European AQ policy – status quo and outlook[1]

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!Please note that this paper contain a personal view and is not an official coordinate position!

Introduction

Air pollution has decreased in Europe and other well developed countries in the last decades. This has been a consequence of a large number of measures to reduce the emission of harmful substances into the air. The main driving force for introducing those emission reductions were

a) well documented effects of high levels of local pollution on human health. Widely known examples of early episodic air pollution events (in the mid of the 20th century) include those in Donora, Pennsylvania (20 people died, 40 percent of the town's 14,000 inhabitants ill), in Meuse Valley (Belgium), where pollution became trapped in a narrow valley leading to 600 ill people and 63 being killed and last but not least the London smog event in 1952, where several thousands were killed over a two-week period in 1952.
b) effects on the environment. These included not only local effects, but also long range air pollution. In the seventies of the last century it became clear that air pollutants can be transported over wide distances (often several thousands of kilometres) and therefore cross national borders. As a consequence, effects like acidification of lakes and rivers or of forest soils occur in areas far away from any major emission sources (for instance in Scandinavia).

Nowadays, its obvious that air pollution cannot be successfully combated at a local or even national level alone. International frameworks are essential to coordinate measures among European countries. The most important framework is probably the European Union but which does not cover the whole European territory. Important is also the UN ECE Convention on Long Range Transboundary Air Pollution (http://www.ece.org/env/lrtap).

Present situation

Regulations for emission reductions have been implemented for most major polluting sectors. In the EU Member States (), several different complementary tools are used to reduce emissions of air pollution, including

- source related emission regulations for mobile sources (road and off-road) and stationary sources;
- product regulations (for fuels, solvents,..);
- regulations on air quality assessment and management, which aims at the improvement of air quality where it is not good;
- national emission ceilings;
- several cross-cutting regulations, including those on environmental impact assessment, strategic environmental assessment, etc.

These regulations have lead to a strong decoupling of economic growth (e.g., as indicated by the GDP) and the emissions of most of the classic air pollutants.

Problems with current legislation

Most of the current directives summarized in the para above have been successful in improving air quality. However, there are a number of problems in some of the details of some of the directives.

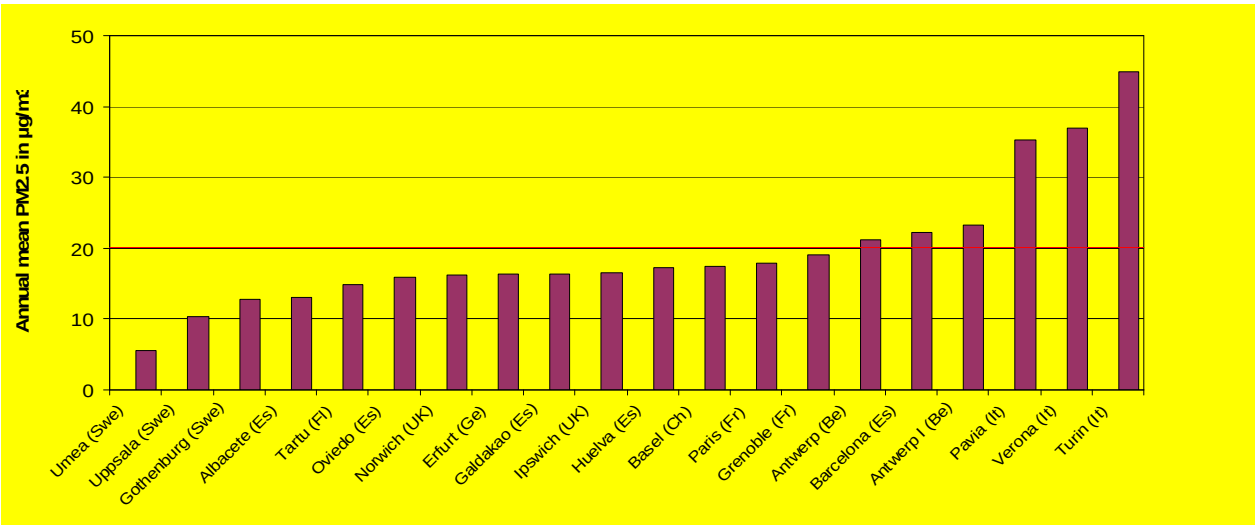
<u>Source related legislation & product regulations</u>: Some of the source related and product directives have been remarkably successful. However, as a matter of fact, important decisions on these items are now taken at a Community level. This ensures that measures are taken by all MS, but clearly limits the flexibility of single MS to establish more stringent requirements in some fields. It's also sometimes a rather lengthy process from a Commission proposal to the adoption of directives, transposition and

[1] This is not meant to provide a comprehensive overview, but rather to provoke discussion at the Gothenburg workshop.

