CATF Submission to the First Global Stocktake

August 2022

Clean Air Task Force (CATF) welcomes this opportunity to share inputs and participate in the first Global Stocktake (GST) of the Paris Agreement.

Clean Air Task Force (CATF) is a global nonprofit organization working to safeguard against the worst impacts of climate change by catalyzing the rapid development and deployment of low-carbon energy and other climate-protecting technologies. With 25 years of internationally recognized expertise on climate policy and a fierce commitment to exploring all potential solutions, CATF is a pragmatic, non-ideological advocacy group with the bold ideas needed to address climate change. CATF has offices in Boston, Washington D.C., and Brussels, with staff working virtually around the world. Visit catf.us and follow @cleanaircatf.

This submission responds to Question 5 (mitigation), which asks "What further action is required?" and "What are the barriers and challenges, and how can they be addressed at national, regional and international levels?" to achieve the goals defined in Articles 2.1(a) and 4.1 of the Paris Agreement.

It also responds to Question 15 (finance flows and means of implementation), which asks "What further action is required" to achieve the goal defined in Article 2.1(c) of the Paris agreement as well as scale up the provision and mobilization of means of implementation (including finance, technology development and transfer and capacity-building), including in the short-term, both from public and private sources, and at the national and international levels.

CATF is highlighting two critical areas where enhanced collective international effort is needed to drive ambition and finance to reach the goals described in Article 2.1(a) and (c) of the Paris Agreement: 1) accelerated support for advanced zero-carbon energy and climate technologies; and 2) stepped-up efforts to mitigate methane pollution. The main points are summarized in the "Key Messages" at top and elaborated below. We also include a cross-cutting note on the need to track progress in these areas to support accountability and facilitate future Global Stocktakes.

Key Messages:

More support is needed for advanced zero-carbon energy and climate technologies

- Reaching the goals of the Paris Agreement requires the international community to employ the full range of tools capable of delivering zero- or very-low-carbon energy.
- Technologies such as advanced nuclear energy and carbon capture and storage are expected to account for nearly half of emissions reductions in 2050.

- These technologies receive limited attention within the UNFCCC bodies charged with technology cooperation, and financial support has been limited and falls far short of investments in renewable energy, energy efficiency and electric vehicles.
- The international community needs to enhance financial assistance, capacity support and technology cooperation for energy technologies that are currently at the demonstration or prototype phase to keep 2050 climate goals within reach.
- A key focus is needed on helping to foster endogenous RD&D and innovation in developing countries to ensure equitable access to the full set of low-carbon energy and climate solutions to fuel economic growth.
- Better tracking of investments in and deployment of advanced zero-carbon energy and climate technologies is needed to assess progress.

More international financial support is needed for methane mitigation

- Meeting the Paris Agreement goals will require fast action to reduce methane. Cutting methane pollution is the best strategy available to slow near-term warming and help keep rising temperatures within livable limits.
- 120 countries (including 70 developing countries) have signed the Global Methane Pledge, committing to reduce methane by 30% by 2030. This sends a strong demand signal.
- Current levels of finance (just 2% of public and private finance) are not adequate to meet the need, which falls short by an estimated $100B per year.
- A top priority is to raise and deliver funds and assistance to develop investable methane mitigation projects and pipelines that could be implemented through existing climate funds and financial institutions, along with supportive enabling environments.
- As methane mitigation is scaled up, further work is needed to consider best practices for methane pricing and how methane should be integrated into global carbon markets.
- Better tracking of methane mitigation investments and emissions outcomes is needed to assess future progress.

