



APAT
Agency for Environmental Protection and Technical
Services

Quality Assurance/Quality Control Plan for the Italian Emission Inventory

Year 2007

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QA/QC General
2007 activities and future improvements

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June, 2007

National Air Emission Inventory: General overview

I. Objective

This document summarizes the specific Quality Assurance (QA) Quality Control (QC) activities and different verification procedures which are applied thoroughly the current inventory compilation as part of the estimation process.

In addition, to a description of the current activities applied and of the documentation, archiving and reporting process, a specific section illustrates the main findings and recommendations of the latest review process together with the response and actions undertaken by the inventory team.

Further improvements and planned QA activities identified during the preparation of the National Inventory and National Inventory Report 2007 are also presented.

A summary of previous QA/QC procedures which helps understand the improvement of the inventory over the years concludes the general part of the report.

Sector specific QA/QC and verification documentation are explained in the relevant chapters.

II. QA/QC activities and verification

Quality control checks and quality assurance procedures together with some verification activities are applied both to the national inventory as a whole and at sectoral level.

The QA/QC procedures are those described in the manual 'Quality Assurance/Quality Control plan for the Italian Emission Inventory. Procedures Manual' (APAT, 2006). Verification activities are also part of the overall QA/QC program. These activities have the ultimate objective of increasing the confidence and reliability of the inventory estimates.

Feedbacks for the Italian inventory derive from communication of data to different institutions and/or at local level. For instance, the communication of the inventory to the European Community result in a pre-check of the GHG values before the submission to the UNFCCC and relevant inconsistencies may be highlighted.

Results and suggestions from expert peer reviews of the national inventory within the UNFCCC process can provide valuable feedback on areas where the inventories can be improved.

Even though an official independent and public reviews of the Italian inventory prior to its submission are not implemented yet, emission figures are subject to

a process of re-examination once the inventory, the inventory related publications and the national inventory reports are posted on the website, specifically www.apat.gov.it, and from the communication of data to different institutions and/or at local level.

The inventory is presented to a Technical Committee on Emissions (CTE), coordinated by the Ministry for the Environment, Land and Sea, where all the relevant Ministries and local authorities are represented; in this task emission figures and results are discussed.

Expert peer reviews of the national inventory also occur annually within the UNFCCC process, whose results and suggestions can provide valuable feedback on areas where the inventory should be improved. Specifically, the Italian GHG inventory was subjected to an in-country review by the UNFCCC Secretariat in September 2005, which results and recommendations are available at <http://unfccc.int/resource/docs/2005/arr/ita.pdf> (UNFCCC, 2005) and to an in-country review in June 2007 which will be concluded by the end of 2007.

The responses and actions to the review process for the general issues are described in details in section IV.

The only official review, apart from those from the UNFCCC, was performed by Ecofys, in 2000, in order to verify of the effectiveness of policies and measures undertaken by Italy to reduce greenhouse gas emissions to the levels established by the Kyoto Protocol. In this framework an independent review and checks on emission levels were carried out as well as controls on the transparency and consistency of methodological approaches (Ecofys, 2001).

The preparation of environmental reports where data are needed at different aggregation levels or refer to different contexts, such as environmental and economic accountings, is also a check for emission trends. At national level, for instance, emission time series are reported in the Environmental Data Yearbook published by the Agency. Emission data are also published by the Ministry for the Environment, Land and Sea in the Reports on the State of the Environment and the National Communications as well as in the Demonstrable Progress report. Moreover, figures are communicated to the National Institute of Statistics to be published in the relevant Environmental Statistics Yearbooks as well as used in the framework of the EUROSTAT NAMEA Project.

At European level, APAT also reports on indicators meeting the requirements of Article 3 (1)(j) of Decision N° 280/2004/EC. In particular, Member States shall submit figures on specified priority indicators and should submit information on additional priority and supplementary indicators for the period 1990 to the last submitted year and forecasts for some specified years. The national trends of these indicators are explained in the report 'Carbon Dioxide Intensity Indicators' (APAT, 2007).

Comparisons between national activity data and data from international databases are usually carried out in order to find out the main differences and

an explanation to them. Emission intensity indicators among countries (e.g. emissions per capita, industrial emissions per unit of added value, transport emissions per car, emissions from power generation per kWh of electricity produced, emissions from dairy ruminants per tonne of milk produced) can also be useful to provide a preliminary check and verification of the order of magnitude of the emissions. This is carried out at European and international level by considering the annual reports compiled by the EC and the UNFCCC as well as related documentation available from international databases and outcome of relevant workshops.

Additional comparisons between emission estimates from industrial sectors and those published by the industry itself in the Environmental reports are carried out annually in order to assess the quality and the uncertainty of the estimates.

The quality of the inventory has also improved by the organization and participation in sector specific workshops. Follow-up processes are also set up in the framework of the WGI under the EC Monitoring Mechanism, which address to the improvement of different inventory sectors. Specifically last year, two workshops were held, one related to the management of uncertainty in national inventories and problems on the application of higher methodologies to calculate uncertainty figures, the other on how to use data from the European emissions trading scheme in the national greenhouse gas inventories. Previous workshops addressed methodologies to estimate emissions from the agriculture and LULUCF sectors, involving the Joint Research Centre, from the waste sector, involving the European Topic Center on Resource and Waste Management, as well as from international bunkers, involving the International Energy Agency and EUROCONTROL. Presentations and documentation of the workshops are available on website at the address: http://air-climate.eionet.europa.eu/meetings/past_html.

