

Air Quality Improvement Plan in Aosta Valley Region

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The Aosta Valley region

Aosta Valley is the smallest region in Italy. It is located on the north-west of Italy where the Alpine chain reaches its highest elevation. Its geography is characterised by long, regular and deep valleys and by wide mountain sides. The relief influences very strongly the meteorological conditions and the phenomena of transport and dispersion of pollutants in the ambient air.



In the mountain zones, the pollutant sources are rare and in general localized, but the high natural environmental value makes very important to maintain condition of clean ambient air.

European and Italian legislation

The Directive 96/62 of the European Council and its four Daughter Directives (1999/30/EC, 2000/69/EC, 2002/3/EC, 2004/107/EC) set the limit values for the most important atmospheric pollutants, such as fine particulate matter, nitrogen dioxide, sulphur dioxide, ozone and benzene. The Directive 96/62/CE also gives the basic principles of a common strategy for the Member States to maintain ambient air quality where it is good and to improve it in other cases.

The Italian Government has implemented the European directives with the law decrees 351/99 and 261/02, for the compilation of air quality plan, and the decree 60/02 for the limit values.

According to all these directives and national laws, the Regional Administration of Aosta Valley started in 2005 the compilation of a regional plan to improve air quality. After the assessment of the current air quality, made by the Regional Environment Protection Agency (ARPA Valle d'Aosta), the Regional Administration has established some measures to reduce the pollutant emissions and to improve ambient air quality.

AIR QUALITY ASSESSMENT

The first step to compile the regional plan was the assessment of air quality for the year 2004. An integrated approach was used by ARPA, the Regional Environment Protection Agency, to evaluate air quality state in the whole region. The integrated assessment of ambient air quality means that the evaluation is made combining the measurements of the Air Quality Monitoring Network, the knowledge of the pollutants sources in the region and a numerical modelling system to calculate the air pollutant concentrations in the whole region. In such a way, the pollutant levels can be related to local sources.

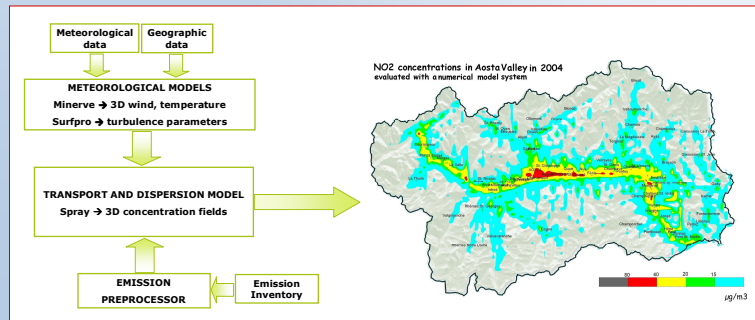
Measurements

The reference pollutant levels are the concentrations measured in Aosta Valley in the year 2004 by the Regional Air Quality Monitoring Network (managed by ARPA). The higher concentrations were measured in Aosta, the main town of the region (see table below). In the monitoring stations of the secondary valleys the pollutant concentration levels are low.

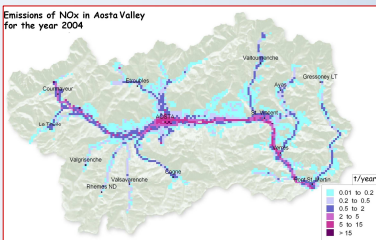
Aosta town	Limit values for the protection of human health		Measured value
NO ₂	Hourly limit value	200 µg/m ³ , not to be exceeded more than 18 times a year	1 hour exceeding
	Annual limit value	40 µg/m ³	25 µg/m ³
PM10	24-hour limit value	50 µg/m ³ , not to be exceeded more than 35 times a year	50 days exceeding
	Annual limit value	40 µg/m ³	33 µg/m ³
Benzene	Annual limit value	5 µg/m ³	4 µg/m ³

Modelling system

The modeling system used to evaluate the hourly concentration levels of atmospheric pollutants is based on a diagnostic model named MINERVE to reconstruct the 3D wind and temperature fields using meteorological measured data (local ground stations and radiosoundings). The atmospheric turbulence scale parameters are computed using the meteorological pre-processor SURFPRO, that can take into account mountain slopes and shadow projection. The Lagrangian particle model SPRAY is finally used to simulate the atmospheric transport and dispersion of pollutants. The results of the numerical simulations for the NO₂ concentrations in the year 2004, expressed as annual means, are shown in the figure below.



