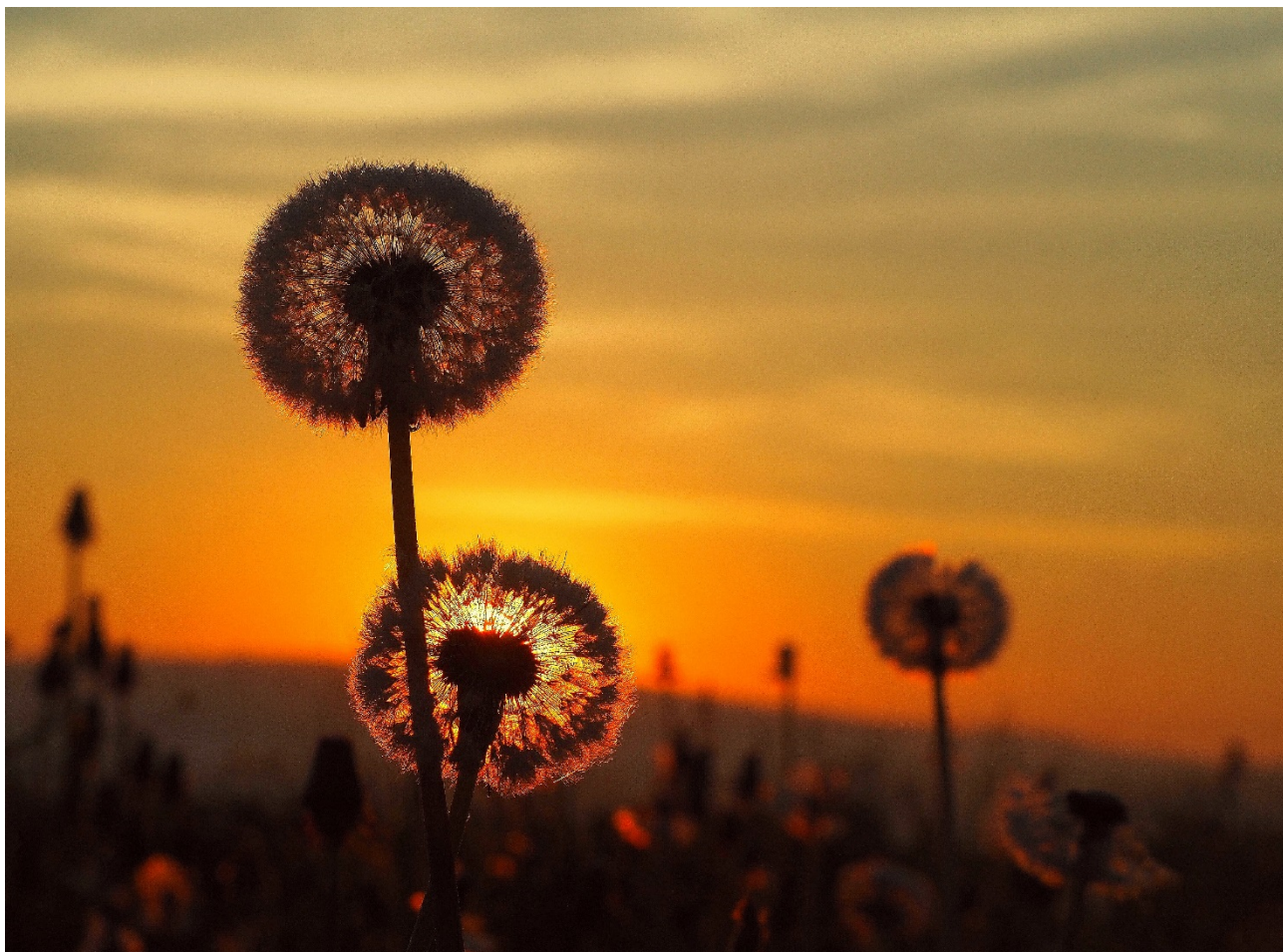


Tropospheric ozone in Europe – an overview by the EEA



Outline

1. The EEA and its work on ozone
2. Ozone specific characteristics
3. Emissions of ozone precursors
4. Concentrations of ozone
5. Exposure of population
6. Health effects
7. Exposure of vegetation
8. Information to the public



1. EEA and ETC/ACM ongoing work on ozone

<https://www.eea.europa.eu/themes/air/publications>

EEA Technical report | No 3/2014

Air pollution by ozone across Europe during summer 2013

Overview of exceedances of EC ozone threshold values: April–September 2013

Air pollution

Air pollution by ozone

Summer 2014 ozone assessment

Overview of exceedances of EC ozone threshold values for April–September 2014

• The European Union (EU) has defined various standards to protect human health against pollution by ozone, including: information threshold, alert threshold, and long-term objective (LTO).

• During summer 2014, concentrations of ground-level ozone significantly exceeded these standards. However, the number of exceedances was lower than the long-term downward trend observed over the last few years.

• The maximum daily 8-hour mean concentration (μm^3) was exceeded in almost all Member States.

• The maximum daily 1-hour concentration of 180 μm^3 (in the population on possible risks), was exceeded at all stations providing data.

• Immediate action was exceeded only 4 times.

• The maximum daily 8-hour mean concentration (μm^3) was exceeded in almost all Member States.

European Environment Agency

Ozone in Southern Europe – Assessment and effectiveness of measures

Air quality in Europe — 2018 report

EEA Report | No 12/2018

ISSN 1977-6449

ETC/ACM Technical Paper 2017/3
April 2018

Mar Viana, Marc Padrosa, Xavier Querol, Andrés Alcazar, Nina Benesova, Blanka Krejčí, Vladimíra Voňová, Eba R. Augustin Colette, Frank de Leeuw, Alberto González delgado

European Topic Centre on Air Pollution and Climate Change Mitigation

The European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM) is a consortium of European Institute under contract of the European Environment Agency. EEA Member States: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, and Turkey.

European Environment Agency

EEA Technical report | No 7/2009

Assessment of ground-level ozone in EEA member countries, with a focus on long-term trends

ETC/ACM Technical Paper 2015/4
October 2015

Air Quality Trends in AIRBASE in the context of the LRTAP Convention

Colette, Maxime Beauchamp

ETC/ACM Technical Paper 2016/7
January 2017

Augustin Colette, Maxime Beauchamp, Bertrand B. The Eurodelta-Trends Modelling Manders, K.A. Mar, M. Mircea Bergstrom, S. Besengeter, G. Brigg, Tagerli, N.

Long term air quality trends in Europe
Contribution of meteorological variability, natural factors and emissions

ETC/ACM Technical Paper 2017/15
August 2018

Sverre Solberg, Sam-Erik Walker, Philipp Schneider, Cristine Guerrero, Augusto Colette

Discounting the effect of meteorology on trends in surface ozone: Development of statistical tools

ETC/ACM Technical Paper 2017/15
August 2018

Sverre Solberg, Sam-Erik Walker, Philipp Schneider, Cristine Guerrero, Augusto Colette

European Topic Centre on Air Pollution and Climate Change Mitigation

The European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM) is a consortium of European Institute under contract of the European Environment Agency. EEA Member States: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, and Turkey.

