POLICY BRIEF

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Using Short-Horizon Metrics to Advance Towards Mitigation of Potent Climate Pollutants

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Solidarity for the Achievement of the SDGs

Abstract

Current international climate frameworks predominantly rely on the Global Warming Potential over 100 years (GWP100) to assess and compare the impacts of greenhouse gases. However, this approach substantially undervalues the climate benefits of mitigating short-lived climate pollutants (SLCPs[1]) such as methane, responsible for nearly 45% of current net warming. The lower warming potential assigned to methane under the GWP100 reduces both policy urgency and financial incentives for rapid mitigation.

This policy brief explores the potential of adopting a 20-year GWP (GWP20) metric as the basis for pricing methane credits within a dedicated voluntary carbon market in G20 countries. By reflecting methane's true short-term climate impact, GWP20 can serve as a catalytic market signal to accelerate action on methane mitigation, generating significant near-term climate benefits, unlocking new finance, and contributing to multiple Sustainable Development Goals (SDGs).

Recognising that no single metric is universally sufficient, the brief also outlines a phased roadmap: first, integrating GWP20 into targeted market mechanisms; and subsequently evolving towards a holistic, inclusive, and science-aligned radiative forcing-based accounting system. Policymakers are also encouraged to promote data-driven tools, such as the Carbon Credit Data Model, to better capture and communicate the real-time climate effects of SLCPs.

Keywords: Global Warming Potential, Short-Lived Climate Pollutants, Methane Mitigation, Voluntary Carbon Market, Climate Finance

[1] Short-lived climate pollutants (SLCPs) primarily refer to methane, tropospheric ozone, black carbon, and HFCs, which are critical for near- and long-term climate protection. SLCPs are known as "super climate pollutants, because of their potency and ability to quickly reduce warming. (Nitrous oxide, N_2O, is also a super climate pollutant but is not short-lived.) Institute For Governance & Sustainable Development, 'Background Note: The Need for Fast Near-Term Climate Mitigation to Slow Feedback and Tipping Points,' 15 March 2025. https://www.igsd.org/publications/background-note-the-need-for-fast-near-term-climate-mitigation-to-slow-feedbacks- and-tipping-points/.)

Diagnosis

The Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report (AR6) confirms global warming is set to exceed 1.5°C this century and current global Nationally Determined Contributions (NDCs) remain insufficient to avert this trajectory. Rapid, ambitious mitigation of all greenhouse gases (GHGs),[2] not just carbon dioxide (CO_2), is essential to achieving the goals of the Paris Agreement.

Climate policy frameworks and financial instruments rely heavily on emission metrics to guide strategic decisions. The most influential metric to date is the Global Warming Potential over 100 years (GWP_{100}), which has shaped how emissions are measured, reported, and priced. However, GWP_{100} inadequately captures the urgent warming effect of short-lived climate pollutants, especially methane, over critical near-term horizons. This brief proposes an alternative approach, prioritising the use of GWP_{20} for methane pricing, to accelerate short-term mitigation, improve market accuracy, and enhance climate finance flows.

Reassessing GWP_{100}: Understanding the Gap

GWP_{100} measures the cumulative radiative forcing of one metric ton of a greenhouse gas relative to CO_2 over a 100-year timeframe. While this has provided a consistent baseline for emission comparison and reporting, it systematically underrepresents the impact of SLCPs like methane. Methane has a significantly higher warming potential, approximately 84 times that of CO_2, over

[2] Katherine Calvin, Dipak Dasgupta, Gerhard Krinner, Aditi Mukherji, Peter W. Thorne, Christopher Trisos, José Romero, et al. 'IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (Eds.)]. IPCC, Geneva, Switzerland.' Edited by Paola Arias, Mercedes Bustamante, Ismail Elgizouli, Gregory Flato, Mark Howden, Carlos Méndez-Vallejo, Joy Jacqueline Pereira, et al. Intergovernmental Panel on Climate Change (IPCC), 25 July 2023. https://doi.org/10.59327/IPCC/AR6-9789291691647.

a 20-year horizon, but only 28 times under GWP_{100}.[3] This discrepancy skews market signals, reduces the urgency for mitigation, and delays potential climate gains.

