

Tom's research on the Rural News article about methane by Doug Edmeades titled "Could the paradigm be shifting".

I find the following:

1. Thomas P Sheahen, who has recently toured NZ saying methane is not a greenhouse gas and who is quoted in the article, is indeed a physicist, but up until 2005, he worked and published on high temperature semiconductors, electrical systems and computer code. He is not a climate scientist. In 2007 he started publishing articles on theological and catholic issues and continues, it seems, to this day. His sole publication on climate was a 2 page book review in 2014. Most of his publications appear to be book reviews. He does not have a Wikipedia page, which means he is a minor player in the realm of climate deniers.

2. The article quotes a journal article by William van Wijngaarden and William Happer. There are a number of collaborations between these two. While Wijngaarden is an atmospheric physicist at York University in Ontario Canada, Happer is physicist specialising in optics and spectroscopy and not a climate scientist. Both are well known climate deniers.

3. They have published a number of journal papers together. A 2019 paper titled "Methane and Climate" seems to be the one mentioned in the Rural News article. It was not published in a peer reviewed journal, like many of their other articles. It was instead published by a group called the "CO2 Coalition" whose stated purpose is: "*The CO2 Coalition of climate scientists and energy economists informs the public (1) about the net beneficial impact of carbon dioxide emissions on the atmosphere, land and oceans, and (2) the net negative impact on the economy, living standards and life expectancy of reducing these emissions by restricting access to energy*". It is clear that this group has a bias. I presume the paper was published here because it could not pass peer review in an established scientific journal.

4. The abstract concludes: "*But (t)he rate of the increase of CO2 molecules, about 2.3 ppm/year (ppm = part per million), is about 300 times larger than the rate of increase of CH4 molecules, which has been around 0.0076 ppm/year since 2008. So the contribution of methane to the annual increase in forcing is one tenth (30/300) that of carbon dioxide.*" And follows: "*Proposals to place harsh restrictions on methane emissions because of warming fears are not justified by facts.*"

5. This is misleading. Methane as an accepted warming potential of around 28 (close to 30) times that of CO2 over a 100 year period, but a warming potential of 84 times CO2 over a 20 year period. Methane in the atmosphere decays (converts to CO2 and H2O) with a half-life of 10.5 years, so the concentration of a quantify of methane released in the atmosphere will decrease by half in 10-1/2 years. If they are going to talk about "annual increases", they need to use a more appropriate comparison between CO2 and CH4. If one uses 84 instead of 30 in their simple equation, the contribution to the annual increase in temperature would be closer to 30%.

6. I've included a chart below from a report by Simon Upton, the Parliamentary Commissioner for the Environment (*Farms, forests and fossil fuels: The next great landscape transformation? March 2019*). Simon was a National MP and ambassador before becoming the PCE. The chart shows the

surface temperature response to a pulse of 3 different greenhouse gases. According to the IPCC “Global Warming Potential over 100 years” ( $GWP_{100}$ ) convention, the chart shows the warming effect of the different gases, assuming a pulse of equivalent  $GWP_{100}$  quantities. In other words, based upon the  $GWP_{100}$  convention, 298 tonnes of  $CO_2$  has the same warming effect of 9 tonnes  $CH_4$  and 1 tonne of  $N_2O$ . (and conversely,  $N_2O$  has 298 times the warming effect of  $CO_2$  and  $CH_4$  has 33 times the warming effect of  $CO_2$ ). You can see that in the early years,  $CH_4$  has a very large warming effect, which decays away quickly and it has minimal warming effect after about 30 years.

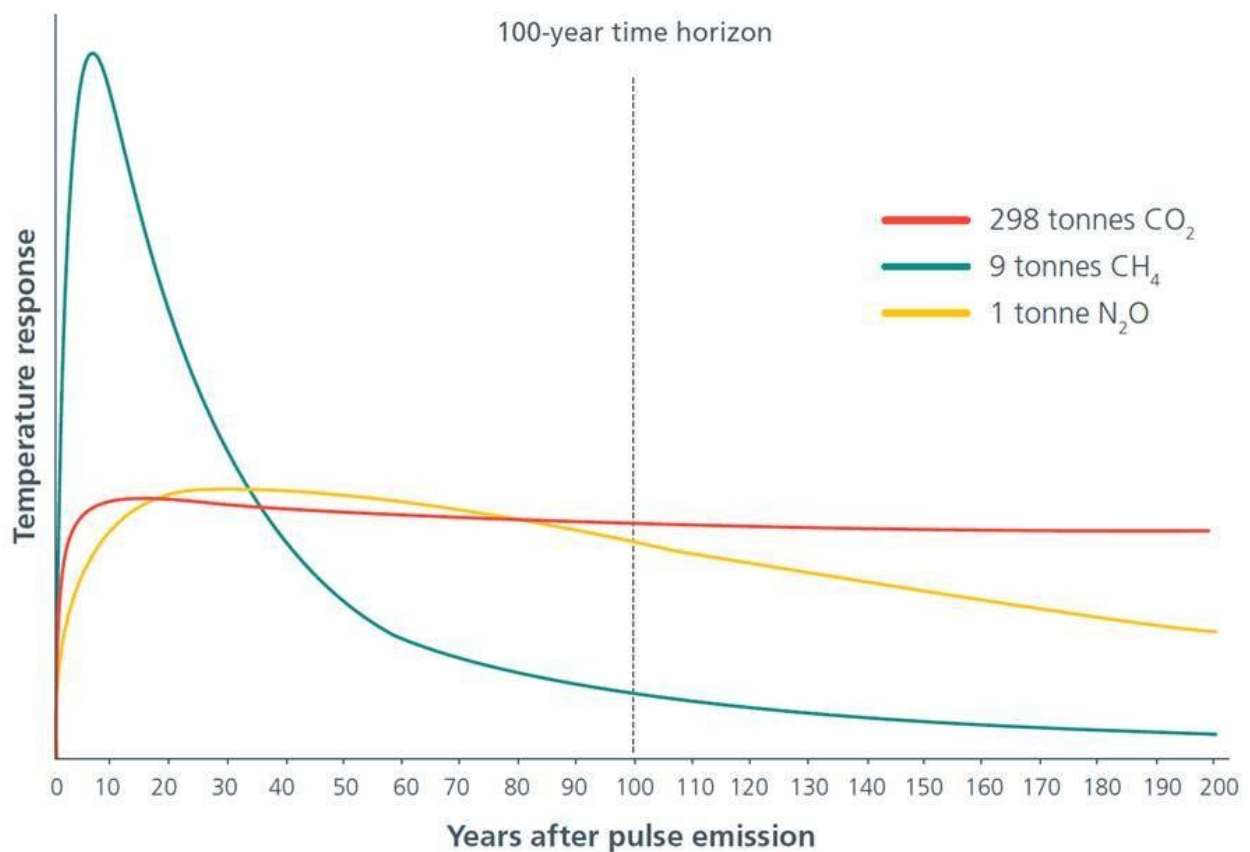


Figure 4.1. Global temperature effects of one-off emissions of carbon dioxide, methane and nitrous oxide released in year zero.<sup>16</sup>