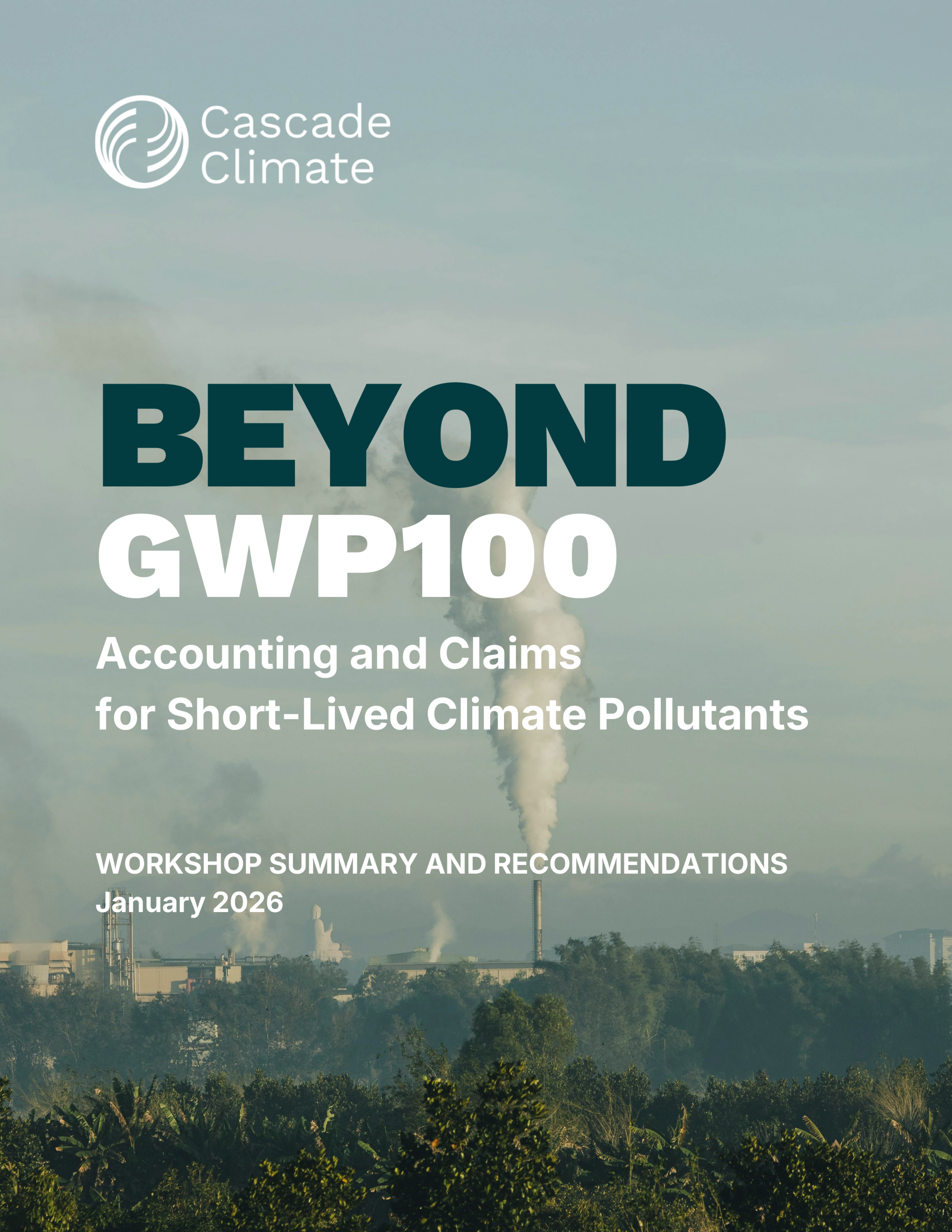
Cascade Climate

BEYOND GWP100

Accounting and Claims for Short-Lived Climate Pollutants



WORKSHOP SUMMARY AND RECOMMENDATIONS
January 2026

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INTRODUCTION

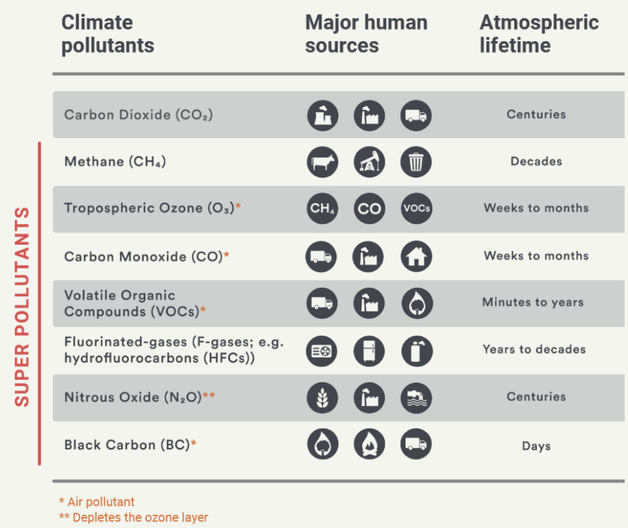
At Climate Week NYC in September 2025, Cascade Climate hosted a workshop convening key stakeholders across academia, civil society, and the private sector to discuss how to ensure consistent and rigorous accounting and claims-making for both short-lived and long-lived mitigation activities, particularly within the corporate net-zero framework. This document synthesizes the major perspectives and recommendations that emerged from that workshop.