A national conference on the Italian emission inventory was organized by APAT in October 2006. Methodologies used to carry out national figures and results of time series from 1990 to 2004 were presented detailing explanations for each sector. More than one hundred participants from national and local authorities, Ministries, Industry, Universities and Research organizations attended the two days meeting.

Other general improvements regarded the development of a National Inventory System and in general the implementation of QA/QC activities.

A specific procedure undertaken for improving the inventory regards the establishment of national expert panels (specifically, in road transport, land use change and forestry and energy sectors) which involve, on a voluntary basis, different institutions, local agencies and industrial associations cooperating for improving activity data and emission factors accuracy.

In addition to these expert panels, APAT participates in technical working groups within the National Statistical System (Sistan). These groups, named *Circoli di qualità*, coordinated by the National Institute of Statistics, are

constituted by both producers and users of statistical information with the aim of improving and monitoring statistical information in specific sectors such as transport, industry, agriculture, forest and fishing. These activities should improve the quality and details of basic data, as well as enable a more organized and timely communication.

QC procedures are also undertaken on the calculations of uncertainties in order to confirm the correctness of the estimates and that there is sufficient documentation to duplicate the analysis. Figures used to draw up uncertainty analysis are checked with the relevant analyst experts and literature references and they are proved to be consistent with the IPCC Good Practice Guidance (IPCC, 2000).

The assumptions on which uncertainty estimations are based are documented for each category. Figures to draw up uncertainty analysis have been checked with the relevant analyst experts and literature references and it has been verified that they are consistent with the IPCC Good Practice Guidance.

Quantitative estimates of the uncertainties for the Italian GHG inventory are calculated using a Tier 1 approach as defined in the IPCC Good Practice Guidance (IPCC, 2000), which provides a calculation based on the error propagation equations. In addition, a Tier 2 approach, corresponding to the application of Monte Carlo analysis, has been applied to specific categories of the inventory but the results show that, with the information available at present, applying methods higher than the Tier 1 does not make a significant difference in figures. The results of the study, 'Evaluating uncertainty in the Italian GHG inventory', were presented at a EU workshop on Uncertainties in Greenhouse Gas Inventories, held in Finland in September 2005, and they are also available on website at the address: http://air-climate.eionet.europa.eu/docs/meetings/050905_EU_GHG_Uncert_WS/meeting050905.html.

A further research on uncertainty, specifically on the comparison of different methodologies to evaluate emissions uncertainty, was also carried out (Romano et al., 2004).

Other specific activities relating to improvements of the inventory and QA/QC carried out in the last year were:

- *Energy – Industrial processes.* An overall revision has concerned the iron and steel emissions coming both from the combustion itself and the production process. A full carbon balance has been calculated and CO₂ emissions have been properly allocated between the relevant subsectors.
- *Waste.* A revision of emissions from solid waste disposal on land, specifically of the methodology to estimate the methane generation potential, has been carried out to fully implement the IPCC Good Practice and overcoming the underestimation of CH₄ emissions.

- *Agriculture*. CH₄ and N₂O emissions have been revised taking into consideration the results from the MeditAIRaneo project.
- *Solvent and Other Product Use*. Emissions were revised on account of new information available from the Italian manufacturers and the Italian Association of Aerosol Producers as well as other relevant associations.
- *Emissions Trading Scheme*. The analysis of sectoral industrial data from the Italian Emission Trading Scheme database has been used to develop country-specific emission factors and check activity data levels.
- *European Pollutant Emission Register*. Data from the Italian pollutant emission register from some industrial sectors were used as a check and comparison with the estimates carried out at national level. This specifically regards the production of non-ferrous metals, chemical productions such as nitric and sulphuric acid, and the production of iron and steel.

III. Documentation, archiving and reporting

All the material and documents used for the inventory preparation are stored at the Agency for Environmental Protection and Technical Services.

All information relating to the planning, preparation, and management of inventory activities are documented and archived. The archive is organised so that any skilled analyst could obtain relevant data sources and spreadsheets, reproduce the inventory and review all decisions about assumptions and methodologies undertaken. A master documentation catalogue is generated for each inventory year and it is possible to track changes in data and methodologies over time. Specifically, the documentation includes:

- electronic copies of each of the draft and final inventory report, electronic copies of the draft and final CRF tables;
- electronic copies of all the final, linked source category spreadsheets for the inventory estimates (including all spreadsheets that feed the emission spreadsheets), as well as any important printouts;
- results of the reviews and, in general, all documentation related to the corresponding inventory year submission.

After each reporting cycle, all database files, spreadsheets and electronic documents are archived as 'read-only' mode.

A 'reference' database is also compiled every year to increase the transparency of the inventory. This database consists of a number of records that references all documentation used during the inventory compilation, for each sector and submission year, the link to electronically available documents and the place where they are stored as well as internal documentation on QA/QC procedures.

IV. Review process recommendations

In the following table, the list of recommendations from the latest review process related to cross-cutting and general issues which should be considered for the 2007 submission is presented; responses to each subject are also included.

