

Health and Environmental Benefits of the Next Generation Fuels Act

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November 10, 2021

The Next Generation Fuels Act (NGFA) supports the use of high-octane low-carbon fuels in optimized engines. Octane in fuels is required to prevent premature combusting and damage to the engine.¹ The NGFA will ensure that ethanol will substitute for carcinogenic aromatics which are currently added to gasoline by refiners to increase gasoline's octane rating and prevent engines from premature combusting. Ethanol has been identified as a less harmful substitution for aromatics.²

Moreover, once released into the atmosphere aromatics also form ultrafine particulate matter pollutants which are responsible for additional mortalities.^{3,4} Importantly, particulate matter emissions have also been identified as a multiplier in COVID related deaths.⁵

The US Environmental Protection Agency, in its regularly released Fuel Trends Report shows that the decrease in aromatics from the year 2000 was commensurate with an increase in ethanol blending. On page 8 that report states: "Ethanol's high octane value has also allowed refiners to significantly reduce the aromatic content of the gasoline, a trend borne out in the data."⁶ The Next Generation Fuels Act ensures that a much higher percentage of harmful aromatics is displaced by ethanol in the fuel resulting in reduced mortalities and cleaner air.

¹ <https://www.eia.gov/energyexplained/gasoline/octane-in-depth.php>

² Mueller, S.; Dennison, G.; Liu, S. An Assessment on Ethanol-Blended Gasoline/Diesel Fuels on Cancer Risk and Mortality. *Int. J. Environ. Res. Public Health* 2021, 18, 6930. <https://doi.org/10.3390/ijerph18136930>

³ "The formation of PM_{2.5} from VOC Precursors is caused when volatile organic gases in secondary organic aerosol (SOA) are oxidized by species such as the hydroxyl radical (OH), ozone (O₃), and nitrate (NO₃). After oxidation of the VOC, some of the oxidation products have low volatilities and condense on available particles becoming part of the PM. VOCs from the **aromatic group** are the most significant contributor to SOA from anthropogenic sources." Source: William Hodan and William Barnard. "Evaluating the Contribution of M_{2.5} Precursor Gases and Re-entrained Road Emissions to Mobile Source PM_{2.5} Particulate Matter Emissions".

⁴ Public health impacts of secondary particulate formation from aromatic hydrocarbons in gasoline; Stackelberg et al.; *Environmental Health* Volume 12, Article number: 19 (2013) <https://ehjournal.biomedcentral.com/articles/10.1186/1476-069X-12-19#Tab5>

⁵ Air pollution and COVID-19 mortality in the United States: Strengths and limitations of an ecological regression analysis. <https://www.science.org/doi/10.1126/sciadv.abd4049>