Long-term evolution of the impacts of ozone air pollution on agricultural yields in Europe

A modelling analysis for the 1990–2010 period

November 2018

Authors: A. Colette, F. Tognet, L. Léonino, V. Lemaire, F. Couvidat, R.M. Alonso Del Amo, I. A. Gonzalez Fernandez, H. Harmens, C. Andersson, S. Toyro, A. Mander, M. Mircea

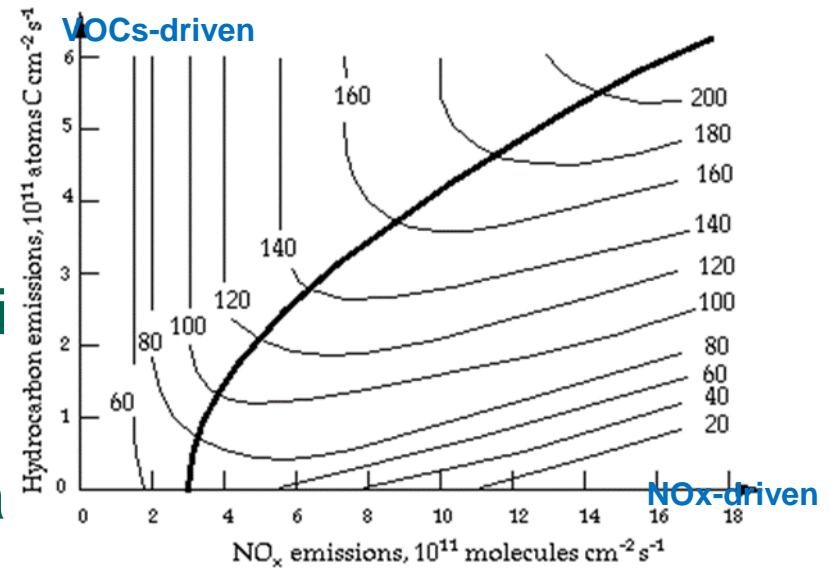
ETC/ACM convention partners: National Institute for Public Health and the Environment (NIHES), Austria, Czech Republic (CZMOP), Institute of Environmental Assessment and Air Quality Research (IEAQA), Institute National de l'Environnement Industriel et des Risques (INERIS), Hungarian Institute for Air Research (HIA), Luxembourg, Luxembourg, National Institute for Environmental Protection (NIEP), Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, and Turkey.

European Environment Agency
European Topic Centre on Air Pollution and Climate Change Mitigation

<https://acm.eionet.europa.eu/reports/#tp>

2. Ozone specific characteristics

- Ozone is a secondary pollutant
- Formation of ozone is not linear
- Different influences: scales contributi
- Several metrics are used for complia



