

Atmospheric black carbon concentrations

The atmospheric levels of black carbon, a major short-lived climate pollutant, have decreased dramatically in California since the 1960s.



Levels of black carbon in the atmosphere are decreasing in California. Commonly known as soot, black carbon is emitted by diesel-fueled vehicles, industrial processes, residential fireplaces and woodstoves. Wildfires are its largest natural source.

Black carbon is the second most important contributor to global warming after carbon dioxide (CO₂) and is considered a short-lived climate pollutant. Reducing its emissions can help delay unprecedented warming due to CO₂ emissions. Reductions can also provide health benefits. Black carbon is a component of a type of air pollution called PM_{2.5} (fine particulate matter that is 2.5 microns or less in diameter) that has been linked to respiratory and cardiovascular diseases.

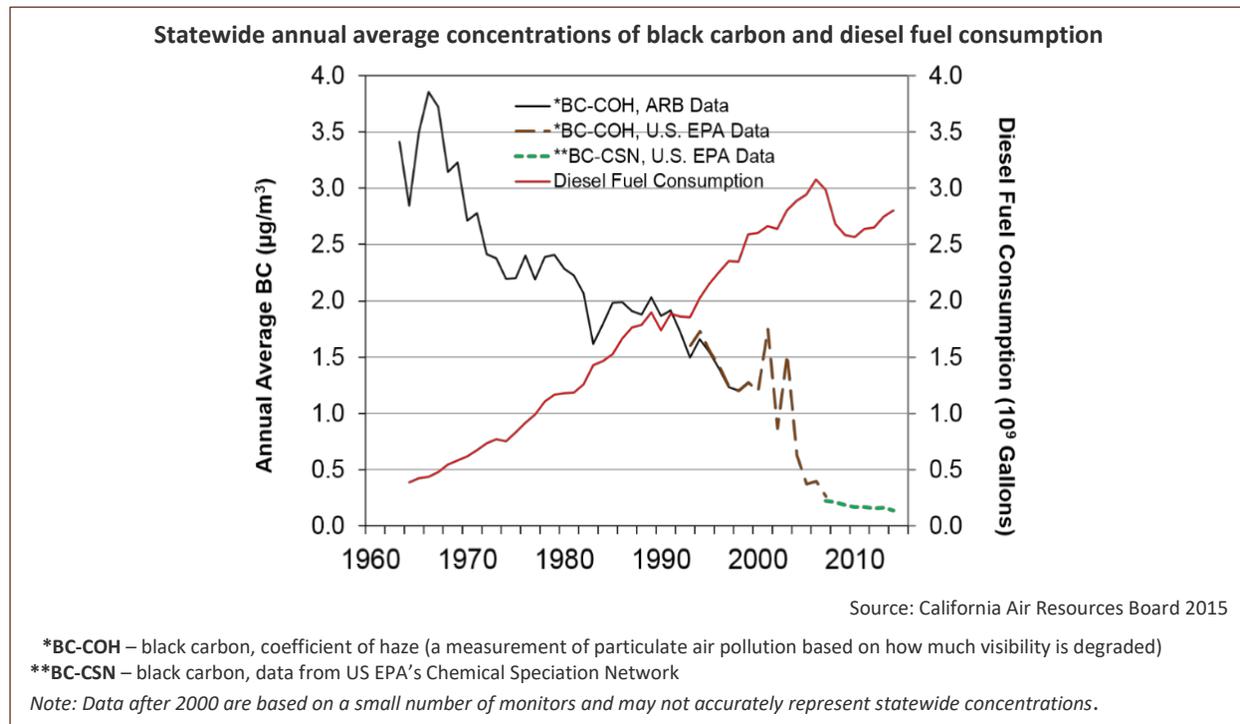


Diesel vehicles emit black carbon (soot) into the atmosphere.

Photo: US Environmental Protection Agency

What does the indicator show?

Annual average black carbon concentrations in California have dropped markedly over the past 50 years, by about 90 percent. This dramatic decline occurred despite increasing consumption of diesel fuel, the largest source of black carbon emissions from human-related activities. New emission standards and restrictions on diesel engines and biomass burning have significantly reduced atmospheric black carbon concentrations across the state.





Why is this indicator important?

As with other short-term climate pollutants, black carbon emission reductions present an opportunity to slow the rate of regional and global warming in the near term. Black carbon contributes to warming by directly absorbing solar energy and releasing it as heat. In addition, black carbon particles can deposit on snow, glaciers, and ice. Deposits darken these light surfaces, causing them to absorb more sunlight and melt faster. This could significantly affect California's water supplies, which rely heavily on snowmelt runoff in the springtime from the Sierra Nevada. Less snowmelt runoff, combined with warmer temperatures over already dry areas, increases wildfire risks — which can in turn release more black carbon particles.

In addition to reduced climate change impact, reduced black carbon emissions especially benefits communities along freight corridors and near ports and railyards where the highest concentrations of diesel particulates occur. Overall, the reduction in black carbon concentrations in the last 50 years has prevented an estimated 5,000 premature deaths in the state each year, while also delivering important climate benefits.



Black carbon deposits can hasten the melting of snow and ice on frozen surfaces such as this snow in the Sierra Nevada.

Photo: U.S. National Park Service



A major source of black carbon in California is diesel fuel. Ports, freight corridors, and railyards have the highest concentrations of diesel particulates.

For more information about this and other climate change indicators, visit:

<https://oehha.ca.gov/climate-change/report/2018-report-indicators-climate-change-california>