Par.	Subject	Description	Response
15	Completeness	The following emissions have not been estimated due to lack of information, as reported in CRF table 9 (the completeness table): in the Energy sector, Manufacturing Industries and Construction, emissions from biomass burnt in Pulp, Paper and Print Industry; in the Industrial Processes sector, potential emissions of HFCs; and in the Solvent and Other Product Use sector, N ₂ O from other use.	Concerning biomass burnt in Pulp and paper sector, more investigation is planned for future submissions. Potential HFCs emissions have been estimated in the 2007 submission. There should be no other uses of N ₂ O as solvent.
18c	Transparency	The NIR provides information on uncertainties and time-series consistency, QA/QC and verification, source-specific recalculations and planned improvements, in line with the recommended "Structure of the NIR" of the revised UNFCCC reporting guidelines, for all sectors except Energy and to a lesser extent LULUCF (although there is information to be reported on these two)	The energy chapter is planned to be completely revised in future submissions.
20-35c	Recalculation	Even though noticeable improvements have been made in reporting recalculations compared with the previous submission, not all of them are described in the NIR or reported in CRF table 8(b)	In the 2007 submission, with the use of CRF Reporter, a complete list of recalculations has been supplied.
21-22-35d	Uncertainties	The assumptions and reasoning behind the values are not provided, nor are the expert judgements used for establishing them documented.	The sources of uncertainties of emission factors are in general derived from the IPCC guidelines, sometimes supported by national measurements. Activity data uncertainties are estimated on the basis of the documentation that supports the published data. All the references are reported in an excel file.
33a	National System	The establishment of a National Inventory System by December 2005 that includes the official designation of a single national entity for the overall responsibility of the inventory	APAT has been officially designed by the Ministry as responsible for the national emission inventory. Specifically referring to the GHG inventory and to the National System a law proposal has been prepared which is following the procedural way.
35b	Transparency	(iv) Including sections in the NIR for uncertainties and time-series consistency, QA/QC and verification, source-specific recalculations and planned improvements for each key category of the Energy sector, where applicable, since this sector contributes 83.7 per cent of total national GHG emissions;	The Energy chapter is planned to be revised in future submissions.
37	Archiving	(b) Develop a master document (based on the group of electronic and printed files called "documentation catalogue") that includes the QA/QC procedures, procedures for record keeping and for archiving all the different kinds of inventory-related documents, and indications of where the documentation can be found (Excel files with references, different folders in the server, etc).	A master catalogue and a reference database has been produced which include all the information needed to retrieve basic files and documentation

In addition, in June 2007, Italy was subject to the in-country review of the Initial report under the Kyoto Protocol and 2006 Inventory. Following the recommendations of the review team the 2006 and 2007 submissions were revised and communicated again. These revisions affected CH₄ and N₂O emissions from Stationary combustion in the energy sector and N₂O emissions from human sewage in the waste sector.

V. Planned improvements and QA activities

Improvements planned for 2007 especially regard the activities and results of the panels within the National Statistical System (SISTAN); in particular, information on the penetration of technologies in the agriculture and waste management sector will be used to update the last year emission data.

Comparisons between regional and local inventories and the results, at the same spatial levels, derived by a top-down disaggregation of the national inventory were performed in 2006. The study enhances areas where improvements still need to increase the comparability of figures. In 2007, the inventory comparisons with the local authorities will continue with a focus on actual emissions and future scenarios, including the evaluation of the adoption of local and national policies and measures. Furthermore, with the aim to share methodologies and improve the knowledge at national and local level, expert panels on waste and agriculture for GHG inventories are planned to be developed in addition to those already in place for road transport, energy and LULUCF sectors.

The top-down disaggregation of the national inventory, for the year 2005, to different spatial levels is in progress.

For the LULUCF sector, following the election of the 3.3 and 3.4 activities and on account of an in-depth analysis on the information needed to report LULUCF under the Kyoto Protocol, the relevant national experts have been consulted in different meetings and an expert panel, *Comitato di Consultazione Scientifica del Registro dei Serbatoi di Carbonio Forestali*, has been established in cooperation with the Ministry of Environment and with the Ministry of Agriculture and Forestry. In 2007 a national meeting regarding the forest statistics and the national forest inventory organised by the National Institute of Statistics (ISTAT) jointly with APAT and the Forest National Corp (CFS) was held. The 2005 National Forest Inventory was presented and the main results were released. These data will be used in the 2008 submission both for the Convention and for the Kyoto Protocol.

In the framework of the preparation of the fourth national communication on climate change and the demonstrable progress report, and in particular with the aim to develop scenarios consistent with emission estimates, many industrial associations have been consulted and relevant information has been collected and past and present emissions have been checked.

The databases of industrial emissions and basic information from the European Directives on the Emission trading scheme, Large Combustion Plant and EPER Registry, are planned to be examined jointly and compared in order to check all the relevant information included.

Further improvements will concern the collection of statistical data and information to estimate uncertainty where available.

VI. Major QA/QC activities over the past years

- *Energy Balance Verification.* A task force made up of energy and inventory experts (Ministry of Production Activities, ENEA and APAT) established to examine differences in basic data between the CRF and the joint EUROSTAT/IEA/UNECE questionnaire submissions and to improve the details of the National Energy Balance finalised its study and reported the results in the document “Energy data harmonization for CO₂ emission calculations: the Italian case” (ENEA/MAP/APAT, 2004).
- *Carbon Emission Factors Review.* A sampling and measurement campaign was carried out jointly with the Stazione Sperimentale Combustibili in order to check the CO₂ emission factors used for emission estimation in the energy sector, specifically the road transport and residential and commercial sector. Representative samples of Italian fuels, specifically gasoline, diesel oil and LPG, were collected and analysed from September 2000 - August 2001. Measurements were compared with default CO₂ emission factors proposed by the IPCC in the 1996 Revised Guidelines and those proposed by the EEA and used in COPERT III methodology. Values of national emission factors resulted higher than the default ones for gasoline and LPG, while those of diesel were lower. Emission factors have been substituted for the years 2000 onwards. The study and the results are described in detail in the APAT report (Contaldi, Ilacqua, 2003).
- *Road Transport Emissions Review.* The Italian Expert Panel on Transport, which comprises experts from Research Institutes, Universities, Industrial Associations, Local Authorities, Ministries and Public Authorities, continues its work on the improvement and assessment of emission estimations from road transport. There has been a considerable improvement on the details of basic data to be used within the COPERT model, both in terms of availability and timeliness. Studies of the expert panel group as well as presentations held in different meetings can be found on the website www.inventaria.sinanet.apat.it/ept.
- *F-gases Review.* A review with industrial associations and the electrical company ENEL was undertaken in order to improve the quality of estimates by implementing the use of the Tier2 methodology. SF₆ estimates improved with the cooperation of the national electrical company ENEL and the main electrical associations. Specifically, for PFC emissions from aluminium production, the estimates were carried out jointly with the only national

