APAT
Agency for Environmental Protection and
Technical Services

Quality Assurance/Quality Control Plan

for the Italian Emission Inventory

Year 2006

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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 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 2006 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 to a Technical Committee on Emissions (CTE), where all the relevant Ministries and local authorities are represented coordinated by the Ministry for the Environment and the Territory, and 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 UNFCC Secretariat in September 2005, which results and recommendations are available at http://unfccc.int/resource/docs/2005/arr/ita.pdf (UNFCCC, 2005).

The responses and actions to the review process 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 of Environment 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.

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 the website at the address: http://air-climate.eionet.europa.eu/meetings/past_html.

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 CO_2 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 CH_4 emissions.
- *Agriculture.* CH_4 and N_2O 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 the Protection of the Environment and for 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' archive 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 which should be considered for the 2006 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, N2O from other use.	Concerning biomass burnt in Pulp and paper sector, more investigation is planned for future submissions. For potential HFCs emissions, we plan to estimate them in the 2007 submission. There should be no other uses of N_2O as solvent.
16	Completeness	There are still some blank cells (i.e. tables Summary 1, 2 and 3). "0" is broadly used throughout the CRF tables, while it should be used only if it the estimate is an actual zero. Otherwise a number, even if very small, or "not estimated" ("NE") or "not occurring" ("NO"), should be reported, depending on the situation.	Notation keys have been fully used across the CRFs. Blank cells have been filled and no 0 values are reported anymore.

18a	Transparency	Emissions trends are described in the NIR, but without referring to the main drivers that explain them (i.e. the sharp increases in the Energy (3.3 per cent) and Industrial Processes (4.1 per cent) sector emissions from 2002 to 2003). For the LULUCF sector, no trend analysis has been inclu ded;	Emission trends have been described in the NIR including LULUCF sector and with reference to the main drivers.
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 the 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)	We reported the more important recalculations; from the 2007 submission with the use of CRF Reporter a complete list of recalculations will be 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.
27	Verification and QA/QC approaches	Even though many activities and QA/QC procedures are already in place, they have not yet been formalised.	The QA/QC plan has been improved and published.
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.
33b	QA/QC plan	The development of a QA/QC system which includes a general QA/QC plan and sector-specific QA/QC plans.	The QA/QC plan has been improved and it is in publication.
35a	Key categories analysis	Complete and correct the key category analysis by: (i) Using 1990 as the base year for halocarbons and SF6; (ii) Using the disaggregation recommended by the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as the Revised 1996 IPCC Guidelines) for Industrial Processes; (iii) Including the LULUCF sector and completing and reporting the revised CRF table 7;	The remarks and suggestion of the ERT have been taken in account.
35b	Transparency	Improve the transparency of the inventory by: (i) Reviewing the reporting of "0" in the CRFs, taking into account that when a category is considered negligible the actual number should be reported or "NE" (not estimated) should be used; (ii) Filling in all blank cells with the corresponding values or notation keys in the CRFs; (iii) Providing an explanation of the em ission trends of the sectors explained by their main drivers in the section "Trends in Greenhouse Gas Emissions" of the NIR; (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; (v) Providing better documentation on methodologies, EFs and AD for the specific source	The remarks and suggestions of the ERT have been taken in account for all the points with some exception concerning the Energy chapter where a more in-depth revision is planned for the future submissions.

		categories that are mentioned below in the corresponding sector sections of this report	
36	QA/QC plan	Formalize the general and category-specific QC activities currently performed by documenting them in written procedures, including ways to register or document the main controls that are made in a systematic way. Special attention should be paid to key categories analysing whether adequate tier 2 source category-specific QC activities are being applied for key categories. Consider the implementation of Basic Expert Peer Review tier 1 QA activities, focusing at first on key categories and those categories where significant changes have been made to data or methods	The QA/QC plan has been improved and published. For the key categories, different expert reviews are developed through the organization of expert panel, the presentation of methodologies and emission data to national and international workshops and the interaction with the sectoral expert during the preparation of the inventory. Comparison of results with emission calculated at local level has been carried for different pollutants, CO_2 included.
37	Archiving	For the record keeping and archiving system already in place, the ERT recommends the Party to: (a) Freeze the finalized inventory documentation using "read only mode" in all electronic files; (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).	Inventory files and documentation have been frozen. A better reorganization of the documentation is in plan for future submissions

V.   Planned improvements and QA activities

Other general improvements are planned for the next submissions, especially regarding the National Inventory System and the QA/QC activities.