Mitigation of **super pollutants** [1] is both urgent and underfunded. Super pollutants are atmospheric pollutants — including methane, tropospheric ozone, tropospheric ozone precursors, fluorinated gases, nitrous oxide, and black carbon — that have greater impacts on atmospheric warming than carbon dioxide per tonne. These pollutants contribute to roughly half of current warming and often pose additional risks to human health and the environment (Climate and Clean Air Coalition 2025).

Many super pollutants remain in the atmosphere for only years to several decades, compared to centuries for carbon dioxide. Because of their short residence time, mitigation of these short-lived climate pollutants (SLCPs) presents perhaps the most effective tool for meaningfully reducing radiative forcing [2] in the near-term. To avert the accelerating risks of near-term warming and the overshoot of temperature goals, **today's climate actions must go beyond mitigation of CO_2 to also prioritize activities that can substantially reduce near-term warming in the coming decades.**

Current climate action frameworks (targets, action plans, accounting metrics) are oriented primarily toward long-term outcomes, without sufficient acknowledgement of the need for near-term radiative forcing mitigation. This design bias directly and indirectly results in **the significant underfunding of SLCP mitigation actions relative to their radiative forcing impact because it discounts or overlooks their near-term benefits.** A more balanced framework is needed — one that integrates fast-acting and long-term mitigation within a coherent strategy.

Addressing SLCPs can deliver immediate climate benefits and reduce the risks of temperature overshoot, but must be pursued in parallel with sustained reductions and removals of long-lived greenhouse gases such as CO_2 if we are to ensure temperature stabilization over the long term. A truly holistic approach therefore recognizes the complementary roles of fast-acting and long-term mitigation actions — aligning finance, metrics, and incentives to drive progress across both timescales.



Courtesy of Climate and Clean Air Coalition (CCAC)

[1] Note that "super pollutants" is not a standard scientific classification and the definition can vary across organizations.
[2] Radiative forcing is the metric used to measure the Earth's energy balance — the difference between the amount of incoming shortwave radiation from the sun and outgoing thermal radiation from the Earth that goes back into space. It is the unit by which scientists measure the Earth's excess trapped heat, measured in watts per square meter, or W/m^2. Global temperature change is the Earth's response to this forcing.

WORKSHOP CONTEXT

Motivation for workshop organizers
Cascade Climate is a philanthropy-backed nonprofit. We propel emerging climate solutions from the margins to the mainstream by orchestrating catalytic interventions across science, markets, and policy to overcome systemic bottlenecks.

As Cascade expands our scope to include both super pollutant reductions and durable carbon removal, we see an opportunity to build bridges between the GHG reduction and removal communities to advance a comprehensive "all-of-the-above" climate strategy. This includes wrestling with complex system-level questions. How do we appropriately balance short-lived and long-lived climate pollutants within net-zero frameworks? How can reduction and removal efforts reinforce rather than compete with each other?

By fostering dialogue and developing practical tools for integrated climate action, we hope to move the community beyond false choices toward truly comprehensive solutions.

On September 23, 2025, Cascade brought together experts from across the climate community to begin this work during Climate Week NYC. Here we began developing a shared mental model for accounting and claims-making across short-lived and long-lived mitigation activities, and a sense for the pros, cons, and implementation implications of the primary accounting option sets.

The role of CO_2 and SLCP mitigation in near-term warming and long-term climate stability
Different tools are required to address near-term warming versus long-term climate stabilization. The most abundant long-lived climate pollutant, CO_2, has a lower radiative forcing impact than SLCPs, but can remain in the atmosphere for centuries. Roughly 50% of CO_2 emitted is taken up by land and ocean sinks, in addition to the atmosphere (National Oceanic and Atmospheric Administration 2015).

CO_2 mitigation broadly does not offer the same near-term benefits as SLCP mitigation for several key reasons: CO_2 is a *stock* climate forcer that accumulates in the atmosphere over centuries-to-millennia [3]. This means that cuts in annual CO_2 emissions take time to meaningfully alter that established stock to influence temperature; by contrast, the short-lived nature of SLCPs means changes in their annual *flow* more directly drives near-term radiative forcing and temperature response [4].

In addition, most cooling aerosols (e.g., sulfate from fossil fuel combustion) are co-emitted with CO_2, so reductions in CO_2 emissions can "unmask" the cooling effect of those aerosols, diluting near-term benefits (Dreyfus et al. 2022). While actions on CO_2 — through both reductions and removals — are indispensable and are critical for long-term climate stability, they will have limited near-term warming benefits.

