

Cross-country comparisons

Air pollution — emissions of selected pollutants



A country comparison of emissions of selected pollutants

Emissions of NO_x, SO_x, NH₃ and NMVOC have decreased significantly in most countries between 1990 and 2012. However, air pollution still causes significant harm to health and the environment in Europe.

The majority of countries are making progress towards meeting their 2020 targets under the 2012 revised Gothenburg Protocol. As a result, air quality in Europe is slowly improving.

Setting the scene

Almost all economic and societal activities result in emissions of air pollutants, the effects of which result in real losses for the European economy, the productivity of its workforce, and the health of its natural systems. Europe's air quality has improved considerably in the last 60 years but has not yet attained the air quality foreseen in legislation or recommended by the World Health Organization. The effects of poor air quality on public health have been felt most strongly in urban areas, with levels of particulate matter (PM) of particular concern;^[1] and in ecosystems leading to biodiversity loss.^[2]

The SOER 2015 briefing on air pollution provides an overview of the status, trends and prospects relating to air quality. This SOER 2015 cross-country comparison focuses on emissions of a group of four pollutants that contribute to acidification, eutrophication, the formation of ground-level (tropospheric) ozone and PM in the atmosphere, namely nitrogen oxides (NO_x), sulphur oxides (SO_x), ammonia (NH₃) and non-methane volatile organic compounds (NMVOC).

About the indicator

The European Environment Agency (EEA) publishes a range of air pollution indicators providing information on emissions of pollutants by country and sector, and assessment of change in relation to targets. The data presented here are submitted to the EEA under the Gothenburg Protocol to the United Nations Economic Commission for Europe's **Convention on Long-range Transboundary Air Pollution** (UNECE/LRTAP), and the EU **National Emission Ceilings Directive** (NEC Directive).

European Union (EU) Member States' emissions data reported under the NEC Directive is compared with NEC Directive ceilings. For Liechtenstein, Norway and Switzerland, data reported under LRTAP is compared with the respective listed emission ceilings of the Gothenburg Protocol. Iceland and Turkey have not signed the Gothenburg Protocol and are therefore not included in Table 1. The EEA has published further details on calculations including methodology, uncertainties and quality assurance procedures.^[3] Data presented here are available from the [EEA data viewer](#).^[4]

The EEA publishes [factsheets summarising key data on air pollution](#) for each of the 33 EEA member countries. Indicators on past and future emission trends are presented, as well as a summary of the national air quality situation in each country.^[5]

Policies, targets and progress

Annual emission limits, known as emission ceilings, for NO_x, SO_x, NH₃ and NMVOC are set by the Gothenburg Protocol to the UNECE/LRTAP, and the NEC Directive with the aim of protecting the environment and human health. The 2012 revision to the Gothenburg Protocol extended existing emission ceilings for 2010 until 2020 obliging countries to maintain emission levels below their 2010 ceilings, or to further reduce emissions if they have not yet met these ceilings.

Table 1: Progress by 32 European countries in meeting the emission ceilings of the NEC Directive or Gothenburg Protocol of the UNECE/LRTAP Convention (2011 and 2012)

Countries	NO _x 2011	NO _x 2012	SO ₂ 2011	SO ₂ 2012	NH ₃ 2011	NH ₃ 2012	NMVO _C 2011	NMVO _C 2012
Austria	41	37	-51	-54	-6	-6	-21	-16
Belgium	18	17	-45	-50	-8	-8	-24	-24
Bulgaria	-45	-50	-38	-61	-63	-64	-48	-48
Croatia	-25	-32	-52	-63	37	39	-19	-24
Cyprus	-10	-9	-46	-58	-43	-45	-31	-34
Czech Republic	-21	-27	-38	-40	-18	-21	-38	-40
Denmark	-1	-9	-75	-77	4	3	-6	-9
EU-27	-4	-7	-47	-51	-17	-18	-22	-23
Estonia	-40	-46	-27	-59	-64	-63	-32	-31
Finland	-10	-14	-45	-53	19	20	-18	-20
Former Yugoslav Republic of Macedonia	3	-10	-8	-19	-3	-12	-8	-8
France	24	21	-34	-38	-8	-13	-30	-32
Germany	23	21	-18	-18	2	-1	-1	-4
Greece	-14	-25	-50	-53	-16	-16	-39	-42
Hungary	-34	-41	-93	-94	-32	-35	-27	-28
Ireland	6	10	-41	-45	-11	-10	-19	-22
Italy	-6	-8	-59	-61	-9	-3	-15	-18
Latvia	-44	-42	-97	-98	-60	-60	-48	-44
Liechtenstein	76	88	-73	-71	13	14	-52	-51
Lithuania	-49	-47	-80	-75	-56	-55	-36	-36
Luxembourg	61	55	-56	-50	-36	-36	-7	9
Malta	-2	8	-12	-14	-48	-49	-75	-73
Netherlands	-1	-5	-33	-32	-2	-6	-20	-21
Norway	11	5	-17	-24	16	17	-31	-30
Poland	-3	-6	-34	-38	-42	-44	-15	-15
Portugal	-29	-32	-62	-65	-47	-47	-5	-6
Romania	-49	-48	-65	-72	-24	-25	-32	-32
Slovakia	-34	-38	-38	-47	-38	-35	-51	-56
Slovenia	3	0	-60	-62	-11	-12	2	-2
Spain	8	6	-39	-45	8	8	-9	-12
Sweden	-6	-11	-56	-59	-9	-10	-22	-23
Switzerland	-11	-12	-59	-59	-1	-2	-40	-41
United Kingdom	-10	-9	-34	-27	-5	-7	-30	-31

