New European Air Quality Directive

Max Gerrit Adam

ACTRIS CiGas - FZJN

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Background

Air pollution in Europe **largest environmental health risk** → e.g. cardio-vascular and respiratory diseases

European Green Deal → **Zero pollution (air, water, soil) until 2050**

Evidence-based **WHO guidelines** from 2021 → lowest threshold value for an **air pollutant** where **health impacts** are evident

Interim targets from **2030** onwards towards **zero-pollution in 2050**

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Background

1996 → **First EU guideline** on ambient air quality assessment and management

2008 → air quality and clean air in Europe

In **2022** the **EU commission suggested** adoption of **new air quality guideline**

→ since **2024** new air quality guideline, **stricter limit values on air pollutants**

Official Journal
of the European Union

EN
L series

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DIRECTIVE (EU) 2024/2881 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 23 October 2024

on ambient air quality and cleaner air for Europe

http://data.europa.eu/eli/dir/2024/2881/oj

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Regulated pollutants

Particulate Matter (PM_{10} and $PM_{2.5}$)
Nitrogen Dioxide (NO_2)
Sulphur Dioxide (SO_2)
Ozone (O_3)
Carbon Monoxide (CO)
Benzene
Lead

Emerging pollutants (since 2024)

UFPs
BC
NH_3
Oxidative potential of PM

Main sources

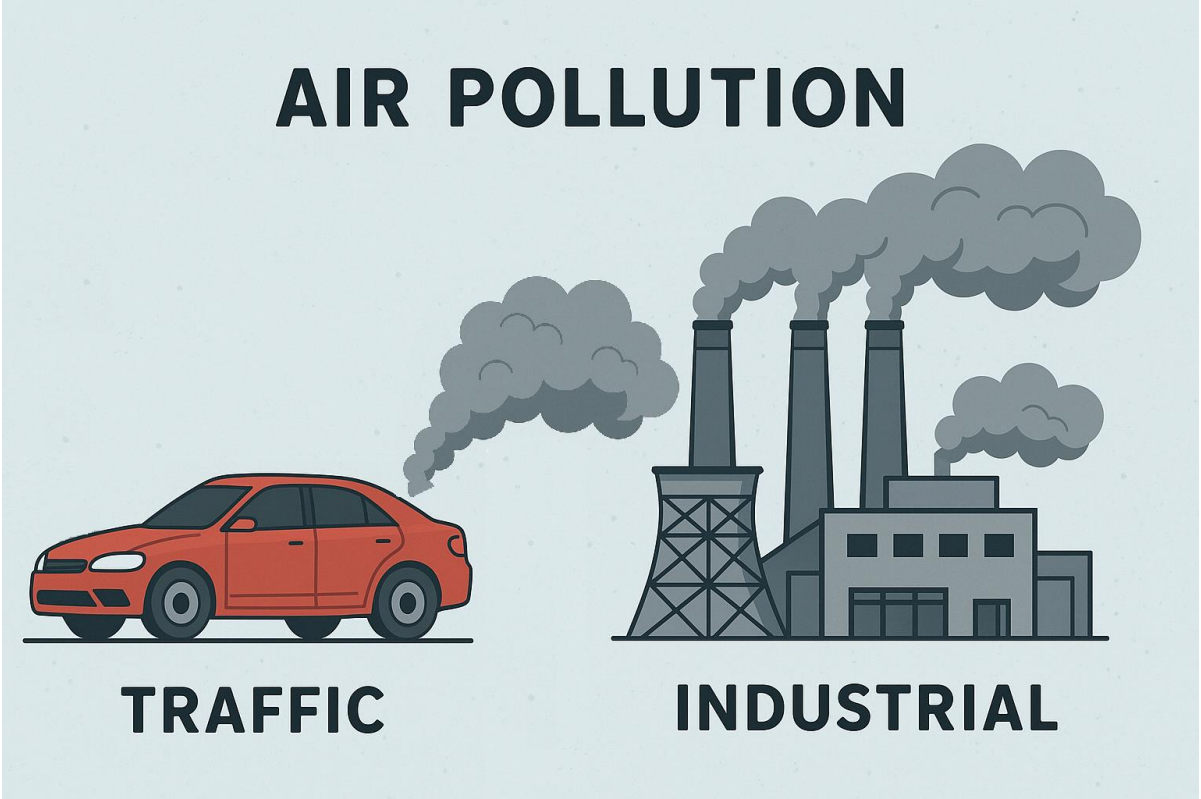

Image generated by ChatGPT (OpenAI, 2025)