As described above, SLCPs typically exhibit a high radiative forcing effect per tonne and much shorter atmospheric lifetimes. Practically, this means that if ongoing SLCP emissions levels are reduced to near-zero, the majority of their warming impact would be eliminated relatively quickly. Because of these fast-acting climate benefits, mitigation of these super pollutants becomes an essential complement to CO_2

[3] "Climate forcing" and radiative forcing are often used interchangeably, representing a change in the climate system.
[4] Large-scale decarbonization efforts (e.g., the full transition away from fossil fuel infrastructure) will also inherently take decades to implement, whereas some SLCP measures (e.g., plugging methane leaks from oil and gas) can theoretically be deployed more rapidly — though both are critical. In combination with the stock-and-flow dynamic described, this suggests mitigation of SLCP-intensive activities have the potential to more effectively deliver near-term warming benefits (Szopa et al. 2021).

reductions and removals — though SLCP mitigation is not a substitute for the CO_2 reductions and durable removals required to achieve and sustain long-term net-zero targets.

Functionally, CO_2 and SLCP mitigation serve to address two separate-but-related goals: limiting warming (e.g., temperature stabilization) in the long term, and reducing the risk of overshooting temperature thresholds with irreversible impacts in the near term.

Mitigating CO_2 and SLCPs cannot be treated interchangeably if we want to achieve both goals.

The challenge of SLCP accounting

Historically, most climate policies and greenhouse gas (GHG) accounting approaches (emissions inventories, LCAs, etc.) have compared GHG emissions by converting different gases into a common unit — the "carbon dioxide equivalent" (CO_2e) — using the 100-year Global Warming Potential (GWP100) metric. This approach treats diverse GHGs as fungible — as if one tonne of methane or nitrous oxide equals a certain fixed number of tonnes of CO_2e — and has the benefit of simplifying accounting and enabling aggregation of emissions across gases into a single target. However, treating all GHGs as fungible via CO_2e can obscure important differences in how pollutants behave and how they impact the environment — especially for SLCPs such as methane, hydrofluorocarbons, and black carbon [5]. GWP100 underweights short-lived forcing impacts by averaging a strong, rapid impact over a long period of time.

These challenges have long been known by scientists and economists, who have suggested alternatives for decades. However, no alternative has been able to replace GWP100, which has evolved to become the established reference for international reporting and national inventories, including as the common metric in Intergovernmental Panel on Climate Change (IPCC) assessments [6] and as a requirement for Nationally Determined Contributions (NDCs) under the Paris Agreement – though countries can choose to use additional, supplemental metrics (United Nations Framework Convention on Climate Change 2022). Since introducing the GWP metric in their 1990 First Assessment Report, the IPCC has been clear that there is no single, scientifically superior climate metric; rather, that a metric should be transparently and intentionally selected based on a given policy objective and assessed on its policy performance. Equivalency metrics are clearly useful for broad accounting purposes, though some experts caution that they should not be used in isolation — particularly where SLCPs are involved. While fungibility itself is not inherently problematic, special attention is needed to ensure its use aligns with the intended mitigation outcome.

The choice of GHG accounting framework is not just a technical detail; it embeds value judgements [7]. This decision shapes which climate goals we prioritize, how companies and nations claim progress, and what mitigation approaches receive funding and attention.

[5] While methane itself has a short atmospheric lifetime, roughly 90% of methane is oxidized by the hydroxyl radical (OH) into CO_2 with a much longer lifetime (Saunois et al. 2020). The warming impact of methane in the atmosphere is much greater than its atmospheric lifetime because it breaks down into other long-lived GHGs.
[6] Despite their widespread usage and importance in climate decision making, common GWP metrics like GWP100 were not intended to be used as definitive metrics; they were proposed in the IPCC's First Assessment Report in 1990 as "simple" and "preliminary" metrics where the time horizons used had no particular scientific importance. Even with the IPCC's caveats, international treaties that followed, including the Kyoto Protocol, codified GWP100 as the de facto emission metric of international policy (Carbon Containment Lab 2023).
[7] There was extensive discussion amongst workshop participants around the best way to frame the importance of the metric decision — e.g., as a value judgement, a moral judgement, or a policy decision — given that these choices sit at the intersection of science and policy, but ultimately reflect what we collectively decide to prioritize. Participants also mentioned there is an equity lens to consider for future generations, given that GWPs can be directly transferable into discount rates, which informs how much we weigh short- vs long-term impacts (Sarofim et al. 2018).

The role of GHG accounting across different policy and market contexts
The GHG accounting framework underpins climate efforts by providing a common, standardized basis: for national emissions inventories and targets, carbon pricing and trading systems, project-based crediting and offsets, corporate and supply-chain disclosure, and lifecycle assessment of products and investments. During the workshop, participants were focused on how the role of carbon accounting can differ based on the particular goals of a given policy or market instrument.

Carbon markets are deeply intertwined with policy decisions — whether developed directly in a policy context in the case of compliance markets, or emerging in response to the absence of policy in the case of the voluntary market. These markets may be designed to reduce the cost of mitigation, enable progress toward key policy goals, meet regulatory requirements, or encourage additional mitigation beyond what is required by regulation — though goals may differ depending on the specific market in question. Within both voluntary and compliance markets, GHG accounting is used to quantify, verify, and trade incremental emission reduction or removal outcomes — allowing companies or governments to counterbalance their own residual emissions by financing equivalent mitigation elsewhere [8].

