ISPRA
Institute for Environmental Protection and Research

Quality Assurance/Quality Control Plan for the Italian Emission Inventory

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This publication refers to activities carried out prior to the unification of the three institutions and, therefore, individual reference is still made to them.

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Contents

QA/QC General
2008 activities and future improvements

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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 the documentation, archiving and reporting processes, 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 2009 are also presented.
A summary of previous QA/QC procedures which helped to 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 Inventory' (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.

An official independent review and public review of the Italian inventory are not implemented yet. Nevertheless, the process of review is carried out and has

feedbacks 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 every year 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. Emission figures and results are shared and discussed.

Expert peer reviews of the national inventory also occur annually within the UNFCCC process; results and suggestions can provide valuable feedback on areas where the inventory should be improved. Specifically, the Italian GHG inventory was subjected to in-country reviews by the UNFCC Secretariat in September 2005 and in June 2007; results and recommendations are available at http://unfccc.int/resource/docs/2005/arr/ita.pdf (UNFCCC, 2005) and at http://unfccc.int/resource/docs/2007/arr/ita.pdf (UNFCCC, 2007). In 2008, submissions 2007 and 2008 have been jointly reviewed and the results are available at http://unfccc.int/resource/docs/2009/arr/ita.pdf (UNFCCC, 2009).

The responses and actions to the review process are described in details in section IV.
The only official review, apart from reviews 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 verification for emission trends. At national level, for instance, emission time series are reported in the Environmental Data Yearbook published by the Institute. Emission data are also published by the Ministry of Environment in the Reports on the State of the Environment, 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 accounting.

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. In 2008, a workshop was held, on the implications of the implementation of the 2006 IPCC Guidelines for national GHG inventories. Previous workshops addressed: the use of European emissions trading scheme data in the national greenhouse gas inventories, management of uncertainty in national inventories, 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 the 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.
In 2007, in the framework of the National Conference on Climate Change, an event previous to the Conference presented the National GHG emission Inventory and specifically the time series of emission estimates from 1990 to 2005; besides a specific session of the Conference was dedicated to the National and local Inventories focusing on methodological issues and policies and measures to be adopted to reduce GHG emissions.

Other general improvements regarded the establishment 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 the sectors of road transport, land use change and forestry and energy) 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, ISPRA 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.
The assumptions, which uncertainty estimations are based, on are documented for each category. Figures 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).
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).

III. Documentation, archiving and reporting

All the material and documents used for the inventory preparation are stored at the Institute.
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);
- 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 excel files 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, as reported in the document FCCC/ARR/2008/ITA, which should be considered for the 2009 submission, is presented; responses to each subject are also included.

Par.	Subject	Description	Response
8	Key categories	The Party does not provide detailed information on the level of key category analysis for the base year and the ERT recommends that Italy provide this information in its next annual submission. In addition, the ERT recommends that the Party report CO2 emissions from stationary combustion. other fuels separately from CO2 emissions from stationary combustion . liquid fuels.	Detailed information on key category analysis for 1990 have been included in 2009 submission and CO2 emissions from stationary combustion. other fuels has been reported separately
10	Main findings	Transparency could be improved by providing explanations of trends of emissions from certain categories and/or certain implied emission factors (IEFs) (for example in energy and industrial processes) and by providing additional information on country-specific methods, emission factors (EFs), and parameters used to calculate emissions (for example in energy, agriculture, and waste). The fuel split between national and international transportation should be updated.	Improvements have been implemented in the NIR to better describe emission trends and methodologies. Aviation and maritime emission estimates have been updated including the split between domestic and international emissions.
11	Completeness	The ERT recommends that Italy cooperate with the CRF Reporter helpdesk in order to find solutions to any unresolved issues so that it is able to include a complete table 7in its next annual submission.	A complete table 7 has been submitted for 1990, 2006 and 2007.
13	Transparency	The ERT noted with appreciation the efforts made by Italy to improve transparency. However, the ERT recommends that transparency be improved in the sector chapters	Some improvements have been done in the NIR 2009 to increase the transparency, especially in the energy and industrial processes chapters. In the

		that explain trends of emissions and/or IEFs for certain categories (for example in energy, industrial processes) and that Italy provide additional information on the country-specific methods, EFs, and parameters used to calculate emissions (for example energy, agriculture, waste). The ERT recommends that Italy improve the use of notation keys, for example by using not estimated (.NE.) instead of not applicable (NA.) for N2O from fugitive emissions from solid fuels if these emissions are actually occurring	waste chapter methodologies and additional information on the country-specific methods, EFs, and parameters used to calculate emissions have been provided. N2O from fugitive emissions from solid fuels are not occurring and so NA has been reported
14,15	Uncertainties	The results of the tier 2 analysis are not included in the NIR, but it is stated that the results of the two approaches are very similar. The ERT encourages the Party to provide a brief comparison of the two approaches and a short discussion of any differences in its next annual submission. The ERT recommends that Italy include a short description of the differences between the 2007 and 2008 uncertainty analyses in its next annual submission	Additional information has been included in the NIR 2009.
16	Uncertainties	It is not clear from the NIR whether or not Italy uses its uncertainty analysis to prioritize further improvements and whether or not plant data are used to verify uncertainties in the activity data (AD) (as recommended by the previous ERT). In response to the request, Italy informed the ERT that uncertainty analysis is used to prioritize improvements, in particular for categories where high uncertainty of AD and parameters is observed (agriculture, LULUCF, fluorinated gases in industrial processes), and that it has started to improve its collection of background AD from the relevant plants. The ERT recommends that Italy provide this information in its next annual submission.	Additional information has been included in the NIR 2009.
18	QA/QC	The ERT recommends that Italy include information on source-specific QA/QC procedures in the energy sector in separate paragraphs (which has already been completed for other sectors). The ERT noted that arrangements for an independent review of the inventory are still under consideration and encourages the Party again to make these arrangements. In addition, the ERT reiterates the recommendation made during the previous review that Italy explain more effectively the activities carried out by the National Statistical System (Sistan) panels responsible for the quality of AD provided by external institutions in its next annual submission.	Some parts of the energy sector chapter have been improved reporting the basic information in separate paragraphs as requested by the guidelines. More information has been supplied related to the SISTAN in relation to the Quality assurance of AD.