1. The international community must accelerate support for advanced zero-carbon energy and climate technologies.

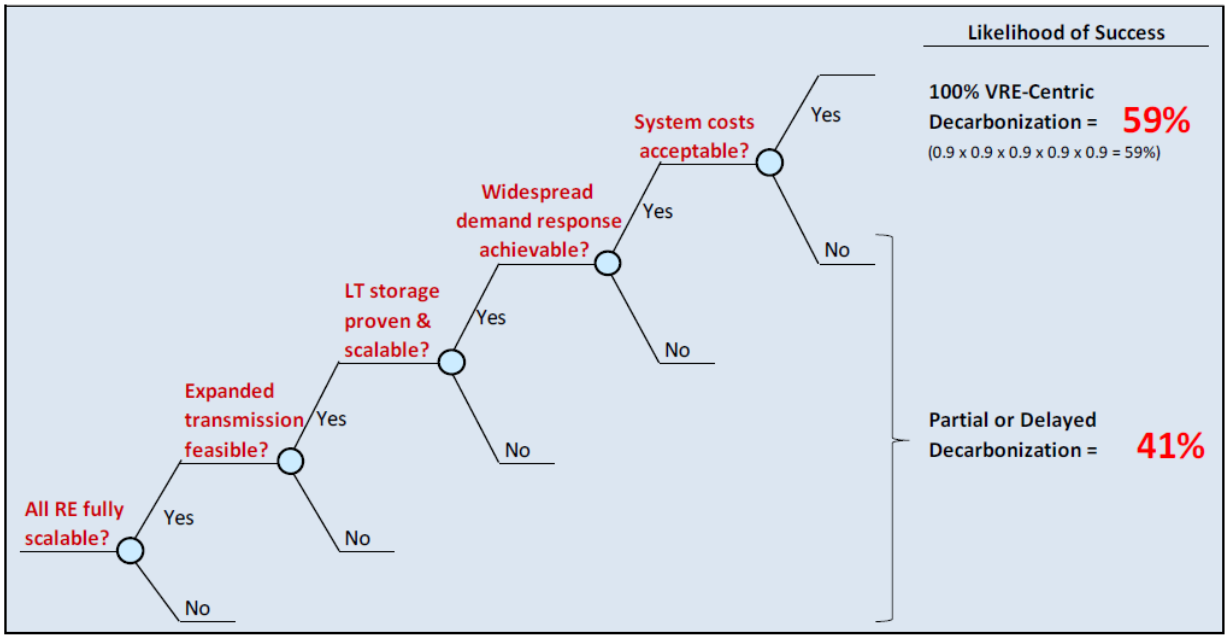
As succinctly articulated by IEA in its Net Zero by 2050 report, "Achieving net zero emissions by 2050 will require nothing short of the complete transformation of the global energy system." This requires moving away from unabated fossil energy sources to mostly zero-carbon alternatives. In 2020, fossil energy sources fueled 78.5% of the global economy.[1] While there is growth in CCS activity, with more than 20 million tons of annual storage capacity now operational across the U.S., Europe and MENA, most fossil energy remains unabated.

It is widely understood that addressing the climate crisis requires the immediate deployment of existing commercial zero-carbon technologies like solar and wind electricity, along with electrification of large parts of the buildings, industry and transportation sectors. However, while these technologies will get us a good way towards the net-zero goal, there are some sectors--such as certain heavy industries and heavy-duty transport--where electrification is not feasible and that will require alternative solutions. Further, factors such as anticipated trade-offs with other land uses, intermittency and seasonal availability, reliance on rare earth minerals, infrastructure needs

[1] REN21. (2022). Renewables 2022 Global Status Report. 37. REN21 Secretariat.

and issues with social acceptance mean that, even in sectors where electrification is viable, exclusive reliance on renewable energy to meet climate goals has a high risk of failure. As illustrated in Figure 1, below, having a portfolio of low-carbon climate solutions will increase the likelihood that some will be technologically and commercially viable over the relevant timeframe.

Figure 1. An illustration of the risks of relying exclusively on variable renewable energy (VRE) to meet climate goals. All five barriers would need to be resolved for a 100% variable renewable energy decarbonization path to be successful. Even if each element is reasonably achievable, the cumulative chance of achieving all five is materially lower. For example, assuming each has a 90% chance of being realized, the likelihood of achieving all five is just 59%. Pursuing multiple technology paths in parallel increases the likelihood of success. Assuming each of three baseload technology paths (such as advanced nuclear energy) has an overall 50% chance of being realized, the likelihood of full decarbonization rises from 59% to 95%.



Source: NorthBridge. (2018). Illustrating the Concept of "Robustness" Decarbonizing the Electric Sector: Dialogue on Decarbonization In the Face of Risk and Uncertainty.

Having a diversity of low-carbon energy and climate solutions can also help the international community meet energy access, energy security and energy reliability needs; eliminate energy poverty; and foster economic growth in low-income countries similar to that enjoyed by modern industrial economies.

