AQLI Air Quality Life Index®

# Europe Fact Sheet

Studying pollution in Europe tells largely a success story after a series of policy reforms. Today, on average, Europeans are exposed to 41 percent less particulate pollution than they were two decades ago, gaining 9 months of life expectancy because of it. Areas that were historically more polluted have seen even greater gains. In Italy's northern Veneto region, for instance, residents gained 2.3 years of life expectancy. In the Silesian province of southern Poland, residents gained 2 years.

## KEY TAKE-AWAYS

- Though most of Europe meets the European Union's air pollution standard of 25 µg/m³, nearly three-quarters of the European population live in areas that do not meet the World Health Organization's (WHO) stronger guideline of 10µg/m³. If particulate pollution were to meet the WHO guideline, average life expectancy across Europe would improve by 3 months.
- The most polluted area of Europe is the eastern part of the continent, where the entire populations of Poland, Belarus, Slovakia, the Czech Republic, Slovenia, Hungary, Lithuania, and Latvia do not meet WHO's guideline.
- Poland is the most polluted country in Europe. Particularly, the cities of Warsaw and Łódź, and their surrounding areas, see high levels of particulate pollution. If pollution were to improve to meet the WHO guideline, residents in Warsaw would gain 1.2 years onto their life expectancy.
- Italy's Po Valley, including the city of Milan, is also a highly polluted part of Europe. Residents there would gain 1.1 years if particulate pollution levels met the WHO guideline.
- Turkey's industrial center of Bursa experiences high particulate pollution as well. Residents there would gain 1.1 years if pollution improved to meet the WHO guideline.

**Figure 1** · Change in Life Expectancy due to Change in PM2.5 Concentration, 1998-2018

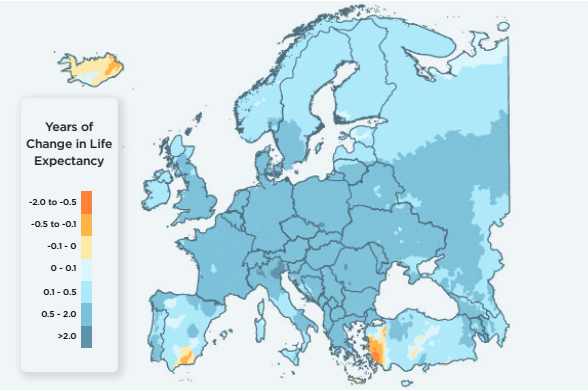
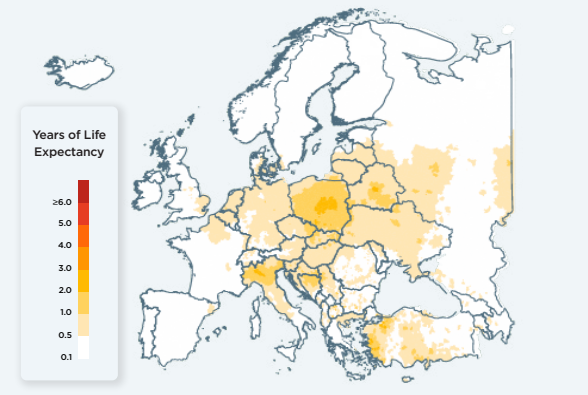



**Figure 2** · Potential Gains in Life Expectancy from Permanently Reducing PM Concentrations from the 2018 Levels to the WHO Guideline



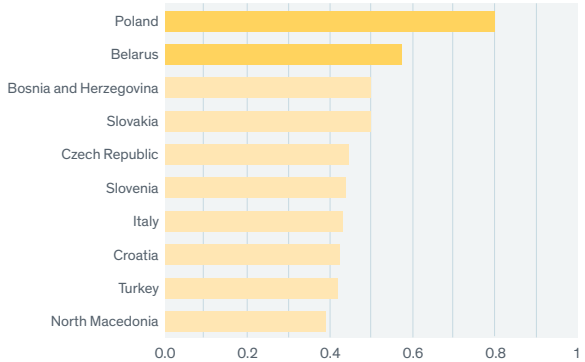

**"The legacy of environmental improvement in much of Europe over the last two decades is evidence that people living in today's pollution hot spots can see brighter skies. A demand for change from citizens and subsequent strong policies have helped to clear the air in parts of Europe before, and can continue to do so to ensure that high pollution today does not need to be tomorrow's fate."**