producer. The Tier 1 method was applied for the time series from 1990-1999, whereas from 2000, the Tier 2 method has been followed using national site specific values. A revision has also concerned HFC emissions on account of major information on the leakages made available by the European Association of Responsible Use of HFCs in Fire Fighting.

- *MeditAIRaneo Project*. A three years project involving the Inventory Reference Centres of the European Mediterranean Countries (Italy, Spain, France, Greece, Portugal) started at the end of the year 2000. The aim was to examine in details emissions that are specific and/or typical of the Mediterranean Countries. Four different studies on air emissions from vegetation, agriculture, solvent use and urban road transport in Mediterranean areas were funded by APAT. Common objectives are analysis of methodologies and emission factors used by Mediterranean countries for estimating emissions, individuation of Mediterranean peculiarities, in comparison with other European countries, such as climate, technologies, industrial management, identification of methodological points which need in-depth examination and uncertainty assessment. An Italian case study has been developed for each of the four projects. By 2006, all the projects are concluded and the results have been used in the national inventory to improve country-specific emission factors.
- *Emissions Trading Scheme*. The analysis of sectoral industrial data from the Italian Emission Trading Scheme database has been used to develop country-specific emission factors and check activity data levels.
- *European Pollutant Emission Register (EPER)*. Data from the Italian Pollutant Emission Register from some industrial sectors are used as a check and comparison with the estimates carried out at national level. In particular, this regards the production of non-ferrous metals, chemical productions, and the production of iron and steel.
- *Local inventories*. A study on the top-down approach to the preparation of local inventories was conducted and Italian emissions for different local areas were derived for the years 1990, 1995 and 2000. The results were checked out by regional and local environmental agencies and authorities in order to find out the main weak points and contribute with information available to characterise the local environment, this contributing as well as a feedback to the improvement of the national inventory. A workshop was also held in 2004 involving local inventory experts with the aim to share experiences and compare national and local estimates and methodologies to carry out emission figures. Final estimates and the detailed methodologies followed for each SNAP sector to carry out emission figures are published in a technical report (Liburdi et al., 2004).

QA/QC Energy
2007 activities and future improvements

Prepared by: Riccardo De Lauretis

June, 2007

National Air Emission Inventory: Energy

VII. Objective

The improvements carried out during the preparation of the 2007 national inventory submission for the energy sector and those expected for the next future are summarised in the following.

VIII. Review process recommendations

In the following table, the list of recommendations from the latest review process related to the energy sector which should be considered for the 2007 submission is presented; responses to each subject are also included.

Further improvements and planned QA activities identified during the preparation of the National Inventory and National Inventory Report 2007 are also presented

Par.	Subject	Description	Response
42	Completeness	All relevant CRF tables (1990–2003) are complete, apart from the description of recalculations in CRF table 8(b). The ERT recommends the Party to complete these tables for its next inventory submission.	In the 2007 submission we reported any changes in AD, EFs and emission estimates of the sector.
44	Transparency	There is no information in the NIR regarding the relationship between the Energy sector and the Industrial Processes and Waste sectors. The Party provided data during the review for waste incineration facilities which produce electricity or heat, which were included in category 1.A.4 Other sectors. The ERT recommends that more documentation be provided in the Energy chapter of the NIR and in the documentation box in table 1A(a) to improve transparency.	The energy chapter of the NIR will be revised in the next submissions, in agreement with the UNFCCC reporting guidelines.
45	Recalculation and time series consistency	The Party indicated during the review that the recalculations were made mainly due to: the revision of preliminary figures in the national energy data; the reallocation of subcategories of Manufacturing Industries and Construction; the transformation of some industrial producers into independent producers; and the updating of energy consumption figures for the Transport subsector. This information is not reported in the CRF tables or the NIR. The recalculations demonstrate Italy's determination to continuously improve its GHG inventory by updating relevant information and eliminating identified errors, but the corrections should be documented in the CRF and NIR.	See the comment above (paragraph 42)
54	Mobile Combustion – Road Vehicles: liquid – CO ₂	Emissions of CO ₂ from Road Transportation are calculated using the COPERT III methodology. Total emission estimates are calculated using a combination of validated technical data (e.g. EFs) and AD provided by various sources (e.g. fleet composition by vehicle category, total mileage by vehicle category, average speed and mileage per driving mode share, and monthly average	Detailed documentation regarding national road transport emission estimates is available on the national expert transport group web site: www.inventaria.sinanet.apat.it/ept . An improvement in estimation of road transport emissions will draw from the use of the new COPERT version COPERT4. Italy will use COPERT4 for the

		temperature). Total consumption of each fuel is estimated on the basis of the input data and parameters. A balance between this amount and the related national statistics is performed to refine the input figures. A description in the NIR of how this is conducted would improve transparency.	2008 submission. Due to the update of the formulas to estimate emissions, differences in CH ₄ and N ₂ O emissions are expected for the whole time series including the base year (1990).
62	Mobile Combustion – Road Vehicle: natural gas – N ₂ O	The N ₂ O EFs for natural gas are calculated starting from the N ₂ O EFs for liquefied petroleum gas (LPG) and their variation depends on the vehicle fleet distribution (conventional in proportion to catalysed). During the review the Party responded that the IEF could be an outlier because in Italy natural gas is largely used for passenger cars, whereas in other countries it is used for buses. The ERT suggests that the Party look into this issue further.	No specific measurements are available regarding N ₂ O emissions from natural gas vehicles. Also in COPERT4 no additional information will be supplied. The average IEF is driven by the consumption of natural gas from passenger cars with catalyst device. On the basis of actual knowledge, N ₂ O emissions increase with the introduction of this abatement technology. In the framework of the European transport expert panel this problem will be examined.

