

REDUCING WASTE, FROM FARM TO PLATE

A multi-stakeholder recipe to reduce food loss and waste



Methane and Ozone Air Pollution Through the Lens of Food Loss and Waste

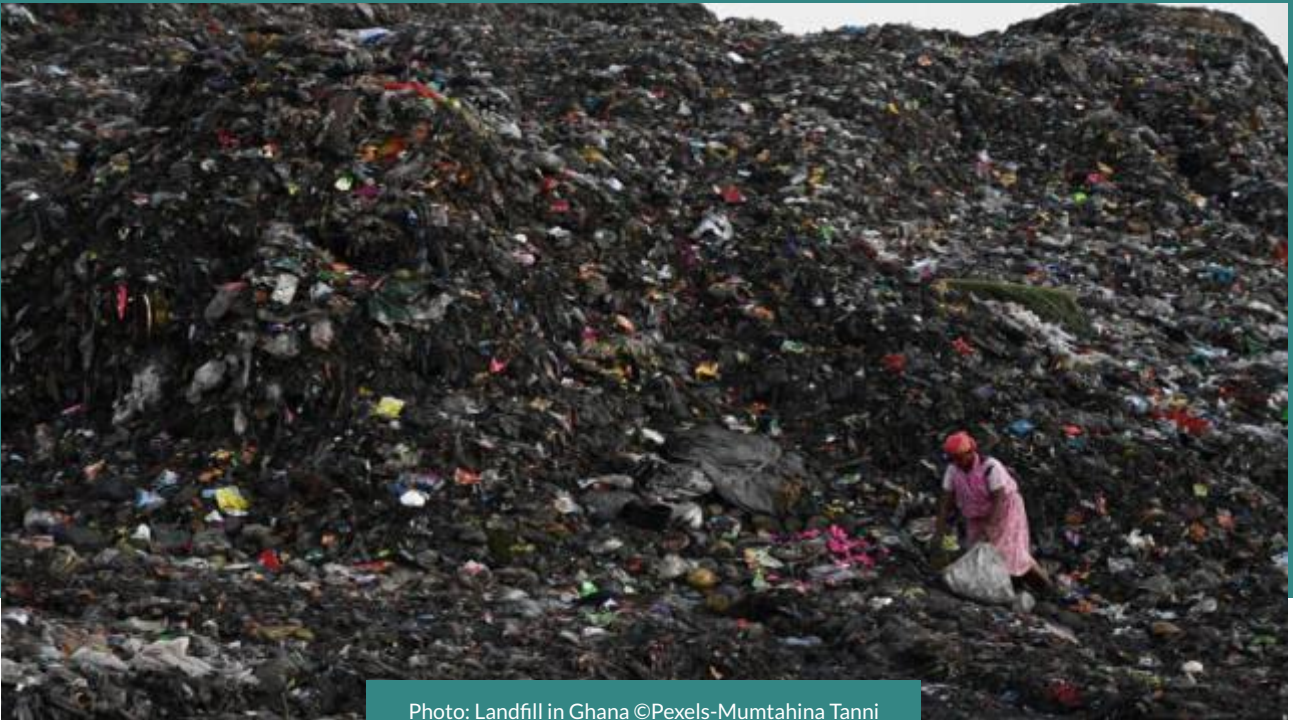


Photo: Landfill in Ghana ©Pexels-Mumtahina Tanni

Potent greenhouse gases and short-lived climate pollutants from our global food systems are increasing at an alarming rate, adversely affecting our ecosystems. This case study highlights research concerning methane emissions (including those from food and waste) undertaken as part of the Global Methane Assessment (GMA) published by the United Nations Environment Program (UNEP) and the Climate and Clean Air Coalition (CCAC). The GMA focuses on the impacts of methane emissions and assesses mitigation measures by public and private actors and the multiple benefits to climate, human health and ecosystems. This assessment was developed by a global team of authors, including researchers from the Stockholm Environment Institute (SEI).

This case study also highlights research done by SEI in collaboration with the Clean Air Fund (CAF) and World Economic Forum (WEF) on reducing air pollutant emissions from the private sector who already report on their GHG emissions including methane in some cases. The members of the Alliance for Clean Air, the first coalition of companies, are aiming to quantify and reduce their air pollutant emissions across their value chains.

