

AIR POLLUTION

Cleaning Europe's air without burdening economic development

IIASA scientific model guides successful multilateral treaty to protect environment

Twenty years ago acid rain ravaged Europe turning trees yellow and killing thousands of fish. Caused by air pollution, acid rain is now under control in Europe, thanks, in part, to the crucial role played by IIASA.

Today, air pollution remains harmful but its effects, such as causing respiratory diseases, are often less visible. Fortunately, plans now in place will clean Europe's air over the coming fifteen years adding, on average, three months to the lives of people living in Europe through improved health. Once again IIASA's research has played a vital role.

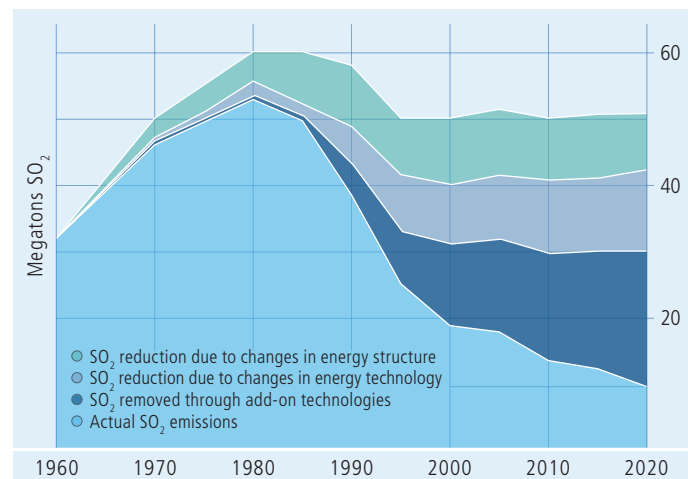
Cleaning up Europe's air is not easy. It requires an effective environmental policy to reduce air pollution in over thirty European countries. And making the policy requires resolving complex scientific and political issues.

An effective policy must consider all the numerous sources of air pollution, ranging from agriculture through industry to transport. Measures to tackle air pollution must be equally numerous. A successful policy must understand the range of air pollutants which, individually and in combination, have multiple effects on the environment. Air pollutants are blown across national boundaries meaning the many countries must agree on the same policy. But each country generates different amounts of air pollution and feels the effects of air pollution unequally.

Yet policymakers have overcome these difficulties with the Convention on Long-range Transboundary Air Pollution of the United Nations Economic Commission for Europe. It is one of the oldest and most successful multilateral treaties protecting the environment, with targets that have led its Parties to slash their emissions of air pollutants drastically. For example, over the past 20 years sulfur dioxide emissions in Europe have plunged by more than 60 percent (see figure).

What was and is the secret of the Convention's success? The answer is the close collaboration that took place between scientists and policymakers who negotiated it. And guiding both groups along the way was a scientific tool, developed by IIASA, known as the Regional Acidification INformation and Simulation (RAINS) model. Indeed, RAINS was the first computer model to be at the center of major international environmental negotiations.

With a few hours of training, scientists, diplomats, politicians, and other non-technical users can pose any number of "what-if" questions to RAINS. How much would it cost to reduce ozone levels to a given standard for all of Europe? For the worst-affected



In 1994 the IIASA RAINS model underpinned the agreement of 33 European governments to reduce damaging sulfur dioxide (SO₂) emissions, when the Second Sulphur Protocol to the Convention on Long-range Transboundary Air Pollution was signed in Oslo. Also known as the Oslo Protocol, it contributed to the sharp decrease in SO₂ emissions during the 1990s.

areas only? What is the cheapest way to stop acidification of forest soils in Bohemia?

With answers to such questions, RAINS has helped European governments agree on increasingly sophisticated environmental policies. The model showed that if the goal is to protect the environment at the lowest cost, making the traditional uniform cuts in emissions across countries is neither efficient nor effective. RAINS helped governments find a more targeted approach leading to the Second Sulphur Protocol to the Convention and subsequent reductions in acid rain.

Such successes persuaded the Convention's Parties (33 European countries) to ask IIASA to further develop RAINS. They and IIASA scientists wanted to move away from artificially isolating air pollutants in separate agreements to making policies that address a complex range of related air pollutants and problems simultaneously.

The resulting Gothenburg Protocols further reduced Europe's problems of acid rain and ozone pollution both quickly and at the lowest cost. Today, RAINS is central in tackling health problems associated with air pollution in the European Commission's Thematic Strategy on Air Pollution for Europe.

RAINS has come a long way since IIASA began developing it in 1983. But without IIASA's approach of bringing together interdisciplinary and international researchers to work on problems that cross national borders, RAINS would not have been possible. ■

Further information Hordijk L & Amann M (2007). How Science and Policy Combined to Combat Air Pollution Problems. *Environment Policy and Law* 37/4: 336–340. Available as Reprint RP-07-002 in IIASA's online publication catalog at www.iiasa.ac.at/Publications.

Professor Leen Hordijk is the Director of IIASA and **Dr. Markus Amann** is the leader of IIASA's Atmospheric Pollution and Economic Development Program.