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Types of stations

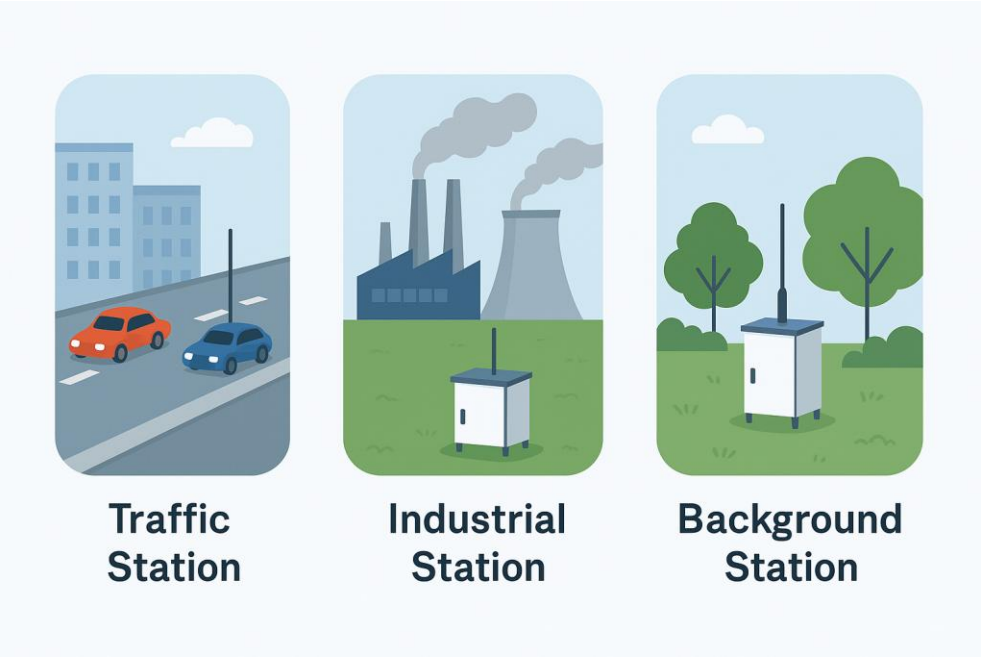
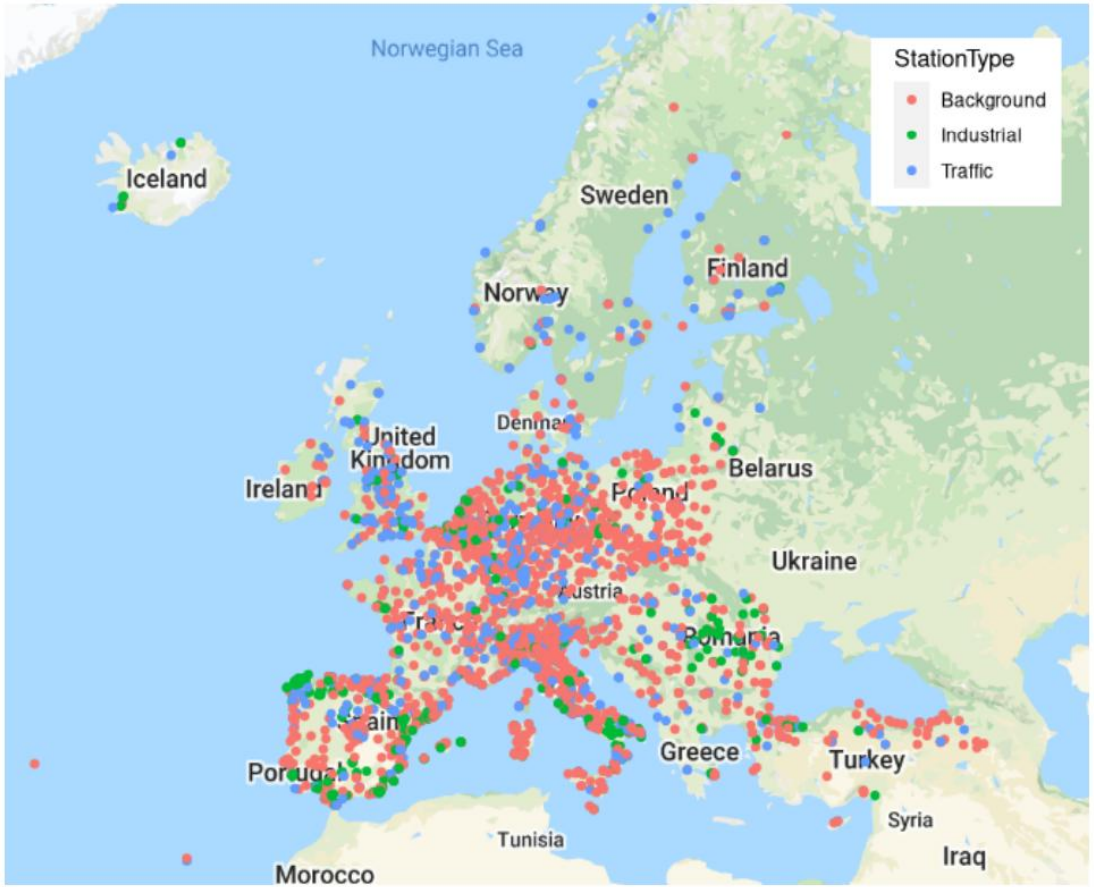


