THE GLOBAL FOOD DONATION POLICY ATLAS

ISSUE BRIEF

REDUCING FOOD WASTE:

VOLUNTARY CARBON MARKETS

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About The Global Food Donation Policy Atlas

The Global Food Donation Policy Atlas is a first-of-its-kind initiative to promote better laws on food donation to help address food loss and food insecurity. This project maps the laws affecting food donation in countries across the globe to help practitioners understand national laws relating to food donation, compare laws across countries and regions, analyze legal questions and barriers to donation, and share best practices and recommendations for overcoming these barriers. The project is a collaboration between the Harvard Law School Food Law and Policy Clinic (FLPC) and The Global FoodBanking Network (GFN). To learn more and compare the food donation laws and policies for the countries FLPC has researched to date, visit atlas.foodbanking.org.

About the Harvard Law School Food Law and Policy Clinic

The Harvard Law School Food Law and Policy Clinic (FLPC) serves partner organizations and communities by providing guidance on cutting-edge food system legal and policy issues, while engaging law students in the practice of food law and policy. FLPC focuses on increasing access to healthy foods, supporting sustainable food production and food systems, and reducing waste of healthy, wholesome food. For more information, visit www.chlpi.org/FLPC.

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About The Global FoodBanking Network

The Global FoodBanking Network (GFN) supports community-driven solutions to alleviate hunger in more than 50 countries. While millions struggle to access enough safe and nutritious food, nearly a third of all food produced is lost or wasted. GFN is changing that. GFN believes food banks directed by local leaders are key to achieving Zero Hunger and building resilient food systems. For more information, visit www.foodbanking.org.

The Global FoodBanking Network®

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ABOUT THIS ISSUE BRIEF

Food loss and waste (FLW) is one of the world's greatest food system challenges. FLW occurs at every stage of the supply chain and generates significant social, environmental, and economic costs.[1] An estimated one-third of food produced globally is ultimately lost or wasted along the supply chain, amounting to approximately 1.3 billion tons of food each year.[2] Much of this wasted food ends up in landfills where it emits methane, a potent greenhouse gas that is up to 80 times more harmful than carbon dioxide in the short term — a single molecule of methane traps more heat than a single molecule of carbon dioxide, causing more intense impacts on global warming in the first 20 years after its release, despite there being less methane in the atmosphere than carbon dioxide.[3]

Meanwhile, global rates of hunger and food insecurity remained high and relatively unchanged between 2021 and 2023, after rapidly increasing in 2020 due to the COVID-19 pandemic.[4] One out of every eleven people in the world experienced hunger in 2023.[5] Around 2.3 billion people (29 percent of the global population) were moderately or severely food insecure in 2023 — 350 million more compared to before the outbreak of the COVID-19 pandemic.[6] Food recovery and redistribution offers a solution to these parallel issues. By redirecting safe, edible food that would otherwise be lost or wasted to people who are hungry, the world can address the troubling mismatch between the amount of food waste and the high rates of extreme hunger, while decreasing methane emissions' contribution to the rise in global temperature.

Thoughtful public policies and initiatives that support FLW reduction are essential to climate mitigation. In addition to the environmental benefits, reducing food loss and waste through food recovery and redistribution results in sizable economic benefits to society, as it minimizes the costs associated with producing and discarding food that is never consumed. Food donation also helps mitigate the costs of hunger and stimulates the economy: food recovery organizations provide jobs or sponsor community development, and recipients of donated food can spend limited financial resources on other basic goods and services.[7] But food recovery organizations' financial viability is often dependent on a varied cadence of philanthropic donations, and more sustainable revenue streams are needed to help them expand their operational capacity and respond to the global climate and hunger crises. This issue brief explores the potential to use revenue from carbon credit sales in the voluntary carbon market to provide financial support to food recovery organizations that increase food security while driving reductions in food waste and its resulting methane emissions.