Key messages

- Methane is a potent greenhouse gas (GHG) and short-lived climate pollutant (SLCP), and is a significant precursor of tropospheric ozone formation. The three key anthropogenic sources of methane are the oil and gas sector, agriculture and waste.
- Methane's atmospheric lifetime of approximately twelve years is much shorter than that of CO₂, which means that taking action to reduce methane emissions can result in rapid reductions in climate, forcing associated warming, and ozone pollution. Several mitigation measures are available for each key emitting source of methane, including improved agricultural practices, improved waste management, and reduced methane losses from oil and gas production.
- Current practices of producing and distributing food can include substantial losses before consumption, and there is considerable food waste after consumption, which is often disposed of through incineration or in uncapped and often informal landfills. This is a waste of food and resources in a world with hunger, poverty and increased food demand, owing to rising population. These practices also contribute to climate change through GHG and SLCP emissions and affect human health due to exposure to air pollution.
- Different actors have opportunities to reduce methane emissions from agricultural practices or by reducing food loss and organic waste, and improving waste disposal practices. For government actors, actions such as improved market infrastructure, last-mile connectivity (key to reducing agri-food loss and waste) or improving waste management policies can have multiple benefits. Businesses also have a critical role in reducing methane, other GHGs and air pollutant emissions starting with the quantification of the environmental implications of their complex value chains in collaboration with their suppliers and supplier networks.
- Businesses and Governments can include air pollutant and methane emissions in their existing GHG inventories and work towards developing integrated mitigation assessments.

Background

Over half of global methane emissions come from human activities, with the remainder coming from natural sources of methane, such as wetlands. The anthropogenic emissions of methane come mainly from three sectors: 35% from fossil fuels, 20% from waste and 40% from agriculture. Methane is a natural byproduct of the digestive process in ruminants such as cattle, sheep, and goats. The gas is also produced by decomposing organic matter, such as livestock manure and agricultural waste. In rice paddies, flooded fields promote the growth of methane-producing anaerobes in the soil. Not only does methane have a warming effect, but it is also one of the main precursors of ground-level ozone formation, which affects human health and reduces crop and forest yields.

Methane is now gaining notoriety as a GHG that has a more significant impact on warming per molecule (compared to CO₂) and is the second most important GHG for global warming that has been seen to date, and concentrations in the atmosphere are increasing at alarming rates. One difference between methane and carbon dioxide is that methane is a shorter-lived gas in the atmosphere, which means that methane concentrations will respond rapidly once emissions are controlled, reducing its warming influence within decades.

In 2022, SEI co-authored the Global Methane Assessment (GMA)^{1,2}, published by UNEP and the CCAC. According to the GMA, “for every million tonnes of decreased methane emissions, about 4,000 asthma-related incidents and emergency department visits, along with 90 hospitalisations per year, could be avoided. The significance of these figures lies in their impact on health and quality of life.