- Regulated in EU via target and not limit values

Standards

Assessment

Hourly values

Annual mean

- Difficulty to implement abatement measures

Maximum daily 8-hours mean

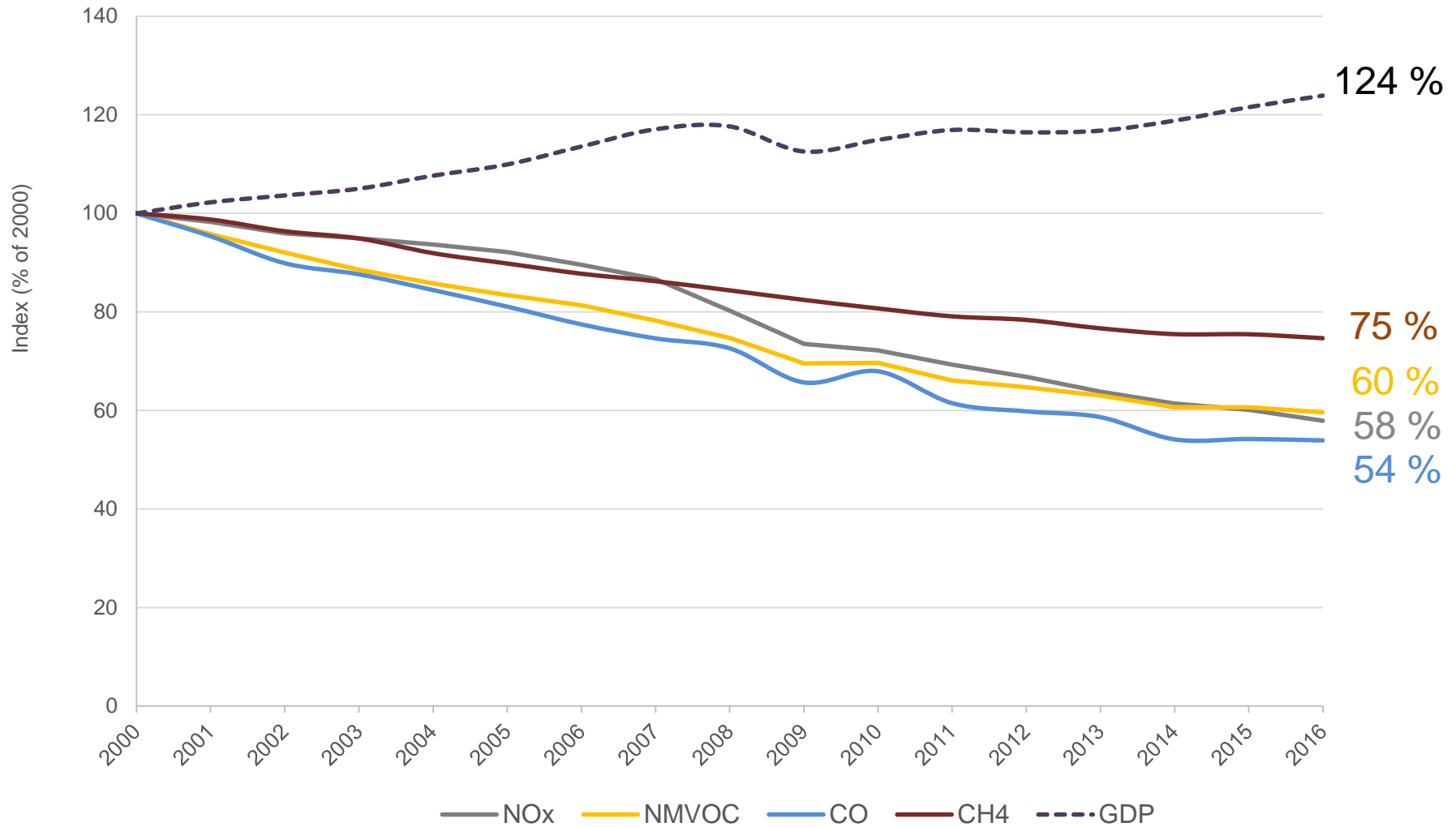
SOMO35

AOT40

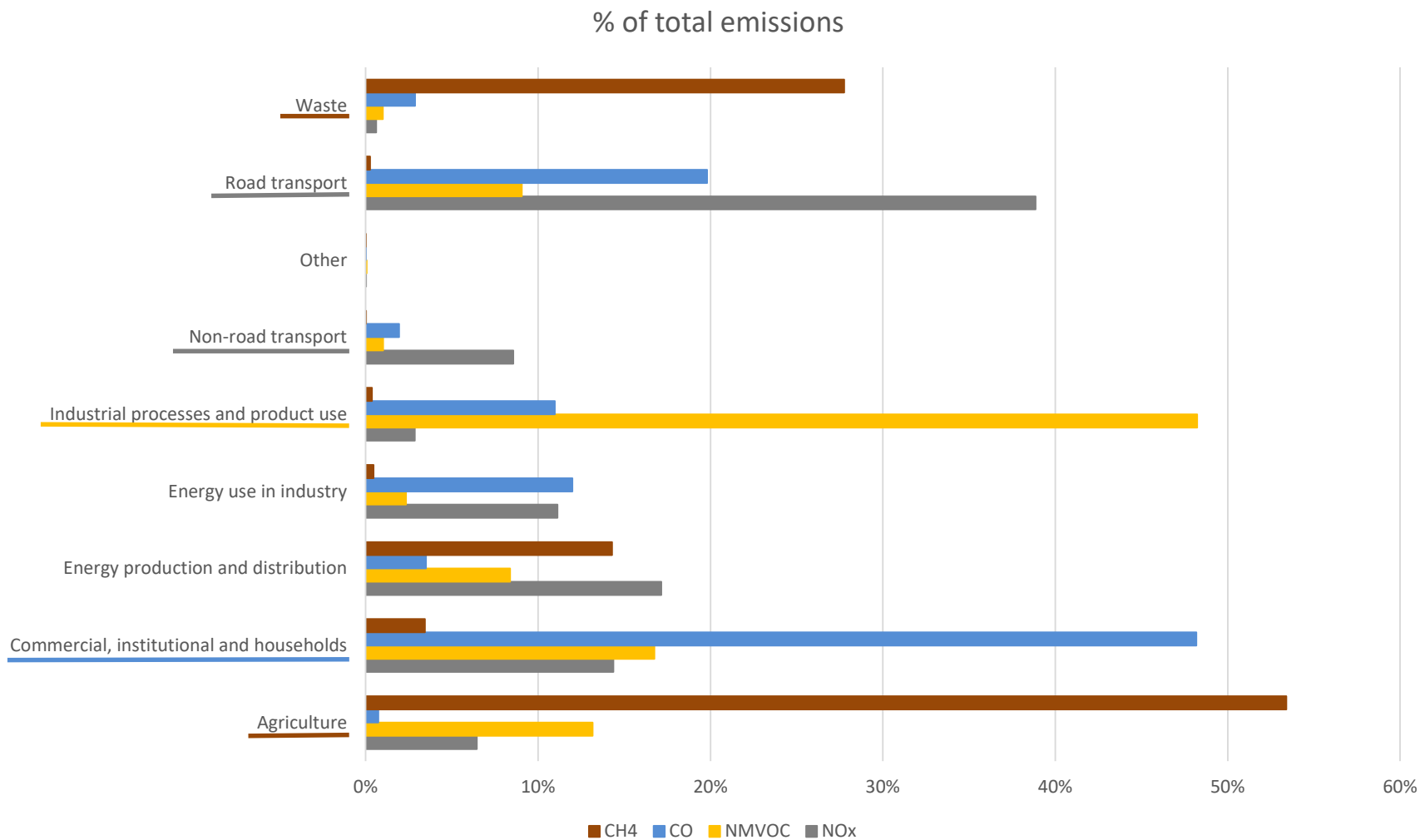
Phytotoxic ozone dose



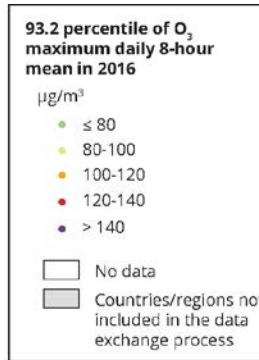
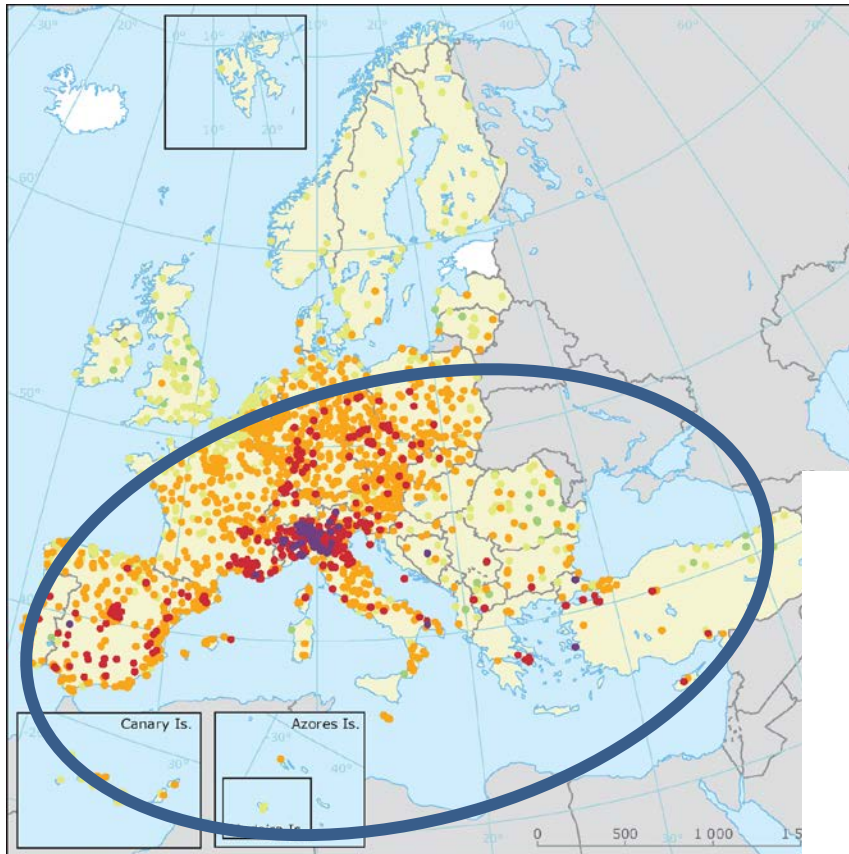
3. O₃ precursors emissions have decreased



