ETHANOL CLEARS THE AIR

RFA
RENEWABLE FUELS ASSOCIATION

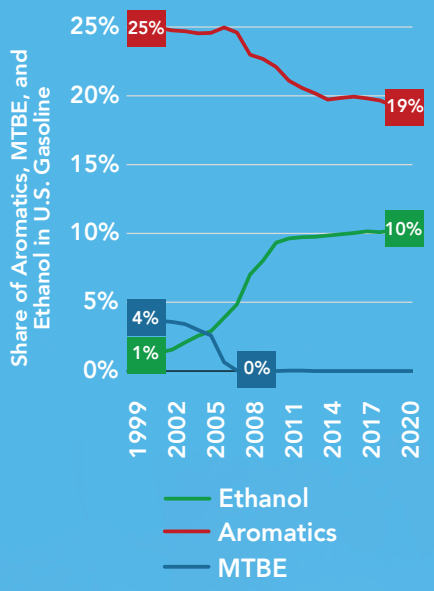
While there has been a lot of attention paid—and rightly so—to ethanol's ability to reduce greenhouse gas emissions, the renewable fuel also has an incredibly important role to play in reducing tailpipe pollution harmful to human health. Adding ethanol to gasoline reduces tailpipe emissions of the following pollutants:

- **Carbon monoxide**, which can cause harmful health effects by reducing oxygen delivery to the body's organs.
- **Exhaust hydrocarbons**, which contribute to ozone, irritate the eyes, damage the lungs, and aggravate respiratory problems.
- **Air toxics** like benzene, which can cause cancer and reproductive effects or birth defects.
- **Fine particulate matter**, which can pass through the throat and nose and enter the lungs, causing serious health effects.

Not surprisingly, more ethanol means even less pollution. Testing of 20 vehicles by the University of California, Riverside in 2022 found that simply replacing E10 with E15 provides the following emissions benefits:

- Particulate matter reductions of **18 percent**;
- Hydrocarbon gas emissions reductions of **5 to 8 percent**;
- Carbon monoxide reductions of **17 percent**; and
- Nitrogen oxide reductions of **3 percent**.

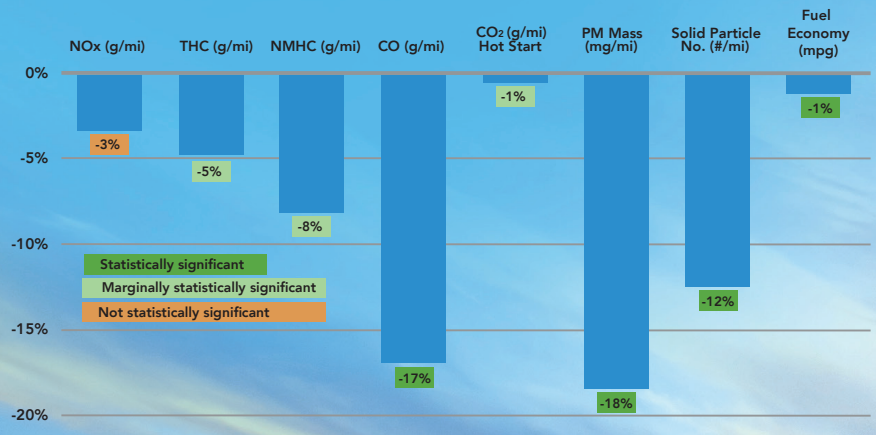
MORE ETHANOL MEANS LESS HARMFUL AROMATICS AND MTBE



Source: U.S. Environmental Protection Agency

These emissions benefits—along with ethanol's ability to replace toxic aromatic compounds in gasoline—mean ethanol blended fuels present a lower risk to human health than regular gasoline. Indeed, a study by The Hormel Institute, the University of Minnesota, and the Energy Resources Center at the University of Illinois Chicago, demonstrates that using more ethanol in our fuel can significantly reduce cancer risk by displacing the most dangerous and toxic chemicals in gasoline.

E15 VS. E10: CHANGES IN EMISSIONS AND FUEL ECONOMY



Source: University of California, Riverside CE-CERT
Notes: Statistical significance based on least square means; NOx, THC, NMHC, CO, CO_2 and PM Mass results are weighted based on cold-start, hot-start, and hot-running emissions.