V. Planned improvements and QA activities

Improvements planned for 2009 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.

First 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 2009, 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 was finalised in 2008.

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 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 ISPRA and the Forest National Corp (CFS) was held. The 2005 National Forest Inventory was presented and the main results were released. In April 2008, the 'National Registry for Carbon sinks' was instituted by a Ministerial Decree; the registry is part of the Italian National System and includes information on units of lands subject of activities under Article 3.3 and activities elected under Article 3.4 and related carbon stock changes. The National Registry for Carbon sinks is the instrument to estimate, in accordance with the COP/MOP decisions, the IPCC Good Practice Guidance on LULUCF and every relevant IPCC guidelines, the greenhouse gases emissions by sources and removals by sinks in forest land and related land-use changes and to account for the net removals in order to allow the Italian Registry to issue the relevant amount of RMUs. Activities planned in the framework of the National Registry for Forest Carbon Sinks should also provide data to improve estimate of carbon sequestration due to Afforestation/reforestation activities and should allow refining the estimate related to the carbon sequestration by IPCC categories. Specifically, 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, a Scientific Committee, *Comitato di Consultazione Scientifica del Registro dei Serbatoi di Carbonio Forestali,* constituted by the relevant national experts has been established by the Ministry for the Environment, Land and Sea in cooperation with the Ministry of Agriculture, Food and Forest Policies.

In the framework of the preparation of the fifth national communication on climate change, 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. Further documentation will be collected in 2009 from industry in the framework of the European carbon leakage and benchmark analysis of the industrial sector involved in the European ETS for the period post-2012.
The databases of industrial emissions and basic information from the European Directives on the Emission trading scheme, Large Combustion Plant and EPER Registry, are being 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 CO_2 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 CO_2 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 CO_2 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. SF_6 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. In 2006, all the projects were concluded and the results have been used in the national inventory to improve country-specific emission factors.
- *Emissions Trading Scheme.* Analyses of sectoral industrial data from the Italian Emission Trading Scheme database are 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, cement and lime 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
2008 activities and future improvements

Prepared by: Riccardo De Lauretis

April, 2009

National Air Emission Inventory: Energy

I. Objective

The improvements carried out during the preparation of the 2009 national inventory submission for the energy sector and those expected for the next future are summarised in the following.

II. Review process recommendations

In the following table, the list of recommendations from the latest review process related to the energy sector, as reported in the document FCCC/ARR/2008/ITA, which should be considered for the 2009 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 2009 are also presented

Par.	Subject	Description	Response
28	Transparency	The ERT noted that the transparency of the NIR could be improved by providing more information on the following: the allocation of emissions from waste incineration in the energy sector, and the use of landfill gas, and the use of oxidation factors for the fraction of C oxidized during combustion (this is currently only briefly mentioned in the NIR).	Additional information has been provided in the NIR.
29	QA/QC	The ERT noted that source-specific QA/QC activities are applied during the emission estimation process. However, no explanation of these activities is provided in the NIR. The ERT encourages Italy to provide a more detailed description of the efforts taken to ensure the quality of the energy sector inventory.	Additional information has been provided in the NIR, especially for the transport sector where recalculation have been done in 2009.
30	Reference approach	The differences between estimates of CO2 emissions using the reference and sectoral approaches are very small for the whole time series. The difference is less than 2 per cent (the median value over all years is 1.9 per cent) except for 1999. A short explanation for the considerable difference of 3.7 per cent in 1999 (single event) would improve the transparency of reporting.	Additional information has been provided in the NIR.
31	Reference approach	The reference approach performed by Italy uses a mixture of IPCC default values and a few country-specific values for the carbon EFs. The reason for this should be explained in more detail, specifically for the other oil category where the difference is greater.	Additional information has been provided in the NIR. Specifically for other oil category, an error has been detected for the last years and it should explain the comment.
32	International bunker fuels	The national energy balance for Italy includes only aggregated fuel consumption data for transport activities. Therefore, model results for the split into domestic and international transport are used. The model for estimating emissions from international bunker fuels uses the available statistical information and research results for the fuel split in 1999. The split of fuel used by	Aviation and maritime estimates have been updated and recalculated considering the results of a specific project. It resulted in a reduction of domestic fuel consumptions in the last years. At the same time agreements have been established, with EUROCONTROL and the National aviation authorities