RECOMMENDATIONS IN BRIEF

This brief is meant to serve as a starting point for interested parties across the globe to consider how carbon credit revenue could support food recovery projects that decrease methane emissions by diverting surplus, wholesome food from landfill or other waste destinations and redistributing it to hungry people. While it includes some policy recommendations, the content is tailored as a primer for a broad audience interested in learning more about considerations for food recovery projects in a voluntary carbon market. Organizations with the mission to reduce FLW, food donors, companies, and policymakers should also consider additional opportunities to reduce emissions from food waste, especially ways for entities to prioritize climate mitigation activities like food donation above any compensation activities like offsets. The policy recommendations are as follows:

To promote transparency, trust, and integrity in the voluntary carbon market, countries should

- **Regulate the Voluntary Carbon Market to Provide Guardrails and Enhance Credibility**
- **In Lieu of Regulating, Adopt Programs that Promote a Credible Voluntary Carbon market**

To support food recovery organizations aiming to enter carbon markets, and make it worthwhile for organizations with limited resources to participate, countries should

- **Provide Grants and Other Financial Supports to Reduce the Financial and Administrative Burdens of Entering the Carbon Market.**

BACKGROUND

The past decade saw an exponential increase in attention toward food loss and waste (FLW), with the international community committing to halve FLW in the 2030 Agenda for Sustainable Development, reflected in Sustainable Development Goal 12.3 ("SDG 12.3").[8] FLW occurs at every stage of the food system: during the initial harvest due to fluctuating market prices, high labor costs, inadequate infrastructure, and demand for flawless produce;[9] by grocery stores and restaurants that overestimate customer demands and rely too heavily on confusing shelf life and product date labels;[10] and by consumers that engage in inefficient shopping and cooking practices.[11] These behaviors have significant environmental, economic, and social consequences. Food that is lost along production and supply chains or wasted at retail and consumer levels has a massive carbon footprint of 3.3 gigatons CO_2e, using roughly 30 percent of agricultural land and accounting for 8 percent, or 70 billion tons, of total global greenhouse gas emissions annually.[12] This damage is estimated at USD 750 billion in environmental costs and more than USD 900 billion in social costs per year.[13] FLW is expensive, squanders natural resources, causes lasting environmental damage, and presents a missed opportunity to redistribute food to the 2.3 billion people experiencing food insecurity.[14]

Food banks and other organizations with the mission to reduce FLW and increase food donation (collectively referred to as "food recovery organizations"), can help mitigate unnecessary FLW by recovering and redistributing safe, surplus food. In 2023, food banks in more than 50 countries recovered an estimated 654 million kilograms of safe, wholesome food.[15] This recovery helped avoid an estimated 1.8 million metric tons of carbon dioxide equivalent ($CO2_e$) emissions (an estimated equivalent emissions reduction of taking over 400,000 passenger vehicles off the road for one year) and provided food access to 40 million food-insecure people.[16]

Methane is the world's second largest contributor to global warming after carbon dioxide, contributing 20-30 percent of the global climate change over the last 200 years. Although carbon dioxide is more abundant than methane in the atmosphere, a single molecule of methane traps 80 times more heat than a single molecule of carbon dioxide over the first twenty-year period, making it a much more concerning climate pollutant in the short-term.[17] Decreasing the amount of methane emissions from FLW could have a significant and nearly immediate impact on reducing the near-term effects of climate change, helping to keep global temperature change below 2 degrees Celsius.[18]

Food waste that decomposes in landfills is a significant source of methane, and diverting edible food from landfills through food recovery and redistribution is a powerful lever for reducing methane emissions.[19] Countries should not ignore the positive impacts that food recovery and redistribution activities contribute to methane emission reductions.

While FLW results in economic loss, food donation can generate sizeable economic gains. First, donating safe, edible food mitigates the sunk costs of producing food that would otherwise go uneaten.[20] Second, donating safe, edible food alleviates hunger, reducing health care expenses associated with malnutrition[21] and increasing productivity, educational fulfillment, and economic potential.[22] Third, food recovery operations create job opportunities at food banks and intermediaries and stimulate the economy by increasing the spending power of food recipients.[23] Indirect gains such as reduced hunger costs and more resilient supply chains that flow to society ultimately help build stronger communities. Finally, donating safe, edible food to food banks reduces the environmental costs of methane emissions resulting from the food decomposing in landfills.[24] Unlocking

this spectrum of benefits requires clarity and sufficient incentives for donors to safely redistribute rather than discard surplus food — as well as financing for food recovery infrastructure and operations.