In the voluntary market, corporate greenhouse gas accounting frameworks (e.g., the Greenhouse Gas Protocol and Science Based Targets Initiative) define how companies measure, manage, and disclose their emissions footprints, set reduction targets, and apply a mitigation hierarchy that prioritizes abatement within the companies' operations while setting guardrails for when and how to use mitigation beyond their operations. These corporate frameworks enable and shape private-sector participation in carbon markets, but they are distinct from credit issuance, transfer, and retirement rules that govern carbon credit transactions themselves (e.g., The Integrity Council for the Voluntary Carbon Market's Core Carbon Principles and carbon registry standards).

In the more direct policy context, GHG accounting can serve different functions depending on where it is applied. At the macro level, it enables governments to track sector-specific and economy-wide performance, monitor progress toward nationally or internationally defined climate goals, and fulfill reporting obligations under frameworks such as the Paris Agreement. At the micro level, it supports specific policy instruments — for example, conducting cost-benefit analyses before regulation, or determining incentive levels (such as the U.S. Section 45Q tax credit) for individual mitigation projects.

The workshop primarily examined how accounting frameworks operate within voluntary carbon markets, while also considering their scientific underpinnings and policy implications. Participants noted that the boundaries between different market- and policy-based instruments are increasingly blurred. For example, compliance markets are often designed to advance policy objectives, but frequently rely on methodologies, standards, and verification infrastructure developed by the voluntary market.

DISCUSSIONS: ACCOUNTING OPTIONS

The September 23 workshop focused on **four primary approaches to accounting** for GHGs and other climate pollutants in market-based contexts. Participants weighed each approach's strengths and limitations. These four primary approaches, described on the following page, are not necessarily mutually exclusive nor collectively exhaustive, and each category contains a variety of approaches within it.

[8] Residual emissions are the emissions that remain after all technically and economically feasible efforts to reduce emissions have been made.

ACCOUNTING OPTION SETS

CATEGORY	HOW THEY WORK
1. **Global Warming Potential (GWP)-based approaches**	Emissions or removals of different gases are converted to a common unit (CO_2e) using their Global Warming Potential over a chosen time horizon (typically 100 years) or set of time horizons (i.e., when GWP20 and GWP100 are reported together). This remains the most widely used reporting convention in national inventories and corporate accounting.
2. **Radiative forcing (RF)-based (time varying) approaches**	These approaches quantify the change in Earth's energy balance (W/m^2) attributable to a given pollutant and convey impacts over time. While static GWP metrics are derived from radiative forcing, these approaches seek to capture reality more directly by offering visibility into the time-varying warming impact of different pollutants over their lifetimes, instead of averaging their impact over a fixed time horizon [9].
3. **Multi-basket approaches**	Short-lived and long-lived gases are tracked in separate "baskets", so that targets and claims reflect their different atmospheric lifetimes and warming behaviors. This approach helps prevent the masking of trade-offs between near-term and long-term impacts, tracks the impact of individual climate forcers, and can improve the alignment of mitigation strategies across timescales [10].
4. **Like-for-like approaches**	Mitigation actions are matched to the type and atmospheric persistence of the underlying emissions. For example, using methane reduction credits to address methane emissions, or ensuring that stored carbon has a durability comparable to the long-lived nature of CO_2 emissions.

Key insights across approaches

Across all four frameworks, workshop participants converged on three key insights:

- GWP100 remains fundamental for comparability and integration within national and international policy systems.
- Complementary approaches that go beyond traditional equivalency metrics — including RF-based, multi-basket, and like-for-like accounting — can enhance integrity by more accurately capturing time dynamics, gas behavior, and physical climate impact.
- **A phased or hybrid transition appears the most practical pathway to align carbon markets in support of both near-term warming reductions and long-term net-zero goals.**

[9] Radiative Forcing is the first order calculation and key input into most GHG impact metrics, including GWP and Global Temperature Potential (GTP) — the measure of the temperature change at the end of a given time period, also relative to CO_2 (Shine et al. 1990). While Radiative Forcing is a proxy for warming, alternative temperature-based metrics and approaches could also be used for a more complete assessment of warming impacts (for instance, considering the temporal dynamics introduced by ocean heat uptake when translating forcing into warming) if warming is the primary focus, while RF approaches take into account other impacts of the change in Earth's energy balance.
[10] It could be argued that multi-basket approaches are a form of like-for-like accounting, given their focus on distinguishing between emissions sources. Multi-basket approaches are more typically discussed in the context of specific policy goals (e.g., tracking of separate gases in the Montreal Protocol), while like-for-like approaches are more typically discussed in the context of market-based approaches (e.g., the Oxford Principles for Net Zero Aligned Carbon Offsetting).

Equivalency vs. non-equivalency: when and why

A central question raised during the workshop was where equivalency-based metrics (e.g., GWP100) are needed, in which contexts they are most appropriate, and how they can best be utilized to drive better climate outcomes. GWP100 remains the long-standing convention for national GHG inventories, reporting under the Paris Agreement framework, and in carbon markets to date — including the Kyoto Protocol's Clean Development Mechanism, many domestic compliance markets, and voluntary standards. However, all equivalency-based metrics carry choices, value judgments, and limitations.

