APAT

Agency for the Protection of the Environment and for Technical services

Italian GHG Inventory National System

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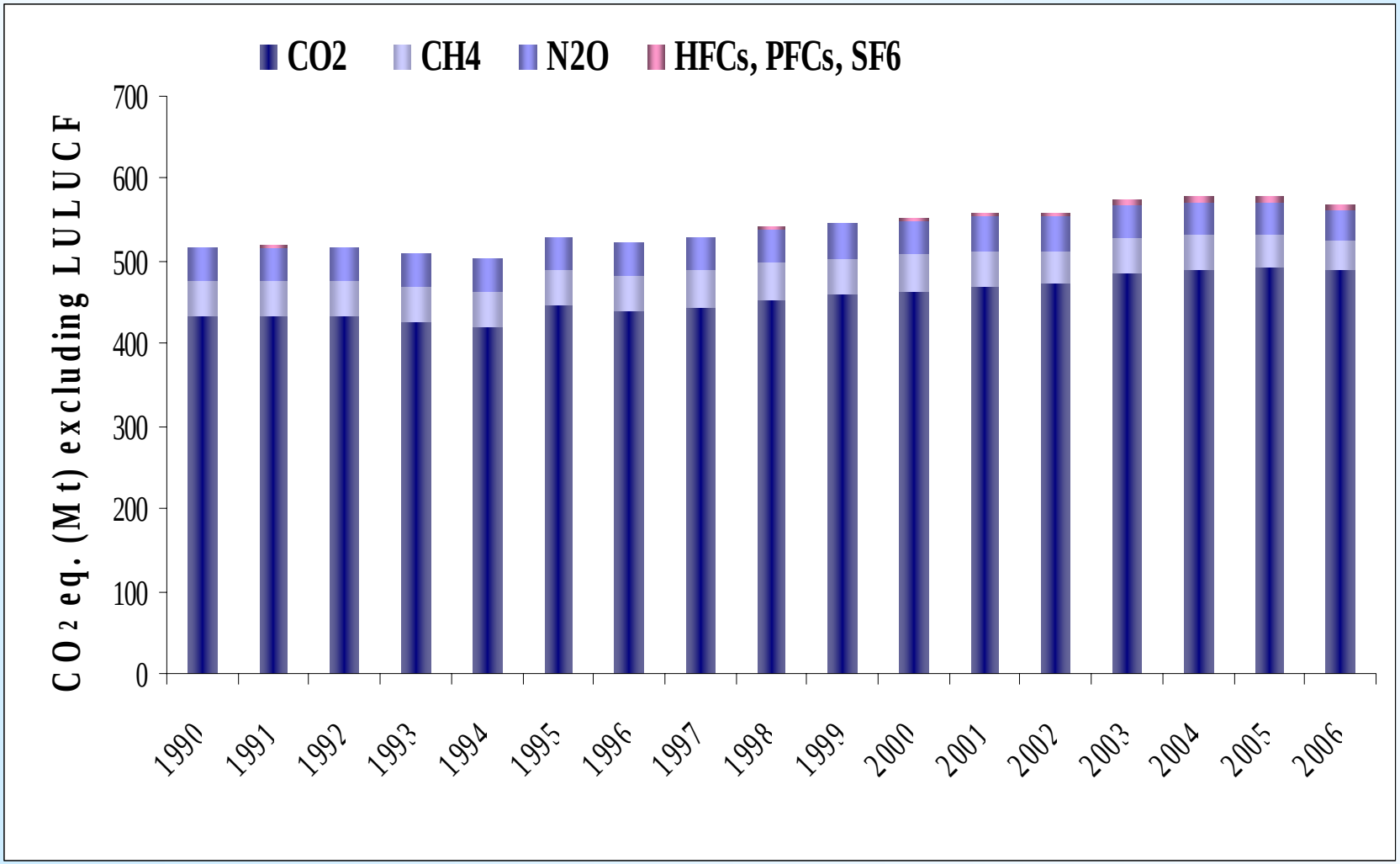
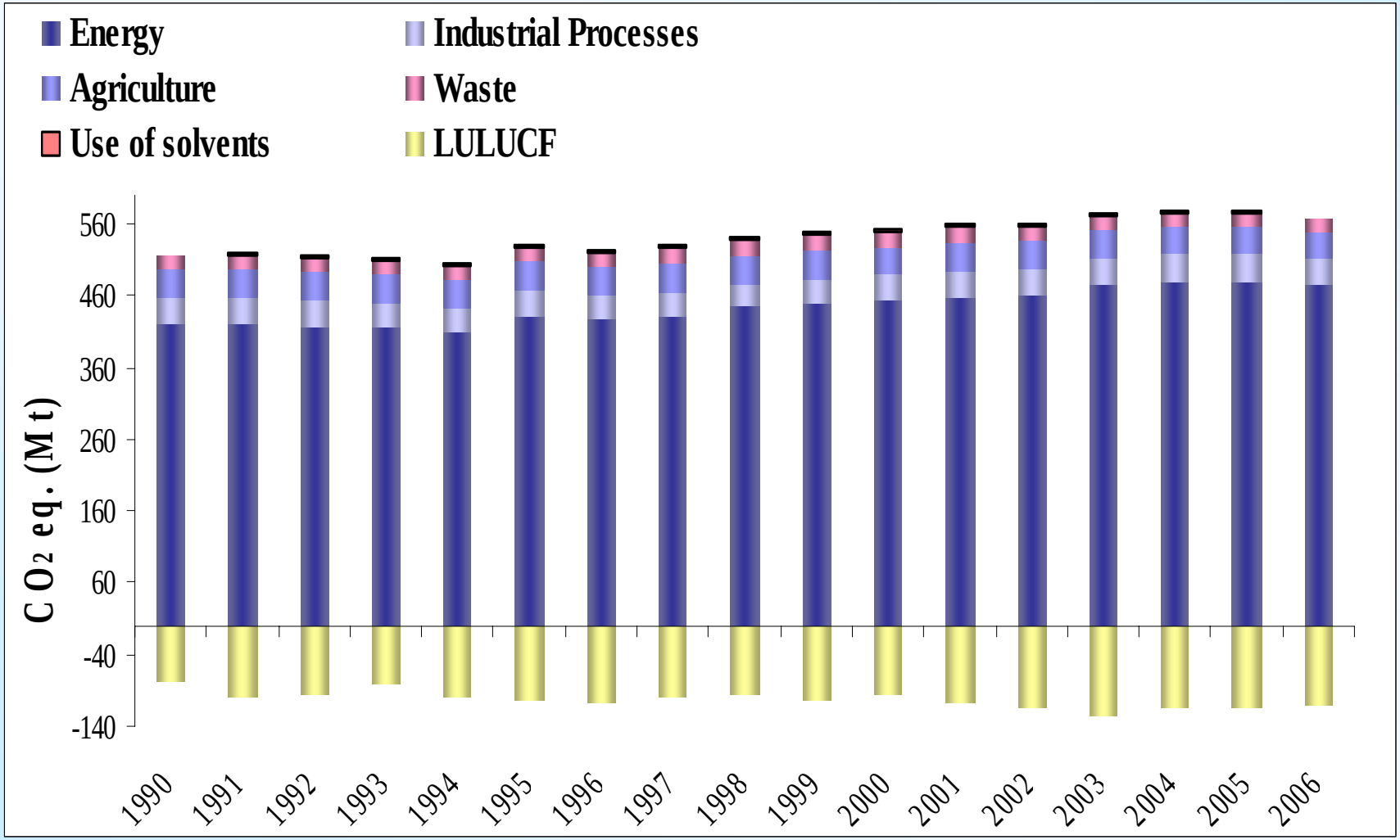