In the framework of the activities within the National Statistical System (SISTAN), i.e within the expert groups *Circoli di qualità*, some results and improvements in the quality of basic statistical data, on account of the proposal by APAT also shared by other national institutions, are expected in the 2007 submission.

Concerning the emission inventory, APAT has planned a national conference to be held in October 2006, completely focused on the national emission inventory and organized in sessions with detailed presentations, at sector level, of the methodologies to carry out the estimates and a description of the relevant emission trend with the underlying driving forces.

Comparisons between regional and local inventories and the results, at the same spatial levels, derived by a top-down disaggregation of the national inventory are being 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. The top-down disaggregation of the national inventory, for the year 2005, to different spatial levels is also planned. In addition, 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.

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 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 will be organised by the National Institute of Statistics (ISTAT) jointly with APAT and the Forest National Corp (CFS).

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 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. 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
2006 activities and future improvements

Prepared by: Riccardo De Lauretis

June, 2006

National Air Emission Inventory: Energy

VII. Objective

The improvements carried out during the preparation of the 2006 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 2006 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 2006 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.	Only major recalculations have been reported. In the next submission we will report any change in AD, EFs and emission estimates.
43	Completeness	However, Italy reports the number 0.00 in many categories under 1.B Fugitive Emissions. For these source categories, the Party should either report the value of the estimates no matter how small they are or use the notation key "NE" if they are not estimated. Some source categories in Fugitive Emissions are still left blank, such as Venting from Combined Activities and Flaring for Gas and Combined Activities. The ERT encourages the Party to report emissions or use the appropriate notation keys for these source categories.	Notation keys have been used.
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	See the comment above (paragraph 42)

		the corrections should be documented in the CRF and NIR.	
47	Verification and QA/QC approaches	A draft of the "Quality Assurance/Quality Control Plan for the Italian Inventory" was presented during the review but it did not contain a specific section on the Energy sector. The Party is encouraged to develop a QA/QC plan for the Energy sector and include information regarding the plan in the NIR.	The QA/QC plan for the energy sector has been developed.
48	Comparison of the reference approach with the sectoral approach and international statistics	The ERT encourages the Party to look into the difference between the inventory data and the IEA data, as pointed out during previous 2005 review stages.	A process of comparison between data supplied to IEA and data published in the National Energy Balance has been developed in cooperation with the Ministry for the economical development. APAT has been involved especially in the checks of the coal energy time series data.
52	Stationary combustion: all fuels – CO2	According to the NIR, the combined use of IPCC EFs for coals, national EFs for coal gases, and the EMEP/CORINAIR EFs for steel works processes produces double counting of emissions. This occurs because of the extensive recovery of coal gases from blast furnaces, coke ovens, and oxygen converters for electricity generation. The Party has developed a country-specific method to avoid the double counting, and it is explained in annex 3 of the NIR, but the explanation is not complete. Additiona l information was provided during the review which clarified the issue. The ERT encourages the Party to include this information in the NIR of its future submissions.	On the basis of the remarks from the review and the availability of data and information provided by the operators, CO_2 emissions from the iron and steel sector have been revised both in the energy and industrial processes sectors. The detailed methodology is reported in the NIR. A full carbon cycle in the sector has been performed and the flowchart has been reported in the NIR.
54	Mobile Combustion – Road Vehicles: liquid – CO2	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 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.	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; which will be available not before December 2006. Italy will use COPERT4 for the 2008 submission. Due to the update of the formulas to estimate emissions, differences in CH_4 and N_2O emissions are expected for the whole time series including the base year (1990).
59	Fugitive emissions: Oil and Gas Operations – CO2	Fugitive emissions of CO_2 consist of emissions from refineries during the petroleum production processes, such as fluid catalytic cracking. The NIR does not provide sufficient information on the methodology or data used. The Party explained during the review that the emissions of CO_2 reported are measured data provided by an association of refineries which collects emissions data from all refinery plants in Italy. The ERT encourages the Party to include relevant information and a brief description of how the data are collected in its next NIR.	More information has been supplied in the NIR.
60	Fugitive emissions: Oil and Gas Operations – CO2	The NIR states that fugitive emissions from refineries and emissions from flaring are the only fugitive CO_2 emissions that exist in Italy. If so, Italy should provide more information in the NIR in the interest of transparency. The "0.00" entered in table 1.B.2 should also be changed to the correct notation key.	CO_2 emissions from gas and oil extraction and production have been estimates on the basis of GPG emission factors as a consequence of a clarification and additional information supplied by the main operators. Proper notation keys have also been used.
61	Fugitive emissions: Oil and Gas	The ERT encourages the Party to improve the transparency of its reporting by describing the methodology, or explaining that the data are	More information has been supplied in the NIR.

