Science for Environment Policy
DG Environment News Alert Service
European Commission

29 March 2012

What next for effective emission and air quality targets?

European policies have eliminated the most visible and harmful effects of air pollution, but current rates of emissions still pose a threat to the environment and to human health. A new study has assessed the policy scope to make further environmental improvements by applying the GAINS (Greenhouse gas-Air pollution Interactions and Synergies) model.

The GAINS model[1] identifies cost-effective emission control strategies to improve air quality at the least cost. It places the many aspects of air pollution into context, including interconnections between different air quality problems and interactions between pollutants in the atmosphere. With the help of funding through the LIFE EC4MACS project [2], the researchers used GAINS to develop projections of future emissions and air quality impacts, assuming that existing trends continue (baseline projections). For the EU's 27 Member States, the projections imply a 6% decline in CO_2 emissions [3] between 2005 and 2020 and an 11% increase for non-EU countries.

Assuming a full implementation of emission control legislation, significant changes are expected in the EU-27: a decrease of two-thirds in sulphur dioxide (SO_2) emissions, one half in nitrogen oxides (NO_x) emissions and one third in emissions of Volatile Organic Compounds (VOCs) as well as of particulate matter (PM 2.5). These reductions will alleviate harmful effects of air pollution, for example, the GAINS model estimates that the average loss in life expectancy attributable to exposure to fine particulate matter will decline from 7.4 months in 2005 to 4.4 months in 2020.

The negative effects of air pollution on ecosystems will also be reduced, for example, in 2005 about 50% of the ecosystem area in Europe experienced harmful nitrogen deposition, whereas only 38% of the same area would be affected in 2020. The baseline scenario analysis indicates that there will be significant improvements in air quality following the continued implementation of emission control legislation. Nevertheless, the projected impacts on human health (shortening of life expectancy by over four months) and on ecosystem health are still of grave concern, and more needs to be done.

So far, EU policy has addressed many of the most immediate sources of air pollution. Now that these 'low hanging fruits' have been harvested, further policy action will come at greater cost and will need to be carefully designed and implemented, the study suggests. The GAINS model estimated that the environmental improvements from full implementation of all available emission control technologies, a so-called Maximum Technical Feasible Reduction (MTFR) scenario, could lead to a further 60% reduction in SO_2, a 30% reduction in NO_x and a 65% reduction in $PM_{2.5}$ by 2020. In turn, these reductions would curb the loss in human life expectancy by a further 50% and diminish the threat to biodiversity from excess nitrogen and acid deposition by more than 60%.

These improvements would raise pollution control costs for Europe from €110 billion (0,66% of GDP) to €192 billion (1,15% of GDP) per year in 2020. However, to ensure maximum cost-effectiveness, the study identifies pollution reduction targets that would realise 75% of those MTFR improvements at only about 10% of total costs. Such cost-effective solutions require common but differentiated efforts by all European countries and need full political backing. The ongoing negotiations under the UN ECE Convention on Long-range Transboundary Air Pollution[5] to revise the Gothenburg Protocol, e.g. to set new national emission reduction targets for 2020 for five key air pollutants, seek to address these questions in a comprehensive way.

1. See: www.iiasa.ac.at/rains/gains.html
2. EC4MACS (European Consortium for Modelling of Air Pollution and Climate Strategies) is supported by the European Commission through the LIFE programme. See: www.ec4macs.eu
3. 6% CO_2 reduction is based on national projections that did not yet take into account the more ambitious climate change mitigation targets comprised in the Climate and Energy Package. See: http://ec.europa.eu/clima/policies/package/index_en.htm
4. See http://www.unece.org/env/lrtap/multi_h1.html
5. See: www.unece.org/env/lrtap/lrtap_h1.html

Source: Amann, M., Bertok, I., Borken-Kleefeld, J. *et al.* (2011) Cost-effective control of air quality and greenhouse gases in Europe: Modelling and policy applications. *Environmental Modelling & Software.* 26:1489-1501.
Contact: amann@iiasa.ac.at **Theme(s):** Air pollution, Climate change and energy