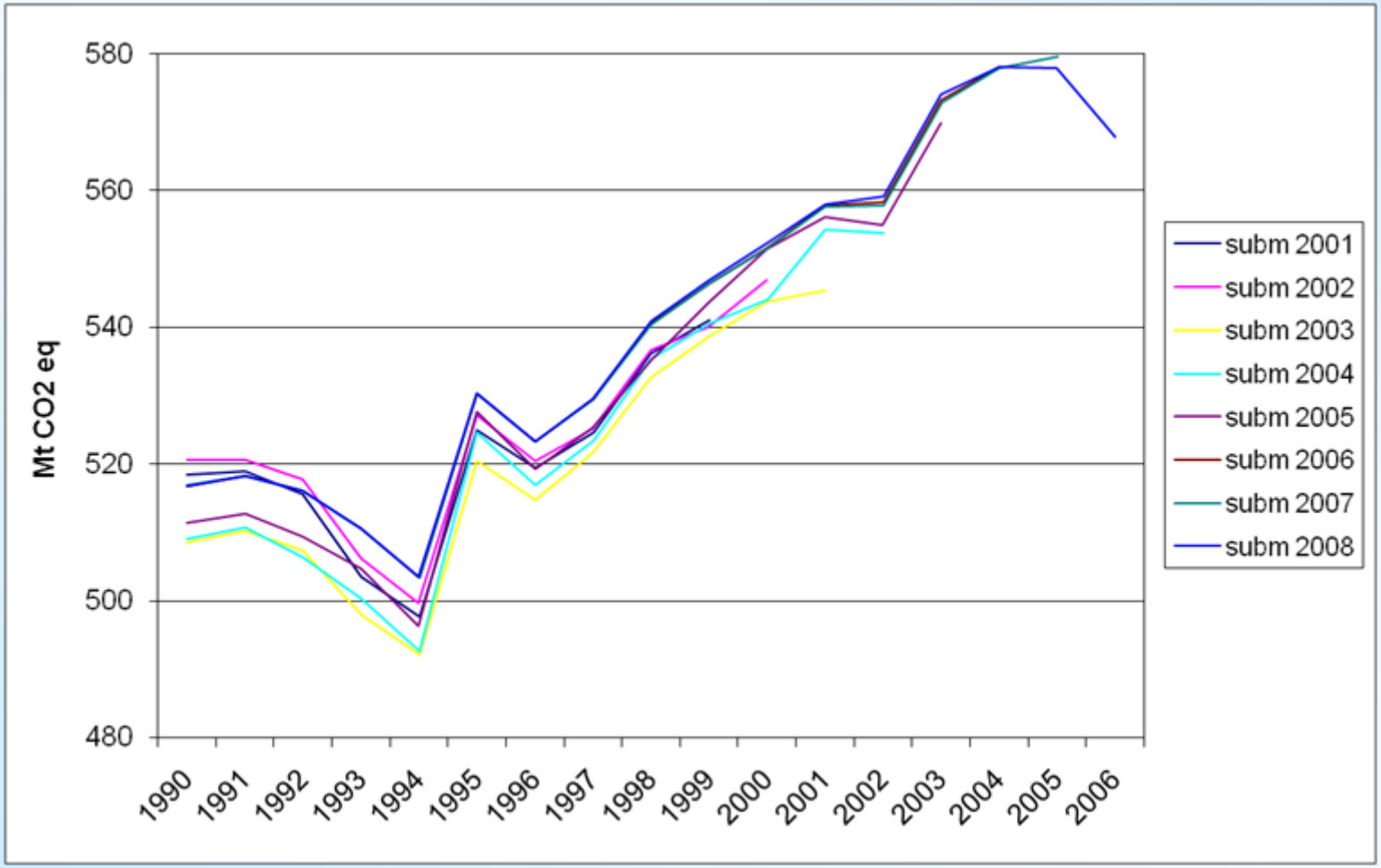
GHG emissions from 1990 to 2006 (without LULUCF) (Mt CO_2 eq.)