Image generated by ChatGPT (OpenAI, 2025)

- There are more than 4000 monitoring stations.
- Model simulations, emission inventories complement measurements.

NO_2 measurements across European stations



Mills and Peckham (2021), Atm., **12**, 385.

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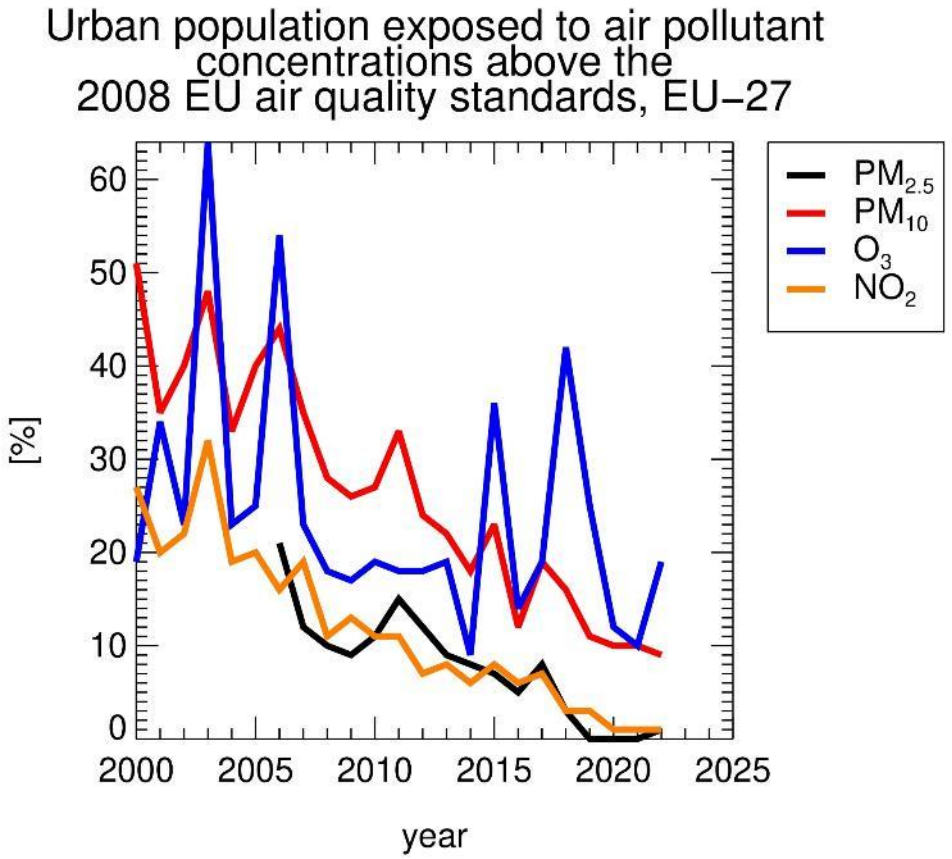

Background and achievements, further air pollutant control

- In 2008 an EU defined an objective for ambient air quality.
- The number of persons exposed to the major air pollutants have been drastically reduced.
- The trend for O_3 is, however, not going in that direction.