		domestic transport and international bunkers are applied for the entire time series and lead to a possible underestimation of emissions from international navigation and air transport. The ERT reiterates its recommendation made during the previous review that Italy includes new results for the fuel split under current conditions. This may reduce the discrepancy between International Energy Agency data and CRF data.	(ENAC) for aviation and with ISTAT for maritime, to allow a yearly availability of basic data with the aim to apply more advanced estimation Tiers for these sectors.
33	Feedstocks and non-energy use	Italy collects all data to perform a detailed mass balance of C in the petrochemical sector, providing good-quality results for this part of the inventory. The ERT noted that Italy reports in Table 1.A(d) data for the amount of C stored and recommends that it further elaborate the explanation of the methods to estimate the amount of C stored in its next annual submission.	Additional information has been provided in the NIR.
35	Civil Aviation: liquid fuel – CO2	The ERT noted that Italy uses available statistical data for the total energy consumption of the relevant fuels to estimate CO2 emissions from civil aviation. Emissions from national aviation are calculated based on modelling results of domestic and international flight movements and fuel consumption. The model input data represent conditions in 1999 and these constant parameters are applied for the entire time series. Most recent trends in civil aviation, such as technical improvements and changes in flight movements due to increased international competition, are not taken into account. Therefore this approach may lead to a potential overestimation for recent years. The ERT encourages Italy to consider results from recent available national research in the model assumptions and to revise the data accordingly to improve the accuracy of the inventory.	See comment to paragraph 32 above
36	Other sectors: other fuels –CO2	The ERT noted that Italy reports CO2 emissions from waste incineration under this category, which is in line with the IPCC good practice guidance. A mass balance method used to determine the amount of waste incinerated is described in the NIR, but no information is provided on waste composition or the method applied to convert the waste amount into energy content, which is included in the CRF tables. The ERT encourages Italy to improve the transparency of its reporting by providing a more detailed description of the methods and procedures applied to estimate CO2 emissions from waste incineration.	Additional information has been provided in the NIR.

III. Planned improvements and QA activities

The revision of the Energy chapter of the NIR is planned to be completed for the next submission, with the aim to increase the transparency of the reporting. Some paragraphs have been already revised following the structure suggested by the UNFCCC guidelines.

Documentation collected in the framework of the different European Directives, and Regulations (EPER/E-PRTR, Large Combustion plants and the Emissions Trading scheme) is planned to be completely integrated in a unique database, with the aim to verify emissions and activity data reported for the same year

under different reporting obligations and identify possible improvements in emission estimations.
Agreements have been established with EUROCONTROL and the National aviation authority (ENAC) for aviation and with ISTAT for maritime which should allow a yearly availability of basic data and the application of more advanced Tiers of estimation for these sectors.
Off-road basic activity data are planned to be checked and updated especially concerning technological information. The project is waiting for being funded.

QA/QC Industrial Processes
2008 activities and future improvements

Prepared by: Barbara Gonella, Riccardo De Lauretis

April, 2009

National Air Emission Inventory: Industrial Processes

I. Objective

The improvements carried out during the preparation of the 2009 national inventory submission for the industrial processes sector and those expected for the next future are summarised in the following.

II. Review process recommendations

In the following table, the list of recommendations from the latest review process related to the industrial processes sector, as reported in the document FCCC/ARR/2008/ITA, and which should be considered for the 2009 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 2009 are also presented.

Par.	Subject	Description	Response
37	Transparency	Estimation approaches, data availability, and relevant documentation are in general transparently presented in the NIR. In some cases additional explanatory information could be included in the NIR to improve the transparency of the reporting of information on peculiarities in IEF trends, such as changes caused by plant closures or process changes (for example in the case of nitric acid or the production of hydrochlorofluorocarbon-22 (HCFC-22))	Additional information has been provided in the NIR to explain better the IEF emission trends in the case of nitric acid and HCFC-22 production.
40	Ammonia production – CO2	Natural gas is used as feedstock in the ammonia production plants and the amount of fuel used is reconciled with the figures reported in the energy sector. The ERT recommends that Italy verify emission data published in the national EPER registry to demonstrate data accuracy.	CO2 ammonia average emission factors is calculated starting from data submitted by plants in the framework of the E-PRTR registry. Data reported by plants are verified in this context by the local authorities. Anyway, we plan to verify data directly with the plants for the next submission.
42	Adipic acid production – N2O	N2O emissions decreased by 69 per cent during the period 1990-2006, because abatement technology had been installed. However, information on the technology's features, which is necessary to assess EF values, has not been provided in the NIR. In response to the ERT request made during the review, Italy explained that the efficiency and the number of hours that the abatement technology was in operation were included in the estimations. The ERT recommends that Italy demonstrate the accuracy of the EF values by providing the aforementioned information in its next annual submission.	Additional information has been provided in the NIR.
43	Iron and steel production - CO2	The IEF for CO2 from iron and steel production decreased significantly during the period 1990-2006. In response to the ERT request made during the review, Italy explained that this is	Additional information has been provided in the NIR.

		due to the use of lime in iron and steel production and provided a description of this use. The ERT acknowledged that data used in its estimations were supplied from many data sources and recommends that Italy explain in detail its data collection, data verification, and QA/QC procedures in its next annual submission.	
45 (ARR)	Production of halocarbon and SF6 - HFCs	The ERT noted that since 1996 hydrofluorocarbon-23 (HFC-23) emissions from HCFC-22 manufacture have been assumed to be zero because a thermal afterburner was installed and untreated leakage of HFC-23 was collected and sent to the thermal afterburner. However, a description of this operational situation was not provided in the NIR. In response to the ERT request, Italy provided additional information during the review, which explained that the thermal afterburner is fully operational. The ERT recommends that Italy explain this in its next annual submission.	Additional information has been provided in the NIR.