		collected annually by the Italian gas company, in the next NIR. The ERT also encourages the Party to fill in the empty cells in the CRF with the actual value or appropriate notation keys in its next submission.	
62	Mobile Combustion – Road Vehicle: natural gas – N2O	The N_2O EFs for natural gas are calculated starting from the N_2O 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_2O 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_2O emissions increase with the introduction of this abatement technology. In the framework of the European transport expert panel this problem will be examined.

IX. Planned improvements and QA activities

The revision of the Energy chapter of the NIR is planned for the next submissions in order to increase the transparency and fulfil with the UNFCCC reporting guidelines.

Regarding the road transport emission estimates, COPERT4 will be used after verifying that the time series of emissions will be 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
2006 activities and future improvements

Prepared by: Riccardo De Lauretis

May, 2006

National Air Emission Inventory: Industrial Processes

X.   Objective

The improvements carried out during the preparation of the 2006 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 2006 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 2006 are also presented.

Par.	Subject	Description	Response
68	Completeness	One missing source is potential PFC emissions	Appropriate activity data need to be explored yet. We plan to estimate potential PFC emissions in the 2007 submission.
69	Transparency	The ERT noted that not all explanations on methods used in the Industrial Processes inventory are transparent.	More detailed explanation of methodology and emission trends have been reported in the NIR, especially regarding the key sources.
71	Verification and QA/QC	The ERT encourages the Party to continue its efforts to improve the data, develop the QA/QC plan, and present it in the next submission.	The QA/QC plan for Industrial Processes has been developed.
75	Nitric Acid production	The ERT welcomes the Party's effort to improve its EFs and AD in future by collecting more information from the operators about N_2O emission trends for Nitric Acid Production, especially for the years 1990–2000.	Detailed information about technology, activity data and emissions has been collected from the operators plant by plant where available. The complete time series from 1990 to 2004 have been reconstructed on the basis of information available and default emission factors reported in the IPCC and GPG referring to the specific plant technologies. It results in -1.1% N_2O emissions in 1990 and +6.6% in 2003.
76	Limestone and dolomite use	The ERT encourages the Party to report limestone and dolomite use as AD in the CRF instead of production data and recommends providing explanation in the NIR as to how the calculations have been done and what AD and EF have been used.	Limestone and dolomite use have been reported as activity data in the CRF and explanation on the methodology adopted has been reported in the NIR.
77	Iron and steel	The ERT welcomes the further investigation which is in progress on collecting sufficient information to apply the IPCC good practice guidance in reporting these emissions. It encourages the Party to provide more detailed explanations of the methodology used, the underlying assumptions, and the conversion factors, AD and EFs used in the NIR. It is also desirable to report the flowchart of the carbon cycle from the iron and steel industry in the NIR.	On the basis of the remarks from the review and the availability of data and information provided by the operators, CO_2 emissions from the iron and steel sector have been revised both in the energy and industrial processes sectors. Detailed methodology is reported in the NIR (see page 74 in the NIR). A full carbon cycle in the sector has been performed and the flowchart has been reported in the NIR.

Other improvements not identified during the review process have been carried out. In particular: the time series of lime production activity data has been revised from 1990 to 2004 on the basis of information supplied both by the operators and by the National Institute of Statistics (ISTAT), especially regarding the consistency of the time series and the representativeness of the production data published by ISTAT; the time series of N_2O emissions from caprolactame production have been calculated after an EC internal review indicating the production in Italy of this intermediate chemical substance; the consistency of estimates from aluminium production has been verified.

XII.   Planned improvements and QA activities

The main improvements planned for the 2007 submission will be the estimation of potential PFCs emissions on the basis of verification on production, import and export data with the National Institute of Statistics and the main operators. Other 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 that emissions and activity data reported under different reporting obligations for the same year   are consistent and identify possible improvements in emission estimations.