3. O₃ precursors emissions from different sectors



4. Wide exceedances of O₃ target value



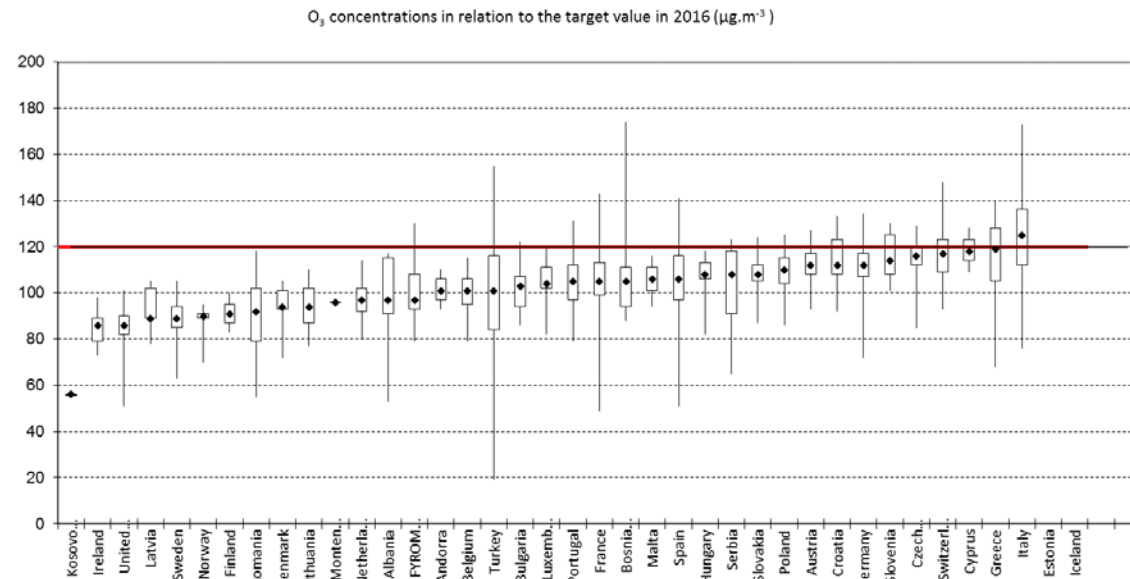
In 2016:

Values **above** the TV in **14 MS** and **5 other countries**

83 % stations below TV

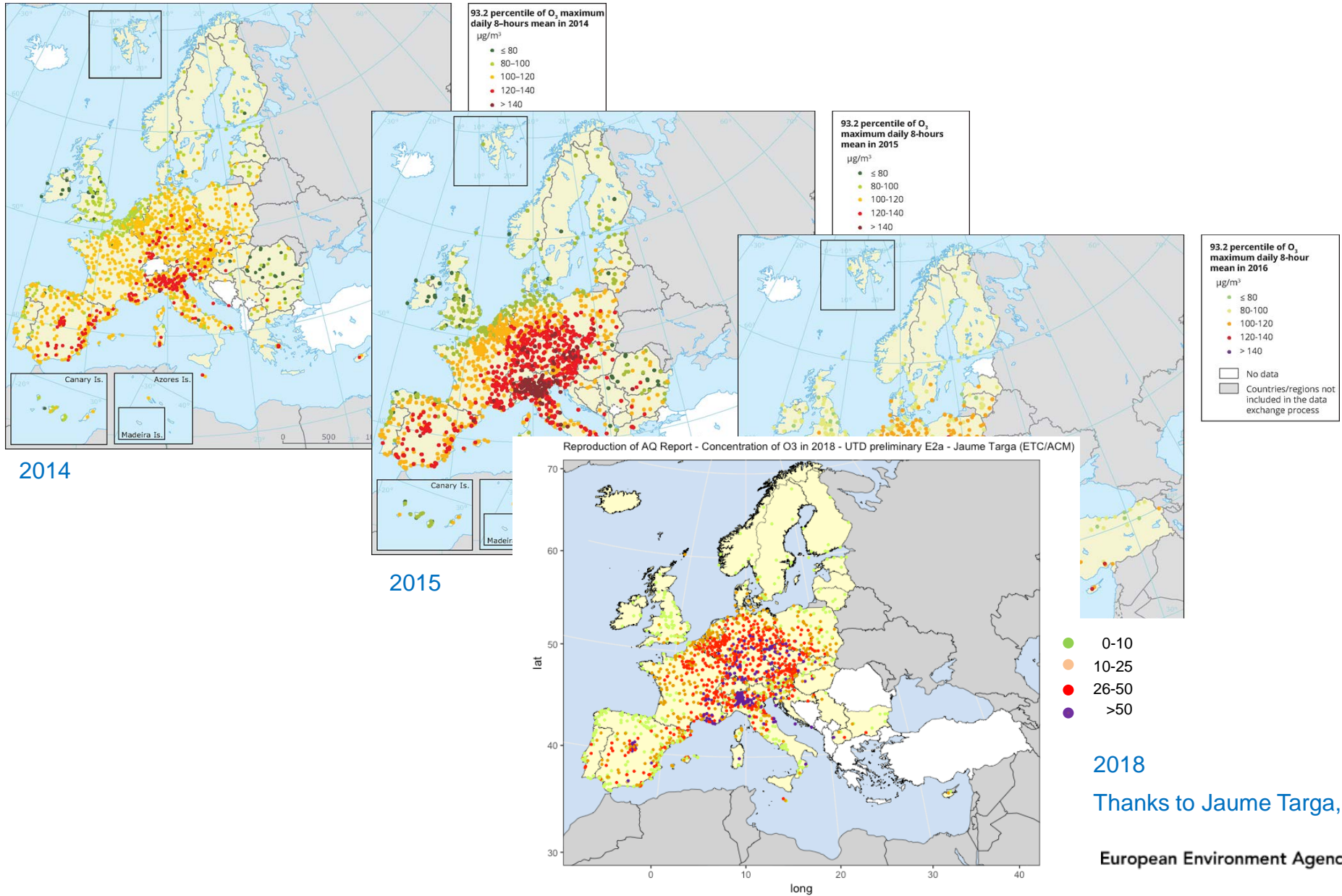
17 % stations below LTO

4 % stations below WHO AQG

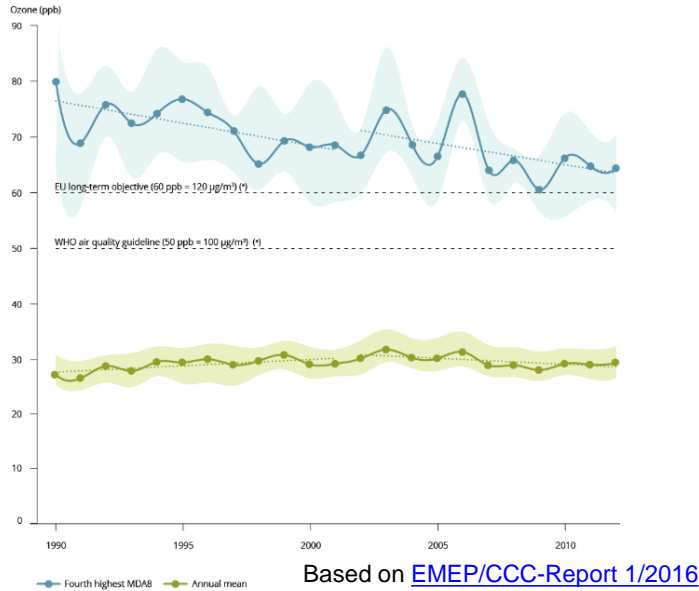


Sources: [Air Quality e-reporting database](#)
[Air Quality in Europe – 2018 report](#)

