

## A. ATMOSPHERE/AIR POLLUTION

Government focal point(s): DG Environment

Responding ministry/office(s): DG Environment

### Introductory Remarks

The **main air pollution challenges** in the EU are health damage due to exposure to ozone and particulate matter, ecosystem damage due to acidifying and eutrophying compounds and damage to vegetation and crops due to ozone. In order to address the main environmental challenges, the Community has in 2002 adopted the 6<sup>th</sup> Environmental Action Programme<sup>2</sup> (6<sup>th</sup> EAP). The European Commission has a leading role in environmental protection and air pollution policy for the Community, being responsible for comprehensive analyses programs of problems, options for solutions and cost-benefit analyses and proposals for legislation. These programs are performed in consultations with various stakeholders in the EU, such as industry, NGOs and the EU Member States.

The Community air pollution policy hinges on three dimensions: regulation on specific sources and fuel quality, national emission ceilings of certain air pollutants and air quality standards which apply everywhere in the EU. It also hinges on the citizens right to know about air pollution, emissions, air quality and effects. The development of Community air pollution policy is closely linked to the climate change policy. Synergies have been found and win-win situations explored. Thus a maximum of policy options could be realised for both policy areas.

There is a close correspondence between the EU legislation and the UNECE Convention on Long Range Transboundary Air Pollution and its protocols in air emission policies. In most cases the limit values of the EU are the same as those of the Convention, thus potentially influencing a larger area than the EU.

### Air pollution policy in effect in the EU

The Community air pollution policy dates back to 1970 when the first regulation on emission standards (carbon monoxide and hydrocarbons) for newly produced light vehicles entered into force. Later, in 1984, also air pollution from stationary sources such as industrial plants and energy industries were addressed requiring the application of best available technology cover the most important air pollutants. This legislation has been updated and amended several times to address new issues and also to take into account technical and economic development. Also other types of transport vehicles and off-road machinery are included in Community legislation.

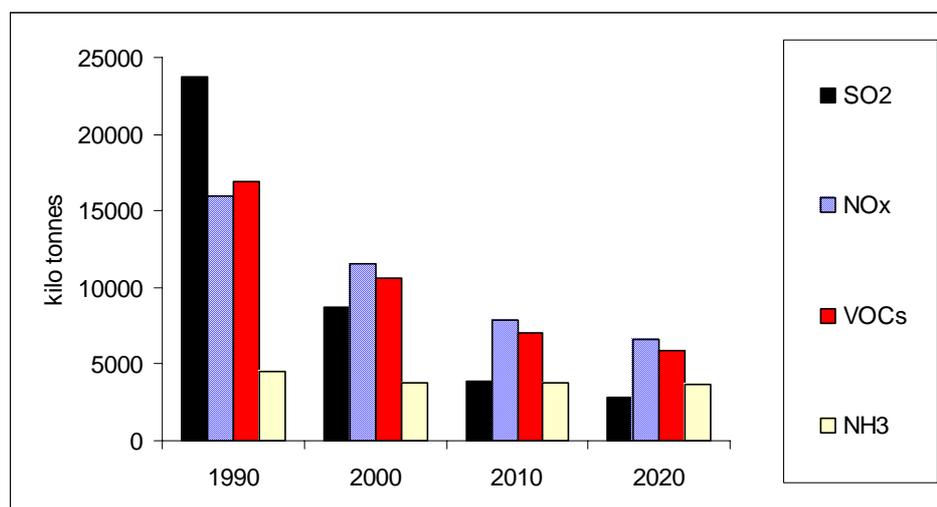
Directives related to air pollution presently include **stationary sources** (including energy plants and industry), **mobile sources and products**, **national emissions ceilings** to cap total emissions and **air quality standards** as well as policies on transport modes such as **shipping**. Other directives have a direct or indirect influence on the emissions of air pollution as well, such as energy efficiency requirements of products and energy efficiency for heating of buildings.

The Community policy on air pollution has been very effective in areas where common directives have been adopted and come into force. Within the present EU the emissions of most “classical” air pollutants have been reduced by substantial amounts and the already adopted legislation will have decisive effect

<sup>2</sup> Decision No 1600/2002/EC of the European Parliament and of the Council laying down the Sixth Community Environment Action Programme (OJ L 242 of 10/9/2002)

also in the future as provisions already decided come into effect and due to the phase in of new installations and new vehicles. For areas where a specific air pollution policy is yet to be developed, such as agricultural emissions of ammonia, the emissions have remained essentially unchanged.