In the framework of the preparation of the demonstrable progress report and the definition of emission scenarios as well as the identification of policies and measures to reduce GHG emissions from the sector, industrial associations have been contacted and appropriate documentation is being collected. This activity will provide a detailed check of actual emissions; updates of the time series of HFCs consumption are expected.

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

For the QA activities of the sector, emission estimates and methodologies will be presented in a detailed way to the Italian stakeholders during a workshop dedicated to the Italian emission inventory, to be held in October 2006.

The implementation of verification activities especially regarding F-gas emissions are planned for future submissions.

QA/QC Solvent and other product use
2006 activities and future improvements

Prepared by: Eleonora Di Cristofaro, Riccardo De Lauretis

May, 2006

National Air Emission Inventory: Solvent and other product use

XIII. Objective

The improvements carried out during the preparation of the 2006 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 2006 submission are highlighted in yellow. 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	NMVOC Emission	Activity data	Emission factor
Paint application	Manufacture of automobiles	2%		EF for the years 1990-1991 have been checked
	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.			

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[1] National Statistics Institute

[2] Government agency research

Degreasing, dry cleaning and electronics	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).	
Chemical products manufacturing or processing	Polyurethane processing	0%	Emissions for the years 2000-2003 have been updated on the basis of information supplied by Plastics Europe Italia-Assobase[4]	
	Leather tanning	5%		NMVOC EFs have been updated, because of the substitution of products based on solvents with the equivalents based on water, in accordance with information collected from UNIC[5].
	Data on production and application of paints, glues and inks have been checked through a cooperation with AVISA[6]. In 2005, we had received data on adhesives from 1995 to 2003; in 2006, we received data on inks related to: production, consumption and quantity of solvent contained in different products.			
Other use of solvents and related activities	Domestic solvent use	24%	Activity data (a cooperation has been activated with some industrial associations, which supplied data related to products consumption) and time series of emission factors have been updated, through a survey on use of solvents in years, among the major manufacturing industries.	

Future improvements	Cumulative percentage	NMVOC emissions	Sub-categories	Categories
NO	27%	27%	Domestic solvent use	Other use of solvents and related activities
NO	38%	12%	Paint application : wood	Paint application
YES	49%	11%	Paint application : construction and buildings	Paint application
YES	58%	10%	Other industrial paint application	Paint application
YES	67%	9%	Paint application : domestic use	Paint application
NO	73%	6%	Application of glues and adhesives	Other use of solvents and related activities
YES	77%	4%	Metal degreasing	Degreasing, dry cleaning and electronics
NO	81%	4%	Printing industry	Other use of solvents and related activities
NO	85%	4%	Leather tanning	Chemical products manufacturing or processing

[3] National chemical industrial association

[4] Industrial association

[5] National Association Tan Industry

[6] Industrial association

			Activity	Category
YES	88%	3%	Paints manufacturing	Chemical products manufacturing or processing
NO	91%	3%	Paint application : car repairing	Paint application
NO	93%	2%	Paint application : manufacture of automobiles	Paint application
NO	94%	1%	Pharmaceutical products manufacturing	Chemical products manufacturing or processing
NO	95%	1%	Rubber processing	Chemical products manufacturing or processing
NO	96%	1%	Fat, edible and non edible oil extraction	Other use of solvents and related activities
YES	97%	1%	Paint application : boat building	Paint application
NO	98%	1%	Inks manufacturing	Chemical products manufacturing or processing
NO	99%	1%	Dry cleaning	Degreasing, dry cleaning and electronics
NO	99%	1%	Vehicles dewaxing	Other use of solvents and related activities
NO	100%	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
2006 activities and future improvements

Prepared by: Rocío D. Cóndor

May, 2006

National Air emission inventory: Agriculture

XV.   Objective

This report describes all activities developed during the preparation of the 2006 national inventory submission for the agriculture sector. Future improvements are also described. Recommendations from the "Report of the individual review of the greenhouse gas inventory of Italy submitted in 2005" have been considered.

XVI.   Review recommendations

This section provides a list of the different recommendations considered from the last review process. In the following table, a list of all recommendations considered for the 2006 submission is presented.