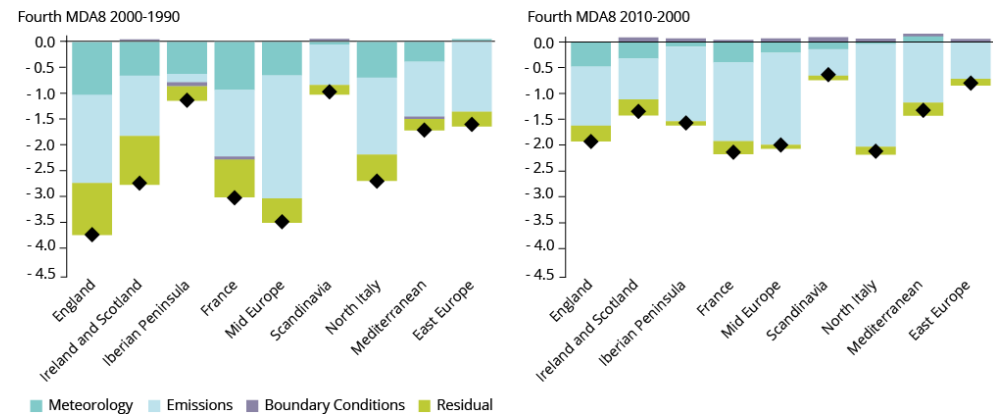
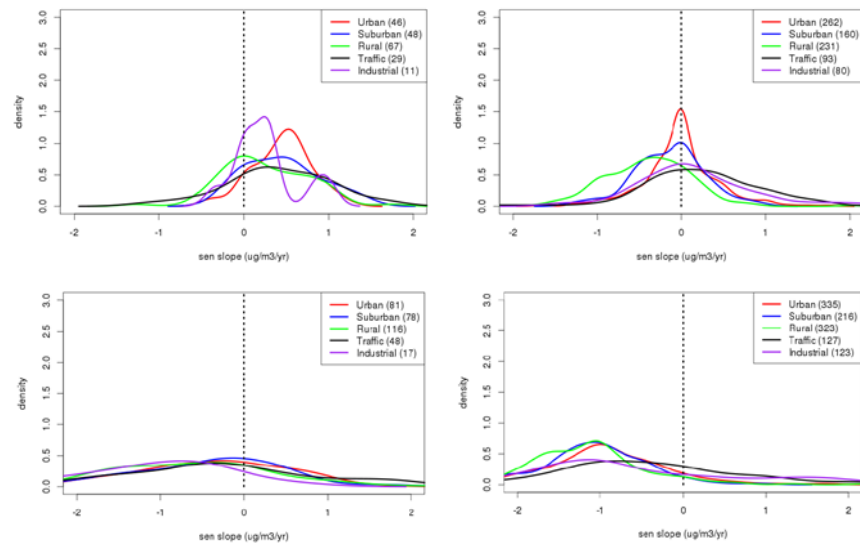
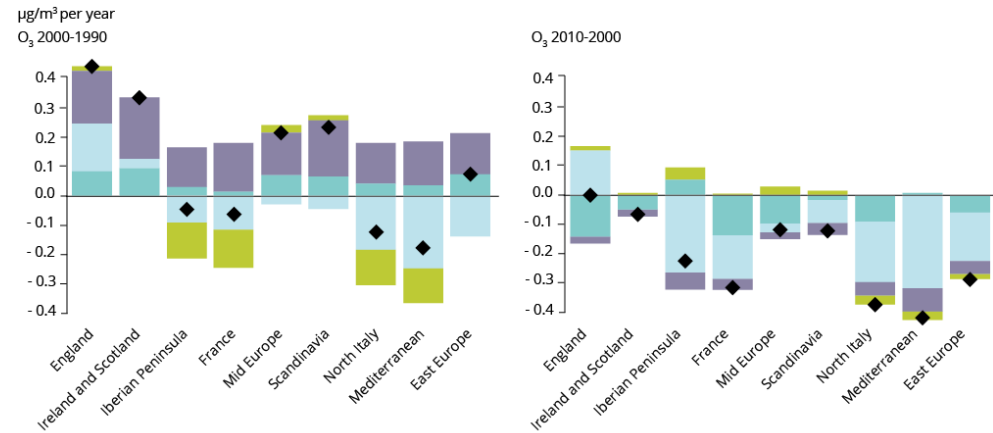
4. O₃ concentrations depend on meteorology