Recent studies highlight the importance of advanced low-carbon energy and climate technologies in reaching global climate goals. According to the IEA's May 2021 *Net Zero by 2050* report, "in 2050, almost half the reductions come from technologies that are currently at the demonstration or prototype phase." The recent IPCC report Climate Change 2022: Mitigation of Climate Change finds that "[e]lectricity systems powered predominantly by renewables will be increasingly viable over the coming decades, but it will be challenging to supply the entire energy system with renewable

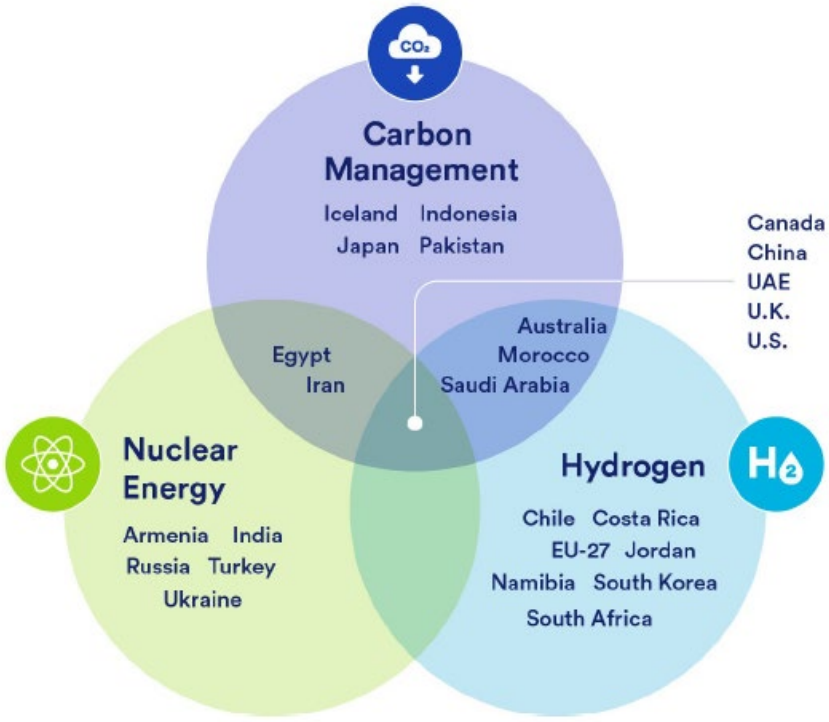
energy."[2] The IPCC further indicates the choice of alternative low- or zero-carbon energy source depends on the characteristics and preferences of each jurisdiction, supporting the notion raised earlier that a range of alternative carbon-free options needs to be developed to ensure that some options will be available to meet energy demand consistent with climate goals. Finally, the IPCC report notes that "[t]he deployment of carbon dioxide removal (CDR) to counterbalance hard-to-abate residual emissions ***is unavoidable*** if net zero CO_2 or GHG emissions are to be achieved" (emphasis added).

Accordingly, reaching the goals of the Paris Agreement requires the international community to employ the full range of tools capable of delivering zero- or very-low-carbon energy to meet the diverse needs of all sectors and countries. We need to have more low-carbon options available. This "optionality" will increase the likelihood of success in holding the increase in global average temperature to well below 2°C above pre-industrial levels as called for under article 2.1(a) of the Paris agreement. ***Therefore, in parallel with immediate deployment of renewables, we need to bring other zero-carbon energy and climate solutions, such as advanced nuclear energy, carbon capture and storage, superhot rock geothermal energy, low-carbon hydrogen, and permanent carbon dioxide removal, to the point that they can be commercially deployed.***

A recent Clean Air Task Force assessment, *How Do Advanced Low-Emission Energy and Climate Technologies Factor into Nationally Determined Contributions*, already shows there is substantial interest by both developed and developing countries in deploying advanced low-emission energy and climate technologies to realize greenhouse gas mitigation goals (see Figure 2, below). Many countries already have well-developed plans to advance these solutions, while others indicate they require international support to make use of the technologies.

[2] CATF considers this assessment of electric systems being "predominately" fueled by renewable energy in the coming decades to be overly optimistic considering the lack of long-duration energy storage to address multi-week and seasonal challenges with intermittent renewable energy. Moreover, CATF notes that the authors' assessment of viability may not fully appreciate the practical challenges of siting large amounts of renewable energy considering land use tradeoffs (e.g., urbanization, agriculture, carbon sequestration, conservation values) and public resistance.

Figure 2. Venn diagram showing national interest in carbon management, zero-carbon fuels (e.g., hydrogen) produced using low-carbon methods, and/or nuclear energy technologies.



Source: Davis, Stacey et al. (2022). NDC Assessment: How Do Advanced Low-Emission Energy and Climate Technologies Factor into Nationally Determined Contributions? 4. Clean Air Task Force.