Regional Emissions Inventory



The emissions inventory is managed and regularly updated by ARPA Valle d'Aosta, taking in consideration most of the pollutant sources in the region: traffic along local roads and highways, international traffic, heating systems, industries, waste management, agricultural and natural sources. The figure on the left shows the NOx emissions in the whole region in the year 2004.

REGIONAL TERRITORY ZONING

The second step of the work was the subdivision of the regional territory in three zones referring to different levels of air pollution:

- ✗ the improvement area, where there are some limit values not respected (nitrogen dioxide, particulate matter);
- ✗ the protection area, where the pollution level is near the limit values;
- ✗ the preservation area where the pollutant concentrations are very low.



The figure shows the region subdivision based on air quality levels.

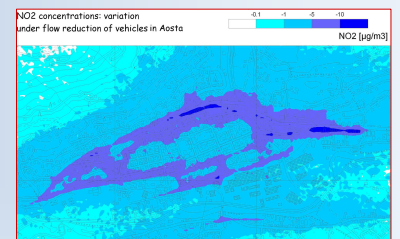
EMISSIONS REDUCTION SCENARIOS

In order to establish some measures to improve the air quality, an analysis of future emission scenarios has been made by the ARPA Valle d'Aosta considering:

- ✗ the vehicle fleet evolution for the years 2010 and 2020;
- ✗ the reduction of the flow of private cars and light duty vehicles in Aosta town;
- ✗ the reduction of the industrial emissions in Aosta town;
- ✗ the measures provided by the Regional Energy Plan (regional law 3/2006).

The effects of these scenarios have been evaluated using the modelling system previously described.

In the figure on the right is shown an example of the impacts evaluation of one emissions scenario.



MEASURES TO IMPROVE AIR QUALITY

Using the results of the emission reduction scenarios, for every zone particular measures on traffic, energy, industry, have been established in order to reduce the pollution levels:

- ✗ transport sector: the measures will act on mobility - to increase public transports and reduce the use of private cars, on commercial transports - to reduce the number of light duty vehicles in the centre of Aosta town and of commercial trucks along the highways, on the technological renewal of private and public means of transport;
- ✗ energy sector: a lot of measures have been planned for the energy efficiency of buildings and for a major usage of renewable energy sources;
- ✗ industrial emissions: the plan provides for the definition of limits for the atmospheric emissions and for the technological improvement according to BAT (Best Available Technologies).

An important part of the plan is the monitoring of air quality using not only the classical measurements made by the monitoring network, but also using innovative methods, such as the characterisation of particulate matter and the measurements of atmospheric depositions. The monitoring is made by ARPA.

Time schedule, costs, priority and waiting results have been defined for every measure.

The improvement plan also contains a programme for monitoring the efficacy of the measures. Every year the regional administration makes a recognition of the progress in fulfilment of the measures. Every three years, the regional administration with the help of ARPA has to check the improvement of air quality levels using the integrated method. If the pollutant levels don't reduce, the planned measures are going to be revised in order to ensure the improvement of air quality.

The Air Quality Improvement Plan as Regional Law

In January 2007, the improvement plan for air quality became a law of the Aosta Valley region; it was past as "Disposizioni in materia di tutela dall'inquinamento atmosferico ed approvazione del Piano regionale per il risanamento, il miglioramento ed il mantenimento della qualità dell'aria per gli anni 2007/2015" (http://www.regione.vda.it/territorio/piano_aria).

Currently, the Regional Administration is carrying out the measures for the air quality improvement and is checking if the measures are really implemented and if the air quality is improving.