Fig. EU-25 land-based emissions of pollutants from 1990 to 2020



Source: CAFE Baseline final report. Land-based emissions of pollutants covered by the NECD

### National emission ceilings

In addition to source specific legislation, the Community has legislation to address the transboundary nature of air pollution where one country's emissions influences another one leading to adverse effects on human health and the environment due to ground-level ozone, acidification and eutrophication, The National Emission Ceilings Directive<sup>3</sup> (NEC) sets upper limits for each Member State for the total emissions in 2010 of the four groups of pollutants sulphur dioxide, oxides of nitrogen, volatile organic compounds and ammonia. The exact implementing measures to achieve these limits are to be decided and implemented by the Member States. The emission ceilings are designed to meet interim objectives for acidification and ozone exposure, and are meant to be achieved in a cost-effective manner.

Parallel to the development of the NEC Directive, the EU Member States together with Central and Eastern European countries, the United States and Canada have negotiated the new "multi-pollutant" protocol under the UNECE Convention on Long-Range Transboundary Air Pollution (the so-called Gothenburg protocol, signed in 1999 and entered into force as from 2005). The emission ceilings in that protocol are to a large extent the same as those of the EU directive but in some cases slightly less ambitious.

### Ambient air quality standards

The ambient air quality standards are set to reduce, mitigate and avoid adverse effects on human health and the environment. The present legislation consists of a framework directive<sup>4</sup> and four specific direc-

<sup>3</sup> Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants.

<sup>4</sup> Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management and Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides

tives on air pollutants. Air quality standards are either expressed as limit values that have to be achieved by a certain date or target values for which the standards should be achieved wherever possible. The air pollutants with limit values include sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead, benzene and carbon monoxide. The air pollutants with target values include ozone and the heavy metals arsenic, cadmium, nickel and Benzo(a)pyrene. For mercury there is only a requirement to monitor the pollutant.

It should be pointed out that the air quality standards for ambient air apply everywhere in the territory of the EU, except in areas that have been explicitly exempted (such as work places). In the event the air quality standards are not met, the Member States, or competent authorities thereof, will have to develop plans and programs to achieve the air quality objectives. Such plans could include both restricting activities and setting more stringent emission standards.

### **Shipping emissions**

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Within a decade or so, air pollutant emissions from seagoing ships in EU waters (or in their direct vicinity) are projected to be larger than those from all EU land based sources put together, because of the relatively poor quality of marine fuel and the lack of engine abatement measures. Thus it will be important to take further action to reduce ship emissions in order to achieve the long term air quality objectives of the EU.

In 2002, an EU strategy to reduce atmospheric emissions from seagoing ships was adopted. The strategy reports on the magnitude and impact of ship emissions in the EU and sets out a number of actions to reduce the contribution of shipping to acidification, ground-level ozone, eutrophication, health, climate change and ozone depletion.

The EU has adopted new legislation (to be published in 2005) that requires ships to use lower sulphur fuels in EU sea areas. The directive will reduce the sulphur content of marine fuels from the current average 2.7%, to 1.5% for fuels used by all ships in the Baltic Sea and by all passenger vessels on regular services between EU ports, from twelve months after publication; and the same 1.5% sulphur limit for all ships in the North Sea & Channel from autumn 2007. The directive also introduces a 0.1 % sulphur limit on fuel used by inland vessels and by all seagoing ships at berth in EU ports, from 1 January 2010.

### **Lessons learned and good practices**

The above-mentioned directives set emission limit values and quality standards for a number of air pollution sources and allow for sufficiently lead time for the sectors to adapt to the new conditions. In some cases flexibility has been built into the legislation, such as for large combustion plants where individual Member States may introduce alternate so called national plans to reach the same objectives as following the limit values. The involvement of the stakeholders in the programs and in the preparation of legislation has been a key factor for its success.

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of nitrogen, particulate matter and lead in ambient air, Directive 2000/69/EC of the European Parliament and of the Council of 16 November 2000 relating to limit values for benzene and carbon monoxide in ambient air, Directive 2002/3/EC of the European Parliament and of the Council of 12 February 2002 relating to ozone in ambient air and Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air.

A major lesson learnt is to consider all sectors that contribute to the problem so that cost effective measures can be taken. One example is the role of shipping emissions that have been excluded in earlier analyses and policy options and has escaped regulation due to lack of appropriate international action. Another aspect to consider is the role of air pollution coming from outside the European Union through long distance transport which may prevent the Community from achieving its environmental objectives.