Given methane's relatively short atmospheric lifespan (approximately 12 years) and its disproportionate near-term impact on warming, using GWP_{100} masks the true opportunity for rapid temperature reduction. Moreover, the delayed accounting under GWP_{100} creates misaligned incentives in carbon markets, particularly voluntary ones, where precision and impact are key to investor confidence and climate outcomes.[4] GWP_{100} metric is inaccurate in its reflection of pollutants' impact as there is no equivalence between different gases – they differ in both lifetime and radiative efficiency. GWP_{100}, therefore, underestimates methane's near-term climate effect and deprioritises its mitigation despite[5] contributing about 45% of current net warming.[6] Research indicates that GWP_{100} undervalues emissions crucial for the 1.5°C goal by 63%.[7] Effective climate action thus demands a dual strategy approach: the marathon to zero out CO_2 emissions complemented by the sprint to rapidly cut non-CO_2 super climate pollutants, particularly methane.[8]

[3] '2.10.2 Direct Global Warming Potentials - AR4 WGI Chapter 2: Changes in Atmospheric Constituents and in Radiative Forcing'. https://archive.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html

[4] Luo, Xi, Tian Xia, Jing Huang, Dongliang Xiong, and Bradley Ridoutt. 'Radiative Forcing Climate Footprints in the Agricultural Sector: Comparison of Models from the IPCC 5th and 6th Assessment Reports'. *Farming System* 1, no. 3 (October 2023): 100057. https://doi.org/10.1016/j.farsys.2023.100057

[5] Global Methane Hub. 'Global Methane Hub - Meet the Moment on Methane'. https://www.globalmethanehub.org/.

[6] *Ibid*

[7] Changing Markets. 'Seeing Stars: The New Metric That Could Allow the Meat and Dairy Industry to Avoid Climate Action • Changing Markets'. Accessed 1 April 2025. https://changingmarkets.org/report/seeing-stars-the-new-metric-that-could-allow-the-meat-and-dairy-industry-to-avoid-climate-action/.

[8] Dreyfus, Gabrielle B., Yangyang Xu, Drew T. Shindell, Durwood Zaelke, and Veerabhadran Ramanathan. 'Mitigating Climate Disruption in Time: A Self-Consistent Approach for Avoiding Both near-Term and Long-Term Global Warming'. *Proceedings of the National Academy of Sciences* 119, no. 22 (31 May 2022): e2123536119. https://doi.org/10.1073/pnas.2123536119.

Relevance of Methane Mitigation for G20

Methane accounts for 0.51 °C of the 1.06 °C observed warming (2010–2019) relative to pre-industrial levels,[9] with G20 nations accounting for over 75% of annual global methane emissions.[10] Under current policies, anthropogenic methane emissions may rise 24–30% by 2050.[11] Around 60% of global methane emissions come from human activities in three main sectors: energy production (oil, gas, and coal), agriculture (livestock and paddy cultivation), and waste (landfill and wastewater).[12] Notably, methane from sectors like agriculture and livestock are categorised as survival emissions;[13] while, luxury emissions, like energy sector methane, stem from production and consumption patterns of the developed world and are generated from non-essential activities.[14]

Targeting methane not only supports climate action (SDG 13) but also positively impacts other SDGs such as SDG 3 (Good Health and Well-being), SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 15 (Life on Land).[15]

[9] IPCC, 2021: Summary for Policymakers. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. In Press.

[10] Our World in Data. 'Methane Emissions'. https://ourworldindata.org/grapher/methane-emissions?tab=table.

[11] Mar, Kathleen A., Charlotte Unger, Ludmila Walderdorff, and Tim Butler. 'Beyond CO2 Equivalence: The Impacts of Methane on Climate, Ecosystems, and Health'. *Environmental Science & Policy* 134 (August 2022): 127–36. https://doi.org/10.1016/j.envsci.2022.03.027.

[12] Saunois, Marielle, Ann R. Stavert, Ben Poulter, Philippe Bousquet, Josep G. Canadell, Robert B. Jackson, Peter A. Raymond, et al. 'The Global Methane Budget 2000–2017'. *Earth System Science Data* 12, no. 3 (15 July 2020): 1561–1623. https://doi.org/10.5194/essd-12-1561-2020.