Note: Countries that were below the national ceiling have a green value, e.g. -5% has a light green background, -45% has a darker green. Countries that exceeded the ceiling have a red background colour and a positive percentage value. Croatia joined the EU in July 2013 and therefore data is shown for information purposes only.

Data sources: EEA. National Emission Ceilings (NEC) Directive Inventory

Emissions of NO_x, SO_x, NH₃ and NMVO_C have decreased over the last two decades. Emissions of NO_x have decreased by 44%, SO_x by 74%, NH₃ by 25% and NMVO_C by 57% since 1990 within the EEA-33. In 2013, eleven countries reported emissions above their ceilings for NO_x (Austria, Belgium, France, Germany, Ireland, Liechtenstein,

Luxembourg, Malta, Norway, Slovenia and Spain), five for NH₃ (Denmark, Finland, Liechtenstein, Norway and Spain) and one for NMVOC (Luxembourg).^{[3][1]} All countries met their emission ceilings for SO_x (see Table 1).

In 2012, 14 countries breached at least one emission ceiling, compared to 13 in 2011 and 15 in 2010. Liechtenstein, Luxembourg, Norway and Spain exceeded two ceilings in 2012. Several countries have persistent problems meeting their emission limits with Austria, Belgium, France, Germany, Ireland, Liechtenstein, Luxembourg, Norway and Spain breaching NO_x ceilings for three consecutive years. Denmark, Finland, Liechtenstein, Norway and Spain have breached NH₃ ceilings for three consecutive years.

The EEA indicator 'emissions of main air pollutants'^[7] provides further details on these four individual pollutants. The assessment of change in emissions since 1990 and comparison to NEC Directive and Gothenberg Protocol targets for NO_x is shown in Figure 1 as this is the pollutant with the greatest number of exceedances of emission ceilings by countries.

The majority of EEA-33 countries have reported lower emissions of NO_x in 2012 compared to 1990. The exceptions to this are Turkey (whose emissions were nearly 2 times higher in 2012 than 1990), Cyprus (34% higher), Luxembourg (18%) and Malta (15%).

Of the EU Member States, Germany and France reported the highest exceedances of the NO_x ceilings in absolute terms in 2012, by 222 and 173 kilotonnes respectively. In percentage terms, Luxembourg (55%) and Austria (37%) continued to exceed their NO_x emission ceilings the most in 2012.^[6]

Although there has been a large reduction in NO_x emissions from the road transport sector, it remains one of the main contributory factors behind the large number of NO_x exceedances. This is in part because the sector has grown more than expected and partly because of the increased penetration of diesel vehicles. These have higher NO_x emissions than petrol-fuelled vehicles and emission standards set in EU legislation have not always delivered the anticipated level of reductions.^[4]