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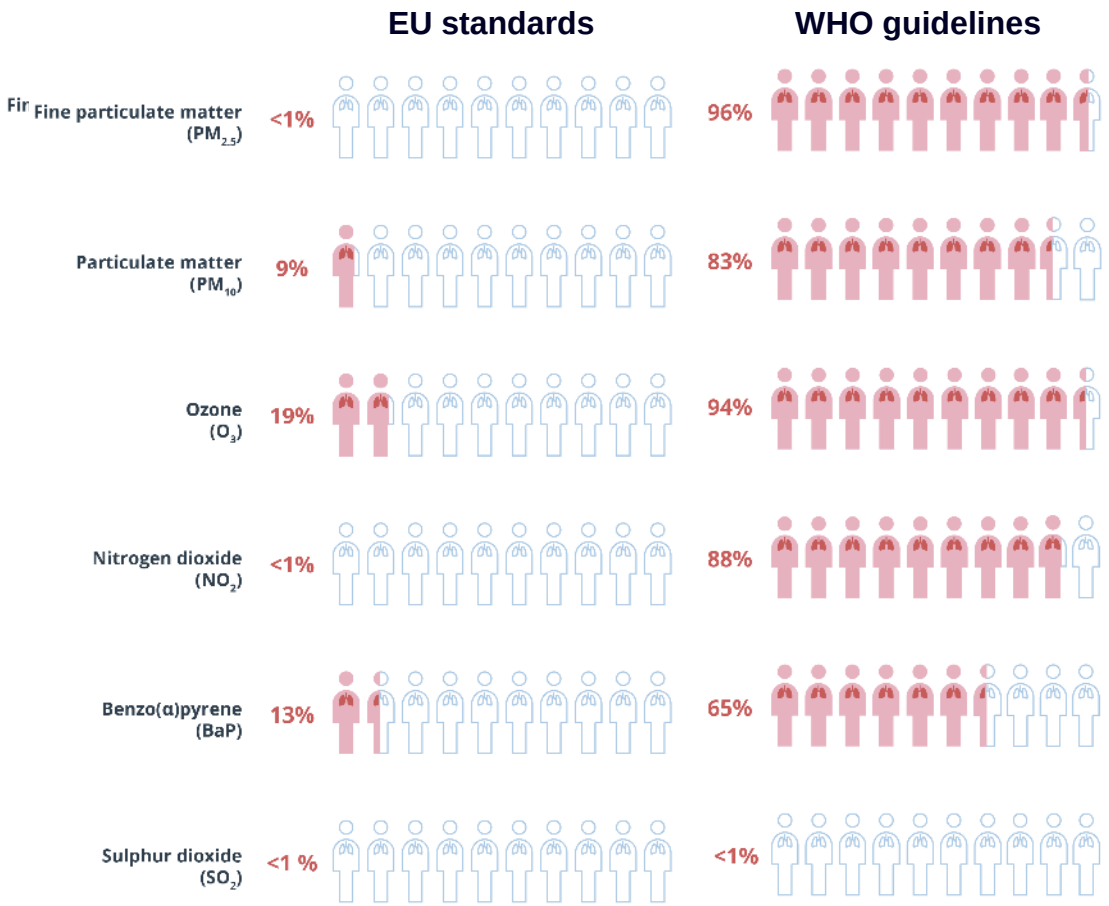
Share of the EU urban population exposed to air pollutant above



https://www.eea.europa.eu/publications/europes-air-quality-status-2024

Are the limit values strict enough?

- 2021: WHO published a new air quality guideline.
- Adverse effect of pollutants below the limit values considered.
- Most of the European populations still live under unhealthy conditions.

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New limit values for the protection of human health to be attained by 1 January 2030

Pollutant	Averaging Period	Limit Value	Not to be exceeded more than	WHO guideline
$PM_{2.5}$	1 day	25 µg/m^3	18 times / year	
	Calendar year	10 µg/m^3	-	5 µg/m^3
PM_{10}	1 day	45 µg/m^3	18 times / year	
	Calendar year	20 µg/m^3	-	15 µg/m^3
NO_2	1 hour	200 µg/m^3	3 times / year	
	1 day	50 µg/m^3	18 times / year	
	Calendar year	20 µg/m^3	-	10 µg/m^3
Benzene	Calendar year	3.4 µg/m^3	-	1.7 µg/m^3
O_3	3-yr avg., max. daily 8-hr mean	120 µg/m^3 (target value)		100 µg/m^3
CO	Max. daily 8-hr mean	10 mg/m^3		10 mg/m^3