4. O₃ concentrations trends: first overview

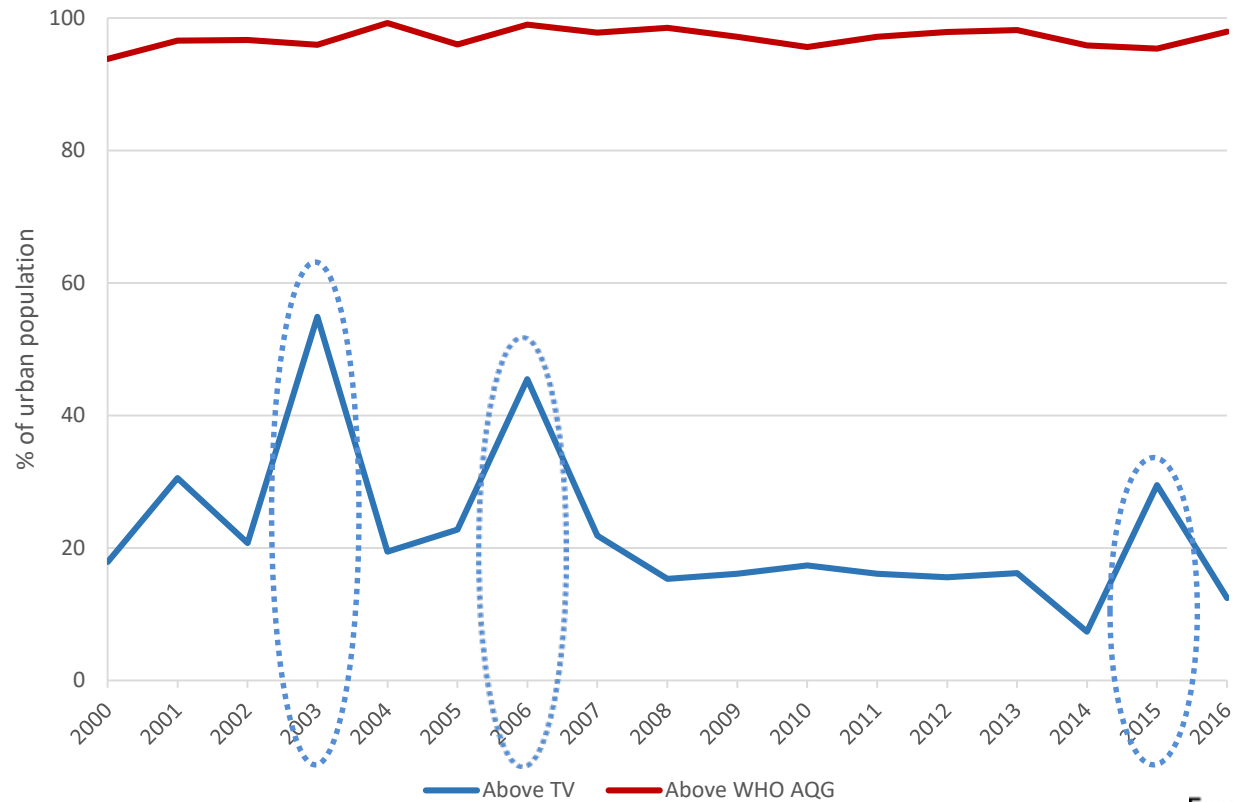


From [ETC/ACM Technical Paper 2016/7](#)



From [ETC/ACM Technical Paper 2015/4](#)

5. Many Europeans still exposed to harmful levels of O₃ pollution



Source: [CSI004](#)



6. Health impacts - latest estimates (2015)

Quantifying the health impacts
of ambient air pollution:
methodology and input data



ETC/ACM Technical Paper 2016/5
December 2016

Frank de Leeuw, Jan Hordijk



The European Topic Centre for Air Pollution and Climate Change Mitigation (ETC/ACM) is a network of national centres under the leadership of the European Environment Agency. ETC/ACM is the lead centre for the EEA's work on air pollution and climate change mitigation.

Air pollution



Health impacts of air pollution

Assessing the risks to health from air pollution

The European Environment Agency (EEA) produces annual air pollution health risk assessments at the European level. These give an objective and comparable estimate of the impacts of air pollution on the population's health. This briefing provides an overview of the methodology followed in the assessments.



Key messages

- The EEA uses the best available air quality data, and information on population and health outcomes at European level to estimate health risk.
- World Health Organization (WHO) recommendations are used in the EEA's assessment. These include the relationships between the concentration of an air pollutant to which a population is exposed and a health outcome (for instance, mortality), and the counterfactual concentrations above which health impacts are considered.
- The estimates are a good indication of the magnitude of the health impacts of air pollution and a solid basis for measuring the impact of policies to improve air quality.
- Health impacts are estimated at population level, rather than for individuals so it is not possible to identify which individuals died because of air pollution.
- The estimated number of premature deaths are a measure of the general impact of air pollution across a given population.

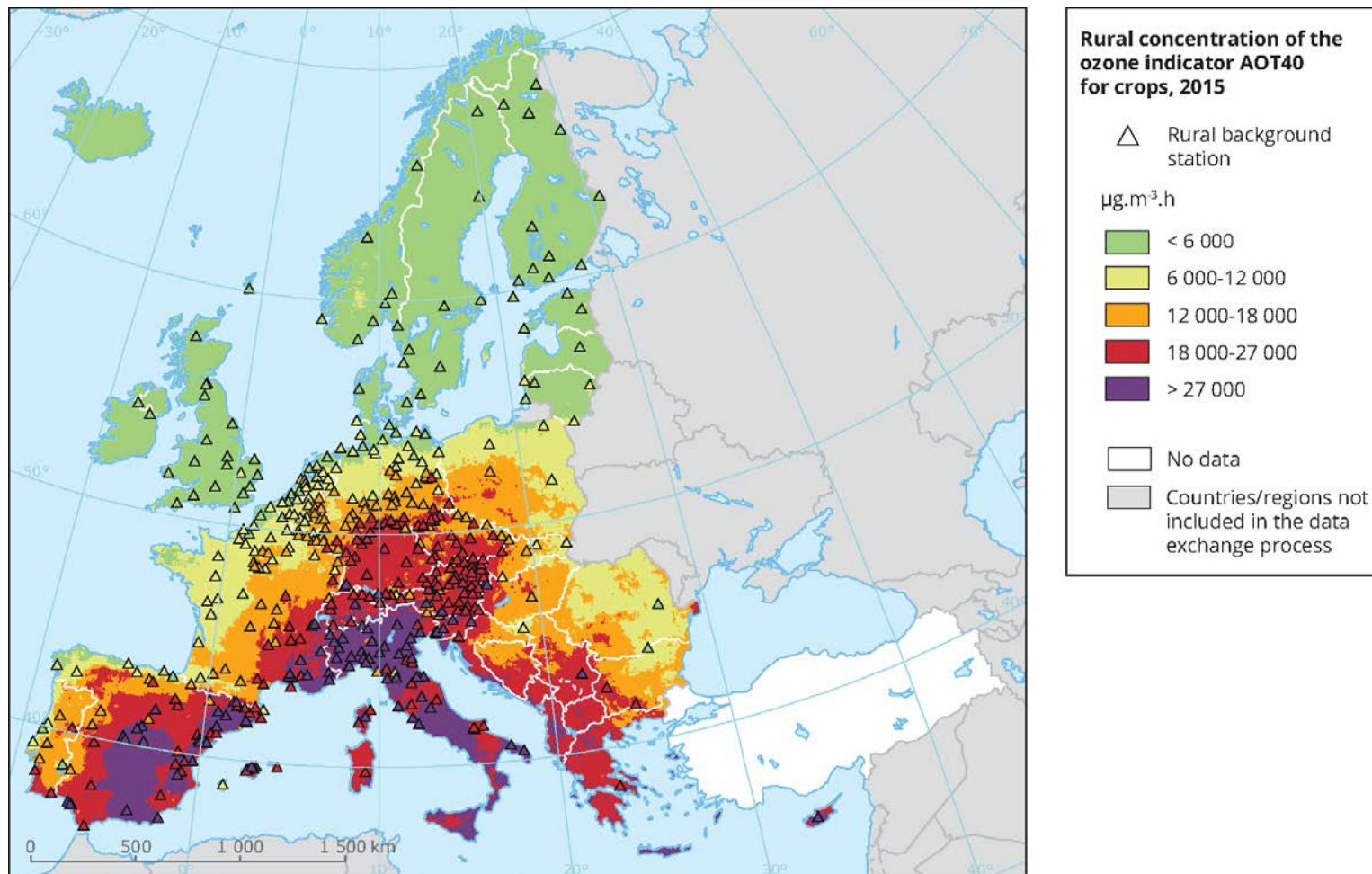
Assessments of the health risk from air pollution estimate and communicate the impact of exposure to air pollution on the population's health. Such assessments may also include the impact of changes in air quality resulting from air quality improvement measures (WHO, 2016).