[13] Survival emissions refer to emissions necessary for the pursuit of subsistence and the activities required to live a healthy life. (Net Zero Climate. 'Equity & Inclusion (Crosscutting)'. https://netzeroclimate.org/sectors/equity-inclusion/)

[14] Net Zero Climate. 'Equity & Inclusion (Crosscutting)'. https://netzeroclimate.org/sectors/equity-inclusion/

[15] The SDGs, also known as the Global Goals, were adopted by the UN in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. ("Sustainable Development Goals." UNDP. https://www.undp.org/sustainable-development-goals.)

Relevance of Markets in GHG Reductions

Private finance significantly drives climate action through carbon pricing mechanisms enabling market participants to trade GHG credits,[16] thereby financially incentivising emission reduction. The G20 Sustainable Finance Working Group (SFWG) underscores carbon markets' potential for channelling funds towards low-emission transitions in emerging economies.[17] Creating high-integrity carbon credits, particularly through a common carbon credit data model, remains a G20 priority for 2025.[18]

Metrics and Markets – Current Status

The value of different GHGs at GWP_{100} is the characterisation factor used to assess the environmental impact of mitigative activities through climate footprints. These climate footprints in turn determine the additionality of a project, and the quantity and quality of carbon credits generated (in CO_2e) and subsequent revenue from sale of said credits in markets. At present, the standardised metric to calculate emission reductions in GWP_{100}. Implicitly, methane's short-term impact is undervalued, diminishing financial incentives for rapid mitigation.

GWP_{20} – an Alternative Short-Term Metric to Incentivise Methane Mitigation

Adopting GWP_{20} as the characterisation factor in methane emission calculations within climate mitigation project footprints would better reflect methane's near-

[16] Environment, U. N. 'Carbon Markets | UNEP - UN Environment Programme', 31 October 2023. https://www.unep.org/topics/climate-action/climate-finance/carbon-markets
[17] G20 Sustainable Finance Working Group. 'G20 Sustainable Finance Working Group - G20SFWG', 18 May 2022. https://g20sfwg.org/

[18] First G20 SFWG Meeting: Co-Chairs and Presidency Summary / 16 – 17 January 2025 (Virtual). https://g20sfwg.org/wp-content/uploads/2025/02/2025-G20-SFWG-Note-on-Agenda-Priorities-rev.pdf

term warming potential. Given national and corporate net-zero targets typically span decades, GWP_{20} would enhance the financial attractiveness of methane reductions. Under GWP_{100} (IPCC AR4[19] values), reducing one ton of methane equates to 25 MT of CO_2e credits while using GWP_{20}, the equivalent credits would be 80 MT CO_2e – making methane mitigation more than 3.2 times more financially attractive.

Foreseeable concerns with adopting GWP_{20}

- **Revamping of Climate Reporting:** Companies shifting to GWP_{20}-based accounting would have to revise emission reporting, incurring additional costs and complicating temporal comparisons for their climate impacts.
- **Methane Bias:** Although the urgency of methane mitigation is well-documented, making a strong case for GWP_{20} adoption, critics may argue that using it could disproportionately spotlight methane, potentially neglecting CO_2 or other SLCPs.
- **Accounting for Spillovers:** Credit generating emission reduction projects often have positive or negative spillovers. For methane mitigation, these examples include health benefits of wastewater treatment or possible air quality standards exceedance due to hydrogen peroxide-based approaches.[20] GWP_{20}-based systems do not explicitly consider these co-benefits and trade-offs for credit calculations, obscuring holistic SDG impact accounting.
- **Integrity Concerns:** Carbon markets already face integrity challenges, with the greatest risk being that the scientific claims behind a credit do not hold

[19] IPCC. 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC, Geneva, Switzerland
[20] Horowitz, H. M.: Intended and Unintended Consequences of Atmospheric Methane Oxidation Enhancement, EGUsphere [preprint], 2024, https://doi.org/10.5194/egusphere-2024-3139

up to scrutiny.[21] Although GWP_{20} strengthens methane reduction incentives, concerns regarding scientific rigor and monitoring persist.