In addition, following the recommendations of the in-country review of the Initial report under the Kyoto Protocol and 2006 Inventory which was held in June, CH₄ and N₂O emission factors from Stationary combustion in the energy sector were revised for the complete time series.

IX. Planned improvements and QA activities

The revision of the Energy chapter of the NIR is planned for the next submissions to increase the transparency.

Regarding the road transport estimates, COPERT4 will be used after verifying that the emission time series is consistent with the assigned amount reported in 2006 by Italy.

Fugitive emissions from oil and gas production need to be further verified with the operators for the last years.

QA/QC Industrial Processes 2007 activities and future improvements

Prepared by: Barbara Gonella, Riccardo De Lauretis

May, 2007

National Air Emission Inventory: Industrial Processes

X. Objective

The improvements carried out during the preparation of the 2007 national inventory submission for the industrial processes sector and those expected for the next future are summarised in the following.

XI. Review process recommendations

In the following table, the list of recommendations from the latest review process related to the industrial processes sector which should be considered for the 2007 submission is presented; responses to each subject are also included.

Further improvements and planned QA activities identified during the preparation of the National Inventory and National Inventory Report 2007 are also presented.

Par.	Subject	Description	Response
68	Completeness	One missing source is potential PFC emissions	Potential PFC emissions were included in the 2007 submission.

Other improvements not identified during the review process have been carried out. In particular, the time series of HFCs consumption has been revised on the basis of information collected from industry during the preparation of emission scenarios and the demonstrable progress report.

Many QA/QC activities adopted in the preparatory period of the 2007 National Inventory submission have been led to various improvements regarding fluorinated gases estimation.

During 2006, in order to update the government's strategy to achieve Italy's emissions reduction target under the Kyoto Protocol, the GHG emission projections up to 2010 and 2020 have been implemented.

This activity has involved all relevant industries, which produce or use fluorinated gases, to supply projections for the future; in some cases the industries have also revised data provided for previous National Inventory submissions. In particular, Solvay Solexis, which is the only national producer and provides trends about the consumption of HFCs per gas and per final use, has revised data from 1996 to 2005 for some substances. Detailed explanation, together with recalculation, is reported in the NIR.

In October 2006, the internal review of the EU-15 GHG inventory, which is an important element of the EC QA/QC activities, and for Member States as well, outlined in the QA/QC programme for the inventory of the European Community, regarded specific activities, included sectors 2C, 2E and 2F. The review process has identified, once again, that Italy does not estimate PFCs

potential emissions and made a recommendation for future submissions. As it well known, potential emissions are calculated as 'Production + Imports - Exports - Destruction'. Thus, the national producer Solvey Solexis has been contacted in order to investigate available data on production, import and export. Data on destruction are not available, but, as mentioned in the IPCC Guidelines, destruction of HFCs and PFCs may be technically difficult and thus not so practised. Regarding PFCs production, Solvay Solexis has confirmed that no production occurs in Italy. As a consequence, this issue has been carried out for the 2007 National Inventory submission: we would think that exports are negligible, whereas imports are equal to the amount treated by semiconductor manufactures that use these substances. However, verification on import and export in national territory is planned for future submissions.

Moreover, internal checks have identified a discrepancy between the time series of primary aluminium production. In this framework, primary aluminium production supplied by national statistics and the only national producer ALCOA in addition with data reported in a site-specific study have been checked, in order to avoid the using of different time series, since data reported in national statistics are supplied by ALCOA too, but in some cases they are slightly different. References are reported in the NIR.

Furthermore in the framework of the disaggregation of national emissions at provincial level planned in 2007 with reference to the 2005 emissions, production data have been collected at a detailed level from the industrial category association and checked with the official statistics supplied by ISTAT.

XII. Planned improvements and QA activities

Planned improvements mainly focus on the improvement of EFs and AD by means of a detailed sectoral analysis of the national EPER and Emissions Trading data for all the industrial sectors. We plan to integrate the documentation collected in the framework of the different European Directives (EPER, Large Combustion plants and the Emission Trading scheme) so that to verify emissions and activity data reported under different reporting obligations for the same year and identify possible improvements in emission estimations.

For what concern the QA activities of the sector, emission estimates and methodologies have been presented in a detailed way to the Italian stakeholders, in a workshop dedicated to the Italian emission inventory, held in October 2006.

The implementation of verification activities especially regarding F-gases emissions are planned for future submissions. Future improvements on fluorinated gases sector will be derived from collaboration with the National Institute of Statistics in the framework of the EUROSTAT NAMEA Project.

In particular, further investigation on fire extinguishers is planned as well the presence of other companies involved in the import/export of fluorinated gases.

QA/QC Solvent and other product use 2007 activities and future improvements

Prepared by: Eleonora Di Cristofaro, Riccardo De Lauretis

May, 2007

National Air Emission Inventory: Solvent and other product use

XIII. Objective

The improvements carried out during the preparation of the 2007 national inventory submission for the solvent sector and those expected for the next future are summarised in the following.