### **Trends and emerging issues**

The stationary sources and transport are key sectors for the reduction of greenhouse gases and of air pollutants harming human health and the environment. A number of countries are presently building more capacity for power generation, both for meeting the increased demand of electricity but also to replace old installations. Transport is also continuously increasing both within the EU as well as into and out of the EU. With the present trend the shipping emissions in EU waters are projected to be higher than the total of land based sources within a decade.

### **Constraints and challenges**

The constraints and challenges vary between the different sub-sectors. The main constraint and challenge for the stationary sources is that not all sub-sectors are covered by legislation. One example would be the power generation sector where the directive covers only plants larger than 50 MW<sub>th</sub>. For the transport sector the main challenge is the increasing volumes of transport, generating both air pollution and other nuisances (noise, congestions) as well as using other limited resources (such as land) in a non-sustainable way. Both for stationary and mobile sources of air pollution a major challenge is to manage demand and to also “turn over the stock” of old existing plants and vehicles. A further challenge is the issue of assessing the real emissions from various sources so that relevant measures and policy instrument can be developed, one example of this would be the real emissions from traffic which may be rather different from those assessed in the test cycles for certification of compliance of emission standards.

For shipping the challenge would be to find measures to implement at the Community scale and to have a basis for action in international forum such as the International Maritime Organisation (IMO).

### **Recent developments - Clean Air For Europe (CAFÉ) and a Thematic Strategy on Air Pollution**

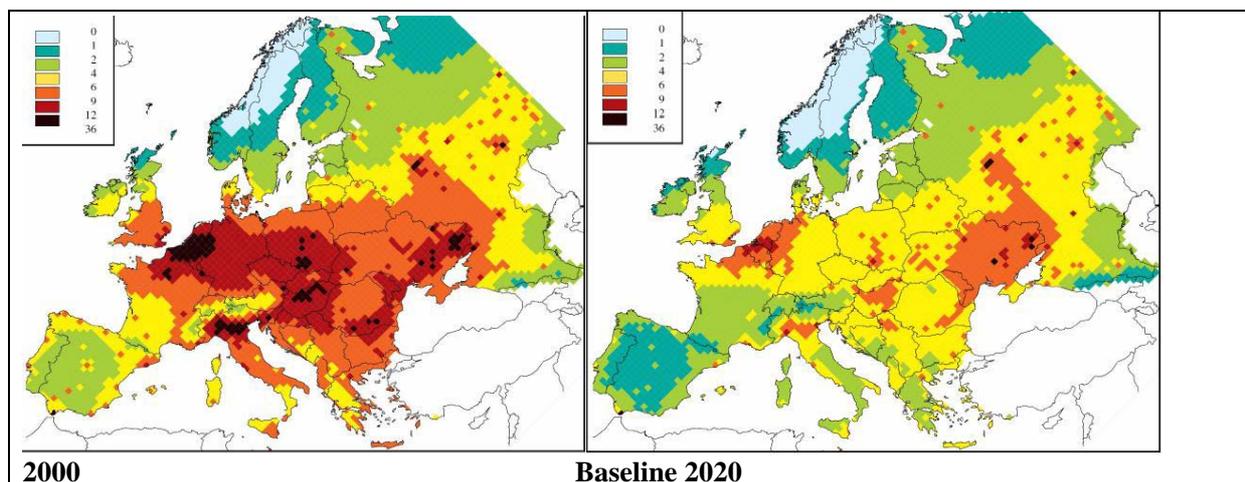
Clean Air for Europe is a program that started in 2001 with the objective to analyse the present and future air pollution situation in the enlarged EU and also to assess the policy options to reach interim and long-term objectives. The long-term objective of the Strategy would be - as outlined in the 6<sup>th</sup> EAP - to achieve an air quality that does not give significant negative effects on human health and the environment. *The Strategy is expected to be adopted by the European Commission in late 2005.*

The analysis of air pollution in the EU identifies both the present and future situation with respect to emissions, air pollution and effects on human health and the environment. Several options of environmental targets have been investigated and explored for cost effectiveness and assessed through cost-benefits analysis. The present air pollution policies will improve the situation for acidification and eutrophication and air quality in general. However, some major effects will still remain such as severe impact on human health due to particulate matter (PM<sub>2.5</sub>) and ozone and widespread damage to the ecosystems due to ozone and eutrophying substances.