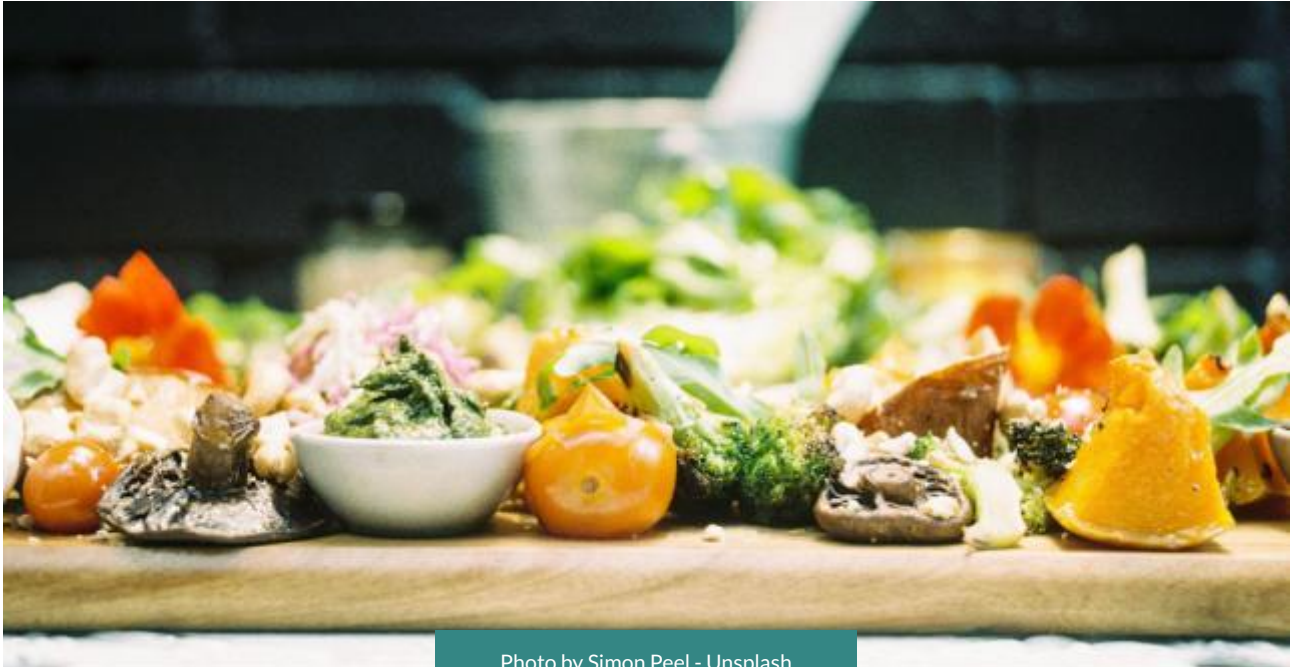


Photo by Simon Peel - Unsplash

Food waste and greenhouse gases

Discarded food along value chains, disposed of in uncapped landfills, contributes to the production of GHGs like methane.

When disposed of in a landfill with no cap collecting the methane, the organic matter rots (decomposes) and emits carbon dioxide and methane into the atmosphere, contributing to global warming.³ Carbon dioxide emissions, the leading cause of global warming, which remains in the atmosphere for a long time (approximately 100 years on average), mainly emanate from the use of fossil fuels and land use change.

“Greenhouse gas emissions have an impact on our food systems. But our food systems also have an impact on greenhouse gas emissions.” - Eleni Michalopoulou, Research Associate, Stockholm Environment Institute

Key facts and figures

- Anthropogenic methane emissions come mainly from three sectors: 35% from fossil fuels, 20% from waste and 40% from agriculture.
- Methane is a potent GHG with more significant impact of global warming per molecule compared to CO₂ and it's the second most important GHG for global warming.

¹ CCAC and UNEP, 'Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions,' Climate and Clean Air Coalition (website), 2021.

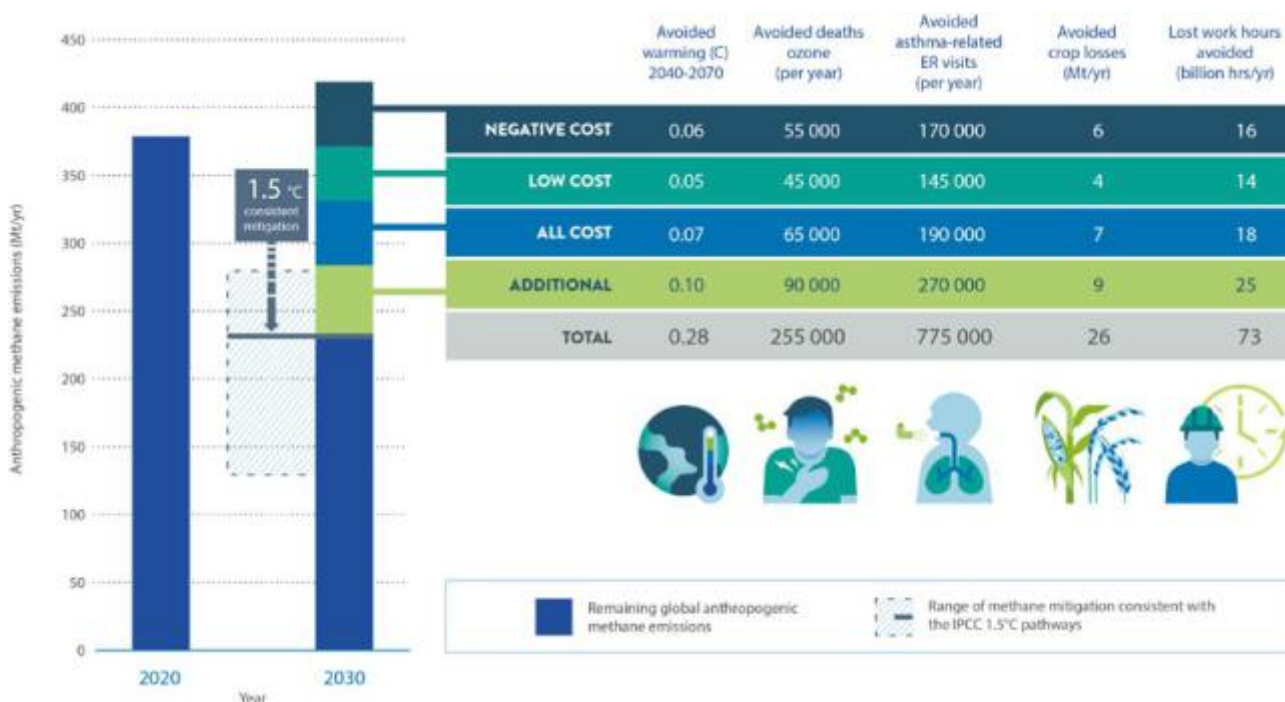
² Food and Agriculture; SEI; [\(Link\)](#)