Here are the primary arguments for equivalency-based approaches that emerged:

- **Simpler reporting and communication:** Converting diverse gases to a single CO_2-equivalent number makes it easier to build inventories, set targets, and communicate progress across sectors and countries — hence its widespread use in IPCC assessments, United Nations Framework Convention on Climate Change (UNFCCC) reporting guidelines, and policy-linked national and international carbon markets.
- **Comparability for markets and policy:** Treating gases as fungible on a common scale allows for aggregated targets and cross-gas comparisons, which many policy and market systems rely on for planning, disclosure, and trading. Under UNFCCC rules, parties are required to use GWP values with specified time horizons in reporting, ensuring consistency and comparability.
- **Cost-effectiveness screening:** A single metric enables policymakers and credit buyers to compare mitigation options on a shared basis when prioritizing investments — an established practice in cost-benefit and marginal abatement analyses.
- **Institutional inertia and convenience:** Practically, equivalency metrics are now deeply embedded in legal and policy frameworks that would require time-intensive process to change, and it is unlikely that UNFCCC parties will revisit their chosen standard metrics without significant momentum behind doing so. So long as governments are required to use this approach for their emissions inventory, other stakeholders will feel an obligation to remain consistent with UNFCCC reporting guidelines.

Conversely, these are the dominant arguments for non-equivalency-based approaches voiced:

- **Making value judgements explicit:** Equivalency metrics encode normative choices, such as the 100-year time horizon, that implicitly privilege long-term outcomes. Using separate baskets or alternative metrics surfaces these value judgements rather than presenting them as objective. Many users of CO_2e are, understandably, not even aware that there is a time horizon component to the metric.
- **Closer alignment with physical behavior:** Accounting for gases separately better captures each gas's distinct lifetimes and warming profiles, versus rolling everything into a single CO_2e number. This is particularly important for SLCPs: for example, methane's GWP is roughly 81 over 20 years but only 28 over 100 years — a striking difference in near-term impact (Greenhouse Gas Management Institute 2024).
- **Sharper goal-setting and risk management:** Disaggregating short- and long-lived pollutants clarifies whether emission trajectories are consistent with specific, time-bounded temperature goals. The Global Methane Pledge — committing to a 30% cut in human-caused methane emissions by 2030 relative to 2020 levels — is a leading example of gas-specific policy design.
- **Allows for the consideration of non-GHG climate drivers.** Some non-equivalency-based approaches are designed to encompass a more complete range of anthropogenic impact on the climate — from GHGs, particulate matter, and non-emissions forcers such as changes in albedo — that a single metric does not capture.

SO, WHERE DID THE GROUP LAND ON EQUIVALENCY?
Given the widespread adoption and entrenchment of GWP100 within keystone frameworks, **participants noted that alternative metrics should generally complement, rather than replace, GWP100 — unless a clear and well-justified case can be demonstrated for an alternative approach.** Even if or when that alternative is demonstrated, it may take significant time to replace GWP100: it's deeply embedded in international guidance, data systems, and market norms.

Participants were also in broad agreement that context matters: the most appropriate accounting tool depends on purpose and scale. In *national and policy contexts*, there was strong support for tracking gases separately where it sharpens policy design and outcome evaluation (e.g., methane-specific pledges or sector policies). In *corporate and voluntary contexts*, while multi-gas disaggregation improves Scope 1 and 2 target-setting, decision-making, and claims, applying the same granularity to Scope 3 emissions is often impractical and resource-intensive [11]. The GHG Protocol itself underscores the inherent complexity, data uncertainty, and boundary challenges in Scope 3 accounting.

SUMMARY: GWP-BASED APPROACHES

Participants examined the strengths and limitations of the current Global Warming Potential (GWP) framework — particularly the 100-year GWP (GWP100) convention that underpins nearly all national inventories, corporate reporting, and market mechanisms. Key themes emerged:

GWP100 remains the most understood and entrenched metric. Its straightforwardness and widespread adoption — across frameworks such as the Paris Agreement Crediting Mechanism, the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), and the Integrity Council for the Voluntary Carbon Market (ICVCM) — make GWP100 the de facto baseline. Participants noted that replacing it would be time intensive given the processes of decision making bodies such as the UNFCC, entail high transition costs (e.g., accounting infrastructure changes, setting up new processes, and capacity building), and any successor would still require normative choices such as selecting time horizon and temperature goals.

Markets today depend on GWP100 for comparability and liquidity. GWP100 is a common metric underpinning cross-gas trading and portfolio aggregation. Some participants argued that, even if it undervalues near-term warming, many super pollutant mitigation activities remain cost-effective under GWP100. They cautioned that moving away from GWP equivalency across gases could fragment markets and limit capital flows, especially when high-quality CO_2 removal supply remains limited.

The 100-year horizon is a compromise, not a law of physics. The IPCC provided these metrics to balance gases with vastly different lifetimes — e.g., centuries to millennia for CO_2, roughly 12 years for methane — rather than as the scientifically "correct" timeframe.

[11] The GHG Protocol classifies a company's GHG emissions into three 'scopes'. Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are all indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions (Greenhouse Gas Protocol 2022).