GHG emissions and removals from 1990 to 2006 by sector (Mt CO_2 eq.)



GHG Emission trends evolution



GHG Emission trends evolution

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
subm 2001	518	519	516	503	498	525	519	525	536	541							
subm 2002	521	521	518	506	500	527	520	525	537	540	547						
subm 2003	509	510	507	498	492	520	515	522	533	539	544	545					
subm 2004	509	511	506	500	493	525	517	523	535	541	544	554	554				
subm 2005	511	513	509	505	496	528	519	525	535	544	551	556	555	570			
subm 2006	517	518	516	511	503	530	523	530	541	546	552	558	558	573	578		
subm 2007	517	518	516	511	503	530	523	529	540	546	552	558	558	573	578	580	
subm 2008	517	518	516	511	504	530	523	530	541	547	552	558	559	574	578	578	568

Institutional arrangements

- **The Agency for the Protection of the Environment and for Technical Services (APAT) is in charge of the development and compilation of the national emission inventory since the institution of the Agency and on the basis of a Legislative Decree 51/08 issued on 7th March 2008**

- **A specific unit is responsible for the planning, preparation and management of the inventory in the framework of both the Framework Convention on Climate Change and the Convention on Long Range Transboundary Air Pollution**

Institutional activities

IMPLEMENTATION OF THE UNFCCC AND OF THE KYOTO PROTOCOL

- **Support the Ministry for the Environment, Land and Sea in monitoring the implementation of the National Action Plan for the Reduction of GHG Emissions, according to law no. 120 of 1st June 2002 and CIPE Deliberation no. 123 of 19 December 2002 (technical support to the activities of the Technical Committee on Greenhouse Gas Emissions (CTE))**

EU GHG MONITORING MECHANISM

- **Support the Ministry for the Environment, Land and Sea in the preparation of the information required by Decision 280/2004/EC (EU GHG Monitoring Mechanism):**
  - **national emissions and projections of greenhouse gas emissions;**
  - **quantitative estimates of the effect of policies and measures;**
  - **indicators to monitor and evaluate progress with policies and measures over time.**

Institutional activities

EMISSIONS TRADING SCHEME

- **Under contract with the Ministry the Environment, Land and Sea, APAT is carrying out the following activities concerning the implementation of Directive 2003/87/EC establishing a scheme for GHG emission allowance trading within the European Community:**

  - **inventory of historical CO_2 emissions from the installations subject to the Directive in Italy;**
  - **development, customisation and administration of the national registry, according to Directive 2003/87/EC, Regulation 2216/2004/EC and UNFCCC Decision 19/CP.7 , established in the Legislative Decree 51/08 issued on 7th March 2008.**

Institutional activities

OTHER UNFCCC AND IPCC ACTIVITIES

- **National Communications and Demonstrable Progress to the UNFCCC;**
- **Coordination and participation in UNFCCC reviews;**
- **Participation to UNFCCC's review teams for National Communications and GHG inventories;**
- **Participation, both as lead authors and reviewers, to the preparation of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.**

Institutional activities

OTHER INVENTORY RELATED ACTIVITIES

- **Preparation of regional and local air emission inventories together with regional/provincial Environment Agencies;**
- **preparation of the annual submissions according to Directive 2001/81/EC on national emission ceilings (national emission inventory and projections)**
- **preparation of the information required under Directive 96/62/EC on ambient air quality assessment and management as concerns emission projections, both at national level and at regional level (in co-operation with ENEA)**

APAT staff

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National Inventory System

- APAT has been designated as single national entity with overall responsibility for the national emission inventory by the Ministry for the Environment, Land and Sea (Legislative Decree 51/08 issued on 7th March 2008)

- The Italian Atmospheric Emission Inventory and the Italian Greenhouse Gas Inventory are entirely compiled and maintained by APAT

- The Italian GHG inventory and the national inventory report are communicated annually to the Secretariat of the UNFCCC and to the European Commission in the framework of the Greenhouse Gas Monitoring Mechanism, after official consideration and approval by the Ministry for the Environment, Land and Sea

- LULUCF reporting for the Kyoto Protocol is included in National System

National Inventory System

- APAT is responsible for all aspects of national inventory system:

  Inventory planning

  Inventory preparation

  Inventory management

National System: *Inventory Planning*

- Activities include:

- collection and processing of data from different data sources;
- selection of appropriate emissions factors and estimation methods consistent with the IPCC Guidelines, the IPCC Good Practice Guidance and the IPCC Good Practice Guidance for land use, land-use change and forestry;
- elaboration of a QA/QC plan;
- establishment of process for the official consideration and approval of the inventory prior to its submission;
- response to the review processes;
- annual updating of the QA/QC plan.

