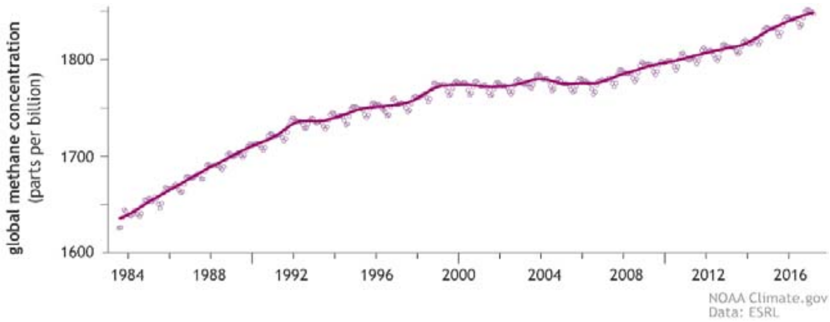
Importance of Methane in Climate Change

Covanta WHITE PAPER

Methane is the second largest contributor to global climate change.[1] A short lived climate pollutant (SLCP) increasingly under international scrutiny, methane has a large climate impact and its atmospheric concentrations continue to rise (Figure 1).[2] The largest man-made sources of methane in the U.S. are oil & gas production and distribution, enteric fermentation (cows), and landfilling (Figure 2).[3]

Figure 1. Trends in global methane since 1983



How does methane compare to CO_2?

Carbon dioxide (CO_2) is the most common GHG, but methane's potency makes it a major contributor to climate change, responsible for about **25%** of manmade global warming.[4] According to the IPCC's 5th Assessment Report, methane's 100-year global warming potential (GWP), a measure of its global warming strength over 100 years relative to an equivalent amount of CO_2, ranges from 28 to 34. This means that if equivalent amounts of methane and CO_2 are emitted, the methane will contribute 28-34 times more to global warming than CO_2 over 100 years. Over a shorter, 20-year time scale, methane is 84- 86 times more potent than CO_2.[5] Methane may be also lingering longer in the atmosphere today than before, as a result of a possible decline in the atmosphere's oxidative capacity, adding to its impact.[6]

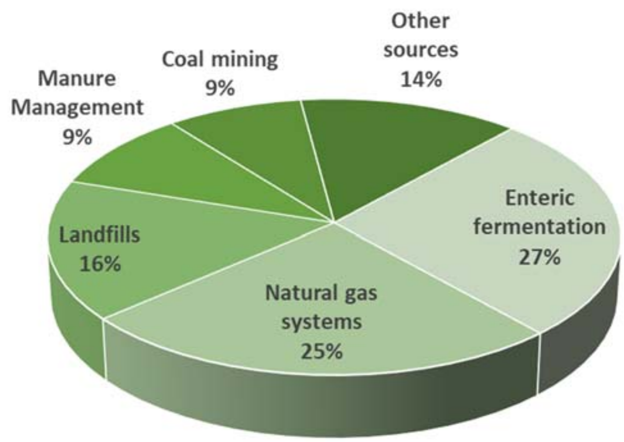
Which timeframe is most accurate?

The choice of the 100-yr timeframe commonly used for GWPs in GHG reporting, inventories, and even scientific studies is somewhat arbitrary and doesn't have a basis in science. According to the IPCC's 5th Assessment Report:

> "There is no scientific argument for selecting 100 years compared with other choices. The choice of time horizon is a value judgment because it depends on the relative weight assigned to effects at different times."[7]

However, there is growing recognition that the 100-yr GWP does not accurately capture the climate impacts of SLCPs, including methane. For years, climate scientists have been calling for separate regulation of climate pollutants like methane owing to their potency and other differences relative to CO_2.[8,9,10]

Figure 2. Major U.S. Manmade Methane Sources



In response, California uses a 20-year GWP in its *Short-Lived Climate Pollutant Reduction Strategy:*

> "The use of GWPs with a time horizon of 20 years better captures the importance of the SLCPs and gives a better perspective on the speed at which SLCP emission controls will impact the atmosphere relative to CO_2 emission controls."[11]

In its *Policy and Action Standard*, the WRI GHG Protocol recommends the use of 20-year GWPs in looking at the significant effects of policies or actions designed to reduce emissions of SLCPs:

> "Twenty-year GWP values may be used to focus on short-term climate drivers, and should be used if the policy or action accessed is specifically designed to reduce emissions of short-lived greenhouse gases, such as methane."[12]

Most recently, New York State has adopted the 20-year GWPs in its ambitious legislation to reach net zero GHG emissions by 2050.

Why is it important to reduce methane and other short-lived climate pollutant emissions?

Fast action to reduce SLCPs, including methane, can significantly reduce the rate of sea level rise and "has the potential to slow down the global warming expected by 2050 by as much as 0.5 Celsius degrees." [13] In the near-term, reducing emissions of SLCPs like methane is more effective than reducing CO_2.[14] A failure to address SLCPs, like methane, significantly increases the risk of crossing the 2°C temperature increase threshold widely discussed as most likely to limit severe climate change impacts.[15]

References

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[5] The IPCC concluded that "it is likely that including the climate-carbon feedback for non-CO_2 gases as well as for CO_2 provides a better estimate of the metric value than including it only for CO_2." See p714 & Table 8-7 of Myhre, G. *et al.* (2013) *Anthropogenic and Natural Radiative Forcing. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., *et al.* (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf

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[10] See p2 of UNEP, WMO, (2011), Integrated Assessment of Black Carbon and Tropospheric Ozone: Summary for Decision Makers. https://wedocs.unep.org/rest/bitstreams/12809/retrieve

[11] CARB (2016) Proposed Short-Lived Climate Pollutant Reduction Strategy https://www.arb.ca.gov/cc/shortlived/meetings/04112016/proposedstrategy.pdf

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[13] Hu *et al.* (2013) Mitigation of short-lived climate pollutants slows sea-level rise, *Nature Climate Change,* 3, 730-734. https://www.nature.com/articles/nclimate1869

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