26 February 2015
Issue 405

Subscribe to free weekly News Alert

Source: Aksoyoglu, S., Keller, J., Ciarelli, G. *et al*. (2014). A model study on changes of European and Swiss particulate matter, ozone and nitrogen deposition between 1990 and 2020 due to the revised Gothenburg protocol. *Atmospheric Chemistry and Physics* 14: 13081-13095. DOI: 10.5194/acp-14-13081-2014. This study is free to view at: www.atmos-chem-phys.net/14/13081/2014/acp-14-13081-2014.html

Contact:
sebnem.aksoyoglu@psi.ch

Read more about:
Air pollution, Environment and health

The contents and views included in Science for Environment Policy are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission.

To cite this article/service: "Science for Environment Policy": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

1.http://ec.europa.eu/environment/air/pollutants/ceilings.htm

European Commission

Science for Environment Policy

European air quality in 2020: success story for $PM_{2.5}$

Levels of the air pollutant $PM_{2.5}$ in Europe will continue to fall in 2020, concludes a recent study. Furthermore, deposition of nitrogen from air pollution will also drop. The outlook seems less positive for ground-level ozone, however, as large amounts of this pollutant continue drift over to Europe from other continents.

This study reports on changes in air quality in Europe, focusing on three pollutants relevant to the Gothenburg Protocol to the Convention on Long-range Transboundary Air Pollution: $PM_{2.5}$ (particles less than 2.5 micrometres in diameter), ozone and nitrogen compounds. The Protocol, designed to reduce acidification, eutrophication and ground-level ozone, came into force in 2005 and set targets to reduce emissions of sulphur, nitrogen oxides (NOx), volatile organic compounds (VOCs) and ammonia by 2010 for each party to the Protocol.

In 2012, it was revised to include $PM_{2.5}$ and black carbon, with new targets for 2020 and beyond. In the EU, the Protocol is implemented through the National Emission Ceilings (NEC) Directive[1].

This study modelled $PM_{2.5}$, ozone and nitrogen for 1990 (the reference year for the original version of the Protocol: i.e. changes are measured in comparison to 1990); 2005 (the revised Protocol's reference year) and 2020 (the revised Protocol's target year).

$PM_{2.5}$

$PM_{2.5}$ causes a range of human health problems, particularly cardiovascular disease and cancer, and can lead to premature death. Atmospheric concentrations fell by 20–60% in Europe between 1990 and 2005, according to the study. This is thanks to cuts in both direct emissions and 'precursor' emissions, such as NOx and SO_2, which can react to form secondary $PM_{2.5}$.

The size of the reductions varied by region; Eastern and Central Europe saw some of the biggest improvements, for instance. Levels look set to continue falling, by about 30% in 2020, compared with 2005, assuming that emissions will continue to be regulated by current legislation, with reduction targets that are very similar to the revised Gothenburg Protocol.

Ozone

Ozone forms in the air through reactions between precursor emissions including VOCs and NOx. It can cause breathing problems in humans and is harmful to plants.

Mean ozone levels increased by 20–45% during 1990–2005, the study found, with the greatest increases in the UK and the Benelux countries. Although precursor emissions fell significantly in Europe, background levels of ozone remained high, largely due to long-range drift from other regions.

In 2020, average levels of ozone will probably continue to increase, but the picture is mixed across Europe. It is expected to increase by around 2 parts per billion (ppb) in the UK and the Benelux countries, for instance, but fall by up to 4 ppb in the Mediterranean region. Again, this assumes that current legislation continue to regulate emissions.

Nitrogen

If excessive levels of nitrogen compounds (formed from emissions of ammonia and NOx) are deposited from the air onto land, they threaten biodiversity. Key sources of nitrogen are combustion and agricultural activities. Between 1990 and 2005 the amount of nitrogen compounds deposited fell by 10–30% in Eastern Europe, but increased by around 20% in Spain and Portugal.

The modelled results suggest that average levels of nitrogen deposition will fall by 10–20% across Europe in 2020 compared with 2005, assuming current legislation remains in place. However, in some areas they will rise: for instance, by 10% in Eastern Europe.