Despite this growing interest in advanced low-emission energy and climate technologies, it is notable that the April 20, 2022 *Synthesis report for the technical assessment component of the first global stocktake* by the Secretariat, a mandated report that aims to provide information to support the assessment of progress made with regard to finance, technology and capacity-building support to developing countries, gives scant attention to advanced zero-carbon energy and climate technologies. For example, there is only a single mention of interest in carbon capture and storage as expressed in Technology Needs Assessments and a single mention of hydrogen fueling becoming eligible for classification as mitigation finance by multilateral development banks.

Likewise, international financial institutions continue to emphasize renewable energy and electric vehicles. As reported in the April 20, 2022 *Synthesis report for the technical assessment component of the first global stocktake*, "Estimates of global climate finance flows increased by 16 per cent in 2017–2018 compared with 2015–2016, reaching an annual average of USD 775 billion per year. The growth was largely driven by further investment in renewable energy, aided by lower technology costs, as well as investments in sustainable transport infrastructure, including electric vehicles."

Funding available to most advanced energy and climate technologies has been much more limited. This is particularly the case for public funds needed to unlock private sector investment in developing countries. For example, the World Bank CCUS Trust Fund has delivered or committed more than $55 million in technical assistance over the last decade to support CCS readiness in Mexico, South Africa, and most recently, Nigeria. However, it is set to close at the end of

2023. Similarly, ADB has worked with several Asian countries with their CCS trust fund, which will expire at the end of 2022.[3] As of now, there is no dedicated support facility to drive future CCS technology development and deployment.

The international finance picture for superhot rock geothermal energy (and conventional geothermal energy) is similarly at a standstill. The Innovation and Networks Executive Agency (INEA) invested heavily in next generation geothermal as a part of Horizon 2020. A select few of these projects unearthed much of the data that has excited the geothermal field about the potential for superhot rock energy. However, the INEA ceased operations on 31 March 2021. The European Climate, Infrastructure and Environment Execution Agency (CINEA) was established on 1 April 2021 to take over its legacy portfolio. No material investment in superhot rock geothermal has occurred since. Conventional geothermal energy could be a game-changer in East Africa with more support, but there has been a general underinvestment in clean firm power sources.

Finance has likewise been a challenge for the scale-up of nuclear energy around the world. This impacts nuclear energy use for power generation, including fossil power plant repowering with nuclear technology, as well as non-electricity applications such as nuclear-produced clean hydrogen and other zero-carbon fuels. New collaborations like the Nuclear Hydrogen Initiative are working to identify finance solutions. Different business models are being considered to address the challenges of managing risk and project timing, among others, including appropriate roles for public finance to overcome barriers to private investment.

Among the advanced zero-carbon solutions, low-carbon hydrogen has been the exception; recent concerns about energy security in Europe are spurring new investments in the Middle East and North Africa to secure future fuel supplies.[4]

A robust toolbox of zero-carbon energy and climate solutions like advanced nuclear energy, carbon capture and storage, superhot rock geothermal energy, low-carbon hydrogen and permanent carbon dioxide removal needed to complement intermittent renewable energy and address hard-to-electrify applications will not happen in time to meet the climate crisis without stepped-up attention to a fuller set of climate mitigation opportunities. Existing firm zero-carbon solutions such as conventional geothermal energy also need more attention to take full advantage of the opportunity. Key needs include:

- Enhanced public and private funding for research and development;
- Supportive policies and enabling environments, including infrastructure investments;
- National mitigation plans, finance strategies, and deployment goals that include advanced zero-carbon energy and climate technologies;
- Adopt a cooperative, cross-sectoral approach that recognizes the crucial role of all stakeholders – activists and environmentalists, governments and industry need to work together to advance real solutions.
- Intensified collaboration and alignment between public and private sector, including finance and industry partners will need to play a key role in advancing and implementing climate solutions

[3] Global CCS Institute. (2022) *CCS Trust Funds at Two Development Banks Set to Close – Where Do We Go From Here?*

[4] Van Dorpe, Simon. (2022). *Commission set to approve record hydrogen project on Friday*. PoliticoPro.

- Accepted procedures for upfront and ongoing community engagement to ensure projects are designed and implemented with community needs in mind with respect to jobs, economic development and minimizing any adverse impacts;
- Financial incentives and risk mitigation for early deployment; and
- Aggressive goals aimed at bringing down the cost of these technologies.