XIV. Improvements

In the following table, the specific improvements and remarks to be taken into account in the future submissions of the national air inventory for the solvent and other product use sector are reported. The improvements carried out during the 2007 submission regarded some update in activity data for the last years. Planned improvements are also reported.

In the second table, emission sources of the sector are listed and information is supplied regarding the need of future improvements.

	Sub-category	NMVOEmission	Activity data	Emission factor
<i>Paint application</i>	Construction and buildings	11%		Check the constant trend of EF in accordance with the European Directive Decopaint
	Domestic use	9%	Update time series	
	Coil coating	0%	Update time series	
	Boat building	1%	Updating time series	
	Other industrial	10%	Update time series	
	Updating of the time series of apparent consumptions of paints. Probably ISTAT ¹ could supply the information, which is required for the most recent years.			
Check the reduction of EF introduced for the activities of metal painting (car repairing, boat building, other industrial paint application), based on hypothesis of substitution of solvent paints with water paints and powders, on the basis of information reported in the publication "Emissioni di composti organici volatili: proiezioni dal 1990 al 2010" (ENEA ² , 1997) or supplied by industry.				
<i>Degreasing, dry cleaning and electronics</i>	Metal degreasing	4%	Update information, received from Federchimica ³ , on activity data and emission factor (these values have been found in literature, but should be reconsidered for new plants).	

¹ National Statistics Institute

² Government agency research

³ National chemical industrial association

Future improvements	Cumulative percentage	NMVOC emissions	Sub-categories	Categories
NO	28%	28%	Domestic solvent use	Other use of solvents and related activities
NO	39%	11%	Paint application : wood	Paint application
YES	49%	11%	Paint application : construction and buildings	Paint application
YES	59%	10%	Other industrial paint application	Paint application
YES	68%	9%	Paint application : domestic use	Paint application
NO	73%	5%	Application of glues and adhesives	Other use of solvents and related activities
NO	77%	4%	Printing industry	Other use of solvents and related activities
NO	81%	4%	Leather tanning	Chemical products manufacturing or processing
YES	84%	4%	Metal degreasing	Degreasing, dry cleaning and electronics
NO	88%	3%	Paint application : car repairing	Paint application
YES	91%	3%	Paints manufacturing	Chemical products manufacturing or processing
NO	92%	2%	Paint application : manufacture of automobiles	Paint application
NO	94%	1%	Fat, edible and non edible oil extraction	Other use of solvents and related activities
NO	95%	1%	Pharmaceutical products manufacturing	Chemical products manufacturing or processing
NO		1%	Rubber processing	Chemical products manufacturing or processing
YES		1%	Paint application : boat building	Paint application
NO		1%	Inks manufacturing	Chemical products manufacturing or processing
NO		1%	Dry cleaning	Degreasing, dry cleaning and electronics
NO		1%	Vehicles dewaxing	Other use of solvents and related activities
NO		0%	Polyurethane processing	Chemical products manufacturing or processing
NO		0%	Glues manufacturing	Chemical products manufacturing or processing
NO		0%	Textile finishing	Chemical products manufacturing or processing
NO		0%	Polystyrene foam processing	Chemical products manufacturing or processing
YES		0%	Paint application : coil coating	Paint application
NO		0%	Glass wool induction	Other use of solvents and related activities
NO		0%	Polyester processing	Chemical products manufacturing or processing

**QA/QC Agriculture
2007 activities and future improvements**

Prepared by: Rocío D. Córdor

May, 2007

National Air Emission Inventory: Agriculture

XV. Objective

This report describes all activities developed during the preparation of the 2007 national inventory submission for the agriculture sector. Future improvements are also described.

XVI. Improvements in 2007 submission and future improvements

In the following table a list with a description of the different activities developed in the last years is presented, future improvements are also described.

Category	Sub-category	Parameter	Gas	Years			Activities
				2006	2007	2008	
General	Activity data	Population	NH ₃ /GHG		✓		Data from 2005 has been updated according to ISTAT publications
	Activity data	Surface/production	NH ₃ /GHG		✓		According to last update from ISTAT, we have updated activity data from 2000-2004
	Activity data	Milk production	NH ₃ /GHG		✓		Milk production data has been updated for 2005
	Activity data	Fertilizer	NH ₃ /GHG		✓		Update data for 2005 and verification for previous years
Enteric fermentation	Dairy cattle	Fat content	GHG		✓		Update of the parameter (ISTAT, 2007[b])
	Dairy cattle	Portion cow giving birth	GHG		✓		Update of the parameter obtained from AIA (2005)
	Dairy cattle/buffalo	Milk production	GHG		✓		Update of the parameter (ISTAT, 2007[b])
Livestock manure management	Livestock categories	Type of housing	NH ₃ /GHG			✓	A query on the type of housing of different livestock categories has been introduced in the Farm and structure survey 2005. Results are expected to be incorporated in submission 2008.
	Livestock categories	Slurry and solid manure storage facilities	NH ₃ /GHG			✓	We expect to get more detailed data from the Farm and Structure Survey 2007, where a query related to storage facilities for slurry and solid manure have been incorporated.
	Livestock categories	Type of housing (2)	NH ₃			✓	We expect to verify information obtain from the APAT/MINAMBIENTE convention related to ammonia reduction (CRPA, 2006[b])
	Livestock categories	Biogas	GHG	✓	✓		In submission 2006, we have applied a reduction because of the recovery of biogas. Animal categories which are involved are swine and cattle. Update of biogas data coming from TERN A will be done every year.
	Livestock categories	Cattle	GHG	✓			In submission 2006, we have changed the distribution of solid and liquid manure according to the weight of animals, like this, GHG methodologies are consistent with the ammonia national inventory.
Rice cult	Activity data	Days of cultivation and cultivars	GHG		✓		Update of activity data according to ENR (2007)
	Activity data	Cultivated surface	GHG		✓		Update of activity data according to ENR (2007)
Agricultural soils	Direct emissions	Sewage sludge	GHG			✓	Appropriate activity data needs to be refined, till now emissions are estimated in the waste sector (Wastewater Handling - N ₂ O from human sewage).
	Activity data	Fertilizer	NH ₃ /GHG		✓		From 1998-2005 we have divided urea and other nitrogen fertilizers, as suggested by ENEA (2006).
	Activity data	Fertilizer	NH ₃ /GHG			✓	Verify outcomes from APAT/MINAMBIENTE project for the use of slow release fertilizers.
	Emission factor	Fertilizer	NH ₃ /GHG	✓			In submission 2006, we have updated the emission factor used for N-NO _x estimations, from 0.3% to 0.7%
Combustion	Activity data	% cereal crop residue burnt	GHG			✓	Probably ISTAT elaboration from "SPA 2003 or SPA 2005" can be useful for obtaining regional information on cereal crop residue burnt.