**Michael Greenstone,** The Milton Friedman Distinguished Service Professor in Economics, the College, and the Harris Shool; Director, EPIC

# $PM_{2.5}$ Concentrations and Life Expectancy Impacts in European Countries and the Most Polluted Region in Each Country.

| Country | $PM_{2.5}$ Concentration 2018 (µg/m³) | Months of Life Expectancy Gained if $PM_{2.5}$ is Reduced to WHO Guideline | Percent of Population in Areas Above WHO Guideline | Regions with Highest $PM_{2.5}$ Concentration, 2018 | 2018 $PM_{2.5}$ Concentration in Most Polluted Region | Months of Life Expectancy Gained if $PM_{2.5}$ is Reduced to WHO Guideline in Most Polluted Region |
|---|---|---|---|---|---|---|
| **Europe** | **12** | **3.1** | **72** | | | |
| **Albania** | 11 | 1.8 | 72 | Elbasanit, Elbasan | 13 | 3.8 |
| **Andorra** | 7 | 0.0 | 0 | Canillo | 7 | 0.0 |
| **Armenia** | 11 | 2.4 | 62 | Ervan* | 15 | 5.5 |
| **Austria** | 13 | 3.2 | 94 | Wien* | 14 | 5.0 |
| **Azerbaijan** | 8 | 0.2 | 14 | Nakhchivan | 10 | 0.8 |
| **Belarus** | 16 | 6.5 | 100 | Pukhavichy, Minsk | 21 | 12.5 |
| **Belgium** | 13 | 4.0 | 98 | East Flanders | 15 | 5.4 |
| **Bosnia and Herzegovina** | 15 | 5.8 | 98 | Brčko City | 18 | 9.4 |
| **Bulgaria** | 11 | 2.6 | 59 | Grad Sofiya* | 15 | 5.8 |
| **Croatia** | 14 | 4.9 | 95 | Brodsko-Posavska | 17 | 7.9 |
| **Cyprus** | 10 | 0.6 | 42 | Limassol | 10 | 0.6 |
| **Czech Republic** | 15 | 5.3 | 100 | Moravskoslezský | 18 | 10.0 |
| **Denmark** | 12 | 2.5 | 100 | Sjælland* | 14 | 4.3 |
| **Estonia** | 10 | 0.5 | 30 | Tartu | 12 | 1.9 |
| **Finland** | 7 | 0.0 | 0 | Uusimaa, Southern Finland* | 9 | 0.0 |
| **France** | 10 | 1.3 | 47 | Nord, Hauts-de-France | 14 | 4.8 |
| **Georgia** | 9 | 0.6 | 40 | Tbilisi* | 11 | 1.2 |
| **Germany** | 12 | 2.9 | 97 | Sachsen-Anhalt | 14 | 5.3 |
| **Greece** | 10 | 1.1 | 63 | North Aegean, Aegean | 13 | 3.2 |
| **Hungary** | 14 | 4.3 | 100 | Borsod-Abaúj-Zemplén | 15 | 5.8 |
| **Iceland** | 4 | 0.0 | 0 | Höfuðborgarsvæði* | 5 | 0.0 |
| **Ireland** | 5 | 0.0 | 0 | Dublin* | 6 | 0.0 |
| **Italy** | 14 | 5.0 | 81 | Milan | 22 | 13.7 |
| **Latvia** | 12 | 2.5 | 100 | Daugavpils, Latgale | 13 | 3.8 |
| **Lithuania** | 13 | 3.4 | 100 | Marijampolės | 14 | 4.4 |
| **Luxembourg** | 10 | 0.4 | 39 | Luxembourg City* | 11 | 0.8 |
| **Malta** | 8 | 0.0 | 0 | Victoria, Gozo | 8 | 0.0 |
| **Moldova** | 11 | 1.8 | 95 | Bender | 13 | 3.8 |
| **Monaco** | 10 | 0.0 | 0 | | | |
| **Montenegro** | 11 | 1.0 | 66 | Podgorica* | | |
| **Netherlands** | 13 | 3.4 | 100 | Zeeuwse meren | 14 | 5.0 |
| **North Macedonia** | 14 | 4.6 | 80 | Šuto Orizari* | 21 | 12.6 |
| **Norway** | 6 | 0.0 | 0 | Oslo* | 9 | 0.4 |
| **Poland** | 18 | 9.7 | 100 | Warsaw* | 23 | 14.9 |
| **Portugal** | 7 | 0.0 | 0 | Porto | 9 | 0.0 |
| **Romania** | 11 | 1.7 | 81 | Satu Mare | 14 | 4.3 |
| **Russia** | 12 | 3.2 | 75 | Moscow City* | 17 | 8.8 |
| **San Marino** | 12 | 2.8 | 100 | Serravalle | 12 | 2.8 |
| **Serbia** | 13 | 3.8 | 97 | Sremski | 15 | 6.1 |
| **Slovakia** | 15 | 5.8 | 100 | Košický | 16 | 6.6 |
| **Slovenia** | 14 | 5.2 | 100 | Osrednjeslovenska* | 16 | 6.5 |
| **Spain** | 8 | 0.4 | 12 | Barcelona | 12 | 2.5 |
| **Sweden** | 8 | 0.2 | 16 | Skåne | 11 | 1.7 |
| **Switzerland** | 11 | 1.8 | 87 | Ticino | 15 | 5.4 |
| **Turkey** | 14 | 4.8 | 88 | Bursa | 21 | 12.7 |
| **Ukraine** | 13 | 3.6 | 96 | Kiev City* | 15 | 6.5 |
| **United Kingdom** | 10 | 1.0 | 53 | Greater London* | 13 | 3.1 |