³ UNEP, 'UNEP Food Waste Index Report 2021,' United Nations Environment Programme (website), 2021.

- The Global Methane Assessment (GMA) found that for every million tonnes of decreased methane emissions, about 4,000 asthma related-incidents and emergency departments along with 90 hospitalizations per year, could be avoided.
- National governments have signed the Global Methane Pledge to reduce methane emissions by 30% in 2030 compared to 2020, potentially preventing 255,000 premature deaths, 775,000 asthma related hospital visits, 73 billion hours of lost labour from extreme heat and 26 million tonnes of crops losses globally.
- Efforts to reduce food waste, optimise livestock management and promote healthier diets could slash methane emissions by 65-80 Mt/year in the coming decades.

Fulfilling the Global Methane Pledge

National governments have a large role to play in reducing methane emissions. Partly in response to the findings of the GMA, about 150 countries have signed the Global Methane Pledge (GMP). Launched at COP26, the GMP aims to reduce methane emissions by 30% in 2030 compared to 2020. The GMP has the potential to generate momentum to implement action to reduce methane emissions. More than 50 countries have developed or are developing national methane action plans, and substantial new financial resources are being directed to methane action.



Current and projected anthropogenic methane emissions and the identified mitigation potential in 2030 of targeted controls and their costs (low cost is greater than zero and less than 2018 US\$ 600 per tonne of methane) as well as a set of additional measures.

(Source: UNEP and Climate and Clean Air Coalition 2021. [Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions](#))

Nations have a crucial role in curbing agriculture and food-related methane emissions by prioritising behavioural change and innovative policies. Efforts such as reducing food waste, optimising livestock management, and embracing healthier diets with reduced meat and dairy consumption, could slash methane emissions by 65–80 Mt/year in the coming decades⁴. Food waste from 'ugly food' often ends up in landfills. We can help reduce food waste by urging people to eat food based on nutritional quality, not aesthetics. Enforcement

⁴ CCAC and UNEP, 'Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions,' Climate and Clean Air Coalition (website), 2021.

of proper waste management policies at local and state levels is critical. Encouraging waste reduction and diversion from landfills by repurposing food waste to animal feed, composting or donating to food banks can mitigate the environmental impact of food waste, especially in urban areas.

Businesses working to reduce methane

The private sector has the potential to play a substantial role in methane, air pollution and other GHG mitigation. Businesses and organisations can optimise their supply chains, especially during the last mile connectivity, to reduce food loss and waste through improved market infrastructure, better packaging to increase shelf life and storage solutions.

