NATIONAL PROGRAMME FOR THE PROGRESSIVE REDUCTION OF ANNUAL NATIONAL EMISSIONS OF SULPHUR DIOXIDE, NITROGEN OXIDES, VOLATILE ORGANIC COMPOUNDS AND AMMONIA

December 2006

Executive Summary

Summary of implemented P&Ms

Background

The Directive 2001/81/EC on National Emission Ceilings (NEC) is aimed to limit air emissions of sulphur dioxide (SO_2), nitrogen oxides (NOx) ammonia (NH_3) and Volatile Organic Compounds (VOC) that can cause acidification and eutrophication, and that contribute to the formation of ground-level ozone. It has been transposed into the Italian legislation by the Decree 21 May 2004, n. 171 (D.Lgs. 171/2004).

The D.Lgs. 171/2004 establishes for Italy the national emission ceilings reported in Table 1 according to Annex I of the Directive 2001/81/EC.

Table 1: National emission ceilings for Italy

SO_2 (kton/y)	NOx (kton/y)	COV (kton/y)	NH_3 (kton/y)
475	990	1159	419

In order to fulfil the obligations on such ceilings, within 2010, Italy drew up the first programme for the progressive reduction of its national annual emissions, in 2003. Such national programme provides a detailed description of the policies and measures adopted, along with the expected emission reductions, as a consequence of such measures.

Moreover, Italy provides, and annually updates, the national emission inventories and the emission projections for SO2, NOx, VOC and NH3.

Description of the situation in Italy

Compared to 90's, a significant decrease in the emissions of the pollutants covered by the Directive 2001/81/EC has occurred, since abatement technologies have been introduced in the industrial and energy production sectors as well as low-sulphur fuels for civil and industrial usage. In particular reductions of SO_2, NOx, VOC and NH_3 respectively amount to about 72%, 40%, 36% and 8%.

The national legislation to achieve such reduction is

- D.P.R. 24 May 1988, n. 203 establishes that all industrial plants must be authorized and respect emission limit values set out taking into account the best available technologies;
- D.M. 8 May 1989 that establishes emission limit values for large combustion plants;
- D.M. 12 July 1990 that establishes emission limit values for existing industrial plants;
- D.M. 21 January 2000, n. 107 that establishes technical provisions for installation, vehicles

and ships employed in deposit, load and transport of gasoline;

- D.P.C.M. 7 September 2001, n. 395, that regulates the sulphur content in liquid fuels;
- D.P.C.M. 8 March 2002 that regulates the market characteristics of fuels and technological characteristics of combustion plants in civil and industrial sector;
- D.M. 16 January 2004, n. 44 that regulates VOC emissions from industrial plants.

The above Decrees have been recently repealed and transposed into the Section V of the framework Decree 3 April 2006, n. 152.

Concerning the transport sector, the potential of reduction of emission is, to a certain extent, associated with the introduction of progressively more stringent provisions related to the abatement technologies and characteristics of vehicle engines and the employment of low polluting fuels. Anyway, the slowness in the conversion of the park fleets and the increase in the vehicle average mileage have strongly influenced the emissions of some NOx and COV. On the other hand, many local and regional authorities also have planned and implemented non-technical measures (such as car pooling and car sharing, mobility management, Limited Traffic Zones, incentives to phase out old vehicles, etc.), whose potential of reduction is currently under investigation at national and regional level.

It should be also noticed that no significant changes in the geographical distribution of stationary emissions anticipated for 2010 has occurred.

Concerning the ground-level ozone, that is a secondary pollutant, concentration trends doesn't show as much improvement as in the other primary pollutants and the need of improving the knowledge of relevant factors, including meteorological-climatic conditions, which clearly contribute to the generation of such concentrations in the ambient air, is generally acknowledged.

Furthermore, it is currently on-going an extensive consultation with the regional expert, to achieve a national shared framework where measures planned at regional and national level are fully integrated.