Other improvements not identified during the review process have been carried out. In particular, the NIR has been improved reporting more information for each single industrial process with a focus on the key categories.
Many QA/QC activities adopted in the preparatory period of the 2007- 2009 National Inventory submission led to various improvements regarding fluorinated gases estimation. In the last years, 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.
The internal review of the EU-15 GHG inventory, which is an important element of the QA/QC programme for the inventory of the European Community activities, and for Member States as well, identified issues regarded specific sectors, e.g. 2C, 2E and 2F. The review process has identified that Italy does not estimate PFC potential emissions and made a recommendation for future submissions. As 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 PFC production, Solvay Solexis has confirmed that no production occurs in Italy. Therefore, this assumption has been applied from the 2007 National Inventory submission: exports are negligible, whereas imports are equal to the amount treated by semiconductor manufactures that use these substances. However, verification on importer and exporter in national territory is planned for future submissions based on data collected in the framework of the EU F-gases regulation. In the first year submission under this regulation, in 2008, few questionnaires have been collected. More information is expected to be collected in the future years.

Furthermore, in the framework of the disaggregation of national emissions at provincial level 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.

III. 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 E-PRTR and Emissions Trading data for all the industrial sectors. We are integrating the documentation collected in the framework of the different European Directives (EPER-E PRTR, Large Combustion Plants and Emission Trading Scheme) in a unique database with the aim to verify emissions and activity data reported for the same year under different reporting obligations and identify possible improvements in emission estimations.

As for the QA activities of the sector, emission estimates and methodologies were presented to the Italian stakeholders, in a workshop held in October 2006 dedicated to the Italian emission inventory, and in two events in 2007 in the framework of the national conference on climate change.

The implementation of verification activities especially regarding F-gas emissions are planned for future submissions on the basis of data collected in the framework of the EU F-gas regulation.

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

QA/QC Solvent and other product use
2008 activities and future improvements

Prepared by: Eleonora Di Cristofaro, Riccardo De Lauretis

May, 2009

National Air Emission Inventory: Solvent and other product use

I. Objective

The improvements carried out during the preparation of the 2009 national inventory submission for the solvent sector and those expected for the next future are summarised in the following.

II. Improvements

In the following table, the specific planned 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 2009 submission regarded some update of activity data for the last years and the update of NMVOC emission factors for the whole time series for polyurethane and polystyrene processing.

	Sub-category	**NMVOC Emission**	**Activity data**	**Emission factor**
Paint application	Construction and buildings	10%		Check the constant trend of EF in accordance with the Decopaint European Directive
	Domestic use	8%	Update time series	
	Coil coating	0%	Update time series	
	Boat building	1%	Updating time series	
	Other industrial	9%	Update time series	
	Updating of the time series of apparent consumptions of paints. We are investigating if alternative sources of information are available, such as import export statistics supplied by ISTAT[1] .			
	Check of average EFs and their possible reduction for paint application, especially in construction and buildings, on the basis of data collected in the framework of the Decopaint EU Directive.			
Degreasing, dry cleaning and electronics	Metal degreasing	4%	Update information, from Federchimica[2], on activity data and emission factor (these values have been found in literature, but should be reconsidered for new plants).	

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

[1] National Statistics Institute

[2] National chemical industrial association

Future improvements	Cumulative percentage	NMVOC emissions	Sub-categories	Categories
	27%	27%	Domestic solvent use	Other use of solvents and related activities
	37%	11%	Paint application : wood	Paint application
✓	48%	11%	Paint application : construction and buildings	Paint application
✓	57%	10%	Other industrial paint application	Paint application
✓	65%	9%	Paint application : domestic use	Paint application
	70%	5%	Polyurethane processing	Chemical products manufacturing or processing
	74%	4%	Application of glues and adhesives	Other use of solvents and related activities
	78%	4%	Printing industry	Other use of solvents and related activities
✓	82%	4%	Metal degreasing	Degreasing, dry cleaning and electronics
	85%	4%	Leather tanning	Chemical products manufacturing or processing
✓	88%	3%	Paints manufacturing	Chemical products manufacturing or processing
	91%	3%	Paint application : car repairing	Paint application
	93%	2%	Paint application : manufacture of automobiles	Paint application
	94%	1%	Rubber processing	Chemical products manufacturing or processing
	95%	1%	Fat, edible and non edible oil extraction	Other use of solvents and related activities
		1%	Pharmaceutical products manufacturing	Chemical products manufacturing or processing
✓		1%	Paint application : boat building	Paint application
		1%	Inks manufacturing	Chemical products manufacturing or processing
		1%	Dry cleaning	Degreasing, dry cleaning and electronics
		0%	Vehicles dewaxing	Other use of solvents and related activities
		0%	Polystyrene foam processing	Chemical products manufacturing or processing
		0%	Glues manufacturing	Chemical products manufacturing or processing
		0%	Textile finishing	Chemical products manufacturing or processing
✓		0%	Paint application : coil coating	Paint application
		0%	Glass wool induction	Other use of solvents and related activities
		0%	Polyester processing	Chemical products manufacturing or processing