Long horizons risk sidelining near-term action. Some participants expressed concern that the dominance of GWP100 structurally favors long-term temperature stabilization and can obscure near-term warming dynamics, potentially delaying investments in SLCP mitigation and worsening overshoot risk [12]. Alternative GWP metrics come with their own challenges: for example, GWP20 doesn't solve the issue of selecting a timeframe, it just shifts priority to near-term warming at the expense of long-term warming.

GWP100 FINDINGS
Participants broadly agreed that GWP100 would be difficult to replace given its widespread use, value in providing consistency and comparability, and entrenchment within major climate frameworks, especially without a clear alternative. However, while GWP100 is based on sound science, it is inherently one dimensional and unable to capture every climate outcome we care about; as such, participants saw value in pairing it with complementary frameworks that better capture near-term dynamics — especially for SLCPs.

SUMMARY: TIME-VARYING, RF-BASED APPROACHES

While GWP100 is an RF-based factor that uses a fixed time horizon, these newer accounting approaches seek to capture reality more directly by better reflecting the time-varying warming impact of different pollutants over their lifetimes, instead of averaging over a 100-year period (Forster et al. 2021). These approaches quantify the direct energy imbalance driving temperature change and can be flexibly tuned to specific timeframes and policy planning horizons; for example, forcing impacts can be calculated based on a project's lifetime or the policy horizon for achieving mitigation goals.

In theory, this time-varying approach could also be applied to temperature impacts in addition to forcing impacts. Participants discussed radiative-forcing (RF)-based accounting — particularly time-varying approaches, which convey impacts over time — as a potential complement to GWP-based accounting. Key themes emerged:

RF accounting captures physical reality more directly over time. It quantifies direct energy imbalance driving temperature change and other climate impacts, can convey impacts over time, and can accommodate non-GHG effects such as other pollutants, contrails, and albedo effects.

Dynamic forcing is integrated into analysis, discouraging one-for-one substitution. Because RF tracks how forcing evolves over time, it enables a comparison of the mitigation impacts of various SLCPs with the mitigation of CO_2 over any given timeframe. Over multiple time horizons — near-term, mid-term and long-term — analyses provide essential context to prevent

[12] In addition to the risk of undervaluing near-term impacts, GWP100 can also overvalue long term impacts, as it can make it appear as though SLCPs still have a considerable impact in 100 years — which is only true if emissions levels for those SLCPs are sustained.

equating short-lived reductions with long-lived CO_2 emissions, thereby raising the ambition for both immediate and durable mitigation.

Complexity presents challenges to market readiness. Some questioned whether market actors could practically apply or communicate such a technical metric, given the scientific literacy and data infrastructure required to support its use. At the same time, while RF is a new term for many, RF accounting is already used to calculate GWP over specific timeframes, so these approaches are not inherently more complex — but rather less well understood and with fewer supporting tools, which itself could limit near-term adoption.

TIME-VARYING, RF-BASED FINDINGS
Time-varying RF-based metrics are scientifically rigorous, support a greater breadth of climate forcers than GWP approaches, and provide the ability to evaluate impacts over time. While these metrics operate within existing GHG data infrastructure and work as analytical complements to GWP-based systems today, they will require new tools, greater awareness, and capacity building to gain broader acceptance and adoption.

SUMMARY: MULTI-BASKET APPROACHES

Participants explored approaches that track short-lived and long-lived gases in separate accounting "baskets" — ensuring that mitigation targets and claims reflect their distinct atmospheric lifetimes and warming behaviors. A multi-basket approach allows for the explicit consideration of two (or more) goals, provides the ability to use multiple metrics across baskets, and is not mutually exclusive with the other approaches considered. For example, a GWP20 metric could be used for a short-lived basket and GWP100 for a long-lived basket.

Separate baskets have proven effective in past policy regimes. Examples include the Montreal Protocol, which prohibited trading across chemicals with different ozone-depletion potentials and lifetimes; the U.S. Acid Rain Program, which ran independent SO_2 and NO_x trading markets; and the Global Methane Pledge, which seeks a 30% cut in human-caused methane emissions by 2030.

Fragmentation risks can be mitigated through careful design. Some participants cautioned that establishing multiple baskets could reduce market liquidity and create inconsistent valuation across gases. Others noted, however, that the voluntary carbon market already differentiates between "temporary" and "durable" carbon removals — effectively functioning as separate timescale-based baskets. Even if there is disagreement about whether cross-gas trading should be allowed, reporting emissions by individual gas is widely viewed as a transparency measure that strengthens market integrity.

Design details and "which baskets" matter [13]**.** Participants debated how many baskets

[13] Participants primarily focused on "two basket" approaches — e.g., accounting for short-lived and long-lived gases separately — but additional approaches were also discussed, including the addition of a third basket to account for localized pollutants. The addition of baskets can increase complexity — for example, different fluorinated gases represent a wide range of GWP impacts, and it would be impractical to have separate baskets for each gas.

should exist; how to group fluorinated gases with a broad range of GWP impacts; how to handle co-emitted gases; and how to communicate dual-claim categories for CO_2 and SLCPs. Attribution challenges also differ: many hydrofluorocarbons have identifiable industrial producers, whereas methane emissions are diffuse and harder to trace.