Par.	Subject	Description	Response
85	Completeness	Application of sewage sludge to agricultural soils in sector	Appropriate activity data needs to be found
86	Transparency	Livestock and crop statistical data time series.	Tables with time series have been included in the different source categories.
87	Transparency	Tabulate the derivation of its tier 2 country-specific	Equations for the application of Tier 2 can be found in the IPCC 2000 Good Practise Guidance. Country-specific parameters used for the Tier 2 are listed in the NIR.
88	Recalculations and time-series consistency	The ERT recommends that the Party document all recalculations in its future submissions, however minor, in both the NIR and the CRF.	Detailed description of recalculation for all source categories can be found in the 6.5 section of the NIR.
93	Enteric Fermentation – CH4	The ERT recommends improving transparency for this category by including an annex to the NIR with enhanced livestock characterization and EF derivation tables, especially for dairy and non-dairy cattle.	Livestock population (cattle and non-dairy cattle) is included in the NIR (see tables 6.2 and 6.3). Other categories are presented in detail in the CRF.
95	Manure Management – CH4	ERT encourages Italy to tabulate the derivation of CH_4 emission rates and EFs for significant species (cattle, buffalo and swine) according to the equations used (Husted, 1994) in its future submissions.	In section 6.3.2 a detailed description of the methodology and equations used for estimating CH_4 has been done.
97	Manure Management – N2O	The ERT recommends that the Party complete CRF table 4B(b) using the correct notation keys for the different AWMS; the Anaerobic Lagoons and Daily Spread MMS cells are left blank.	The CRF Table 4B(b) blanks cells have been completed.
99	Rice Cultivation – CH4	The ERT and the Party agreed during this review that the increase of the seasonally integrated EF by 20 per cent, to account for post-harvest emissions, would no longer take place as this practice is not appropriate to Italian rice production (Wassmann et al., 1994). The Party should recalculate the estimates of CH4 from this source for its next submission.	An in depth analysis has taken place, see chapter 6.4 from NIR.
102	Direct N2O Emissions from Agricultural Soils – N2O	Italy uses a country-specific FracGASM of 0.39 and FracGASF of 0.10 in estimating direct emissions of N2O from soils. The ERT recommends that Italy tabulate the calculation of these fractions in the NIR or in an annex to the report.	The $FRAC_{GASM}$ and $FRAC_{GASF}$ parameters have always been estimated according to the IPPC definition. A more clear description is provided in section 6.5.2 of the NIR as well as tables with the time

			series of $FRAC_{GASM}$ and $FRAC_{GASF}$.
102	Direct N2O Emissions from Agricultural Soils – N2O	The ERT encourages the Party to use consistent N excretion balances across all inventories, N2O and ammonia.	Nitrogen balance and methodology consistency has been always present in the national air emission estimations. In the NIR a more clear description of this process is given (see 6.1 and 6.5).
107	Indirect N2O Emissions from Agricultural Soils – N2O	The ERT encourages the Party to develop a country-specific FracLEACH as this source category is the largest contributor to agricultural N2O emissions, 19.45 Gg or 26.9 per cent in 2003.	It has been verified the $FRAC_{LEACH}$ which is used for indirect emission estimations. Country-specific $FRAC_{LEACH}$ parameter is similar to the IPCC default value.
109	Field Burning of Agriculture Residues – CH4 and N2O	The ERT recommends that the Party estimate emissions only from regions where it considers that this activity takes place as a farming practice. The Party probably overestimates the cereal crop residue burnt, as it accounts for total national cereal crop production at present.	Future improvement considered the verification of the parameter "cereal crop residue burnt".

XVII. Improvements in 2006 submission

In the following table a list of the different activities developed for 2006 is presented, as well as future improvements. References are found in the NIR (section 10.5).

Category	Sub-category	Parameter	Year of submission			Activities
			2005	2006	2007	
General	Activity data	Population/s			?	Continuous update of activity for the coming years, according to
Enteric fermentation	Dairy cattle	Weight gain	?			Modification of parameter for 2005 submission (CRPA, 2006)
	Dairy cattle	Digestibility		?		Discussion of the digestibility parameter according to the rational average value for milk production (CPRA, 2006)
	Dairy cattle	Fat content		?		Update of parameters according to update data obtained from ISTAT (ISTAT, 2006a)
	Dairy cattle	Portion cow giving birth		?		Update of parameters according to update data obtain from AIA (2005)
	Dairy cattle	Milk production		?		Reconstruction of parameter according to different sources (ISTAT, several years) [a], [b], [c], [d], [e], [f]; ISTAT, 2006a; OSSLATTE, 2001; OSSLATTE /ISMEA, 2003)
	Dairy cattle and non dairy cattle	Average weight		?		Update the average weight with Inter-project on nitrogen balance results (CPRA, 2006; Regione Emilia Romagna, 2004)
	Dairy cattle	% grazing		?		Update with statistics obtained from the Agriculture Census (CPRA, 2006)

