

Science for Environment Policy

Global air quality to worsen significantly under 'business as usual' human activity

Global air quality will significantly deteriorate by 2050 unless further steps are taken to cut current emissions from human activities, according to recent research. Most people around the world will be affected by worsening air quality with hotspots of particularly poor air occurring in China, northern India and the Middle East.

Despite measures to abate air pollution in many parts of the world, industrial activity can be expected to cause air pollution to increase globally with serious consequences for human health.

This study presents a possible future of world air quality up to 2050, if no further emission controls beyond those that were in place in 2005 are implemented and assuming that existing pollution trends continue. The researchers estimated global pollution levels under this 'business-as-usual' (BaU) scenario using an atmospheric chemistry model. Although the BaU scenario is pessimistic, it highlights what could happen if no action is taken to curb emissions. Air quality was compared in recent and future years: 2005, 2010, 2025 and 2050.

The study focused on five key pollutants that negatively affect human health: fine particulate matter (PM_{2.5}), nitrogen dioxide, sulphur dioxide, ozone and carbon monoxide. Naturally-occurring emissions such as sea spray, desert dust, biomass burning and volcanic emissions were also included in the study but kept constant.

Despite some uncertainties associated with modelling air quality, the results suggest that, by 2050, China and northern India, and the Middle East in particular, will be hotspots of pollution where large populations will be negatively affected by worsening air quality.

Pollutant emissions have already reduced air quality over the east and west coasts of North America, Europe and the Mediterranean Basin and the Middle East, in addition to eastern China and India. The study's results suggest that air quality will continue to deteriorate in East Asia over coming decades, through the combined effects of nitrogen dioxide, sulphur dioxide and PM_{2.5}. Ozone pollution will not increase as strongly in this region, mainly because some ozone will be removed by complex chemical reactions found in local conditions. However, northern India and the Persian Gulf regions will continue to suffer with increasing ozone levels up to 2050.

Under the BaU scenario, air pollution will continue to increase over North-eastern USA and Central and Eastern Europe, but not nearly as strongly as in Asia as a result of air quality and climate policies already in place by 2005. Air quality will decrease significantly over the Middle East and North Africa through a combination of emissions from human activities and natural causes, mainly desert dust pollution. In general, the EU and North America have a similar future 'pollution level per capita' which is almost constant for the BaU future scenario. Although the energy demand is increasing in these regions, the population density is relatively stable. On the other side, the developing countries present a much higher increase in the 'pollution level per capita', mainly due to the increases in industrialisation and population density in addition to increasing energy demands.

The researchers suggest that tough action and legislation are needed to avoid a scenario where even the average person would be living under conditions of significantly deteriorating air quality. Unless such measures are introduced, air quality for the global average citizen in 2050 would be almost comparable to that for the average citizen in East Asia in the year 2005, the researchers suggest.

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