- The web electronic address where all the inventory related information can be found is:

http://www.sinanet.apat.it/it/sinanet/serie_storiche_emissioni

National System & National Statistical System

- *collection and processing of data from different data sources*

- Different institutions are responsible for statistical basic data and data publication, which are essential for APAT in order to carry out emission estimates;

- These institutions are part of a National Statistical System (Sistan), which provides national official statistics, and therefore are asked periodically to update statistics;

- The National Statistical System is coordinated by the Italian National Institute of Statistics (ISTAT) whereas other bodies, joining the System, are the statistical offices of ministries, national agencies, regions and autonomous provinces, provinces, municipalities, research institutes, chambers of commerce, local governmental offices, some private agencies and private subjects

National System & National Statistical System

- The Italian Statistical System was instituted on 6th September 1989 by the Legislative Decree n. 322/89, which established guiding principles and criteria for reforming public statistics

- This decree addresses to all public statistical bodies and agencies which provide official statistics both at local, national and international level in order to assure homogeneity of the methods and comparability of the results

Structure of Sistan

ISTAT

Statistical offices

Ministries

Institutes of statistical information diffusion

National agencies

Regions and autonomous provinces

Provinces, municipalities

Research institutes

Chambers of commerce

National System & National Statistical System

- The homogeneity of the methods used for official statistics is assured through a coordination plan (*National Statistical Plan*)
- A national statistical plan which defines surveys, data elaborations and project studies for a three-year period shall be draw up and updated annually, as established in the Decree n. 322/89
- The procedures to be followed with relation to the annual fulfilment as well as the forms to be filled in for census, data elaborations and projects, and how to deal with sensitive information are also defined
- The plan is finally approved by a Prime Ministerial Decree
- The latest Prime Ministerial Decree, which approved the three year plan for 2008-2010, was issued on August 2008 (G.U. 27/10/2008)
- Ministries, public agencies and other bodies are obliged to provide data and information specified in the annual statistical plan

National System & National Statistical System

- The main Sistan products, which are primarily necessary for the inventory compilation, are:

➢ National Statistical Yearbooks, Monthly Statistical Bulletins, by ISTAT (National Institute of Statistics);

➢ Annual Report on the Energy and Environment, by ENEA (Agency for New Technologies, Energy and the Environment);

➢ National Energy Balance (annual), Petrochemical Bulletin (quarterly publication), by MSE (Ministry of Economic Development);

➢ Transport Statistics Yearbooks, by MINT (Ministry of Transportation);

➢ Annual Statistics on Electrical Energy, by TERNA (National Independent System Operator);

➢ Annual Report on Waste, by APAT.

- The national emission inventory itself is a Sistan product.

National System & National Statistical System

Example of the main statistics provided within the Sistan

ENERGY

Energy statistics from MSE

- Import, export and consumption of petroleum products
- Import, export and consumption of carbon products
- Import, export and consumption of natural gas
- Uses of energy sources in industrial concerns with more than 50 employees (not carried out in the last 3 years)
- National energy balance
- Monitoring of the oil market
- Structure and activities of the extractive industry in Italy
- Prospection and production of liquid and gaseous hydrocarbons and geothermal prospecting
- Oil refinery production
- Petrochemical industry production
- Weekly prices of several petroleum products (super-grade petrol, diesel, etc.)