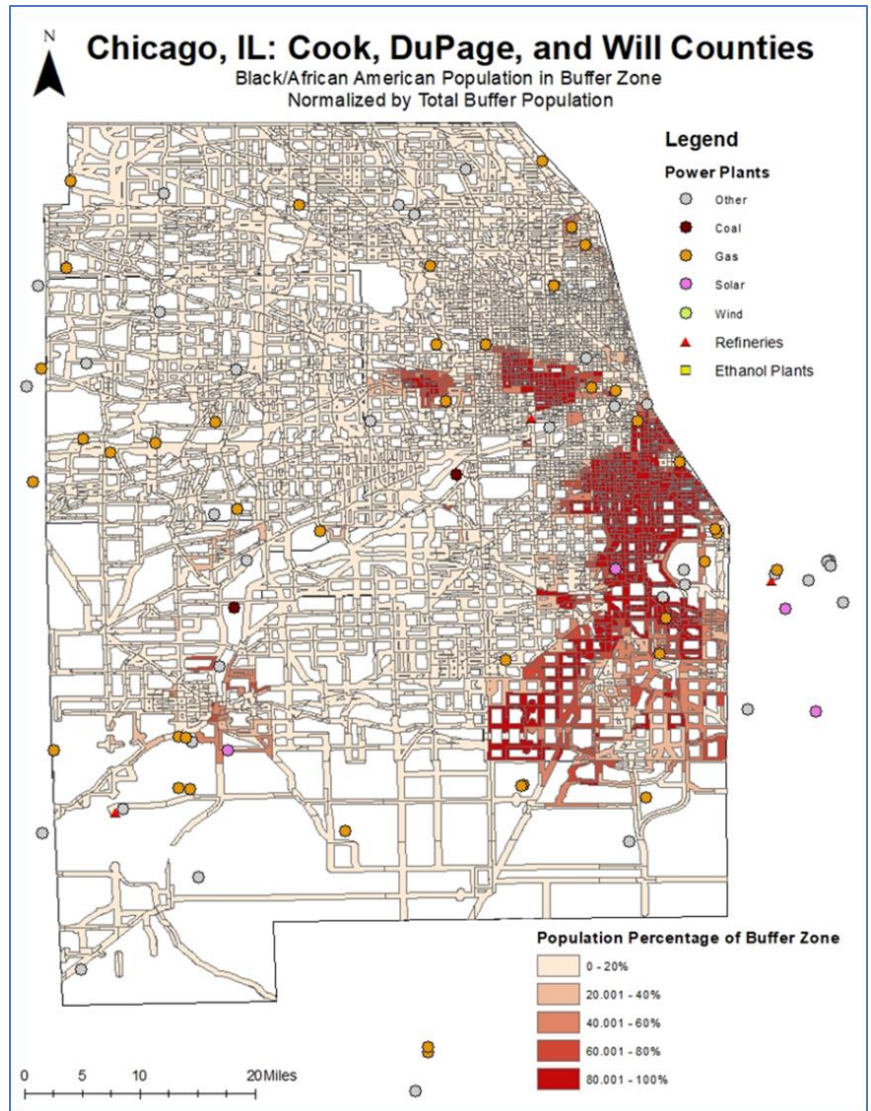
⁶ Fuel Trends Report: Gasoline 2006 - 2016 ; Office of Transportation and Air Quality; U.S. Environmental Protection Agency; EPA-420-R-17-005; October 2017; <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100T5J6.pdf>

Additionally, ethanol has a much lower carbon footprint than gasoline. Pure ethanol emits only half of the greenhouse gas emissions than gasoline.⁷ A recent World Health Organization report documents that climate change is not only responsible for property damage but also mortalities.⁸

Environmental modeling by the University of Illinois at Chicago, Energy Resources Center has shown the following:

- The NGFA by encouraging increased ethanol use will reduce aromatics-related mortalities by 1,400 cases by the year 2035 which will save \$12.7 billion in economic and monetized health damages.
- The NGFA will reduce GHG emissions by the year 2035 by 1 billion metric tonnes which will save \$43.5 billion in monetized damages.
- The combined savings (reduced aromatics + reduced GHG emissions) from the NGFA total \$56.2 billion.⁹

A study by the University of Illinois Chicago has shown that in cities like Chicago, minority groups who live in higher proportions next to high-traffic expressway corridors stand to benefit in particular from clean fuels.¹⁰



⁷ "Retrospective analysis of the U.S. corn ethanol industry for 2005-2019: implications for greenhouse gas emission reductions; Uisung Lee, Hoyoung Kwon, May Wu G, Michael Wang; Biofpr 2021.

⁸ <https://www.who.int/heli/risks/climate/climatechange/en/>

⁹ Assumes sales of 16 million high octane low carbon fuel vehicles from model year 2026 through 2035. Use of 20% ethanol blends from 2026-2030 and 30% ethanol blends from 2031-2035.

¹⁰ Steffen Mueller; "Avoided Mortalities from the Substitution of Ethanol for Aromatics in Gasoline with a Focus on Secondary Particulate Formation"; University of Illinois at Chicago Energy Resources Center; August 12, 2019; https://erc.uic.edu/wp-content/uploads/sites/633/2020/03/UIC_Indirect_Aromatics_SOA_Paper_FINAL_8_12_2019.pdf