Recommendations

In the near- to medium-term, a GWP_{20}-based market mechanism for methane can be a powerful metric for policymakers to incentivise spatial and sectoral methane mitigation. It would recondition market participants' perspective towards methane mitigation, leading to improved diversion of climate finance along with positive spillovers to achieve multiple SDGs. However, due to the concerns highlighted above, the adoption of this mechanism should be accompanied by a sunset clause and in the longer-term, a systemic shift should be made towards an alternative metric, which can rectify the errors committed while adopting a GWP-based metric over any arbitrary timescale. A more fruitful strategy would be to identify a metric which reflects the time varying impact of all SLCPs and GHGs, does not establish an absolute equivalence between the climate impacts of different gases, and does not prioritise a single GHG over others.[22]

To bridge these gaps, the more accurate accounting metric should be based on the radiative forcing (RF)[23] of different climate pollutants, over their respective lifespans. It does not establish false equivalence between different GHGs and considers the radiative efficiency and atmospheric lifetime of each of climate pollutant to assess the resulting warming by the pollutant, in each year of the selected time horizon (say, a project's lifetime). It is a more holistic, inclusive and

[21] "Integrity Issues in the Voluntary Carbon Markets." n.d. KPMG. https://kpmg.com/xx/en/our-insights/regulatory-insights/integrity-issues-in-the-voluntary-carbon-markets.html

[22] Luo, Xi, Tian Xia, Jing Huang, Dongliang Xiong, and Bradley Ridoutt. 'Radiative Forcing Climate Footprints in the Agricultural Sector: Comparison of Models from the IPCC 5th and 6th Assessment Reports'. *Farming System* 1, no. 3 (October 2023): 100057. https://doi.org/10.1016/j.farsys.2023.100057.

[23] Radiative forcing is the net change in the energy balance of the Earth system due to some imposed perturbation. It is usually expressed in watts per square meter averaged over a particular period of time and quantifies the energy imbalance that occurs when the imposed change takes place. (Myhre, G., D. Shindell, F.-M. Bréon, W. Collins, J. Fuglestvedt, J. Huang, D. Koch, J.-F. Lamarque, D. Lee, B. Mendoza, T. Nakajima, A. Robock, G. Stephens, T.

accurate methodology as it covers the time-varying radiative efficiencies of different GHGs and accounts for short-lived climate forcers. Moreover, these footprints include RF from current emissions and residual RF from historical emissions. While these theoretical proposals need to be validated, in the longer-term, incentivising SLCP mitigation more broadly in the market calls for the use of such an evolved metric, accompanied by an assessment of co-benefits and trade-offs of activities with other indicators, particularly SDGs.

Policymakers, particularly within G20 should adopt a phased approach – initially integrating GWP_{20} to prioritise methane mitigation and subsequently transitioning to a comprehensive RF-based system. Such evolution ensures alignment with the 1.5°C climate goal while addressing short-term urgency and long-term sustainability comprehensively.

Actionable Recommendations for G20 Policymakers

- The G20 should leverage its upcoming forums to foreground the critical imperative of mitigating SLCPs, given their pronounced multi-sectoral impacts. Deliberations must also highlight the necessity of institutionalising advanced and robust metrics. Engagement with scientific experts on SLCP impacts is essential to generate momentum among policymakers.
- The *Carbon Credit Data Model* of G20 SFWG 2025, which will stand as global reference point for transparency and integrity of carbon markets, should reflect the true warming mitigation of carbon credit projects – by using short-horizon metrics such as GWP_{20} for methane mitigation credits and eventually, the RF-based metric across valuation.
- Regulatory authorities overseeing national carbon markets and private sector emissions accounting should adopt enhanced frameworks and methodologies. This should begin with the application of GWP_{20} for methane accounting and offsetting and eventually transitioning to a

unified, comprehensive RF-metric to optimise methodological coherence. A phased implementation, commencing with field validation, pilot initiatives, stakeholder capacity development, and eventually national scaling, would enable eventual global harmonisation.

- G20's engagements with carbon market participants (including corporations, regulators, registries, project developers, and standardisation bodies) must emphasise methane mitigation's strategic relevance and the catalytic role that voluntary offsetting can play in this regard. Central to this discourse should be the dual environmental and economic benefits of short-horizon metrics-based credits.

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