QA/QC Agriculture
2008 activities and future improvements

Prepared by: Rocío Dánica Cóndor

February, 2009

National Air Emission Inventory: Agriculture

I. Objective

The seventh report describes activities and improvements carried out during the preparation of the national agriculture emission inventory - submission 2009 (section II). Moreover, responses to the review process recommendations are reported (section III and IV).

II. Activities and improvements

Since 2006 submission, results from the MeditAIRaneo project have been included in the preparation of the Agriculture emission inventory (GHG/CLRTAP). Besides, results from the convention signed between APAT and the Ministry for the Environment, Land and Sea have been incorporated.
Improvements for the Agriculture sector are described in detail in this section. Moreover, an ISPRA report describing the procedure for the preparation of the agriculture UNFCCC/CLRTAP emission inventory at national and local level and the main result has been published.

The Italian National Statistical System (SISTAN) revises every year the National Statistical Plan that covers three years. In this framework, the Agriculture, Forestry and Fishing Quality Panel (*Circolo Qualità Agricoltura, Foreste e Pesca*) has been established under the coordination of the Agriculture service of ISTAT. Through this process different improvements at activity data level have been reached in the last years.

In the future, the implementation of an *ad hoc* survey on "Agricultural Production Methods", regulated by the European Commission will be crucial for improving the preparation of the national agriculture emission inventory (GHG/CLRTAP). This survey will be carried out during the 2010 Agricultural Census in Italy. Detailed data such as animal grazing information, animal housing and storage systems characteristics, and use of manure/slurry for land application information will be collected. Already, initial efforts have been oriented to collect these data at provincial level through the incorporation of specific queries in the Farm Structure Survey (FSS) from 2005 and 2007. APAT is coordinating with the Agriculture Services of ISTAT to incorporate the Italian peculiarities of agricultural production in this survey.

In Table 1, a list with the different activities developed for the 2009 submission and future improvements are described.

Category	Sub-category	Parameter	Years		Activities
			2009	2010	
General	Activity data	Population	√		Data from 2007 and provisional data from 2008 has been uploaded
	Activity data	Surface/production	√		Update data from 2006, upload data from 2007 and provisional data from 2008. Rice production has been updated for the years 2004, 2005 and 2006 with data from ENR.
	Activity data	Milk production	√		Milk production data 2007 has been collected (ISTAT web site)
	Activity data	Fertilizer	√		Data from 2007 has been collected (ISTAT web site)
Enteric fermentation	Dairy cattle	Fat content	√		Data from 2007 fat parameter has been collected (ISTAT web site)
	Dairy cattle	Portion cow giving birth	√		Data from 2007 has been collected (AIA, 2008)
	Dairy cattle/buffalo	Milk production	√		Data from 2007 on milk production has been collected (ISTAT web site)
Manure Management	Livestock categories	Type of housing		√	A query on the type of housing of different livestock categories has been introduced in the Farm and structure survey 2005. Results need to be further analysed and are expected to be incorporated in a coming submission.
	Livestock categories	Slurry and solid manure storage facilities		√	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	Production methods		√	Different queries have been incorporated in a specific section of the 2010 Agricultural Census. Grazing, housing, storage systems and land spreading information will be collected.
	Livestock categories	Biogas	√		Data on biogas from 2007 has been collected (web site GSE)
Rice cultivation	Activity data	Days of cultivation and cultivars	√		Update data 2004, 2005, 2006 and collected 2007. Updated rice production statistics has been provided for the years 2004, 2005, 2006 (ENR, 2008)
	Rice	Emission factor	√	√	We have contact DG Joint Research Centre Institute for Environment and Sustainability - Climate Change Unit, which have been in charge of measuring rice paddy fields in Italy. New measurements have been done in 2007 and 2008. Data is still not available.
Agricultural soils	Direct emissions	Sewage sludge		√	A new study is being carried out for the land spreading category. We expect results for the end of 2009. Appropriate activity data needs to be refined, till now emissions are estimated in the waste sector (Wastewater Handling - N2O from human sewage).
	Activity data	Fertilizer		√	Verify outcomes from APAT/MINAMBIENTE project for the use of slow release fertilizers.

Table 1. Improvements for the Agriculture emission inventory (GHG/CLRTAP)

III. Individual review process recommendations

In Table 2, responses to the recommendations from the "*Report of the individual review of the greenhouse gas inventories of Italy*" (see FCCC/ARR/2008/ITA 16 January 2009 [3]).