Energy statistics from ISTAT

- Annual survey of industrial production (Prodcom)
- Multipurpose survey of household consumption
- Monthly survey of industrial production
- Preparation of the Energy Use Tables
- Population and housing censuses
- Industry and service censuses
- External trade statistics

Energy statistics from TERNA

- Annual statistics on the production and consumption of electricity
- Monthly statistics on the production and consumption of electricity
- Monthly statistics on the demand for electricity
- Daily statistics on the demand for electricity
- Production and sales of heat from CHP plants
- National energy efficiency indicators
- Survey of energy consumption by small- and medium-sized enterprises (not carried out in the last 3 years)
- Survey of energy consumption by the tertiary sector (not carried out in the last 3 years)
- Survey of biomass consumption in the residential sector (not annual)

ENVIRONMENT

Environmental statistics from APAT

- Sustainable development indicators
- Agro-environmental indicator development
- Two-year OECD-Eurostat questionnaire on Waste, Air, Soil, Noise, Environment
- Surveys
  - Environmental radioactivity
  - Air quality
  - Municipal acoustic zoning
  - Quality of water suitable for fish
  - Quality of water suitable for molluscs
  - European inventory of pollution emissions
  - Electromagnetic pollution
  - Waste informative economic system
  - Wave data related to ten different Italian coastal zones
  - Waste

- Sea and coastal water quality
- CORINAIR emissions inventory
- Critical Loads mapping
- Georeferentiated national information system concerning high accident hazards
- National soil monitoring network
- Italian surface water monitoring activities

National System: *Inventory Planning*

➢ *elaboration of a QA/QC plan*

- APAT has elaborated an inventory QA/QC procedures manual which describes QA/QC procedures and verification activities to be followed during the inventory compilation process

- Specific QA/QC procedures and different verification activities which are implemented thoroughly the current inventory compilation, as part of the estimation process, are figured out in the annual QA/QC plan

- Future planned improvements are prepared for each sector, by the relevant inventory compiler; areas for sectoral improvement are identified in response to inventory UNFCCC reviews and other kind of processes.

National System: *Inventory Preparation*

- Activities include:

  - Estimation of emissions
  - Quantitative evaluation of uncertainty
  - Assessment of key categories
  - Implementation of QA/QC procedures
  - Recalculation
  - Basic independent review
  - Re-evaluation of the inventory planning process

National System: *Inventory Preparation*

- *Estimation of emissions*

Methodologies & basic data

- Methodologies are as far as possible consistent with the Revised 1997 IPCC Guidelines, IPCC GPG
- National methodologies are supported by referenced background documents
- CORINAIR Emission Inventory Guidebook is also used
- Activity data best available, proxy variables
- National EFs are integrated by default EFs (IPCC, CORINAIR, EPA) in case national data are not available

National System: *Inventory Preparation*

- APAT has established fruitful cooperation with a number of governmental and research institutions as well as industrial associations
- Activities aim at the improvement of provision and collection of basic data and emission factors and exchange of information on scientific studies
- When in depth investigation is needed, specific sector analyses are committed to ad hoc research teams or consultants
- APAT also coordinates with different national and regional authorities and private institutions for the cross-checking of parameters and estimates as well as with ad hoc expert panels
- Basic data, emission factors and methodologies used in the estimation process are consistent with the IPCC Guidelines and supported by national experiences and circumstances
- Final decisions are up to inventory experts, taking into account all the information available

National System: *Inventory Preparation*

Sources of Activity Data

SECTOR	ACTIVITY DATA	SOURCE
1 Energy 1A1 Energy Industries	Fuel use	Energy Balance - Ministry of Production Activities Major national electricity producers
1A2 Manufacturing Industries and Construction	Fuel use	Energy Balance - Ministry of Production Activities Major National Industry Corporation
1A3 Transport	Fuel use Number of vehicles Aircraft landing and take-off cycles and maritime activities	Energy Balance - Ministry of Production Activities Statistical Yearbooks - National Statistical System Statistical Yearbooks - Ministry of Transportation
1A4 Residential-public-commercial sector	Fuel use	Energy Balance - Ministry of Production Activities
1B Fugitive Emissions from Fuel	Amount of fuel treated, stored, distributed	Energy Balance - Ministry of Production Activities Statistical Yearbooks - Ministry of Transportation Major National Industry Corporation
2 Industrial processes	Production data	National Statistical Yearbooks- National Statistics Institute International Statistical Yearbooks-UN Sectoral Industrial Associations
3 Solvent Use	Amount of solvent use	National Environmental Publications - Sectoral Industrial Associations International Statistical Yearbooks - UN
4 Agriculture	Agricultural surfaces Production data Number of animals Fertiliser consumption	Agriculture Statistical Yearbooks - National Statistics Institute Sectoral Agriculture Associations
5 Land use change and forestry	Forest and soil surfaces Amount of biomass Biomass burnt Biomass growth	Statistical Yearbooks - National Statistics Institute State Forestry Corps National and Regional Forestry Inventory Universities and Research Institutes
6 Waste	Amount of waste	National Waste Cadastre - Agency for the Protection of the Environment and for Technical Services National Waste Observatory