MULTI-BASKET FINDINGS
Multi-basket accounting can enhance transparency and policy precision, but would benefit from internationally harmonized standards and clear communication rules to prevent fragmentation and confusion across markets.

SUMMARY: LIKE-FOR-LIKE APPROACHES

Finally, participants discussed like-for-like frameworks, which match mitigation activities to emissions with comparable atmospheric lifetimes, storage durability, or radiative forcing impacts. The goal is to ensure that the magnitude and duration of mitigation mirrors those of the climate impact being compensated.

Durability matching aligns with emerging best practices in high-integrity offsetting. The Oxford Principles for Net Zero Aligned Offsetting recommend that fossil carbon emissions from geological stores should only be balanced by removals with similar long-term storage (≥ 1,000 years) and that portfolios should transition toward durable carbon removal over time (Axelsson et al. 2024).

Implementation demands substantial analytical capacity and long-term liability management tools. The approach is conceptually sound and already being piloted (e.g., Google) but it demands detailed data, rigorous accounting, and mechanisms to manage interim emissions liabilities until short-term credits are replaced by durable ones. These requirements create analytical and administrative burdens for most companies.

Feasibility for an average buyer remains uncertain, but leadership pilots could set an important precedent. For most corporate purchasers, durability-matched crediting introduces complexity: aligning mitigation timescales, managing liabilities over horizons that extend beyond typical business planning cycles, and navigating the limited availability of durable carbon removals needed to replace SLCP credits. Some participants cautioned that strict durability matching might unintentionally divert funding away from near-term SLCP mitigation. Yet others countered that large corporations — by piloting such rigorous accounting — can demonstrate what credible long-term alignment looks like, catalyzing innovation, integrity, and eventual mainstream adoption.

LIKE-FOR-LIKE FINDINGS
Like-for-like accounting is scientifically rigorous but operationally complex. Success will hinge on clear rules for managing liabilities and safeguards that ensure investment flows not only to near-term mitigation efforts, but also to future durable removals.

CASCADE RECOMMENDATIONS

FOR SLCP ACCOUNTING IN A VOLUNTARY MARKET CONTEXT

Based on workshop discussions summarized above, Cascade Climate has developed the following recommendations regarding the accounting of short-lived climate pollutants within **corporate greenhouse gas accounting and voluntary carbon market contexts.** These recommendations reflect Cascade Climate's synthesis and interpretation of workshop insights — they do not necessarily represent the views of individual participants or their organizations.

The recommendations are intended for corporate purchasers of short-lived climate pollutant reduction credits, and should not be directly applied to compliance markets or regulatory policy frameworks. Nonetheless, we recognize that voluntary market rulesets can be seen as test beds for future policies and industry standards. Further discussion on how voluntary climate finance could connect to policy development can be found in Cascade's writings **here**.

For Cascade, our overarching goal is to enable greater voluntary climate finance directed towards mitigation approaches where incentives are currently lacking; climate impacts are measurable, verifiable, and additional; and strong guardrails can be put in place to prevent perverse or unintended outcomes.

Should corporate emissions reporting account for CO_2 and non-CO_2 emissions separately?

Yes, where disaggregated data are available. Despite the predominant use of GWP100 as a simplified equivalency metric for greenhouse gas reporting, we encourage corporate sustainability reports to disaggregate emissions by individual pollutant, as well as to report aggregated emissions [14]. Moving toward pollutant-level disclosures allows for a more accurate assessment of the atmospheric impacts of the emissions and mitigation actions across different timescales.

We recognize that pollutant-level reporting is generally more feasible for Scope 1 and Scope 2 emissions, but presents greater challenges for Scope 3. Given the limited direct monitoring of Scope 3 emissions for most companies, it is important to acknowledge the potential for false precision and to transparently communicate the assumptions and the inherent uncertainties underlying Scope 3 estimates.

Should companies and voluntary market participants consider transitioning to accounting approaches that better value near-term warming?

Yes. We encourage companies and voluntary market participants to experiment with

[14] In addition to emitting climate forcers with vastly different atmospheric lifetimes, human activities also typically emit a mix of cooling and warming agents, and reactive gases whose chemical reactions in the atmosphere lead to the formation or destruction of greenhouse gases (such as carbon monoxide and hydrogen). In order to know the true climate impact of any activity, it is important to account for all climate-relevant species — and as such, we should ideally move towards improved tracking and reporting of co-emitted cooling emissions over time (Buma et al. 2025).

accounting approaches beyond GWP100 as a complement — not a replacement — to conventional GWP100-based methods.

While GWP100 has served as the backbone for comparability across pollutants and consistency in inventory reporting, relying exclusively on it for target setting, action planning, and accountability tracking can obscure the climate significance of near-term warming. A substantial body of literature indicates that frameworks relying solely on 100-year equivalencies undervalue the atmospheric benefits of mitigation targeting SLCPs (Miller at al. 2024).

That said, while alternatives have been proposed for decades, non-GWP100-based accounting approaches remain in early stages of methodological development and institutional acceptance. They should be introduced thoughtfully and transparently — ideally through pilots that test whether such approaches genuinely enhance climate ambition and improve outcome alignment across time horizons relative to a GWP100-based framework.