The European Environment Agency's (EEA) annual health risk assessment is published in the Air Quality in Europe report and aims to:

Country	Population (1 000)	PM _{2.5}		NO ₂		O ₃	
		Annual mean (µg/m ³)	Premature deaths (†)	Annual mean (µg/m ³)	Premature deaths (†)	SOMO35 (†)	Premature deaths (†)
Austria	8 576	13.3	5 900	19.8	1 200	6 170	380
Belgium	11 237	13.0	7 400	20.9	1 500	2 790	220
Bulgaria	7 202	24.1	14 200	16.1	640	4 180	350
Croatia	4 225	17.4	4 500	17.3	430	6 240	230
Cyprus	1 173	16.9	750	14.1	30	6 390	40
Czech Republic	10 538	17.0	10 100	16.6	490	5 560	460
Denmark	5 660	9.7	2 800	10.5	80	2 200	90
Estonia	1 315	6.7	560	8.2	< 5	1 780	20
Finland	5 472	5.3	1 500	8.8	40	1 360	50
France	66 488	11.9	25 800	17.9	9 700	4 250	1 800
Germany	81 198	12.3	62 300	20.0	13 100	4 300	3 000
Greece	10 858	19.1	12 000	18.1	2 300	6 910	1 100
Hungary	9 856	18.9	12 800	18.0	1 300	5 100	400
Ireland	4 629	6.5	1 100	7.6	30	2 100	100
Italy	60 796	18.5	60 600	24.9	1 200	2 200	2 200
Latvia	1 986	10.6	1 600	12.4	100	2 580	100
Lithuania	2 921	11.7	2 600	12.4	100	2 580	100
Luxembourg	563	12.0	1 100	12.4	100	2 580	100
Malta	429	12.4	1 100	12.4	100	2 580	100
Netherlands	16 901	11.9	44 500	18.1	1 700	4 530	1 300
Poland	38 439	22.5	44 500	18.1	1 700	4 530	1 300
Portugal	10 621	12.7	27 900	21.2	8 900	5 820	1 800
Romania	21 482	12.7	1 800	16.7	160	6 650	100
Slovakia	5 433	12.7	27 900	21.2	8 900	5 820	1 800
Slovenia	2 069	28.7	3 000	18.1	110	6 200	90
Spain	45 887	12.7	1 800	16.7	160	6 650	100
Sweden	9 747	5.9	3 000	10.8	110	2 080	140
Switzerland	64 875	9.4	21 300	19.7	9 600	1 290	590
Turkey	2 892	20.5	1 400	18.1	130	7 220	70
Andorra	78	13.3	50	20.5	< 5	6 050	< 5
Bosnia and Herzegovina	3 825	18.9	3 700	16.2	150	6 050	170
Former Yugoslav Republic of Macedonia	2 069	28.7	3 000	18.1	110	6 200	90
Iceland	329	5.5	60	11.9	< 5	260	< 1
Kosovo under UNSCR 1244/99	1 805	26.4	3 700	15.8	70	6 130	120
Liechtenstein	37	11.0	20	20.5	< 5	5 800	< 5
Monaco	38	14.4	20	29.7	20	8 020	< 5
Montenegro	622	18.5	640	16.4	20	6 790	30
Norway	5 166	5.9	1 300	12.3	200	1 760	50
San Marino	33	16.2	30	16.2	< 1	7 180	< 5
Serbia	7 114	23.3	13 000	18.4	860	5 280	420
Switzerland	8 238	11.8	4 200	21.4	1 000	6 170	300
EU-28	506 030	13.9	291 000	18.9	76 000	4 250	16 400
Total	538 278	14.1	422 000	18.8	79 000	4 310	17 700

Between 14 000 and 18 000 premature deaths in Europe each year originating from short-term exposure to ozone.

7. Vegetation and crops are still affected by O₃ pollution



Source: [CSI005](#)

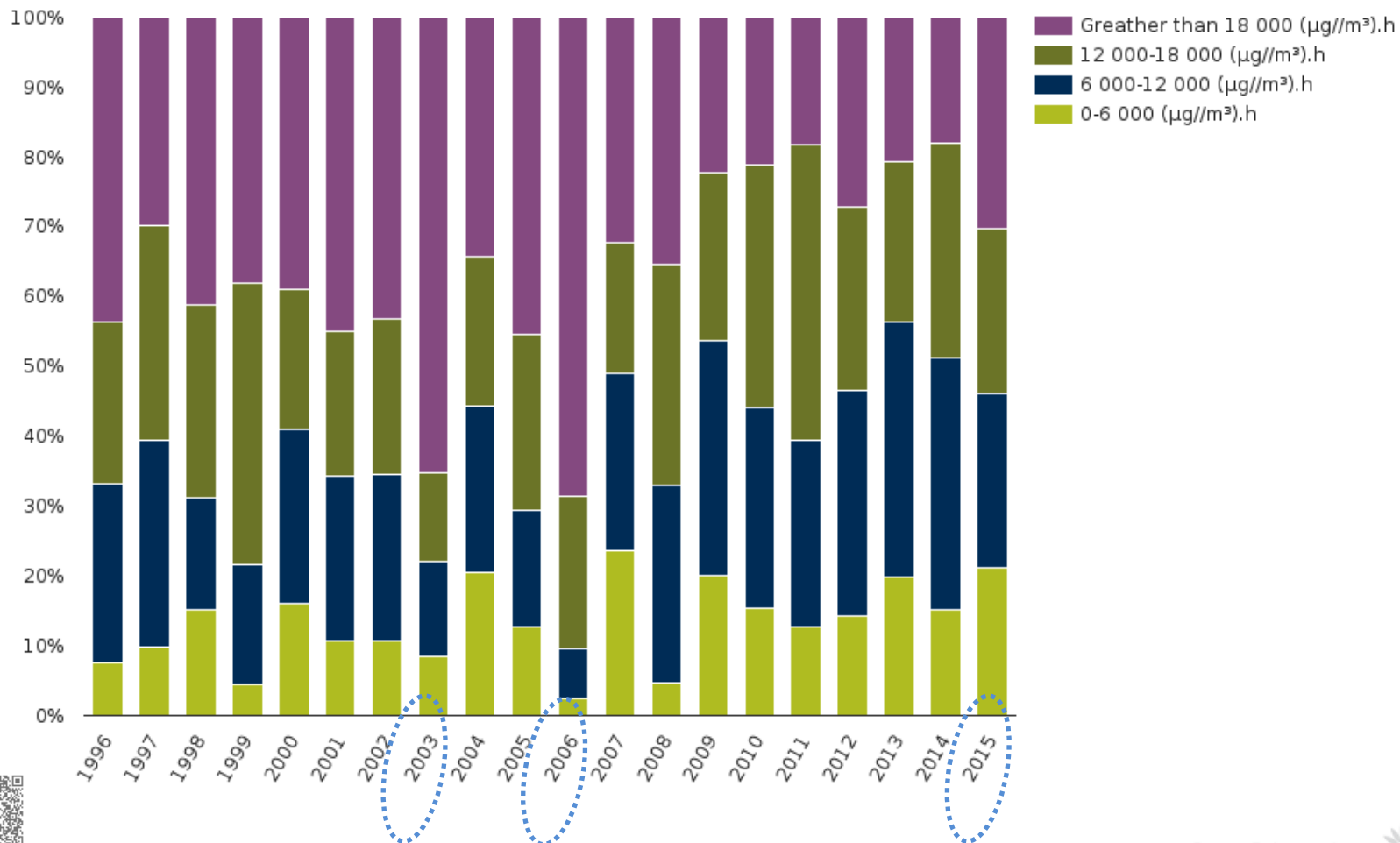
In 2015,

- Values **above** the TV for protection of vegetation in **31 %** of the EEA agricultural area
- Values **above** the LTO in **80 %** of the EEA agricultural area