National System: *Inventory Preparation*

Methods and Emission Factors

SUMMARY 3 SUMMARY REPORT FOR METHODS AND EMISSION FACTORS USED

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6	
	Method applied [1]	Emission factor [2]	Method applied [1]	Emission factor [2]	Method applied [1]	Emission factor [2]	Method applied [1]	Emission factor [2]	Method applied [1]	Emission factor [2]	Method applied [1]	Emission factor [2]
1. Energy												
A. Fuel Combustion												
1. Energy Industries	T3	CS	T3	D	T3	D						
2. Manufacturing Industries and Construction	T2	CS	T2	D	T2	D						
3. Transport	T1, T2a, C	CS	T1, T2a, C	C, CS	T1, T2a, C	C, CS						
4. Other Sectors	T2	CS	T2	C	T2	C						
5. Other	T2	CS	T2	C	T2	C						
B. Fugitive Emissions from Fuels												
1. Solid Fuels			T1	D, C,CS								
2. Oil and Natural Gas	T2	CS	T2, T3	CS								
2. Industrial Processes												
A. Mineral Products	D, T2	CS, PS										
B. Chemical Industry	D	C, PS	D	C, PS	D	D, PS						
C. Metal Production	D	C, CS	D	C, CS					T1, T2	PS	D	PS
D. Other Production												
E. Production of Halocarbons and SF_6							CS	PS	CS	PS	CS	PS
F. Consumption of Halocarbons and SF_6							T2a, CS	D, CS, PS	CS	PS	T3c, CS	CS, PS
G. Other												
3. Solvent and Other Product Use	**C**	**C, CS**			**CS**	**CS**						
4. Agriculture												
A. Enteric Fermentation			T1, T2	D, CS								
B. Manure Management			T1, T2	D, CS	D	D, CS						
C. Rice Cultivation			T2	CS								
D. Agricultural Soils					D	D, CS						
E. Prescribed Burning of Savannas												
F. Field Burning of Agricultural Residues			D	D	D	D						
G. Other												
5. Land-Use Change and Forestry												
A. Changes in Forest and Other Woody Biomass Stocks	T1, T2	D, CS										
B. Forest and Grassland Conversion												
C. Abandonment of Managed Lands												
D. CO_2 Emissions and Removals from Soil												
E. Other	T1, T2	D, CS	T1, T2	D, CS	T1, T2	D, CS						
6. Waste												
A. Solid Waste Disposal on Land			T2	D, CS								
B. Wastewater Handling			D	D	D	D, C						
C. Waste Incineration	D	CS	D	C	D	CS						
D. Other			CS	CS								
7. Other *(please specify)*												

(1) Use the following notation keys to specify the method applied: D (IPCC default), RA (Reference Approach), T1 (IPCC Tier 1), T1a, T1b, T1c (IPCC Tier 1a, Tier 1b and Tier 1c, respectively), T2 (IPCC Tier 2), T3 (IPCC Tier 3), C (CORINAIR), CS (Country Specific). If using more than one method, enumerate the relevant methods. Explanations of any modifications to the default IPCC methods, as well as information on the proper use of methods per source category where more than one method is indicated, and explanations on the country specific methods, should be provided in the documentation box of the relevant Sectoral background data table.