One company quantifying emissions and promoting measures to reduce them is IKEA, which operates in-store restaurants and cafes in several countries. It was one of the first global businesses to publish across the value chain in line with its People and Planet Positive Strategy to reduce food waste by 50% in its operations.⁵ IKEA's food waste management efforts include menu planning, portion control, surplus food redistribution in partnership with local food banks, an increased number of plant-based options in its food range and sustainable sourcing.⁶

IKEA has also been raising awareness among its customers about food waste by placing educational materials, posters and information displays in its stores to inform customers about food waste. IKEA also provides food storage products such as containers and reusable bags designed to help customers store food more effectively and reduce waste from food spoilage. They also offer a wide range of plant-based foods in their in-store restaurants and cafes as well as their supermarket aisles that is more sustainable with lower emissions.

Alongside its plant-forward menu, IKEA launched the 'Better Now' initiative in 2018 to repurpose rice straws from India into rugs and furniture. Rice straw is typically burned after the grain is harvested, significantly contributing to air pollution.

IKEA has been exploring the use of rice straw in India and Ghana, traditionally considered agriculture waste, as a sustainable resource that can be repurposed into furniture, mats and rags.

Beyond GHG reporting

While the private sector has been increasing its efforts on quantifying and reporting GHG emissions, quantifying and reporting their air pollutant emissions has only very recently been included in corporate sustainability reports.

IKEA is one of the 10 founding members of the 'Alliance for Clean Air', a corporate movement for clean air to accelerate climate action, was launched at COP26 by the World Economic Forum in partnership with the Clean Air Fund. The 16 alliance members include Google, Accenture, Biogen, Bloomberg, EY, GEA, GOTO, GSK, HALEON, IKEA MAERSK, Mahindra, Moderna, Oracle, Siemens and WIPRO, and it is supported by SEI.

SEI research and policy work has contributed to reducing food waste, promoting sustainable consumption, and mitigating food systems' environmental impact for the past three decades. SEI has facilitated collaborations and partnerships focused on boosting the ambition of Nationally Determined Contributions (NDCs) to the United Nations Framework Convention for Climate (UNFCCC), ratified by 198 countries that have committed to act on climate change and regularly report on their progress.^{7,8}

⁵ CAF, 'IKEA leads the way on corporate transparency and action on Air Pollution,' Clean Air Fund (website), February 2023.

⁶ IKEA, 'IKEA Sustainability Report Fy22,' IKEA, 2022, pp. 1-53.

⁷ UNFCCC. 'Fact sheet: The need for mitigation,' United Nations Framework Convention on Climate Change, 2023, pp. 1-7.

⁸ Analysis and Tools for Nationally Determined Contributions; [\(Link\)](#)

SEI, the CCAC and IKEA partnered in a project to create a practical guide that allows companies to quantify their air pollutant emissions and include them as part of their sustainability reports and GHG inventories.⁹ The guide was launched at COP27 and endorsed by the Alliance for Clean Air. The 16 companies of the Alliance have committed to quantifying their value chain air pollutant emissions from critical sectors, including electricity generation, transport, industrial processes, agriculture and waste.

“Through the air pollution guidance, we as a business can measure our impact and take action to minimise or eliminate it.”

- Andreas Ahrens, Head of Climate at the Inter IKEA Group

Acting now to reduce food-related emissions is an urgent priority

Available methane measures can simultaneously reduce human-caused methane emissions by as much as 45%, or 180 million tonnes a year (Mt/yr) by 2030. This will avoid nearly 0.3°C of global warming by the 2040s and complement all long-term climate change mitigation efforts. It would also, each year, prevent 255,000 premature deaths, 775,000 asthma-related hospital visits, 73 billion hours of lost labour from extreme heat, and 26 million tonnes of crop losses globally.¹⁰