7. Vegetation and crops are still affected by O₃ pollution

Stacked chart — Exposure of agricultural area to ozone in EEA member countries



Source: [CSI005](#)



7. EEA's contribution to public information

[Explore air pollution data](#)

[Up-to-date air quality data](#)

[Air quality statistics](#)

Air quality statistics

Dashboard (Tableau) — Prod-ID: DAS-20-en — Published 28 Aug 2018

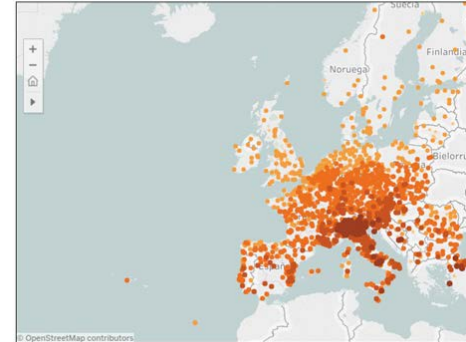
Topics: Air pollution

Key air quality statistics for the main air pollutants

StatisticsViewer | Graph | Table

Air quality statistics

Year: 2017 | Pollutant: Ozone (O3) | Statistics: 93.15 percentile



Graph - average for selected

Year

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

2017

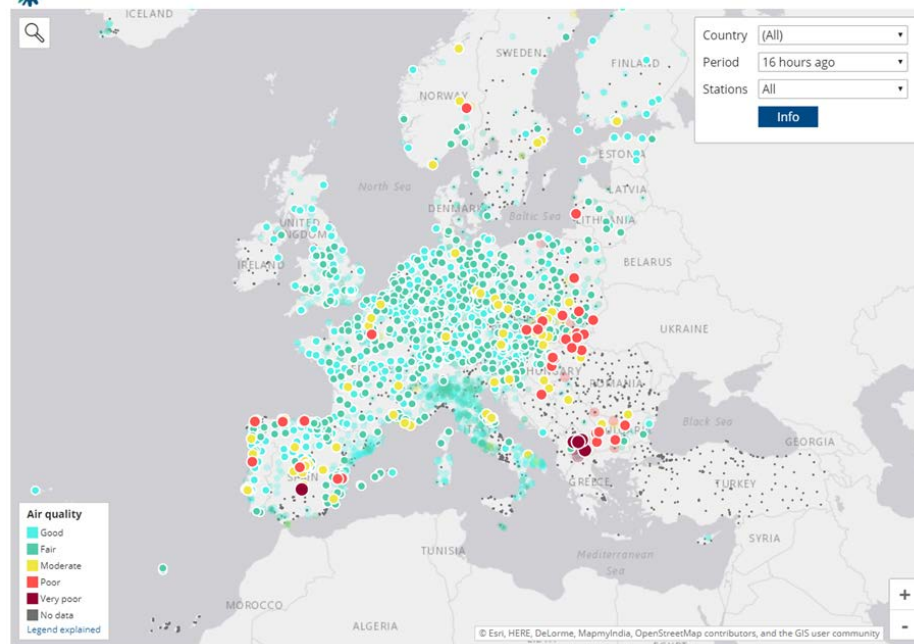
2017

2017

2017

2017

European Air Quality Index



Air quality
Good
Fair
Moderate
Poor
Very poor
No data
Legend explained

© Esri, HERE, DeLorme, MapmyIndia, OpenStreetMap contributors, and the GIS user community

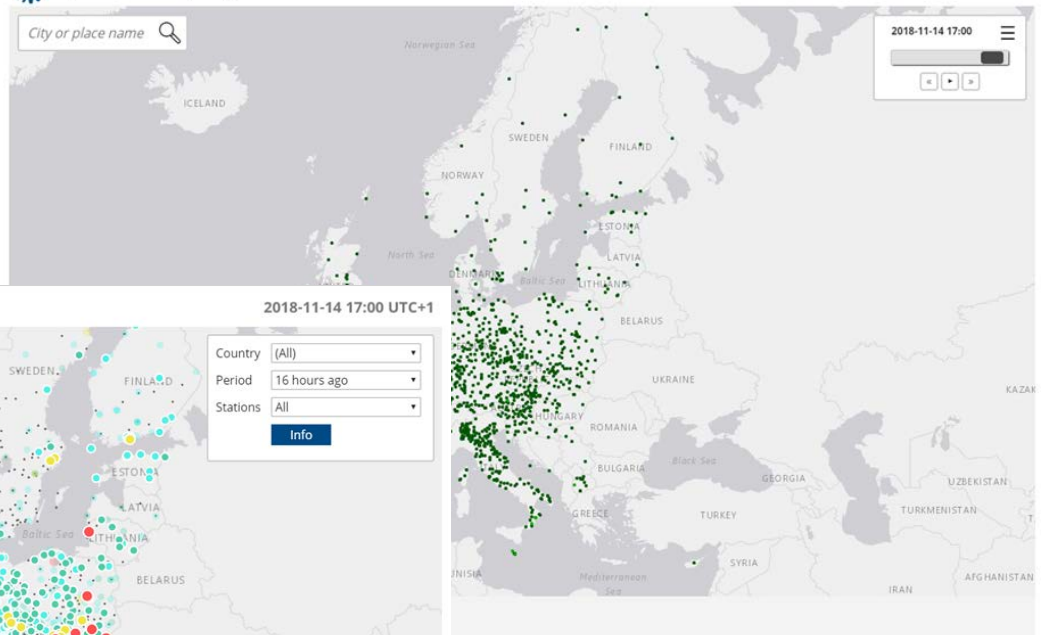
Up-to-date air quality data

GIS Map Application — Prod-ID: DAS-19-en — Published 01 Aug 2018 — Last modified 01 Aug 2018

Topics: Air pollution

Latest measurements from Europe's air quality monitoring network

Up-to-date air quality data



Country: (All)
Period: 16 hours ago
Stations: All
Info

European Environment Agency



[Air quality index](#)

Thank you!

Alberto.GonzalezOrtiz@eea.europa.eu
eea.europa.eu/themes/air/

Sign up to receive EEA news, reports
and alerts on your areas of interest at
<http://eea-subscriptions.eu/subscribe>