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European Air Pollution Policies/strategies, a discussion paper

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Aims and objectives

One of the objectives of the sixth EAP is to establish “-----a high level of quality of life and social well being for citizens by providing an environment where the level of pollution does not give rise to harmful effects on human health and the environment.”

The sixth EAP defines non-exceedance of critical loads and levels as the long term objective for acidifying and eutrophying substances.

Current state

There have been considerable progress in air pollution policies and also the health/environment situation have improved significantly in Europe since 1990. But still we do have a serious problem. Particulates give rise to more than one year reduced life expectancy for the quite large European population. Oxidants will give a premature death for more than 10 000 people every year. Critical loads for acidification and eutrophication is being exceeded over large areas. The air quality directives for NO₂, O₃ and PM 10 will be exceeded in many of the large urban areas, 2005/2010.

The base-line scenario

IIASA has made calculations for the emissions 2010 and 2020 based on a business as usual scenario, the base-line scenario. The emissions of especially SO_x but also NO_x, VOC and particulates (PM 2,5) will be reduced substantially from 2000 till 2020. For land based sources about 65 % for SO_x and about 45 % for the other substances. The naval sector will increase its emissions but still there is a total reduction, especially for SO_x.

For NH₃ it is worse, it is almost a stand still even if it is a bit below the demands in the NEC directive. The NH₃ will be more problematic because it will control most of the acidification when SO_x goes down.

The preliminary calculations with the RAINS model for the base line 2020 shows an improvement for the exposure and the health effects, from about a year to 5 months reduced life expectancy. 5 months is still a considerable health effect.

The calculations of critical loads/levels for acidification/eutrophication show not that much of improvement you could expect. There will still be large areas with exceedances.

If you use AOT 40 as the criteria for effects of ozone, then especially southern Europe will be affected. If you use the uptake of ozone then there will also be effects of importance in northern Europe.

To sum up, the air pollution problems in Europe will not be solved using a business as usual scenario.

Policy scenarios

There are obviously a very interesting scenario, a post-2012 climate measure scenario for 2020. If Europe shall have a chance to meet CO₂ reductions of about or more than 50 % till 2050, we have to make significant progress till 2020. One possible scenario is 20 % reduction of CO₂ till 2020. Such a scenario will give important effects with regard to reduction of SO_x, NO_x, VOC and particulates.

As mentioned above, NH₃ will be the most important substance connected to acidification. A scenario including the CAP policy will be introduced. But there is a need for a more far-reaching scenario on the agricultural side, to see if the NH₃ emissions can be reduced in a cost efficient manner.

The cost-benefit studies

The CAFE cost-benefit scenarios made by AEA Technology and the Merlin project have not been finalized yet. Previous studies made as a basis for the NEC directive showed quite clearly that almost all countries benefited from abating air pollution as required by the G5/2 scenario, a more far-reaching scenario than the Gothenburg protocol. Benefits were two to five times the calculated abatement costs. It is the high costs related to the health impact that give rise to the high figures on the benefit side. Very probably this will be the case also this time for 2020 even with more costly abatement programs.

An European air pollution policy-strategy

The strong driving forces to reduce emissions of SO_x, NO_x, VOC, particulates and NH₃ are the climate change effects and the health effects. The latter according to particulates and ozone. There are good possibilities to find common solutions. A joint strategy to reduce CO₂ and CH₄ together with the air pollutants will be cost effective. The instruments and incentives from the air side will first of all be the ones for which there are experience.

We do already have experience with three legislative tools to reduce air pollution at the EU level, the air quality directives, the NEC directive and a number of source directives for automobile exhaust, the LCP directive, the IPPC directive, the VOC directive, the directive for non-road vehicles, there are some more. These three tools have worked effectively together even if there are obvious problems. One of these is linking the different scales together, urban, regional and hemispheric.

Source oriented directives

There is a lot of work going on relating to the EU emission standards for vehicles and there are also proposals for passenger cars, for heavy duty cars, for diesel and petrol driven cars. The NO_x, VOC and particulate emissions can be reduced further. There is a similar development going on in North America. There is an obvious need to reduce the emissions as much as possible and a good starting point for the discussion is the German (UBA) proposal for further reductions, Euro V, model year 2008 and 2010.

The LCP directive is important and is now being implemented in countries. The time scale for meeting the limit values are for some installations rather long and it should be analyzed and assessed if they can be shortened.

In the CAFE program there is an important study about combustion plants less than 50 MW. Small scale installations can have significant particulate emissions and larger plants are important SO_x and NO_x emitters.

Stage II for the fuel recovery systems will be a cost effective measure to reduce VOC emissions for the EU as a whole.

Shipping is an obvious and growing source of SO_x and NO_x emissions and it is very important to find incentives for reduction of emissions. The solution have to be found at the EU level but with consideration of the IMO annexes. Some countries do have economic incentives which have been effective.

For the agricultural sector there are recommendatory annexes in the Gothenburg protocol and work is going on to develop them further. This sector is dominating the ammonia emissions and they are being increasingly important for the acidification and eutrophication effects. The possibilities to further strengthen the annexes and make them more mandatory should be investigated in the LRTAP as well as the EU context.

The air quality directives

To me, the directives for NO₂, PM₁₀ and O₃ are functioning well and do not need to be changed. They are based on well documented health effects and they are very important when implementing a local/urban air pollution strategy.

The question is if there is a need for a PM_{2,5} air quality directive. The problem is that a significant part of the exposure is coming from outside the urban area and often also outside the country. One possibility is to have recommendatory target value for PM_{2,5} of 10-12 µg/m³ as an annual average.

The NEC directive

The exposure of particulates and consequently the emissions of SO_x, NO_x and particulates have to be reduced. The RAINS model calculations will give us information on possible cost effective scenarios with common targets for health impacts, ozone effects, acidification and eutrophication. The scenarios will be based on possible developments in the energy, traffic and agricultural sectors till 2020 mainly according to solutions to climate change questions. The base-line scenario shows reduced levels of SO_x, NO_x and VOC emissions 2020 compared with the NEC directive but there are good and needed possibilities for further reductions.

Other incentives

There is considerable experience of economic instruments to control SO_x and NO_x emissions effectively in a number of European countries and there is also experience of trading systems, mainly in North America.

The development of the energy, traffic- and agricultural sectors till 2020 will be very important relating to air pollution. The incentives, legislation, subsidy systems used and being further developed will have a major impact also on the air pollution situation.

The hemispheric scale

A discussion of the hemispheric scale for the transport of air pollution will be very important in an European air pollution strategy. The ozone levels goes up year by year and mercury and many POPs is transported globally. Particulates is also a concern in this context.

LRTAP with lead countries (USA, Germany, UK,---) are running scientific workshops to better understand the matter. When is the time to assess the situation and take an initiative ? LRTAP has good contacts with other regional air pollution bodies around the world and will be a good place for such an initiative.

Summary

An European air pollution strategy should focus on:

- *Combine the scales, local/urban, national, regional and hemispheric
- *Link air pollution science and policies with climate change
- *Priority to particulates and nitrogen
- *An air quality directive for PM 2,5 as a recommendatory target value
- *Keep the air quality directives as they are
- *A revised NEC directive and Gothenburg protocol is needed (2020)
- *Make the source directives more stringent
- *An LRTAP initiative towards UNEP about the hemispheric problems