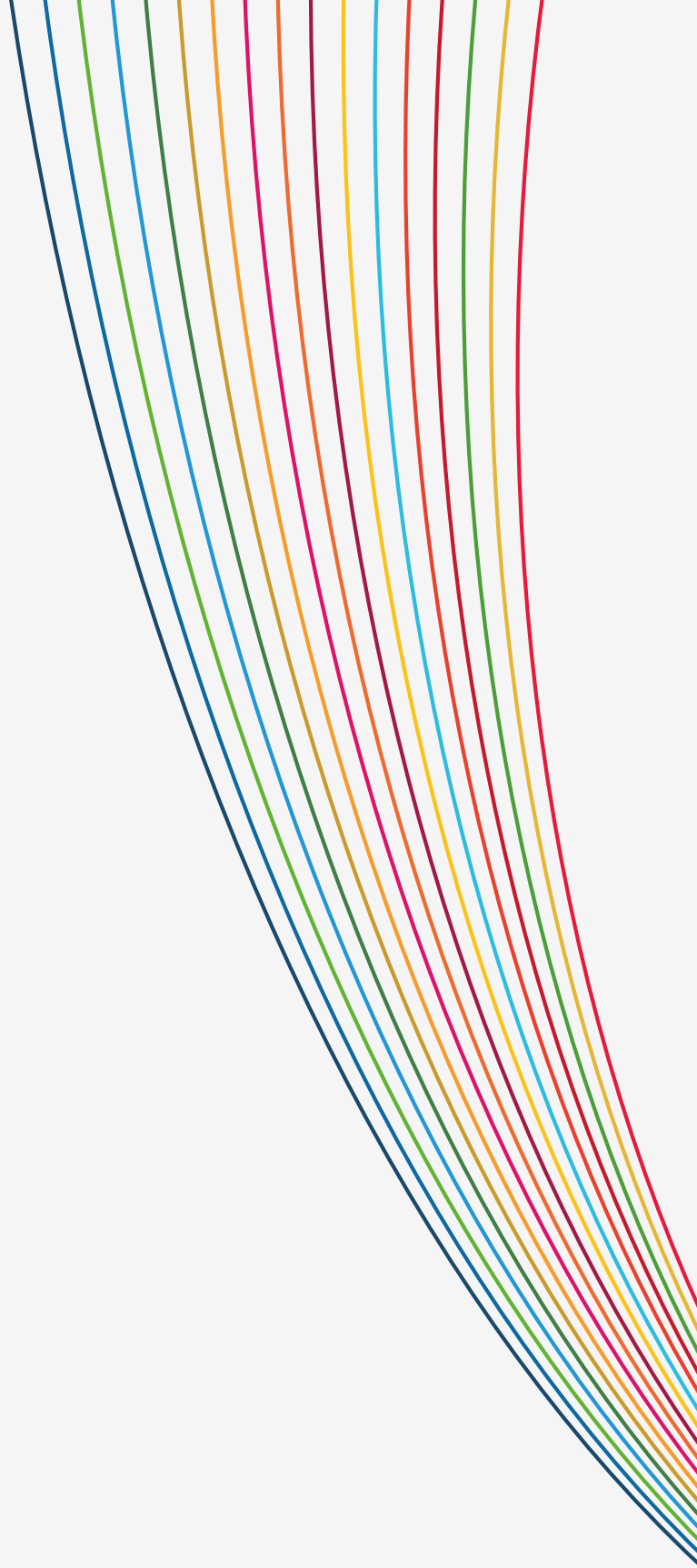
“Methane mitigation can save lives, prevent respiratory disease, help prevent further warming and contribute to healthier ecosystems. The measures that must be taken to achieve this are readily available and cost-effective. There is no reason not to act now. Explicitly and specifically addressing methane emissions will benefit everyone, particularly the vulnerable.”

- Eleni Michalopoulou, Research Associate, SEI

Reducing human-caused methane emissions is one of the most cost-effective strategies to rapidly reduce the rate of warming and contribute significantly to global efforts to limit temperature rise to 1.5°C. Launched at COP26, the Global Methane Pledge (GMP) aims to reduce methane emissions by 30% in 2030 compared to 2020. With 2030 just seven years away, we must act boldly and make thoughtful, transformative changes without inadvertently creating new challenges.

⁹ CAC and UNEP, 'Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions,' Climate and Clean Air Coalition (website), 2021.

¹⁰ J., Kuylenstierna, C., Malley, and E., Michalopoulou, 'Global methane assessment: Benefits and costs of mitigating methane emissions,' SEI (website), May 2021.



NUTRITION CONNECT (GAIN)

Headquarters
Geneva, Switzerland
Rue Varembé 71202 Geneva, Switzerland
Mailing address:
PO box 55, 1211 Genève 20
T: +41 22 749 18 50