[3] http://unfccc.int/resource/docs/2009/arr/ita.pdf

Par.	Subject	Description	Response
	Enteric fermentation – CH4	48. "… The ERT recommends improving the transparency of the NIR by elaborating on the parameters and IPCC good practice guidance equations used to obtain the country-specific EFs in the tier 2 methods for dairy cattle, non dairy cattle and buffalo in its next annual submission."	We have included in the annex of the NIR submission 2009 a table with the time series of all parameters used for estimating tier 2.
	Manure management – CH4	**49. "…The ERT noted that the percentage of manure allocations and methane conversion factors documented in CRF table 4.B (a)s2 are incorrect and recommends that Italy improve the quality checking procedures for its next annual submission".**	Italy will improve its checking of its inventory submission to prevent errors while completing CRF tables in the future.
	Manure management – N2O	**50. The ERT noted that Italy applies the same N excretion rate (116 kg/hd/year) for dairy cattle for all years and encourages the Party to consider developing a N excretion rate for dairy cattle that reflects changes in the dairy herd over the time series for future inventory submissions. During the review, Italy stated that it was working with agricultural experts to explore the possibility of developing this time series.**	As already clarified in our response, we have carried out a specific research study on nitrogen balance which results identified a country-specific nitrogen excretion factor. It is not possible to finalize studies on nitrogen excretion annually. We are consulting agricultural experts to individuate the proper proxy variable (where information is available) to model the EF over the time series.
	Direct soil emissions-N2O	**51. ".... thus the correct FSN should be 710,052.6 t of nitrogen. The ERT recommends that Italy correct this value in its next annual submission and that it ensure that proper QC procedures are implemented to avoid errors of this nature in the future."**	The error for the year 2006 has been corrected.
	Indirect soil emissions-N2O	**52 "……Italy uses country-specific values for FracGASF (0.092) and FracGASM (0.290) in estimating the amount of nitrogen volatilized from synthetic fertilizers and manures that is deposited onto soils. The ERT noted that the amount of nitrogen from atmospheric deposition (321,191 t) is reported incorrectly in CRF table 4.Ds1. Based on a total nitrogen excretion of 833,940 (CRF table 4.B (b)) and total synthetic fertilizers of 781,824 t, the amount of nitrogen should be 313,741 t. The ERT recommends that Italy correct this error in its next annual submission and encourages Italy to develop a country-specific value for fraction of N input to soils that is lost through leaching and run-off (FracLEACH) as emissions from this category are the largest contributor to total N2O emissions from agricultural soils (33.0 per cent).**	The error has been corrected. The $FRAC_{GASM}$ parameter, both direct and indirect estimations has been reported in NIR and in the CRF Reporter (Table 6.27).
	Pasture, range and paddock manure - N_2O	**53. The ERT noted that the amount of N reported in CRF table 4.Ds1 for 2006 (155,766.3 t) does not correspond with the amount of N in CRF table 4.B.(b) (159,675.4 t), but is in fact the same value as reported in 2005. This also means the incorrect IEF is reported (0.0205 kg N2O-N/kg N) instead of the correct value (0.02 kg N2O-N/kg N). The ERT recommends that Italy correct this value in its next annual submission and recommends that Italy ensure that the proper QC procedures are implemented to avoid errors of this nature in future.**	The error has been corrected.
		54. The ERT encourages Italy to provide a full N balance for manure management and agricultural soils for the entire time series in its next annual submission, which would help reduce N input errors in the CRF tables and improve the overall transparency of reporting.	Italy will consider this suggestion.

Table 2. Response to the Individual Review Process recommendation document

QA/QC LULUCF
2008 activities and future improvements

Prepared by: Marina Vitullo

April, 2009

National Air Emission Inventory: LULUCF

I. Objective

The report summarizes the improvements and remarks, which have been identified during the preparation of the 2009 inventory submission for the LULUCF sector.

II. Improvements

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

Forest land (5A)
In 2009 submission, final results of the Second Italian National Forest Inventory (INFC), related to the forest areas have been used, permitting a more precise evaluation of the estimated time series of the forest areas; the INFC data related to the soils survey will definitely constitute a robust database, allowing refined estimates and lower related uncertainty.
The 'National Registry for Carbon sinks', instituted by a Ministerial Decree on 1st April 2008, is part of the Italian National System and includes information on units of lands subject of activities under Article 3.3 and activities elected under Article 3.4 and related carbon stock changes. The National Registry for Carbon sinks is the instrument to estimate, in accordance with the COP/MOP decisions, the IPCC Good Practice Guidance on LULUCF and every relevant IPCC guidelines, the greenhouse gases emissions by sources and removals by sinks in forest land and related land-use changes and to account for the net removals in order to allow the Italian Registry to issue the relevant amount of RMUs. Activities planned in the framework of the National Registry for Forest Carbon Sinks should also provide data to improve estimate of carbon sequestration due to Afforestation/reforestation activities (with a special focus on soil organic content), and should allow to refine the estimate of forest land category. Specifically, 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, a Scientific Committee, *Comitato di Consultazione Scientifica del Registro dei Serbatoi di Carbonio Forestali,* constituted by the relevant national experts has been established by the Ministry for the Environment, Land and Sea in cooperation with the Ministry of Agriculture, Food and Forest Policies.
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. To this end, an interregional project, named INEMAR[4], developed to carry out atmospheric emission inventories at local scale, has added a module to estimate forest land emission and removals, following the methodology applied, at national level, to estimates removals and emissions by forest land. The module will be applied, at local scale with local data, in seven of the 20 Italian regions and the results will constitute a good validation of the used methodology.
An expert panel on forest fires has been set up, in order to obtain geographically reference data on burned area; the fraction of CO_2 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.
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.
Carbon stocks change due to land converting to Forest Land has been estimated and reported since the 2007 submission, as anticipated in the "2005 Quality Assurance/Quality Control plan for the Italian Inventory[5]". In the next submissions an upgrade of the used model is foreseen to achieve the above cited improvements and to obtain more accurate estimates of the carbon stored in the dead wood, litter and soil pools, using the outcomes of research projects on carbon stocks inventories, with a special focus on the Italian territory.

