How does CO2, CH4, N2O, and SF6 emissions relate to particulate matter?

CO2

Related Links:

CO2 Emission Sources

https://www.epa.gov/ghgemissions/carbon-dioxide-emissions

- Relations
    - Emission sources that release CO2 often overlap with PM release (e.g. burning fossil fuels)
    - Increased CO2 can worsen PM related issues (e.g. hotter drier conditions causing wildfires increasing PM emission)
    - GHG that's not directly harmful to human health at typical atmospheric levels
    - Byproduct of complete combustion, PM is from incomplete combustion/dust/chemical reactions in air

CH4

Related Links:

Methane Emission Sources

https://www.epa.gov/ghgemissions/methane-emissions

- Relations
    - *Shared sources of release*
        - Fossil fuel burning (can release both CH4 and PM)
        - Wildfires, agricultural burning
        - Waste management (landfills and manure release CH4, and if burned, PM)
    - *Atmospheric Chemistry*
        - CH4 more specifically in the troposphere leads to formation of Ozone (O3)
            - Tropospheric ozone forms when nitrogen oxides (NOx) and volatile organic compounds (VOCs), including methane, react in the presence of sunlight.
        - O3 formation/CH4 chemistry/NOx further promote the formation of PM

TLDR

- Cutting back on CH4 emissions will decrease ozone formation, indirectly decreasing PM formation

N2O

Related Links:

N2O Emission Sources

https://www.epa.gov/ghgemissions/nitrous-oxide-emissions

Ammonia Volatilization

https://extension.missouri.edu/publications/wq257

- Relations
    - Shared sources of emissions
        - Fertilizers release N2O into soil
        - nitrogen-based emissions from agriculture can also produce ammonia gas (NH_3), which reacts with acids (like sulfuric and nitric acid) to form secondary particulate matter (e.g., ammonium sulfate, ammonium nitrate) and produce PM

SF6

Related Links

https://www.epa.gov/ghgemissions/fluorinated-gas-emissions

- Relations
    - Limited sources of SF6 emissions
        - Refrigerants, Fire retardants, insulating gas in electrical equipment
    - Atmospheric Chemistry
        - Close to none as SF6 is an inert gas
    - Indirect climate warming from SF6 emissions could result in indirect PM increase, not nearly as much as CO2 and N2O