We encourage companies and voluntary market participants to lead these science-based pilot efforts. Early demonstrations can help establish methodological credibility, demonstrate practical feasibility, and build the familiarity and confidence needed to enable eventual integration into corporate disclosure standards and compliance frameworks.

Should corporate purchasers be allowed to continue compensating for residual CO_2 emissions with short-lived climate pollutant mitigation actions?

Yes — provided robust guardrails are in place. At Cascade Climate, we view the voluntary carbon market (VCM) as a vital component of the climate-finance toolkit. It enables the mobilization of mitigation actions that are not yet embedded in regulations, national policies, or industry baseline commitments. It also allows companies — once their Scope 1 and Scope 2 emissions are credibly and comprehensively addressed — to extend their impact beyond operational boundaries and to contribute to broader system-level climate gains.

Eligibility restrictions that are overly narrow — such as blanket exclusions of certain project types — risk dampening innovation, dissuading participation, and limiting the market's capacity to channel capital at scale. A well-designed market should uphold environmental integrity while maintaining sufficient flexibility to accommodate a diverse portfolio of project types capable of delivering measurable and verifiable climate impact. For this argument to hold, it is crucial to design accounting systems that are transparent about not only the magnitude, but also the time horizon of project claims. Two time dimensions matter especially:

- (1) **the duration of atmospheric impact** — e.g., the persistence of the climate benefit from SLCP mitigation activities, particularly when used to compensate for residual CO_2 emissions, and
- (2) **the duration where additionality holds** — e.g., the period during which the mitigation activity remains genuinely "above and beyond" the regulatory or policy baseline, before that baseline catches up and the activity becomes policy-driven rather than voluntary.

If compensation of residual CO_2 emissions with short-lived climate pollutant reductions were to continue, how can equivalency be established?

There is no scientifically “correct” equivalency metric. Any equivalency metric you choose inherently introduces subjectivity and tradeoffs between different climate priorities, and we know that the current impact measurement system overemphasizes long-term impacts at the expense of short-term impacts.

Ideally, we should be working toward a system of impact measurement that accurately reflects the effects an intervention has on the climate, the duration of that impact, and when that impact occurs. It is critical that the field moves towards metrics and accounting approaches that encompass a broader range of climate impacts, even if GWP100 equivalency approaches cannot be replaced today — which means providing space for experimentation and maturation of more novel approaches that can eventually be integrated into market standards.

The status quo of GWP100 equivalency has historically provided a mechanism to convert reductions in short-lived climate pollutants into CO_2-equivalent credits within corporate net-zero strategies — but this approach will be insufficient to meet both near-term warming and long-term climate stabilization goals.

As such, companies should strive to go above and beyond this static equivalency by embedding short-lived climate pollutant mitigations within a climate strategy that more accurately reflects atmospheric impacts over time. For example, companies could:

- Match short-lived climate pollutant reduction credits (e.g., methane, HFCs) against their own short-lived emissions, thereby maintaining consistency in pollutant-type matching, or
- Commit to progressive transition, gradually replacing short-lived climate pollutant credits with durable carbon removals, so that, over time, the aggregate impact of the credit portfolio more closely aligns with the long-lived greenhouse gas emissions being neutralized.

In effect, the second approach aims to balance net radiative forcing impacts from both short- and long-lived climate pollutants — rather than simply producing a “net-zero CO_2-equivalent” number based on GWP100 alone.

We note that the perspectives of workshop participants varied widely on this topic, with some suggesting that today’s status quo option is not credible and should be phased out, while others suggested that the current approach is reasonable for the time being. Many agreed that the status quo is critical to maintain until alternative approaches are market-ready to avoid corporates pulling out of their commitments. Participants generally agreed that no accounting alternatives available today are well developed enough, or have the supporting tools required, to be adopted by the majority of companies who want to offset their residual, hard-to-abate CO_2 emissions towards net-zero goals.

From Cascade's perspective, eliminating the status quo approach without market-ready alternatives risks discouraging market participation and reducing voluntary climate ambitions at a time when climate finance options are limited. While many companies are not in a position to go beyond the status quo equivalency approach today, they are the organizations that may eventually adopt — and help to codify within standards — the novel measurement approaches that leading companies pilot and mature. Even if these organizations are not in a position to lead on novel approaches today, they can — and should — begin to extend their analysis beyond GWP100 to obtain a more comprehensive understanding of the different climate impacts their decisions and chosen mitigation approaches may have.

Conclusion

Taken together, these recommendations are meant to make corporate and voluntary climate action on short-lived climate pollutants both more ambitious and more practically grounded. By encouraging pollutant-level transparency, thoughtful experimentation with metrics and accounting frameworks beyond GWP100, and compensation practices that reflect the real timing of climate impacts, companies can play a meaningful role in closing today's incentive gaps.

At Cascade Climate, we see the voluntary market as a space to learn-by-doing — to test what works, to course-correct with evidence, and to help shape the standards and policies that will ultimately carry these efforts into the mainstream.

Note: This workshop, and the recommendations above, are not intended to serve as a replacement or alternative to established accounting standards, frameworks, and guidance, such as the GHG Protocol and Science Based Targets Initiative.

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