Cropland (5B)
In 2009 submission, estimates of carbon losses by pruning (in cropland remaining cropland) has been made as well as revision of SOC reference value for cropland, resulting in a remarkable variation in the emissions and removals by cropland category.
The research project SOILSINK, financed by the Italian Ministry for University and Research, has the purpose of studying 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.
Additional researches will be made to collect more country-specific data on woody crops. Improvements will concern the implementation of the estimate of carbon change in cropland biomass 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*) and the application of different

[4] INEMAR: INventario EMissioni Aria: http://www.ambiente.regione.lombardia.it/inemar/e_inemarhome.htm
[5] APAT 2005, *Quality Assurance/Quality Control plan for the Italian Inventory*

biomass accumulation rates and harvest/maturity cycles for the various categories.
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.
Activities planned in the framework of the National Registry for Forest Carbon Sinks should also provide data to improve estimate of carbon sequestration due to Afforestation/reforestation activities (with a special focus on soil organic content), and should allow to refine the estimate of soil organic content in cropland category.

Grassland (5C)
In 2009 submission, remarkable deviations from the precedent sectoral estimates occurred, essentially due to the revision of SOC reference value for grassland.
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. Activities planned in the framework of the National Registry for Forest Carbon Sinks should also provide data to improve estimate of carbon sequestration due to Afforestation/reforestation activities (with a special focus on soil organic content), and should allow to refine the estimate of soil organic content in grassland category.

Wetlands (5D)
The acquirement of data about flooded lands will allow, in next submission, to implement GPG method to estimate CO_2, CH_4 and N_2O emissions from flooded lands.

Settlements (5E)
In 2006 submission a *Settlements* time series has been developed from *Corine Land Cover*[6] 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

[6] Corine Land Cover Programme: http://www.clc2000.sinanet.apat.it/cartanetclc2000/

CO_2 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 CO_2 release from *Grassland* fires will be also supplied. Activities planned in the framework of the National Registry for Forest Carbon Sinks should also provide data to improve estimate of estimate of emissions by biomass burning.

QA/QC Waste
2008 activities and future improvements

Prepared by: Barbara Gonella

April, 2009

National Air Emission Inventory: Waste

I. Objective

This report summarises the improvements, which have been identified during the preparation of the 2009 inventory submission for the waste sector.

II. Review process recommendations and improvements in 2009 submission

In the following table, the list of recommendations from the latest review process related to the waste sector, as reported in the document FCCC/ARR/2008/ITA, and which should be considered for the 2009 submission is presented; responses to each subject are also included.

Par.	Subject	Description	Response
66	Sector overview	The ERT noted that the information reported does not make it possible to identify whether or not category-specific QA/QC procedures, as required by the IPCC good practice guidance for key categories, have been fully implemented (e.g. how QA/QC has been applied to uncertainty estimates). The ERT recommends that Italy document in more detail the category-specific procedures applied and provide a description of general QA/QC procedures implemented in its next annual submission.	Those quality control checks and quality assurance procedures, together with some verification activities, described in the NIR, are applied to the waste sector.
69	Key categories – Solid waste disposal on land – CH_4	Italy estimated the amount of wastewater sludge sent to landfills based on the number of wastewater plants, the population connected to wastewater plants, and the assumption that 80 kg of sludge is produced per inhabitant per year. Seventy five per cent of wastewater sludge is sent to landfills. The ERT recommends that Italy explain its choice of assumption in its next annual submission.	Additional explanations have been added in the NIR. In particular, the Waste chapter has been totally revised with the aim to clarify ERT comments.
70	Key categories – Solid waste disposal on land – CH_4	In response to the ERT request, Italy provided information on which landfills have been considered as managed and which as unmanaged for the period 1950.2000, noting that all .new. landfills were managed during the period 2000.2006. The ERT encourages Italy to include this information in its next annual submission. The ERT noted some inconsistencies between the NIR and the CRF tables. For example, in the NIR Italy reported that 50 per cent of unmanaged landfills are shallow, whereas in the CRF tables unmanaged waste disposal sites (depth > 5 m) are reported as .NO.. The ERT recommends that Italy correct these inconsistencies in its next annual submission.	Additional explanations have been added in the NIR. In particular, the Waste chapter has been totally revised with the aim to clarify ERT comments.
71	Key categories – Solid waste disposal on land – CH_4	The ERT noted that Italy reported country-specific data on degradable organic carbon, which is higher than the IPCC default for different waste categories. The ERT further	Additional explanations have been added in the NIR. In particular, the Waste chapter has been totally revised with the aim to clarify ERT comments.