Manure management	Dairy cattle	Slurry correction factor		?		According to update studies the correction factor, which was normally used for estimating slurry EF has been cancelled (CPRA, 2006; Bonazi et al., 2005; APAT, 2004)
	Dairy cattle	Volatile solids		?		The volatile solid parameters has been updated, according to new data available (CPRA, 2006)
	Buffalo	Emission factor		?		New emission factor has been estimated for both cow buffalo and other buffaloes, according to new information (Condor et al.,)
	Livestock categories	Type of housing			?	A query on the type of housing of different livestock categories has been introduced in the ISTAT survey "farm and structure". Results are expected for 2006 and 2007.
	Livestock categories	N excretion rates		?		New nitrogen excretion rates have been used for the 2006 submission, Inter-regional project on nitrogen balance (CPRA, 2006; GU, 2006; Xiccato et al., 2005)
	Livestock categories	Slurry and solid manure production		?	?	Update according to new studies (CPRA, 2006; Bonazzi et al., 2005; APAT, 2004). Probably, information collected from "farm and structure" survey from ISTAT will be useful for updating information.
	Livestock categories	Average weight		?		Update with Inter-project on nitrogen balance (CPRA, 2006; PROINCARNE, 2005; Regione Emilia Romagna, 2004)
	Management system	Emission factors		?		Verification of emission factors used for the liquid system, solid storage and other management systems have been done.
Rice cultivation	Emission factors	Daily CH, EF		?		For 2006 submission a seasonal methane emissions factors has been estimated based on the daily methane emission factor and the period of cultivation of rice (Schutz, 1989 [a], [b]. A new emission factor has been incorporated for estimation of emission from fields with the dry-seeded practise (Leip et al., 2002).
	Emission factors	Post-harvest emission		?		According to the review process from 2004 (UNFCCC, 2004), post-harvest emissions have been eliminated, they do not correspond to water regimes applied in Italy (Wassmann, 2005).
	Emission factors	Scaling factors		?		Scaling factors used for estimations have been updated with a recent publication (Yan et al., 2005)
	Activity data	Days of cultivation and cultivars		?		In order of obtain the average national days of rice cultivation, characteristics from the different cultivars present in Italy for the whole time series were used (ENR,2005)
	Activity data	Agronomic practise		?		Agronomic practise in Italy have been revised (Lupotto et al., 2005; Wavattaro et al., 2004; ISTAT, 2006; Tinarelli, 1973; 1986; Baldoni & Giardini, 1989)
Agricultural soil	All livestock categories	N excretion rates				Update with Inter-project on nitrogen balance (CPRA, 2006; CU, 2006; Xiccato et al., 2005)
	Direct emissions	$FRAC_{CASM}$		?		Last submission, $FRAC_{CASM}$ was not calculated correctly. Now $FRAC_{CASM}$ is calculated for the whole time series and based on the manure nitrogen used as fertiliser, corrected for NH_3 and NO_x emissions (input from CLRTAP inventory).
	Direct emissions	$FRAC_{CASP}$		?		Last submission there was a fixed parameter, now the inventory contains a times series of $FRAC_{CASP}$, (input from the CLRTAP inventory). Estimations are based on N-NH, and N-NO emissions from soils with fertilisers and the content of N fertilisers.
	Direct emissions	Sewage sludge			?	Appropriate activity data needs to be refined, till now emissions are estimated in the waste sector (Wastewater Handling – N_2O from human sewage).
	Indirect emissions	$FRAC_{LEACH}$		?		The IPCC default parameters has been verified with national sources (ADBPO, 1994; ADBPO, 2001)
Field Burning	Activity data	Annual crop production		?		Update activity data from ISTAT publications
	Activity data	% cereal crop residue burnt			?	Probably ISTAT elaboration from "SPA 2003 or SPA 2005"can be useful for obtaining regional information on cereal crop residue burnt

QA/QC LULUCF
2006 activities and future improvements

Prepared by: Marina Vitullo

May, 2006

National Air Emission Inventory: LULUCF

XVIII. Objective

The report summarizes the improvements and remarks, which have been identified during the preparation of the 2006 inventory submission for the LULUCF sector.