**Figure 3** · 10 European Countries with Greatest Potential Gains in Life Expectancy from Reducing $PM_{2.5}$ to the WHO Guideline




## ABOUT THE AIR QUALITY LIFE INDEX (AQLI)

The AQLI is a pollution index that converts particulate air pollution into perhaps the most important metric that exists: its impact on life expectancy. Developed by the Energy Policy Institute at the University of Chicago (EPIC), the AQLI is rooted in cutting-edge, peer-reviewed research co-authored by EPIC Director Michael Greenstone that for the first time quantified the causal relationship between long-term human exposure to air pollution and life expectancy. The Index then combines this research with hyper-localized, global particulate measurements, yielding unprecedented insight into the true cost of particulate pollution in communities around the world. The Index also illustrates how air pollution policies can increase life expectancy when they meet the World Health Organization's guideline for what is considered a safe level of exposure, existing national air quality standards, or user-defined air quality levels. This information can help to inform local communities and policymakers about the importance of air pollution policies in concrete terms.

Methodology: The life expectancy calculations made by the AQLI are based on a pair of peer-reviewed studies, Chen et al. (2013) and Ebenstein et al. (2017), co-authored by Michael Greenstone, that exploit a unique natural experiment in China. By comparing two subgroups of the population that experienced prolonged exposure to different levels of particulate air pollution, the studies were able to plausibly isolate the effect of particulates air pollution from other factors that affect health. The more recent of the two studies found that sustained exposure to an additional 10 µg/m3 of PM10 reduces life expectancy by 0.64 years. In terms of PM2.5, this translates to the relationship that an additional 10 µg/m3 of PM2.5 reduces life expectancy by 0.98 years. To learn more about the methodology used by the AQLI, visit: aqli.epic.uchicago.edu/about/methodology