In particular, the Italian Ministry for the Environment, Land and Sea, who establishes general rules concerning environmental issues to be applied at national level for environmental issues, coordinates regional and local policies with the aim of facilitating the establishing of shared rules and objectives in order to achieve the best air quality protection through a Working Group whose members are representatives of Regions and autonomous Provinces, Associations of Municipalities and for technical-scientific issues with representatives of the National Agency for Environmental Protection and Technical Services (APAT), the National Research Council (CNR) and the National Agency for New Technologies, Energy and the Environment (ENEA).

Among the objectives of such Working Group, there are

- the comparison and the harmonization of national and regional/local emission inventories according to a top-down and a bottom up approach.
- the widespread use of integrated assessment models to estimate the effectiveness of the measures applied, at local, regional and national level, in order to perform a cost-benefit assessment of pollution reduction in the atmosphere and
- the harmonization and the communication of the measures implemented, at regional level, according to article 8 of Directive 96/62/EC.

Emission Inventories and projections for 2010

According to the article 4 of the Decree 21, May 2004, n. 171, which embodies the Directive 2001/81/EC into the national legislation, the Agency for Environmental Protection and Technical Services (APAT) of Italy and the Italian National Agency for New Technologies, Energy and the Environment (ENEA) draw up, respectively, the emission inventories and projections.

In particular, APAT, which is the *National Reference Centre* in Italy of the European Environment Agency (EEA), develops the national emission inventories according to the EMEP/CORINAIR Guidebook (2005), produced for the UN/ECE Convention on Long-range Transboundary Air Pollution (CLRTAP)[1] and published by the EEA, as established in the Annex III of the Directive 2001/81/EC.

On the other hand, ENEA elaborates the emission projections by the RAINS-Italy Model, the Italian version of the Integrated Assessment Model *Regional Air Pollution INformation and Simulation* (RAINS), developed by the International Institute for Applied Systems Analysis (IIASA, Laxenburg, Austria)[2] for the purposes of the modelling analyses under the UN/ECE Convention LRTAP to Abate Acidification, Eutrophication and Ground-level Ozone, and also used in the review process of the NEC Directive of the European Commission.

Concerning the final emission inventories, in the following table the aggregated values for the years 2000, 2001, 2002, 2003 and 2004 as well as the provisional data for the 2005 are reported.

Table 2: Final national emission inventories for the years 2000, 2001, 2002, 2003 and 2004 and provisional figure for the year 2005

	Emissions (kton/y) 2000	Emissions (kton/y) 2001	Emissions (kton/y) 2002	Emissions (kton/y) 2003	Emissions (kton/y) 2004	Emissions (kton/y) 2005*
SO_2	771	736	664	506	477	450
NO_x	1.367	1.353	1.261	1.253	1.233	1121
COV	1.542	1.443	1.341	1.312	1.264	1234
NH_3	433	446	447	424	422	415

* Provisional figures

According to the NEC Directive, Italy submitted to the European Commission the national programme in 2003. The national emission projections available at that time evidenced difficulties in respecting NOx and NH_3 ceilings. Nevertheless, the latest projections (August 2006), shows that the 2010 emission ceilings would

1 http://www.unece.org/env/lrtap/

2 http://www.iiasa.ac.at/rains/

be respected for SO_2, VOCs and NH_3.

Then again, the emission projections at 2010 for NOx, calculated on the basis 2006 parameters, show compliance with the ceiling (865 kton versus the national emission ceilings of 990 kton), if the same methodology, as that for the 1998 negotiate for the NEC Directive, is employed. But, such national projections reach 1.057 kton, exceeding the ceiling of 67 kton, if the successive modifications in the EMEP – CORINAIR methodology are taken into account (Table 3).

Table 3: Emission projections calculated at the year 2010

	Ceilings 2010	**Emission projections (kton/y) 2010**
SO_2	475	376
NO_x	990	1.057 - 865
COV	1.159	940,97
NH_3	419	416

In figure 1 a synthetic representation of the progressive reduction of national emissions is reported.