Further measures are needed to reduce these effects and to achieve the long term objectives. Potential measures would include transport, industry, power generation and small scale installations for heating. Also the overall emissions of the Member States need to be reviewed and the review can be a basis for revision of the Directive on National Emission Ceilings (2001/81/EC) and other source directives, includ-

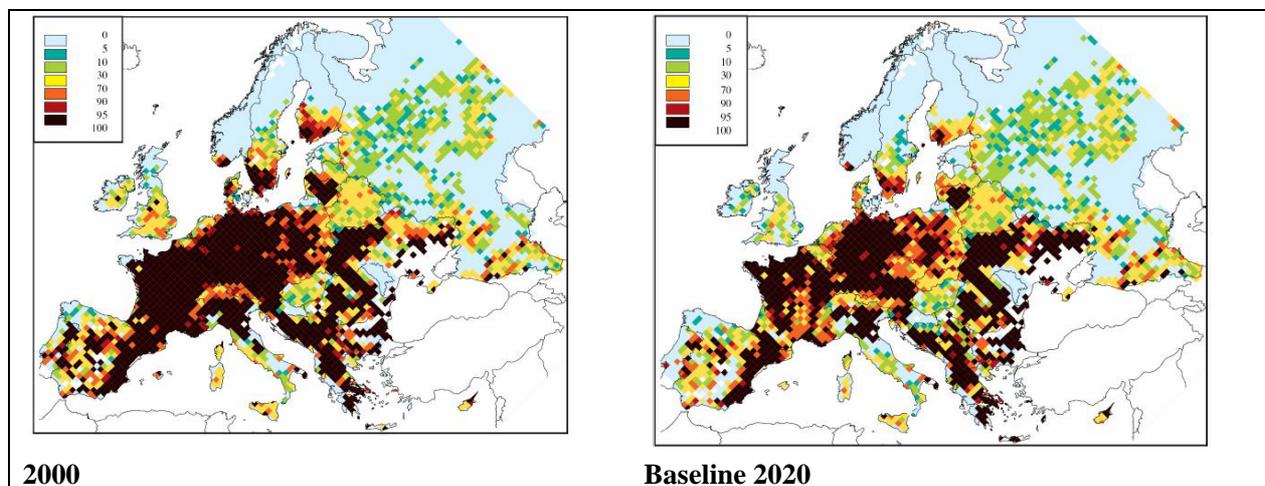
ing new emission standards for vehicles and other products. In view of the new findings of adverse health effects of air pollution on human health, and in particular for the particulate matter also new air quality standards focusing on the finer fraction  $PM_{2.5}$  would be under consideration.

Figure Loss in life expectancy attributable to anthropogenic  $PM_{2.5}$  in 2000 and 2020 (Results from the CAFE program)



Source: RAINS. Note: Calculation based on meteorological conditions of 1997.

Figure Evolution of the percentage of the total ecosystem area receiving nitrogen deposition above the critical loads for nutrient nitrogen in 2000 and 2020 (Results from the CAFE program)



Source: RAINS. Note: Calculation results are based on meteorological conditions of 1997, using grid-average deposition. Critical loads data base of 2003.

### **Lessons learned and good practices**

The CAFE program has been highly successful in using the knowledge base approach to analyse the policy options and also successful because of its wide consultations with European stakeholders. An important lesson learnt has been the free and open access of information<sup>5</sup> for all stakeholders in the process.

### **Trends and emerging issues**

The CAFE program has shown that air pollution causes major impact on human health and the environment throughout the EU. The main damage is due to airborne particulate matter, ozone and other harmful substances, like acidifying and eutrophying components. Substantial emissions reductions would be needed to reach the long-term objectives of the 6<sup>th</sup> EAP. Furthermore, as emissions go down in Europe the emissions outside Europe grow in relative importance (local and regional problems remaining the main sources). Another important finding of CAFE is that in order to reach the objectives in a cost-effective way, all sectors have to contribute to emission reductions, including those where only few measures have been taken such as in agriculture, international shipping and aviation and on domestic heating.

For air quality a main trend is the difficulty to attain the air quality limit values and target values in most of the EU Member States, in particular in the larger cities. Plans and programs at the regional or local level have to be developed to meet the objectives and in many cases this would be essential for improvements. However, in many cases also Community action may be needed to achieve the objectives.

### **Constraints and challenges**

The main constraint for achieving the objectives of air quality policy as reflected in the 6<sup>th</sup> EAP is mainly the cost of implementation, although the benefits of action ( i.e. reduced externalities) generally are substantially larger than the cost. A main challenge is to find the most effective way of implementing the measures (choice of policy instrument), and to find the right balance between community and national programmes. A Strategy on Air Pollution, as announced in the 6<sup>th</sup> EAP, should be adopted by the Commission in 2005.

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<sup>5</sup> Available at <http://europa.eu.int/comm/environment/air/cafe/index.htm>