Global Warming Potential of Nitrous Oxide (GWPN) Relative to Carbon Dioxide (GWPC)

L. David Roper, ROPERLD@VT.EDU'

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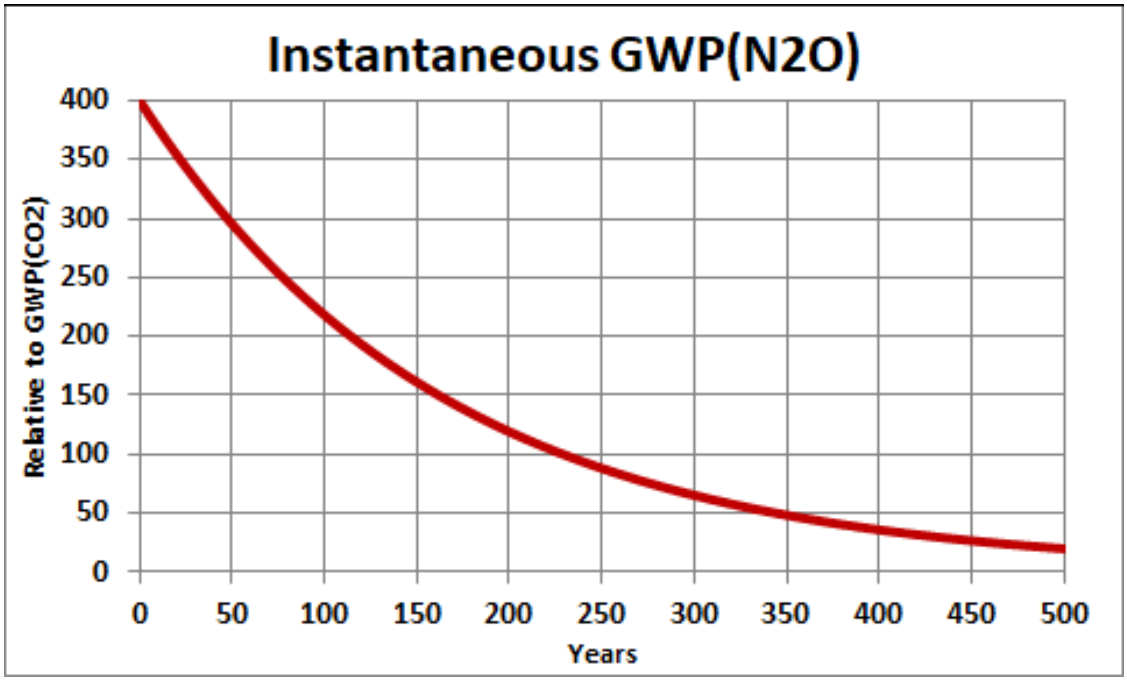
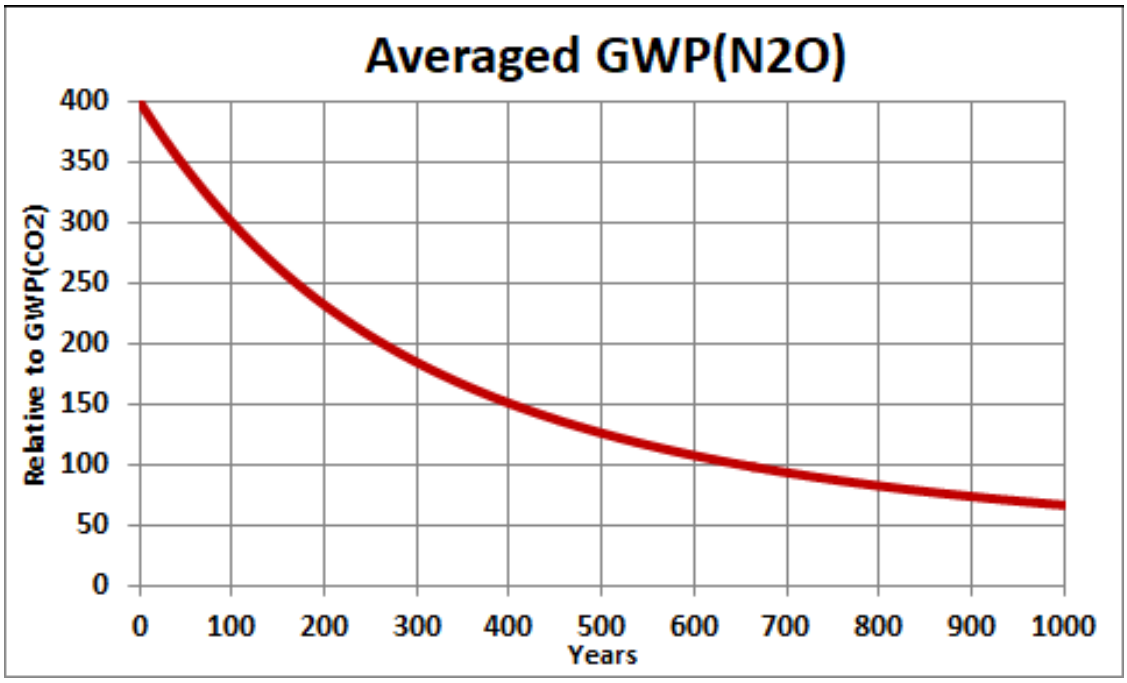
Nitrous Oxide (N_2O) is a very potent global-warming gas. A EPA document states that It has a global-warming potential (GWPM) 300, average over 100 years, times the carbon-dioxide (CO_2) global-warming potential, GWPC = 1. Other documents give slightly different numbers; e.g. https://www.epa.gov/ghgemissions/understanding-global-warming-potentials and https://unfccc.int/process/transparency-and-reporting/greenhouse-gas-data/greenhouse-gas-data-unfccc/global-warming-potentials.

This document uses a time-dependent equation for GWPM involving the half-life equation and the half-life of 114 years for the reaction $N_2O + O_3 \rightarrow N_2 + 2O_2$. Note that this reaction depletes ozone (O_3) in the atmosphere, "a major environmental problem because it increases the amount of ultraviolet (UV) radiation that reaches Earth's surface, which increases the rate of skin cancer, eye cataracts, and genetic and immune system damage." The equation uses GWPC = 1.

The equation is $GWPN = GWPN_0\left(\frac{1}{2}\right)^{t/t_h}$ where $t_h = 114$ years. The value of $GWPN_0 = 398.9$ yields the following curves



The asymptote is 0.



It remains in the atmosphere for a long time.