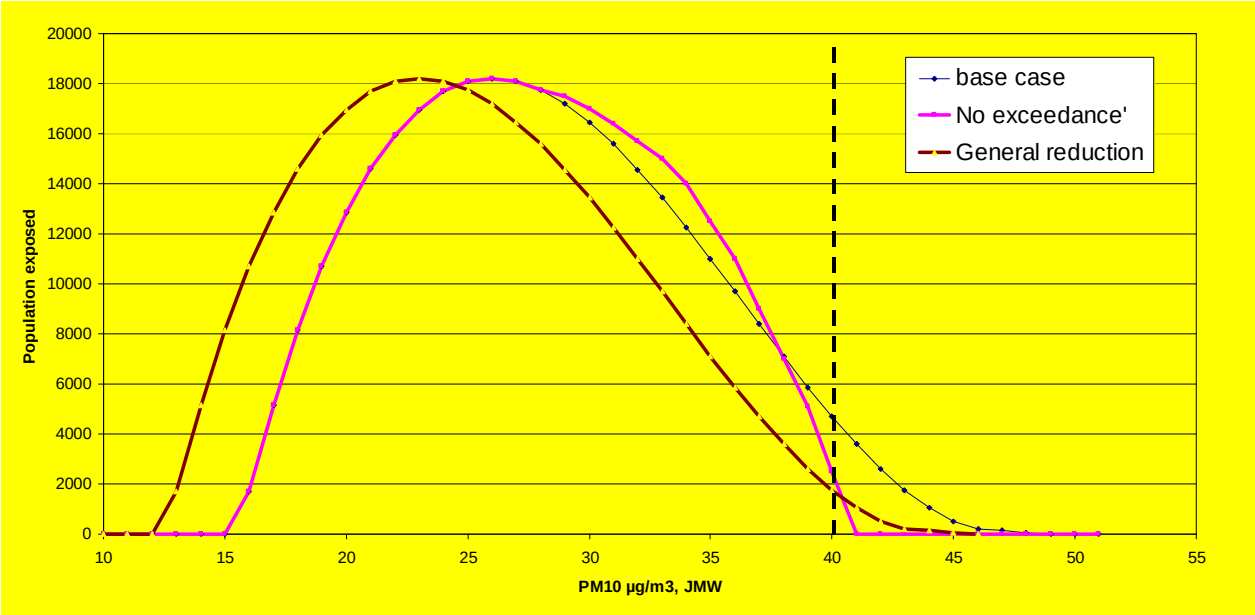
implementation at a MS level. This prevents rapid adaptation of current legislation to state-of-the-art regulations (EURO5,6). The agreements reached are also often compromises and do not necessarily represent best available technology (LCP directive). The effectiveness of one of the key pieces of legislation to reduce harmful effects of plants on the environment – the IPPC directive - still remains to be evaluated.

National emission ceilings: The NEC D (and the Gothenborg Protocol) was designed to reduce emissions of substances contributing to transboundary air pollution causing acidification, eutrophication and ground level ozone. Ideally, this directive should trigger additional cost effective measures to approach agreed environmental targets. It also leaves MS some flexibility in choosing appropriate measures to reduce their emissions cost effectively. Since the emission ceilings are linked to environmental objectives, they are formulated as absolute figures. However, this leads to some problems in particular if emissions have to be recalculated and change, e.g., due to changes in emission factors, (as has happened for the NOx emissions of HDV). For Austria, there are indications that for some of the pollutants no additional measures are required to comply with the ceilings (in other countries, the ceilings are widely overachieved), while for one pollutant (NOx) the ceiling seems out of reach and far beyond MFR (maximum feasible reduction). Alternative approaches (relative ceilings? ceilings for source groups?) could be considered. In any case, any regulation prescribing emission ceilings requires the establishment of high quality, robust, transparent, consistent, comparable, complete and accurate emission inventories in all countries.

Air quality framework and daughter directives: The FWD and its daughter directives establish AQ limit and target values to be met at a certain date for various pollutants. Some of the pollutants covered by this legislation have a rather strong regional/transboundary component (as ozone and PM); therefore, it is not easy to establish a fair and cost-effective balance of measures at different scales (local, regional and international) under the current legal instruments.
There is also some concerns about the application of a limit value concept for pollutants with no apparent no-effect level and which have very different concentrations in Europe (as with PM). Current air quality standards are to a large extent based on the concept of an effect threshold, below which significant health effects are not likely to occur. As stated, there might be no threshold for PM and ozone. Therefore, even if the Limit Value/Target Value is achieved, health impacts will continue. Vice versa, health benefits will accrue from a reduction in pollutant concentrations below the current standards. Figure 1 displays annual mean PM2.5 concentration from various cities in Europe. A limit value of 20 µg/m3 seems in this example in some regions almost out of reach, while it would not trigger any further reductions in other cities, while this would also lead to health benefits.



It is also doubtful if a policy focused on the abolishment of isolated exceedances of the limit value achieves the best health outcome for the population as a whole. This is schematically illustrated in the following graph:



The x axis contains annual PM levels, while the y axis shows the # of people exposed to different concentrations. If there is a linear concentration response function and no threshold, the 'no exceedance' case has only marginal health benefits compared to the base case, while the general reduction would be far more effective. Despite those considerations, the limit value approach might still be warranted e.g., to avoid that small groups bare an excessive risk.