(2) Use the following notation keys to specify the emission factor used: D (IPCC default), C (CORINAIR), CS (Country Specific), PS (Plant Specific). Where a mix of emission factors has been used, use different notations in one and the same cells with further explanation in the documentation box of the relevant Sectoral background data table.

National System: *Inventory Preparation*

➢ *Quantitative evaluation of uncertainty*

- The uncertainty assessment helps to identify the key categories whose effect on the total uncertainty of the inventory is highest
- Uncertainty assessments have been calculated on the Italian greenhouse gas inventory from the inventory of 2001 onwards, recalculations only apply to the base year
- Quantitative estimates of uncertainty for the Italian GHG inventory are calculated using a Tier 1 approach as defined in the IPCC Good Practice Guidance, which provides a calculation based on the error propagation equations
- The assumptions on which uncertainty estimations are based are documented for each category. Figures to draw up uncertainty analysis are checked with the relevant analyst experts and literature references and they are consistent with the IPCC Good Practice Guidance

National System: *Inventory Preparation*

➢ *Assessment of key categories*

- A key source category is defined as an emission source that has a significant influence on a country's GHG inventory in terms of the absolute level of emissions, the trend in emissions, or both. Key source categories are those which, when summed together in descending order of magnitude, add up to over 95% of the total emissions

- A key source analysis has been carried out according to the Tier 1 and Tier 2 methods of the IPCC GPG

National System: *Inventory Preparation*

➢ *Implementation of QA/QC procedures*

- 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

- Procedures are applied thoroughly the inventory compilation and as part of the estimation process

- All the measures to guarantee and improve the transparency, consistency, comparability, accuracy and completeness of the inventory are undertaken

National System: *Inventory Preparation*

➢ *Recalculation*

- To meet the requirements of transparency, consistency, comparability, completeness and accuracy of the inventory, the entire time series from 1990 onwards is checked and revised every year during the annual compilation of the inventory

- Recalculations are elaborated on account of changes in the methodologies used to carry out emission estimates, changes due to different allocation of emissions as compared to previous submissions and changes due to error corrections, new information available

National System: *Inventory Preparation*

- Changes are also based on the observations of the different inventory review stages (internal and external evaluations by third parties involved in inventory issues), the review feedbacks received from the UNFCCC Secretariat on the previous inventory or from the European internal review, and other collected information

- Information on the major recalculations can be found in:

- sectoral and general chapters of the national inventory reports;
- relevant CRF tables;
- annual QA/QC plan.

National System: *Inventory Preparation*

➢ *Basic independent review*

- Regarding a basic review of the inventory provided by preferably an independent third party, before the submission of the inventory, as requested by the UNFCCC guidelines, different proposals for an independent basic review of the greenhouse gas emission inventory are under examination

- Difficulties are encountered not only in funding but in finding inventory experts, at national level, who are not involved in the preparation of the emission estimation process.

National System: *Inventory Preparation*

➢ *Re-evaluation of the inventory planning process*

- Whenever relevant changes in methodologies and emission estimates for key sources are planned, new methodologies and emission factors are chosen after consultation with the national experts also in the framework of the national sectoral expert panels. Internal reviews are also undertaken, comparing different methodologies, before modifications are included in the inventory

- The QA/QC plan is updated every year to re-evaluate the quality objectives of the inventory

National System: *Inventory Management*

- All the reference material, estimates and calculation sheets, as well as the documentation on scientific papers and the basic data needed for the inventory compilation, are stored and archived at the Agency
- The archive is organised so that any skilled analyst can obtain relevant data sources and spreadsheets, reproduce the inventory and review all decisions about assumption and methodologies made
- After each reporting cycle, all database files, spreadsheets and electronic documents used for the inventory compilation are archived as ‘read-only-files’ so that the documentation and estimates could be traced back during the review process or the new year inventory compilation
- A back-up copy of the annual master catalogue is also prepared

National System: *Inventory Management*

- Particular attention is paid to the archiving and storing of all inventory data, supporting information, inventory records as well as all the reference documents

- A ‘reference’ database which increases the transparency of the inventory has been developed. This database consists of references of all documentation used in 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