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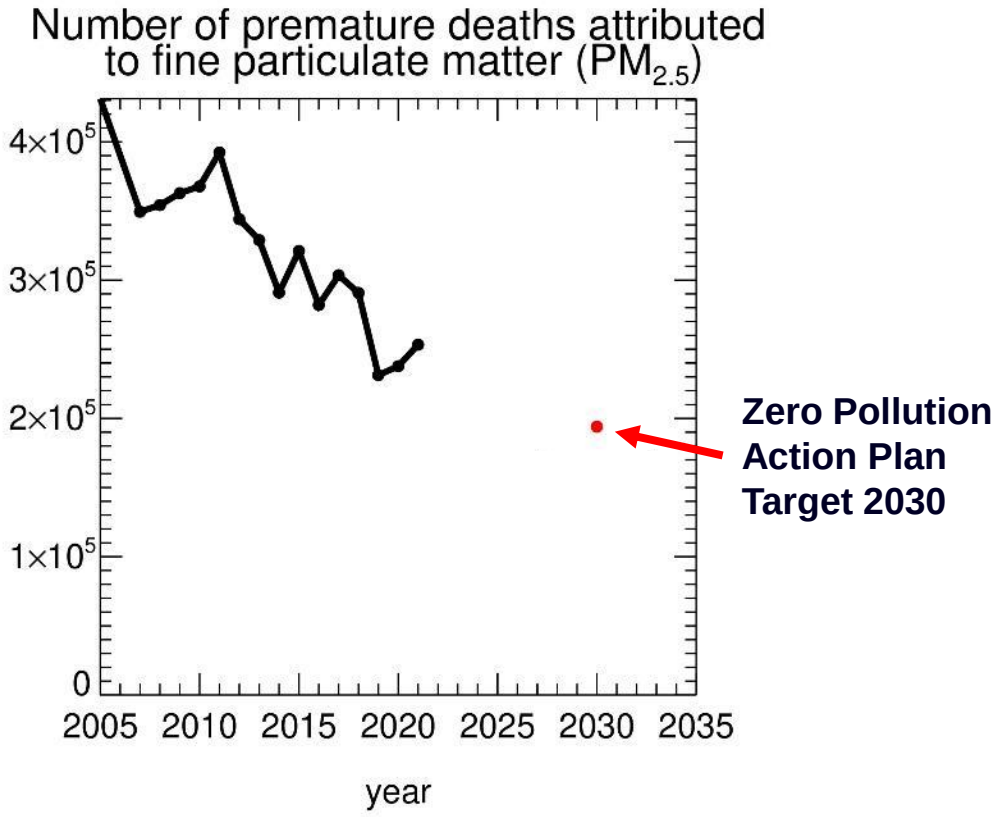

The EU action plan

- Reduce the number of premature deaths caused by air pollution by 55% in 2030, compared to 2005.
- Stricter thresholds for air pollution.
- Monitoring pollutants of emerging concern (e.g. UFPs, NH_3, BC)
- Enhancing the right to clean air, improved access to justice. Open access information.

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Reference method for the measurement of nitrogen dioxide (NO_2) and oxides of nitrogen in ambient air

The reference method for the measurement of nitrogen dioxide and oxides of nitrogen in ambient air is that described in EN 14211:2012 'Ambient air – Standard method for the measurement of the concentration of nitrogen dioxide and nitrogen monoxide by chemiluminescence'.

http://data.europa.eu/eli/dir/2024/2881/oj

European norm EN 14211:2012
→ Use of Molybdenum converter

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The way forward

New EU AQ directive came into effect 10th December 2024

→ **Member states have 2 years** to adopt the new laws, regulations and administrative provisions

- **Special focus on PM and NO_2** as health impact highest → follow closely future WHO decisions
- **Limit values instead of target values** for **Arsenic** (calendar year: 6.0 ng/m^3), **Cadmium** (calendar year: 5.0 µg/m^3), **Nickel** (calendar year: 20 ng/m^3), and **Benzo(a)pyrene** (calendar year: 1.0 ng/m^3)
- Interim air quality standards for 2030, thereafter aligned closely with WHO → zero pollution in 2050
- Economic benefits in 2030 estimated between €42 – €121 billion for annual cost of €6 billion
- **People suffering from health damages** due to **air pollution** have the **right to be compensated,** in the case of a violation of EU air quality rules.