QA/QC LULUCF
2007 activities and future improvements

Prepared by: Marina Vitullo

May, 2007

National Air Emission Inventory: LULUCF

XVII. Objective

The report summarizes the improvements and remarks, which have been identified during the preparation of the 2007 inventory submission for the LULUCF sector.

XVIII. Improvements

In the following, specific improvements and remarks to be taken into account in the next submission of the national emission inventory for LULUCF sector are reported.

Forest land (5A)

In 2007 submission, preliminary results of the first inventory phase of the Second Italian National Forest Inventory, consisting in interpretation of orthophotos, were used as input data for the model, in carbon stocks. This source of information refers to the year 2002. The final results of the new forest inventory, available for the end of 2007, will allow a more precise evaluation of the estimated time series, in order to reduce the related uncertainty.

Data collection in the new national forest inventory should also allow an accurate analysis of aboveground - litter carbon amount relationship, in order to find the most appropriate mathematical representation. In the 2007 submission, the results of the European project CANIF (*CARbon and NITrogen cycling in Forest ecosystems*⁴), which has reported such relations for a number of European forest stands, have been used. The total litter carbon amount has been estimated from aboveground carbon amount with linear relations differentiated per forestry use: stands (*resinous, broadleaves, mixed stands*) and coppices.

A specific procedure undertaken for improving the inventory regards the establishment of national expert panels which involve, on a voluntary basis, different institutions, local agencies cooperating for improving activity data and emission factors accuracy.

An expert panel, named "*Comitato di Consultazione Scientifica del Registro dei Serbatoi di Carbonio Forestali*" has been constituted by the Ministry for the Environment, Territory and Sea, in order to plan and manage activities related to the Kyoto Protocol; the principal aim of the panel is the formalisation of Kyoto network, for the acquiring and the elaboration of data needed for the reporting activities.

An expert panel on forest fires has been set up, in order to obtain geographically reference data on burned area; the fraction of CO₂ emissions due

⁴ CANIF project: <http://medias.obs-mip.fr/ricamare/interface/projet/canif.html>

to forest fires, now included in the estimate of the forest land remaining forest land, will be pointed out in the next submission.

In addition to these expert panels, APAT participates in technical working groups, denominated *Circoli di qualità*, within the National Statistical System (Sistan). Concerning LULUCF sector, this group, coordinated by the National Institute of Statistics, is constituted by both producers and users of statistical information with the aim of improving and monitoring statistical information for forest sector. These activities should improve the quality and details of basic data, as well as enable a more organized and timely communication.

In the next submissions an upgrade of the used model is foreseen to achieve the abovementioned improvements and to obtain more accurate estimates of the carbon stored in the dead wood, litter and soil pools, using the outcomes of the national forestry inventory.

Cropland (5B)

In the next submission estimates of carbon change in cropland biomass will be provided at a higher disaggregate level, with the subdivision of the activity data in the main categories of woody cropland (orchards, citrus trees, vineyards, olive groves); in particular specific coefficients for aboveground woody biomass and harvest cycles in cropping system containing perennial species, representative of the Mediterranean area, will be looking for, with the purpose to use them in estimate improvements process.

The research project SOILSINK, financed by the Italian Ministry for University and Research, has the purpose of study the climate change impact on carbon stocks in the agro-forestry sector; hopefully this project will contribute to a better characterisation of agricultural soil, in terms of impact, on carbon stocks, of different management practices.

The research project AGRIT, carried out by the Italian Ministry of Agriculture (MIPAF), will be useful to supply data on land use change, with a special focus on *Cropland* transition. A study, with the participation of National Statistics Institute, and MIPAF members, has been undertaken to compare AGRIT outcomes with the future data of the new forest inventory, in order to supply ancillary information on confidence level of the AGRIT data and to provide an integrate estimate of crops and forestry area.

Concerning the areas in transition to *Cropland*, investigation will be done to obtain additional information about the final crop types, to obtain a more precise estimate of the carbon stocks change.

Grassland (5C)

Concerning land in transition to *Grassland*, further investigation will be made to obtain additional information about different types of management activities on *Grassland*, and the crop types of land converting to grassland, to obtain a more accurate estimate of the carbon stocks change.