Finally, it isn't enough to develop and deploy these advanced solutions in a handful of developed countries; to foster widespread uptake of the full set of solutions needed to address the climate crisis and meet global energy needs and wants in an equitable manner, the international community must intentionally **facilitate access and leadership in different geographic and development contexts**. To fuel economic growth and develop within climate limits, emerging and developing economies will need to make use of advanced zero-carbon energy and climate solutions. International technology and research collaboratives such as CEM/MI should work to expand developing country partnerships, including research, development and demonstration projects led by developing countries and aligned with their domestic economic, resource and social contexts. Likewise, the technology mechanism of the convention should consider strategies to nurture innovation and entrepreneurialism within developing countries. A meaningful share of early deployment projects for each new technology should take place in the developing world.

2. The international community must step-up efforts to mitigate methane pollution

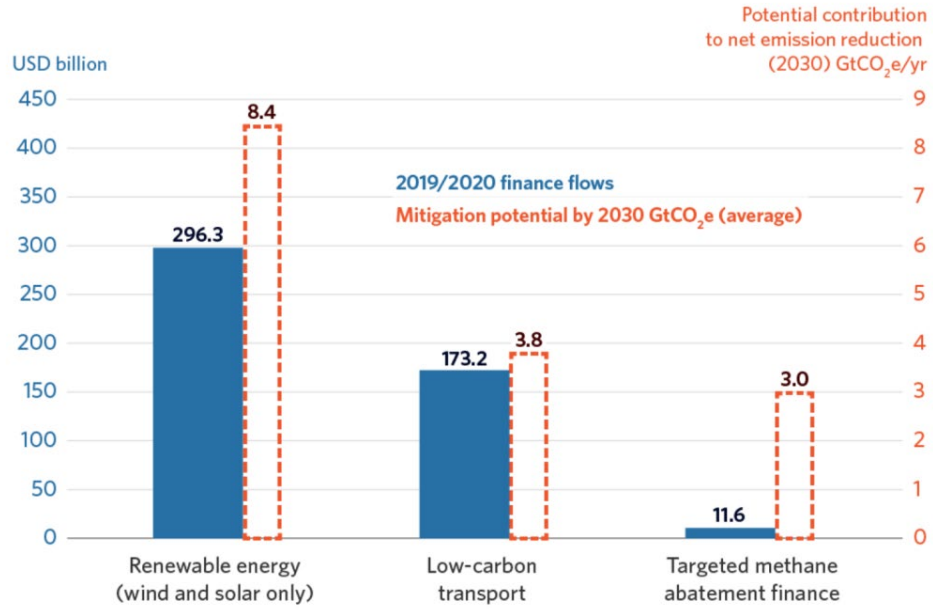
Meeting the Paris Agreement goals will require fast action to reduce methane alongside fast and sustained actions to mitigate carbon dioxide. Methane is responsible for roughly half of warming that has occurred to date, and because of its shorter time in the atmosphere and higher potency (a global warming potential over 80 over a 20-year period), reducing methane will yield fast climate benefits, providing near-term relief to communities suffering from the worsening effects of climate change. In fact, cutting methane pollution is an essential strategy to slow near-term warming and help keep rising temperatures within livable limits. To keep 1.5 degrees Celsius within reach, the IPCC called for reducing methane by 45% by 2030 relative to 2010 levels *in addition to* deep cuts in carbon dioxide. IEA's 2021 net-zero pathway includes a 75% reduction in fossil fuel methane within ten years, making use of the full set of currently available abatement measures and technologies. Responding to the urgency—and opportunity—presented by methane, 120 countries have signed the Global Methane Pledge, committing to reduce methane emissions by 30% by 2030. This includes 70 developing countries eligible for overseas development assistance.

Delivering on the methane opportunity will require actions to mitigate methane across the three sectors that account for roughly 80% of anthropogenic emissions: waste, fossil fuels, and agriculture. All three sectors have low-cost, proven mitigation options, and many are win-win from a sustainable development standpoint. For example, reductions in food waste reduce methane emissions while also reducing energy use related to producing and transporting wasted food and enhancing food security, and strategies to reduce methane from rice farming can also save water, energy, and labor. According to analysis by McKinsey, 80% of the identified methane abatement opportunity—amounting to more than 140 MMT of methane—can be reduced using measures that cost $10 per ton of CO_2e or less.[5]

[5] DeFabrizio, Sam, et al. (2021). Curbing Methane Emissions: How Five Industries Can Counter a Major Climate Threat. 22. McKinsey Sustainability.

