity data. EF = Emission factor. Source: Rypdal and Zhang (2000). n.a.= Not Applicable

Fifteen parameters (emission factors and activity data) are identified as key for the level determination in 1990; four additional parameters are identified for the trend to 2010.

The good practice guidance also considers additional qualitative criteria. Three of these (mitigation, future growth and high uncertainty) have been covered by the analysis (Rypdal and Zhang 2000), as this took uncertainty into account and as the analysis also was made on an emission projection for 2010. The last criterion (unexpectedly low or high emissions) needs to be evaluated source by source and we have not so far made any progress, see also 5, Sectorial Guidance.

Recalculations and consistency in time series

The GHG inventory is improved continuously. Most years an emission source is reviewed in detail. Also small errors are detected. In many cases this also leads to changes in earlier reported emission figures. A consistent time series is always maintained in the national inventory system. Figures for the recent year is compared with earlier estimates as a consistency check. We will in the future improve the system of recording of recalculations (see 3 Quality assurance and quality control). If a methodology not can be implemented for every year an appropriate good practice splicing option is used.

3. Quality assurance and quality control

The inventory system is generally well documented. The last version is published in SSB (2000). In here documentation of all elements is given with further references for sub-sources. Also more technical documentations, directed to the inventory team, exist in Norwegian.

QA/QC forms an important part of the inventory compilation. We are quite confident that the basic estimate does not contain gross errors as a Tier 1 type of QA/QC has been assessed during the time the basic GHG inventory has been developed. The methodology is reviewed

systematically for key sources, see also 5. Emphasis is consequently put on QA/QC for a new inventory year. New estimates are compared to previous estimates and deviations are detected and assessed in a systematic manner. Another member of the inventory team checks parts of the compilation. When a new methodology is implemented the output is compared to the former methodology and deviations are explained. Norway has not performed a formal stakeholder review. However, source experts are involved in the inventory development when needed, either for actually developing the methodology or advisory.

Statistics Norway has in 2001 started the process of implementing TQM (Total Quality Managament) adapted to production of statistics. The GHG inventory has been selected as a pilot area to formalise the QA/QC process. The following items will be emphasised:

- A more cost-effect prioritisation of resources. Systematically use the concept of key sources.
- A better system for record keeping of historical data sets and recalculations, better documentation of expert judgements, assess the possibility for a more up to date version of the documentation (today only distributed about every 5 years)
- Assess the appropriateness of the inventory system with respect to maintenance, quality control and user needs.

At the same time the good practice guidance (in particular chapter 8) will be taken into account. The results will be published in a report by the end of 2001. The new QA/QC procedure will, as far as possible, be implemented when preparing the reporting in 2002, though part of it only can be implemented in the longer term.

The inventory is based on many data from various parts of Statistics Norway and from many external institutions. It is sometime difficult to formally adapt a systematic QA/QC in a uniform manner involving all partners. Statistics Norway takes the responsibility to make a consistency check of such data, but can only in cases when this check indicates discrepancies go back to the data providers for further clarifications.

4. Verification

The Good Practice Guidelines give a general advice on verification. Some of these can only be performed at an international level. Options are

1. Comparisons with other national inventory data
2. Direct source testing
3. Comparison with national scientific and other publications
4. International comparisons
5. Comparisons with atmospheric measurements.

Option 1 and 3 are integrated with the inventory system. Norway has one centralised system of GHG inventories. In the inventory process source specific inventories and research is taken into account. Norway has little experience with direct source testing, where measured data are available they are usually used in the inventory. Option 5 is not feasible to perform at the national level without substantial resources.
We find option 4 most suitable given limited resources.

In 1999 Norway made a comparison of their reported GHG emissions to those of Canada, New Zealand and Sweden (SFT 2000). These countries were selected as they have a similar industrial and social structure compared to Norway. Here we used independently published activity statistics to compile implied emission factors. Various types of indicators were compiled. The report concluded on the suitability of various indicators and the difficulties with this method. The main conclusion was that we felt that our reporting is complete and in reasonable agreement with the other countries. We also discovered some smaller errors on where emissions are allocated when reporting to UNFCCC. It is, however, often difficult to conclude, when reporting is deviating, what is correct.