XIX. 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 2006 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 hopefully for the end of 2006, 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 2006 submission, the results of the European project CANIF (*CArbon and NItrogen cycling in Forest ecosystems*[7]), 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.

Improvements will be also related to the outcomes of European research projects on carbon stock inventories in Europe. Specifically for Italy, two projects are in progress: INFOCARB - Carbon fluxes and Pools in Forest Ecosystems and Progetto Kyoto which should estimate the carbon amount in the Lombardy region. Details of the projects can be found at the website links: http://www.cealp.it, http://www.flanet.org/ricerca/kyoto.asp.

Carbon stocks change due to land converting to Forest Land has been estimated and reported in 2006 submission, as anticipated in the "2005 Quality Assurance/Quality Control plan for the Italian Inventory[8]". 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

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[7] CANIF project: http://medias.obs-mip.fr/ricamare/interface/projet/canif.html
[8] APAT 2005, *Quality Assurance/Quality Control plan for the Italian Inventory*

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, as CARBO-INVENT[9] and CARBOEUROPE GHG[10], will be used to increment the quality of estimates.

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 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 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[11]* 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

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[9] CARBO-INVENT project: http://www.joanneum.at/CarboInvent/index.html
[10] CARBOEUROPE GHG project: http://gaia.agraria.unitus.it/ceuroghg/ghg.html
[11] Corine Land Cover Programme: http://www.clc2000.sinanet.apat.it/cartanetclc2000/

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 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 and reported in next submission. Estimates on CO_2 release from *Grassland* fires will be also supplied.

N_2O emissions from disturbance associated with land-use conversion to cropland (5(III))
As reported in "*2005 Quality Assurance/Quality Control plan for the Italian Inventory[12]*", in the background table for the reporting of nitrous oxide emissions from disturbance associated with land-use conversion to Cropland, in 2005 submission, emissions were are incorrectly reported as negative. In 2006 submission values have been reported with correct sign, resulting in strong variation with previous submission values.

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[12] APAT 2005, *Quality Assurance/Quality Control plan for the Italian Inventory*

QA/QC Waste
2006 activities and future improvements

Prepared by: Barbara Gonella

May, 2006

National Air Emission Inventory: Waste

XX.   Objective

This report summarises the improvements, which have been identified during the preparation of the 2006 inventory submission for the waste sector.

XXI.   Solid waste disposal on land

ERT Recommendation	Party
Italy has used a different methodology from that described in the IPCC good practice guidance in estimating the methane generation potential (Lo). This leads to a half-low value of the Lo parameter and in turn underestimation of CH4 emissions. The ERT have recommended Italy to include the revised estimates (during the review) for solid waste disposal in its next inventory submission.	Detailed information is reported in the NIR.
In estimating CH4 emissions using the first order decay (FOD) model, Italy has not applied the normalization factor for correcting emission estimates in accordance with the IPCC good practice guidance. This leads to overestimation of emissions.	On the basis of the draft 2006 IPCC Guidelines, the correct normalization factor has been applied.
A weighted average for the methane rate constant (k) has been used to estimate CH4 emissions from solid waste disposal on land. This is not recommended since the model is non-linear. The Party is encouraged to estimate CH4 emissions separately for different waste types and to add up the results to yield a better estimate of emissions.	The model has been divided in three sub-model for each waste type (Rapidly Biodegradable Waste; Moderately Biodegradable Waste; Slowly Biodegradable Waste). Activity data have been estimated from 1950, included sludge. Four different waste compositions have been use for different periods (1950 – 1970; 1970 – 1990; 1990 – 2005; 2005 on toward).

The improvements identified in the last submission, also by the Review team, regarding the differentiation of the waste composition (and thus the DOC and k) in the time series, have been carried out.

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 and Territory that has the authority to ask the Regions to provide this information.
These improvements will regard the submissions not before 2008.

XXII. Wastewater handling

CH_4 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 (depuratore consortile);

- 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. Cuoiodepur).
In the first case, CH_4 emissions have been already estimated in Domestic and Commercial sector: they are zero due to the fact that wastewaters are treated 100% aerobically. For this reason a double counting could be expected.
Regarding off site plants (*depuratori consortili*), a survey is being conducted 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: for these wastewaters the assumption of 15% treated anaerobically still remains.

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.

XXIII. 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 (see De Stefanis and Consonni's articles).
A further improve regards the verification of double counting in the energy sector due to energy recovery plants.