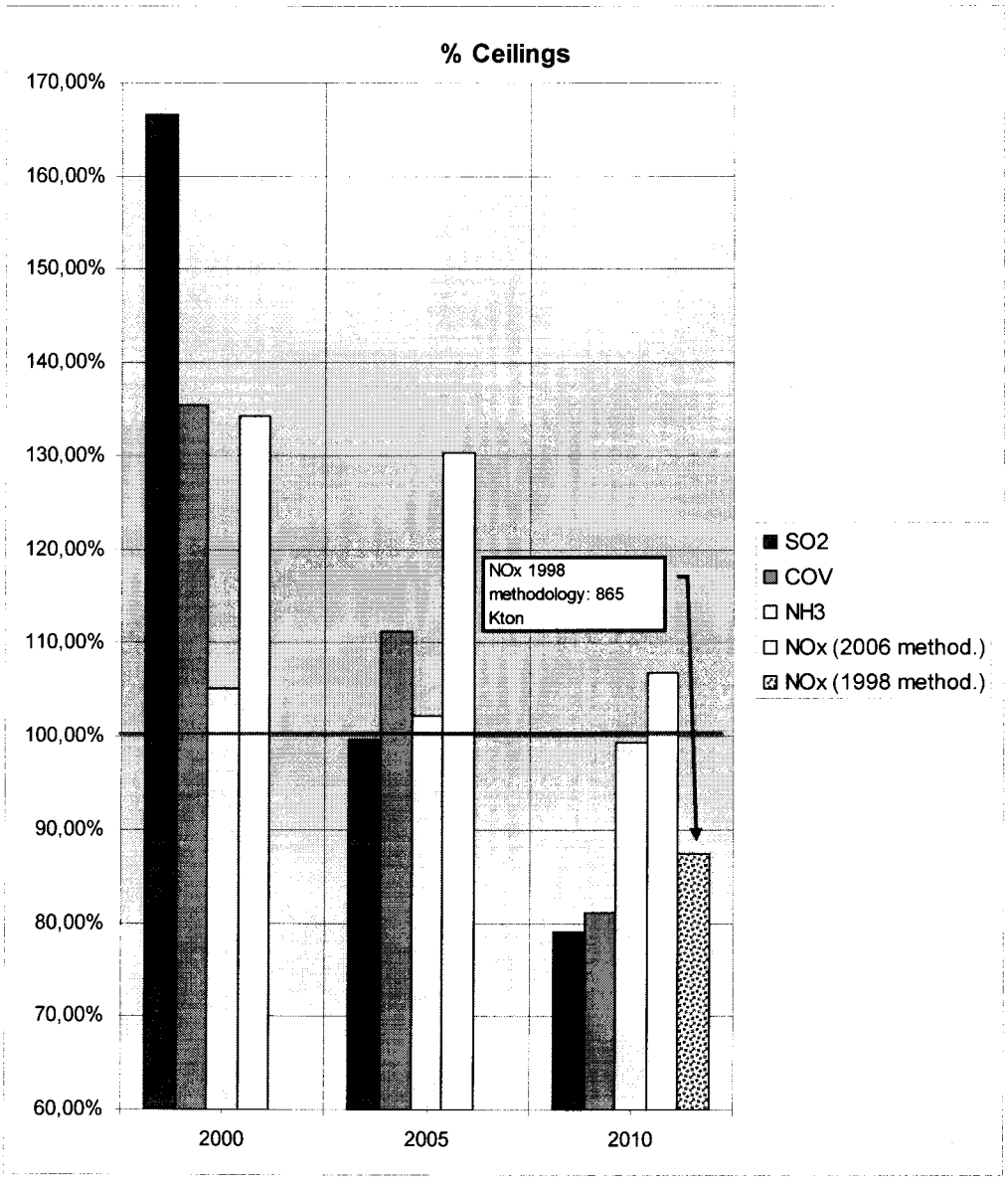

Figure 1: Attainment of national emission ceilings in Italy calculated on the basis 2006 parameters

Main methodological revisions are due to

1. the review of the removal efficiencies of the abatement technologies applied to road light & heavy duty vehicles
2. a different share in the fuel consumptions in the maritime transport sector from the year 2000.