CO_2 emissions are compiled using the reference approach and the estimate is compared to the sectorial approach. The deviation is quite high. This is due to the large oil and gas sector, most oil and gas produced is exported and the statistical error in the energy balance is quite high (statistical error here will necessarily also show up in the reference approach). We have also problems with finding the correct level of comparison between the two approaches. For the same reason estimates made independently by other organisations may deviate substantially from national figures. We will stress that we have confidence in the CO_2 estimates made by the sectorial approach as the statistical system accurately covers the *use* of oil products and other fuels. We will in 2001 further assess the problems of CO_2 estimates from Norway based on the reference approach.

5. Sectorial guidance

We have so far little experience in using the sectorial chapters of the Good Practice Guidance. In general they seem to contain additional information and clarifications to the 1996 Revised guidelines that are useful. The Energy chapter is too fragmented and should contain an overview of all CO_2.

We have not yet had the possibility to assess in detail whether the methods and data we use are according to good practice. According to good practice, the selection of methodology is most critical for the key sources. In table 3 we have made an assessment of the level of methodology used for the key sources.

The impression is that the key sources have been prioritised in the inventory system, but there are areas that should be prioritised further.

Table 3. Methodology and data used for key sources

		Methodology	Data quality	Documentation
IPCC	**category**			
1A	Fuel combustion	IPCC Tier 2/Tier 3	Appropriate. Energy statistics is under improvement in Statistics Norway in 2001	Yes
1A1c	Energy extraction	IPCC Tier 2/Tier 3	Appropriate. From the Petroleum Directorate. Of high quality due to the tax system. Emission factors could be improved.	General. Could be improved with respect to details.
1A3a	Aviation	IPCC Tier 3/Good practice method	Appropriate. Fuel for domestic aviation is collected from the airlines annually.	Detailed studies performed for 1995 and will be performed in 2001 for year 2000.
1A3b	Road transportation	IPCC Tier 3	Appropriate in general. Large uncertainty connected to N_2O emission factors (level and trend)	A more detailed assessment is made appr. every 5 years. For N_2O, however, data are in general limited.
1A3d	Navigation	IPCC Tier 3	Norway has a large ship and fishing fleet which introduces some uncertainty compared to other sources of CO_2. For fishing the uncertainty is high and it is suggested to perform a survey.	More detailed assessments are made every 5 years. Here bottom up estimates of fuel use in ships and vessels are compared to the sales figures used in the inventory. For shipping values are in reasonable agreement.
1A4a	Service sectors	IPCC Tier 2	A survey of fuel use is planned in 2001.	General.
1B2a	Oil loading	National methodology.	Estimates are made by the Petroleum Directorate in collaboration with the oil companies.	General. Could be improved with respect to details.
1B2c	Venting	Reported values	Values are more uncertain than for flaring and oil loading.	General. Could be improved with respect to details.
1B2c	Flaring	IPCC Tier 2/Tier 3	Appropriate. From the Petroleum Directorate. Of high quality due to the tax system. Emission factors could be improved.	General. Could be improved with respect to details.
2C2	Ferroalloy production	Good practice	Appropriate. Amount of reducing agents used is reported annually and estimates are compared to estimates made by the plants themselves.	Methodology was revised in 2000. Old documentation needs to be upated.

Table 3 continued. Methodology and data used for key sources

2C3	Aluminium production	Good practice	Appropriate. Methodology for PFC estimates has been developed in cooperation with the industry. Annual reporting. Complete consistency in time-series is difficult to obtain.	Appropriate.
2F	HFC consumption	Actual emissions. National methodology.	Appropriate. Consumption data are collected annually. Assumptions on leakage rates need to be checked in the future.	Appropriate.
4A1	Cattle – fermentation	IPCC Tier 1	Could be improved. Difficult to obtain data to perform Tier 2. Data for Tier 1 are available.	OK for Tier 1
4D	Agricultural soils	IPCC default	Data mostly available for the current methodology. Data on the area of histosols is highly uncertain. Data on manure treatment will be collected in 2001. It would require substantial research to identify emission factors adapted to national circumstances.	Appropriate
6A	Waste disposal	IPCC Tier 2	Appropriate. Waste statistics is collected annually for municipal waste. Industrial waste data are highly uncertain. Incinerated methane gas from landfills are reported from the plants annually and are considered accurate.	Appropriate

References

Rypdal (1999): An evaluation of the uncertainties in the national greenhouse gas inventory. Report 99:01. Norwegian Pollution control authority.