Wetlands (5D)

The acquirement of data about flooded lands will allow, in next submission, to implement GPG method to estimate CO₂, CH₄ and N₂O emissions from flooded lands.

Settlements (5E)

In 2006 submission a *Settlements* time series has been developed from *Corine Land Cover*⁵ data; changes in living biomass soil carbon stocks from land converting to settlements have been estimated in the latest submission; studies will be done to obtain additional statistics about *Settlements* and urban trees formation, in order to provide carbon stocks estimates. Moreover improvements will concern acquirement of data adequate to estimate carbon stocks changes in dead organic matter for land converting to *Settlements*.

Biomass Burning (5(V))

The forest fires expert panel plan to obtain geographically reference data on burned area; the overlapping of land use map and georeferenced data should assure the estimates of burned areas in the different land uses. The fraction of CO₂ emissions due to forest fires, now included in the estimate of the forest land remaining forest land, will be pointed out in the next submission. Estimates on CO₂ release from *Grassland* fires will be also supplied.

⁵ Corine Land Cover Programme: <http://www.clc2000.sinanet.apat.it/cartanetclc2000/>

**QA/QC Waste
2007 activities and future improvements**

Prepared by: Barbara Gonella

May, 2007

National Air Emission Inventory: Waste

XIX. Objective

This report summarises the improvements, which have been identified during the preparation of the 2007 inventory submission for the waste sector.

XX. Improvements in 2007 submission

In this section different activities developed for 2007 submission are presented.

Solid waste disposal on land (6A)

During 2006, in order to update the government's strategy to achieve Italy's emissions reduction target under the Kyoto Protocol, the GHG emission projections to 2010 and 2020, specifically for waste management, have been implemented.

A complete scheme of waste management has been reconstructed on the basis of national regulations and policies planned for the future, for the waste sector as well as the energy sector. During this activity, which has involved the evaluation of all the regulations both already in force or to be entering in force, as well as updated scientific papers, slightly modifications have been carried out in the calculation model implemented to estimate methane emissions from managed landfills. These modifications have regarded the revision of the time series of sludge disposed of. Detailed explanation is reported in the NIR.

Waste incineration (6C)

A study on the top-down approach to the preparation of local inventories was conducted and Italian emissions for different local areas were derived for the years 1990, 1995 and 2000. The results were checked out by regional and local environmental agencies and authorities (the last comparison has been performed in 2006, and is being to presented in a workshop in a month) in order to find out the main weak points and contribute with information available to characterise the local environment, this contributing as well as a feedback to the improvement of the National Inventory. Moreover, in 2007, the top-down disaggregation of the National Inventory, for the year 2005, is in act. This activity, that has been carried out at the same time of the preparation of 2007 GHG inventory submission, has suggested some improvements in the waste incineration plants database. Detailed explanation is reported in the NIR.

XXI. Planned improvements and QA activities

With the aim to share methodologies and improve the knowledge at national and local level, expert panels on waste for GHG inventories is planned.

Solid waste disposal on land (6A)

Other improvements are expected due to the entering in force of the Landfill Directive 1999/31/EC. The application of the Directive could implement the availability of data regarding the main parameters influencing the estimation of emission from landfills:

- waste composition;
- fraction of methane in the landfill gas;
- amount of landfill gas collected and treated.

The Landfill Directive has been transposed in the national legislation by the Legislative Decree 13 January 2003, n° 36. From July 2005 all the landfills should be in compliance with the new legislation: thus, it is expected that every year, starting at least from July 2006, all the Regions will receive from each landfill the information reported above. These parameters could be available thanks to the Ministry for the Environment, Territory and Sea that has the authority to ask the Regions to provide this information.

These improvements will regard submissions not before 2009.

Wastewater handling (6B)

In the following, remarks on possible improvements in future submissions are reported.

CH₄ emissions from industrial wastewater are estimated from the organic content, once known the wastewater production for each industrial sector and the specific COD. It is assumed that 15% of industrial wastewaters are treated in anaerobic systems, as indicated in the IPCC guidelines, but there is no information on whether the wastewater plant is a:

- on site plant;
- off site plant (depuratori consortili);
- municipal wastewater plant.

In Italy many industries discharge in the same sewage collector as municipal wastewaters. Alternatively, some industries that are located in the same area can discharge in a dedicated plant, specific for industrial wastewaters (i.e. Cuoidepur).

In the first case, CH₄ emissions have been already estimated in Domestic and Commercial sector. For this reason a double counting could be expected.

Regarding off site plants (depuratori consortili), a survey is conducting by Federgasacqua: some information could be available on type of wastewaters treated, equivalent inhabitants and type of biological treatment (aerobic or anaerobic).

At this step, only industrial wastewaters that are treated directly in the industrial plant (on site) remain.

About the legislation, the reference is the Legislative Decree 11 may 1999, n° 152. A useful document is the Reporting by the European Commission on the application of the Directive 91/271/EC.

Waste incineration (6C)

As reported for solid waste disposal on land, the waste composition is very important to improve CO₂ emission factor on the basis of carbon content. As reported above, in order to update the government's strategy to achieve Italy's emissions reduction target under the Kyoto Protocol, the GHG emission projections to 2010 and 2020, specific to waste management, will be prepared. As a consequence, a focus on waste management and how this could influence the waste composition is expected. These improvements are linked with those regarding solid waste disposal on land.

Compost production (6D)

In 2006, the attendance to national Conferences and Workshop on waste sector has helped contacts with experts in composting plants: a comparison between data reported in the National GHG Inventory and data carried out by these experts is planned for the next submission, especially for CH₄ emission factor and the input percentage of waste treated as compost in mechanical-biological treatment plants.