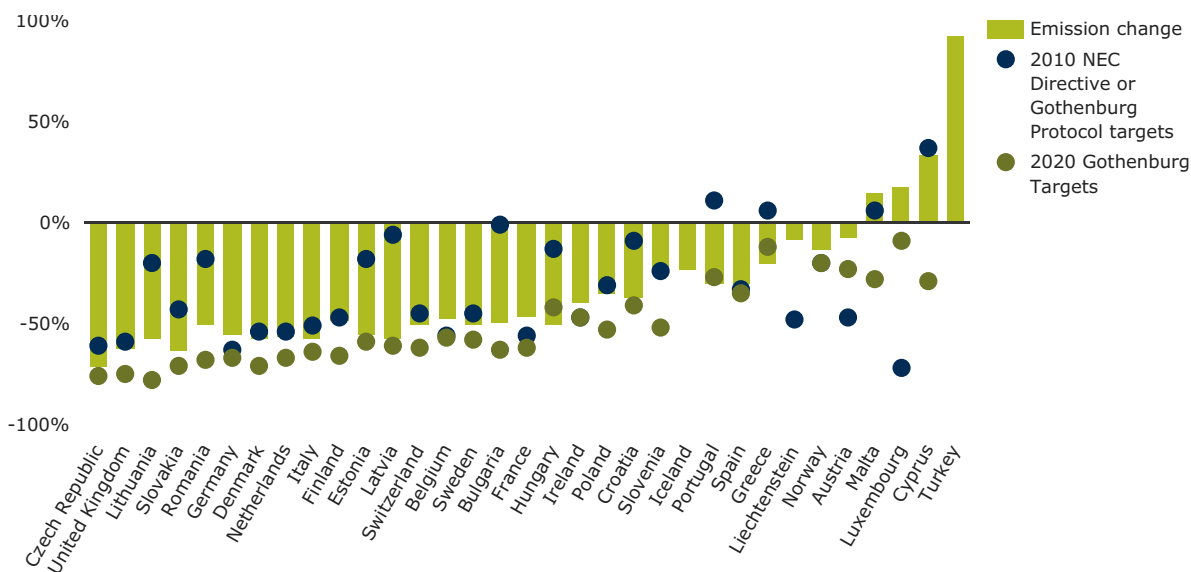
Prospects

Despite improvements in recent decades there are still major challenges in reducing air pollution and direct and indirect impacts on human health, the economy and environment. Road transport, industry, power plants, households and agricultural activities continue to emit significant amounts of air pollution.

Thirty EEA member countries have 2020 emission reduction targets set under the 2012 revised Gothenburg Protocol. For all four pollutants, the majority of countries are making progress towards meeting these targets.^[3] For SO_x, fifteen countries have already met the proposed 2020 targets according to emissions data for 2012. For NH₃, sixteen countries met their ceilings and nine countries have met ceilings for NMVOC. Only one country (Portugal) has already met its NO_x target in 2012, while six countries have met new 2020 targets for primary PM_{2.5} emissions.^[7]

Management of air pollution is challenging because of its cross-border nature, the need to address the many sources of emissions, and the different spatial scales of the resulting pressures and impacts. European air policy has undergone substantial review and in 2013 the proposed Clean Air Policy Package^[8] included a measure to strengthen national emission reduction commitments by revising the NEC Directive to set emission ceilings for 2020 and 2030 for the four pollutants (NO_x, NMVOC, SO_x and NH₃), as well as two additional pollutants, fine particulate matter (PM_{2.5}) emitted directly into the air and methane. Proposed actions also include focusing on air quality in cities, national and local actions. The implementation of measures to improve air quality and ameliorate impacts often takes place at regional and local level. Therefore sharing of information and experiences amongst countries is an important factor in improving knowledge and providing tools for air quality planning.

Figure 1: Change in emissions of NO_x (nitrogen oxides) in 33 European countries (1990 to 2012) and comparison with the 2010 NEC Directive and Gothenburg Protocol targets



Note: 2020 Gothenburg targets scaled from 2005 base year to show percentage reduction from 1990.

Data sources: EEA. National emissions reported to the Convention on Long-range Transboundary Air Pollution (LRTAP Convention)

Air Implementation Pilot

Almost three quarters of Europeans live in cities. The air quality in our cities is therefore of significant importance to the health of Europeans. Considerable progress has been made in the past twenty years in improving urban air quality, but issues remain. A number of different air pollutants such as nitrogen dioxide, particulate matter, and ozone remain above regulated levels, posing a threat to human health. The Air Implementation Pilot brought together 12 cities with the aim of better understanding the challenges faced in implementing air quality and enabling learning from experience and each other. Lessons learnt relate to data, modelling, monitoring networks, management practices and public information.^[9]

SOER 2015 cross-country comparisons analyse selected environmental issues across a number of EEA countries. They are part of the EEA's report SOER 2015, addressing the state of, trends in and prospects for the environment in Europe. The EEA's task is to provide timely, targeted, relevant and reliable information on Europe's environment.

For references, see www.eea.europa.eu/soer or scan the QR code.

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