		noted that Italy reported the percentages of waste categories landfilled considering wet weight of waste for different waste categories. The ERT recommends that Italy explain how wet and dry weights have been combined in its next annual submission in order to improve the consistency of its reporting.	
72	Key categories – Solid waste disposal on land – CH_4	Italy uses country-specific values for the CH4 generation rate constant (k), which is encouraged in the IPCC good practice guidance. Since these values differ from the IPCC default (for example national k value for rapidly biodegradable waste is three times higher than the IPCC default), it is good practice to document how this value has been obtained by taking into account the composition of waste disposed of in solid waste disposal sites over time and conditions at these sites. The ERT encourages Italy to explain this value in its next annual submission.	Additional explanations have been added in the NIR. In particular, the Waste chapter has been totally revised with the aim to clarify ERT comments.
73	Non key categories – Wastewater handling – CH_4	Italy used the IPCC methodology, and IPCC default EFs and country-specific EFs, including wastewater output per tonne of production and chemical oxygen demand (COD), to estimate CH_4 emissions from industrial wastewater handling. The ERT recommends that Italy provide references on the country-specific parameters used (for example the COD value used in the iron and steel and textile industries) in its next annual submission.	Additional explanations have been added in the NIR. In particular, the Waste chapter has been totally revised with the aim to clarify ERT comments.
74	Non key categories – Wastewater handling – CH_4	The ERT noted that Italy reported that 95 per cent of domestic and commercial wastewater and 85 per cent of industrial wastewater are treated in aerobic conditions (which imply lower emissions), without further explanation. Furthermore, Italy used country-specific AD (industrial production) and some country-specific parameters, such as COD, but applied IPCC default uncertainties to estimate the uncertainty associated with these estimates. The ERT encourages Italy to explain the drivers for CH_4 emissions from wastewater handling becoming a key category and to collect information on the uncertainty of country-specific data in its next annual submission.	Additional explanations have been added in the NIR. In particular, the Waste chapter has been totally revised with the aim to clarify ERT comments.
75	Non key categories – Waste incineration – CO_2, CH_4, N_2O	Under waste incineration, Italy reported emissions from agricultural residues that have been collected and burned. In response to the ERT request made during the review, Italy clarified that these agricultural residues are collected and are managed in different ways (disposed of in landfills, composted, combusted to produce energy). The ERT recommends that Italy explain the distribution of these agricultural residues between the management practices listed above, and estimate and report associated CH_4 and N_2O emissions accordingly using the appropriate EFs in its next annual submission.	Additional explanations have been added in the NIR. In particular, the Waste chapter has been totally revised with the aim to clarify ERT comments.
76	Non key categories – Waste incineration – CO_2, CH_4, N_2O	In order to estimate emissions from the incineration of the other types of waste (municipal, industrial, hospital), Italy analysed its fossil C content and reported CO_2 and non-CO_2 emissions from non-biogenic	Additional explanations have been added in the NIR. In particular, the Waste chapter has been totally revised with the aim to clarify ERT comments.

		waste in line with the IPCC good practice guidance. The ERT noted that although references have been provided for some of the default parameters used, the EFs estimated in some cases (e.g. industrial waste, waste oil, hospital waste) were unclear and the ERT recommends that Italy improve the transparency of its reporting with regard to the use of country-specific EFs in its next annual submission.	

In the waste sector the main feedback to the improvement of the National Inventory is coming from regional and local environmental agencies and authorities, which check the results of the top-down disaggregation of the National Inventory, available for the years 1990, 1995, 2000 and 2005, in order to find out the main weak points and contribute with information available to characterise the local environment.

Moreover, the preparation of National Communications helps to check and improve emission estimates. 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 energy sector. Energy production data from waste, such as biogas from landfills and wastewater treatment plants and energy from waste incinerators, coming from different sources of information and reported in different units, have been compared and checked.

III. Planned improvements and QA activities

With the aim to share methodologies and improve the knowledge at national and local level, an expert panel on waste is planned.

Solid waste disposal on land

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, Land and Sea that has the authority to ask the Regions to provide this information.

Moreover, ISPRA is involved in an in depth environmental study of Malagrotta area, where is located the biggest European non hazardous waste landfill. The study has been assigned to the Institute by the Minister of the Environment, Land and Sea, in order to verify the real status of the environment, afterwards several complaints from local inhabitants. The results of this study could be improve the national inventory and could be used as quality control procedure.

Wastewater handling

Since 1951, periodically (1951, 1963, 1975, 1987, 1993, 1999 and 2005) the National Institute of Statistics (ISTAT) carries out census analysis on urban water, regarding water supplying, aqueducts, sewer systems and wastewater treatment plants: next surveys are expected for 2008 and 2012.
Possible improvements in future submissions could come from the share of information with the Office of the Ministry of the Environment, Territory and Sea who is responsible for water activities.
Some improvements could also come from the analysis of EPER/E-PRTR data.

Waste incineration

As reported for solid waste disposal on land, the waste composition is very important to improve CO_2 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 for 2010 and 2020, specific to waste management, have been 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 and the collection of new information on waste composition.

Compost production

In 2008, the attendance at national Conferences and Workshops 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 2010 submission, especially for CH_4 emission factor and the input percentage of waste treated as compost in mechanical-biological treatment plants.