Economic instruments: On a Community level, there is not much experience with economic instruments as a tool to reduce emissions of air pollution.

New clean air policy objectives in the European Union

The 6th Community Environment Action Programme (Sixth EAP) was adopted in July 2002 by the European Parliament and the Council (Decision 1600/2002/EC). This Programme sets out the key environmental objectives to be attained in the European Community. It also establishes, where appropriate, targets and timetables for meeting these objectives. One of the objectives of the Sixth EAP (Article 2) 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".

Is there a need for additional measures?

Despite considerable progress in clean air policy in Europe, air pollution still poses a considerable threat to human health and the environment as a whole. Concerning health effects, numerous scientific publications have provided evidence for various health effects of different air pollutants. This evidence was recently reviewed and assessed (WHO, 2004; for PM: US EPA, 2003). Many different adverse effects have been linked to exposure to air pollutants like ozone and particulate matter (PM). The latter has been linked to an increased risk of cardiopulmonary disease and a reduction in life expectancy of a year or more for people living in European cities. Some of these effects occur at very low concentrations that were previously considered safe. Taken together, the evidence is sufficient to strongly recommend further policy action to reduce levels of air pollutants. It is reasonable to assume that a reduction in air pollution will lead to considerable health benefits.

There is also compelling evidence that deposition of eutrophying (and in some regions acidifying) pollutants has not been decreased to a level compatible with sustainable development (). Other problems include the long range distribution of certain pollutants, which can accumulate and cause harm to the environment and health (including certain heavy metals and POPs).

A recent analysis of IIASA (IIASA, 2004) indicated that the environmental problems linked to air pollution mentioned in the para above will not be solved in 2020 assuming a 'business as usual' (BAU) scenario (in the terminology of CAFÉ, this is called the baseline scenario).

Outlook

While additional measures are needed to achieve agreed environmental goals (e.g., as formulated in the sixth Environmental Action programme of the European Union), these are becoming increasingly expensive. This has several consequences.

1. There is a growing need for accurate information on the effect of air pollution on health and the environment as a basis for designing scientific, effective and well targeted strategies to further reduce these effects. For example, any new EU directive proposed by the European Commission should be assessed concerning its impact (i.e. concerning the costs and benefits). This requires robust, quantitative information. As a consequence, there is a need for research to focus on the remaining open questions.
2. As stated above, there are in principle different tools available to reduce air pollution. Any further measures should build on an evaluation of the effectiveness of existing tools. This requires an in-depth ex post analysis.
3. Any measures to reduce the emissions of air pollutants become potentially more effective if they are synergistic with measures to reduce other environmental effects. One example which has been recently well documented are the synergies (and sometimes trade offs) between measures to reduce the emissions of classical air pollutants and green house gases. Reducing the emission of greenhouse gases is a major challenge for the society. At least for the most important greenhouse gas, CO2, there are no end-of-pipe measures to reduce emissions, since it is the primary product of the combustion of carbon containing fuels. Therefore, other measures (increasing energy efficiency; structural changes; increase use of renewable energy sources) are needed.
4. In some sectors, technical measures have been far advanced. However, there seems often much room for non-technical measures, e.g., in the transport sector.

Some open questions

At this stage there are a number of open questions. Some of them are highlighted:

1. How should we design our future clean air goals? Even though there is common agreement that effects on health and the environment should be reduced cost effectively, there are a number of details to be discussed. How far should we go? How should we balance different effects which are not directly comparable? There are also additional considerations to cost effectiveness, e.g. on environmental justice: There are indications that the health burden caused by air pollution is not equally distributed among the population. There might be groups at increased risk, e.g., those living in the vicinity of sources and those with lower educational level. Concerning effects on ecosystems, not all ecosystem may be equally worth protecting.
2. Which instruments/tools should we use to further reduce air pollution? We have a lot of experience with some of the tools mentioned above. They are often, but not always complementary. How can we effectively combine, e.g. source related regulations, ceilings and limit values?
3. How can we link the different scales? There is a need to establish a coherent strategy which is capable of linking different scales effectively. Several scales have to be addressed simultaneously, in particular for pollutants like PM. Hot spots are of relevance, since health risks have to be reduced for those subjects which are exposed to highest concentrations. The responsibilities for measures usually lies with local authorities. Urban background concentrations are highly relevant for the general exposure of the population and therefore health effects. Regional background concentrations of PM and ozone are caused by emissions at a European scale. The same is true for acidifying and eutrophying pollutants. There is also increasing evidence that emissions outside Europe contribute significant to ozone levels observed in Europe.

4. How can we link up with climate change? There are tight links between classical air pollutants and greenhouse gases. There are common sources; common (and sometimes antagonistic) measures to reduce emissions; some of the air pollutants have a direct effect on radiative forcing, including ozone and PM. Up till now, it is open how these links are considered in designing synergistic and effective abatement strategies.