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The way forward

Supersites

- **Comprehensive, long-term data sets of air pollutants**
- **Strategically located in urban and rural areas**, and near sources of pollution like ports, airports, major roads, industries, and residential heating
- **Criteria**
  - 1 supersite in urban areas / 10 mio. people
  - 1 supersite in rural areas for countries >10,000 km^2 & <100,000 km^2; at least 1 supersite for countries >100,000 km^2
- **Mandatory measurements**: PM_{10}, $PM_{2.5}$, UFP, BC, UFPs, BC, NO_2, O_3, NH_3 (mandatory for rural only)
- Monitoring at supersites shall be coordinated with ACTRIS and EMEP

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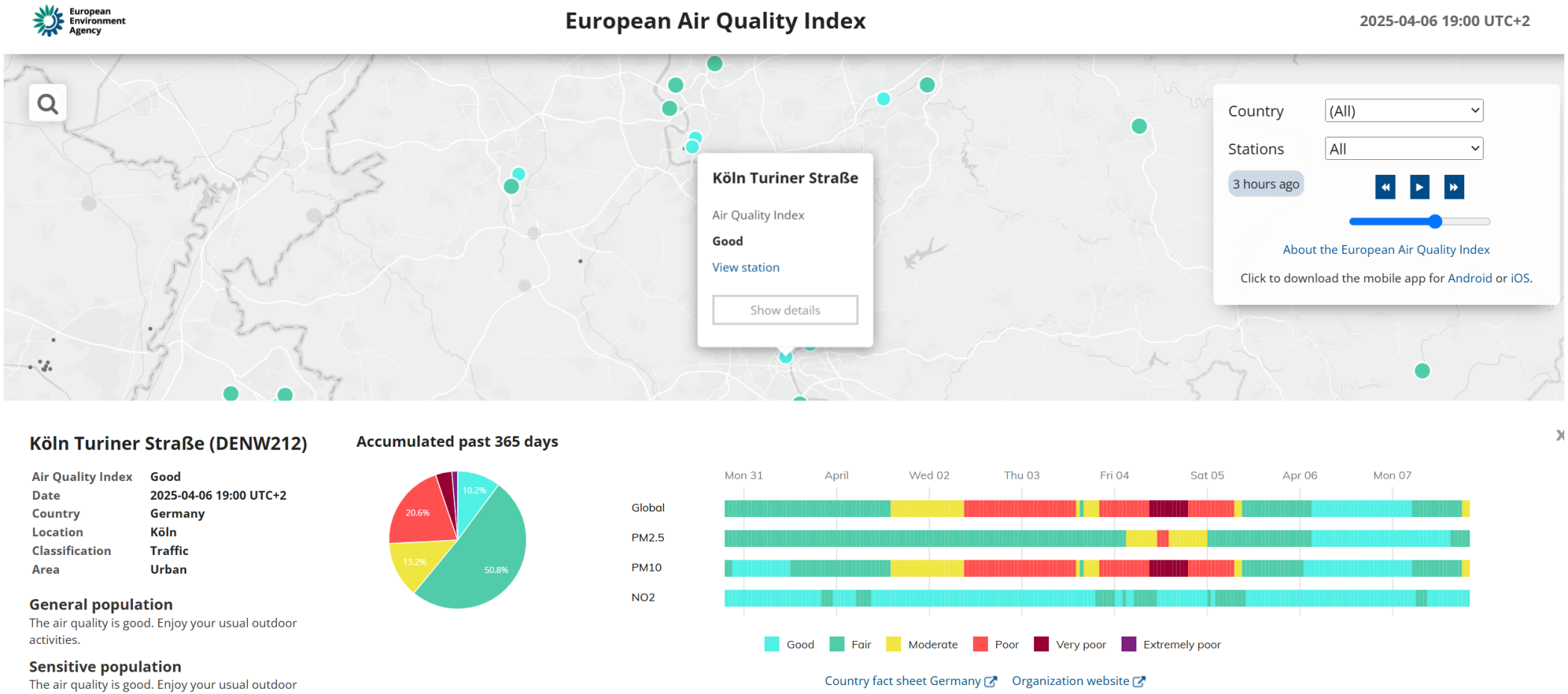
Public access to information



https://airindex.eea.europa.eu/AQI/index.html