Rypdal and Zhang (2000): Estimation of uncertainties in greenhouse gas emission data. Report 2000/13. Statistics Norway.

Rypdal and Flugsrud (2001): Sensitivity analysis as a tool for systematic reductions in greenhouse gas inventory uncertainties. Environmental Science & Policy, Vol 4, 2001, 117-135.

Rypdal and Winiwarter (2001): Uncertainties in greenhouse gas emission inventories - evaluation, comparability and implications. Environmental Science & Policy, Vol 4, 2001, 107-116.

SFT (2000): Verification of the Norwegian emission inventory. Comparing emission intensity values with similar countries. (Sigurd Holtskog, Gisle Haakonsen, Eli Kvingedal, Kristin Rypdal and Bente Tornsjø) Reports 1736. Norwegian pollution control authority.

SSB (2000): The Norwegian emission inventory. Documentation of methodology and data for estimating emissions of greenhouse gases and long-range transboundary air pollution. (Ketil Flugsrud, Eilev Gjerald, Gisle Haakonsen, Sigurd Holtskog, Henning Høie, Kristin Rypdal, Bente Tornsjø and Fredrik Weidemann).

PAPER NO. 7: UNITED STATES OF AMERICA

U.S. VIEWS ON ITS EXPERIENCE USING THE IPCC "GOOD PRACTICE GUIDANCE AND UNCERTAINTY MANAGEMENT IN NATIONAL GREENHOUSE GAS INVENTORIES"

The United States is pleased to provide comments on the first year of experience in applying IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories. Good practice guidance is an invaluable tool for raising the overall quality of Parties' greenhouse gas inventories through the minimization of uncertainty, and the development of inventories that are transparent, complete, comparable and accurate.

Good Practice Guidance was used extensively in the development of our April 15, 2001 inventory submission to the UNFCCC, including the application of rigorous methods for all key sources (and many other sources); QA/QC (Quality Assurance/Quality Control) procedures, including peer and public review; and transparency in reporting through documentation of methods, activity data and emission factors. The April 15, 2003 U.S. inventory submissions will fully reflect IPCC Good Practice Guidance, consistent with the schedule for Annex I Parties.

The additional effort needed to implement good practice in the United States is modest because our inventory already reflected much of the substance of good practice. However, there have been recent improvements that were the direct result of the guidance provided by IPCC, such as a QA/QC planning document to formalize and improve upon our existing process of internal QC, external peer review and public review. In addition, the source-specific guidance for emissions from industrial wastewater, livestock, aluminum production, and semiconductor manufacturing have helped the United States prepare more accurate estimates.

In the area of uncertainty assessment, the U.S. plans to prepare quantitative uncertainty estimates for all source categories. Like most Annex I Parties, the U.S. has had less experience with Tier 2 uncertainty assessment methodology than with the incremental methodological improvements to individual source categories. Even with improved methodological guidance, however, calculation of uncertainty will remain highly dependent on expert judgment for the foreseeable future. Full implementation of the optional, higher-tier methods to quantify uncertainty is, therefore, a lower priority for the United States than the improvements to individual source categories and the formalization of our QA/QC system.

Good practice has been very useful as a benchmark in the UNFCCC review process. It allows reviewers and the host country to focus on the most important aspects of the inventory, and provides a clear methodology for prioritizing inventory improvements. The U.S. also believes that it is essential to assist Parties with economies in transition to implement good practice. Currently, we are partnering with inventory experts in the Russian Federation and Ukraine on technical projects aimed at improving their national inventories. Translation of good practice into Russian and other official UN languages should be a high priority, as is inventory capacity building for developing countries.

There are two specific areas in which good practice guidance could be improved. First, it can be difficult for inventory experts to cross-reference the emission factors provided in the Revised 1996 IPCC Guidelines with the emission factors in IPCC Good Practice. We encourage the IPCC to address this problem in its project to build an emission factor database. Similarly, there should be a mechanism for updating emission factors to reflect changes in the state of knowledge, either through the IPCC emission factor database, or through a revision of the IPCC Guidelines.

Finally, we note that the IPCC recently held a planning meeting to begin preparation of good practice guidance for the LUCF chapter of the 1996 Revised Guidelines. The US strongly supports the IPCC's efforts to improve the existing guidelines and believes that timely completion of this work will further assist Parties in preparing high quality inventories of greenhouse gas emission sources and sinks.

- - - - -