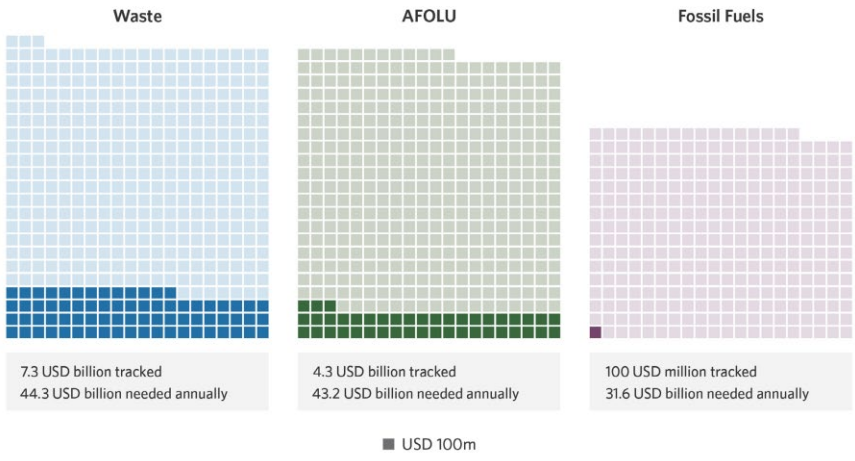
Despite the importance of reducing methane this decade and the availability of low- (and negative-) cost opportunities, in its recent report [The Landscape of Methane Abatement Finance], the Climate Policy Initiative estimates that less than 2% of international climate finance goes to methane mitigation projects. Methane mitigation projects have been largely overlooked by the finance community, receiving considerably less funding relative to the mitigation potential as compared to renewable energy and low-carbon transportation (see Figure 3).[6]

Figure 3. Finance flows in different sectors compared to their net emission reduction potential



Source: Rosane, Paul et al. (2022).

Figure 4. Tracked methane abatement investment compared to average annual needs through 2050 by sector



Average annual investment needed by sector over the 2021-2050 period under a +2C° of warming scenario, and current progress (dark-colored boxes) given 2019/2020 tracked investments. Source: 2050 needs come from Harmsen et al. 2019 and were linearly interpolated from 2019/2020 tracked levels to calculate average annual investment needs.

Source: Rosane, Paul et al. (2022).

[6] Rosane, Paul et al. (2022). The Landscape of Methane Abatement Finance. Climate Policy Initiative.

Delivering the needed methane mitigation is estimated to require a substantial (over $100B per year) increase in international public and private climate finance (Figure 4, above),[7] but also 1) an intensified focus on development of investable projects, pipelines, and policies to create enabling environments; 2) a stronger appreciation by international financial institutions and project developers of the climate imperative of methane mitigation projects and how such projects can support sustainable development outcomes; and 3) improved partnerships among countries and financial institutions to share best practices on methane mitigation, and among national and local governments to prioritize and finance local projects. **Funds are needed immediately to help developing countries create project pipelines and enabling environments that will allow them to put forward investable methane mitigation projects to climate funds and other international financial institutions.**

A final note relates to the use of carbon markets to help pay for implementation of methane mitigation projects. As methane mitigation is scaled up, further work is needed to consider best practices for methane pricing and how methane should be integrated into global carbon markets. On the one hand, it is urgent to accelerate methane mitigation in the near-term given the high near-term impact of such emissions reductions. On the other hand, trading off short-lived climate pollutants for long-lived ones can be problematic, regardless of the global warming potential assigned to the methane emissions reductions. Some viable options include prioritizing methane fees or taxes rather than market schemes (e.g., such as the proposed methane fee in the Inflation Reduction Act in the U.S.) and establishing a separate market for short-lived climate pollutants.

Cross-Cutting Recommendation

In the case of both advanced zero-carbon energy and climate technologies and methane mitigation solutions, there is also a need to improve tracking of key metrics. Lack of tracking makes it more difficult to set aggressive but realistic goals and evaluate progress in meeting goals. This potentially includes tracking progress towards advancing enabling policies and infrastructure; progress delivering public and private finance; progress deploying mitigation solutions; progress reaching metrics of commercial viability and progress in reducing emissions. By encouraging improvements in tracking key metrics, the GST can help improve the collective accountability of governments, international financial institutions and the private sector towards meeting commitments and actions on the path to reaching net-zero goals.

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[7] Ibid.