Concerning the point 1, a recent study acquired by the European Commission (ARTEMIS) has demonstrated that the NOx removal efficiencies, associated to the diesel vehicles, are significantly lower than the values known at the time of establishing the NEC ceilings (1998). Consequently, the UN/ECE Task – force on Emission Inventories and Projections has updated the EMEP – CORINAIR methodology parameters. As a result, with the current activity levels, the calculated NOx emissions are significantly higher.

Concerning the point 2, article 2 of Directive 2001/81/EC establishes that the emissions from international maritime traffic are not covered. Nevertheless, the significant share of emissions from the international maritime traffic, taking place among national ports, has been introduced into the calculations, even though Member States have absolutely no control on such transport sub-sector consumptions and related emissions.

In the following table, differences in emission estimates are quantified.

Table 4: Differences in emission estimates due to the update of the EMEP – CORINAIR methodology

	Methodology used in 1998 (kt NOx)	**Methodology updated in 2005 (kt NOx)**	**Difference (kt NOx)**
2010 NOx emissions from the road vehicles (TRA_RD kton)	304	425	+ 121
2010 NOx emissions from Maritime transport sector (TRA_OTS kton/y)	31	101	+ 70

In the 2003 national programme also ammonia was indicated as a NEC pollutant that might exceed the national ceiling. Recent studies, carried out at national level, have shown as, in the past, the ammonia emissions have been overestimated and that the current 2010 projection is expected to be below the ceiling. Currently, a further revision of emission factors related to fertilizers and studies on the penetration of good practises are on going. Results of such activities are expected to further reduce the estimated projection of ammonia emissions.

Will the national ceilings be achieved for: (*) Projections calculated according to the methodology used for the 1998 negotiate of NEC Directive, as expressed in the previous paragraph.	SO_2	X Yes ☐ No
	NOx (*)	X Yes ☐ No
	VOC	X Yes ☐ No
	NH_3	X Yes ☐ No

Further measures introduced to achieve the national emission ceilings

An accurate comparative analysis of the possible further measure, in terms of cost/efficacy, has been carried out, sector by sector. In particular, the following criteria have been taken into account:

- *feasibility*: practicability of the implementation;
- *environmental efficacy*: efficacy in achieving the environmental objective (in terms of options);

- *economic efficiency*: efficiency with regard to abatement costs (in terms of options);
- *distributive effects*: minimum impact on the competitiveness of the system, well accepted both by private companies and by consumers.

Studies showed that a significant margin of reduction can be obtained in the following sectors:

- *industrial sector*: adoption of best available technologies (BAT) in the old large plants according to authorisation (environmental permit), as required in 2007 by the annex I of Directive 96/61/EC concerning integrated pollution prevention and control (IPPC).
- *transport sector*: implementation of technical measures according to Directives on additional measures on light and heavy duty vehicles and non-technical measures, such rationalization and promotion of public transport for the general population and goods. An ENEA study on "*Policy instruments for NOx emissions reduction in Italy*" has also shown as in the Sea Transport, a high potential of emission reduction, associated to quite low marginal costs, exists.
- *tertiary industrial and residential sector*: measures to increase the usage of more efficient household heating plants and appliances and the energy efficiency of buildings; adoption of innovative technologies, usage of low pollution fuels and energy renewable sources.

Other information http://www2.minambiente.it/sito/settori_azione/iar/iam/emissioni/nec.asp http://www2.minambiente.it/sito/settori_azione/iar/iam/emissioni/studi_CE_25_10_2006.asp	A summary of the results of the national expert studies are reported on the web site of Ministry, in the page dedicated to the emission inventories and projections prepared according to the NEC Directive.