What is carbon pricing?

Carbon pricing assigns a price to carbon emissions with the goal of mitigating the negative externalities from greenhouse gas (GHG) emissions. It can be an effective tool to incentivize climate action because it aims to incorporate the external costs of emissions into an entity's economic decision-making. There are three main frameworks for carbon pricing: (1) carbon taxes, (2) compliance carbon markets or emissions trading systems (ETS), sometimes called cap-and-trade, and (3) the voluntary carbon market (VCM).[25]

Carbon taxes levy a price on carbon consumption (generally fossil fuels), and governments collect the tax from emitters as set forth in the law or implementing regulation.[26] The ETS is a compliance market because regulations set a limit on emissions and mandate participation by certain emitters, such as power plants and other industrial operations.[27] The voluntary carbon market (VCM) is generally unregulated and does not require participation from specific emitters, but instead enables various stakeholders to participate voluntarily and offset their emissions to meet their GHG reduction targets.[28] There is potential to regulate the VCM that would not mandate participation but would instead provide guardrails to ensure integrity in the marketplace.

What is a carbon credit?

Typically, in both compliance and voluntary markets, one carbon credit represents one metric ton of carbon dioxide equivalent (CO2e) that an emissions reduction project either removes from the atmosphere or avoids altogether, such as, in the case of food recovery and redistribution, when edible food is diverted from the landfill to the food bank for human consumption and methane emissions from that food are avoided in the landfill.[29]

Pricing emissions through carbon markets is one way for entities to internalize and assign a value to their emissions. Buying a carbon credit as an offset compensates for the entity's emissions and in turn generates revenue for the project outside the entity's value chain (such as food recovery activities) that avoid or reduce GHG emissions. There are two main types of carbon markets that could help countries and entities meet emissions reductions commitments: compliance carbon markets (or emissions trading systems) and the voluntary carbon market (VCM), which is the main topic of this issue brief.

Purchasing carbon credits in a VCM can help entities that are actively committed to reducing their emissions but need help achieving their emissions goals in the near term as they transition to carbon neutral practices in the long term. The potential of using carbon markets to reduce emissions in the near term notwithstanding, solely focusing on carbon credits is not a way to achieve full, long-term decarbonization. Other long-term, operational changes are needed for entities and countries to achieve and maintain carbon neutrality.

For entities that choose to use carbon credits as part of their emissions reduction strategy, financing food recovery projects is an option worth considering because of the methane reductions and the added co-

benefits, an essential feature of high-quality carbon credits in VCMs. Co-benefits are the added positive impacts that a carbon credit project contributes to society above and beyond emissions reductions.[30] Food recovery organizations avoid emissions and reduce hunger by recovering surplus food (that would otherwise decompose and produce methane in landfills) and redistributing it for human consumption.[31] In addition to hunger relief, food recovery activities contribute other co-benefits, such as sustainable development and poverty reduction.[32]

THE VOLUNTARY CARBON MARKET TYPICALLY FUNCTIONS AS AN UNREGULATED MARKET

While governments regulate and enforce compliance carbon markets, buying and selling carbon credits in the **voluntary carbon market** (VCM) occurs independent of a regulatory framework. A VCM operates for entities and individuals that voluntarily commit to reducing their emissions and want to purchase carbon credits to offset their unavoidable emissions — ideally entities participate in the VCM to complement their internal decarbonization activities and achieve emissions reductions above and beyond what they can do in their internal operations and along their value chain.[33] Entities seeking to offset their emissions participate in the VCM by buying carbon credits from credit retailers, brokers, exchanges, or directly from the project developer.[34]

There is currently no global standardization or rules for monitoring carbon credit trades in the VCM.[35] Climate change mitigation projects that want to acquire and sell carbon credits in the VCM usually need to receive certification through a carbon crediting program, such as Verra, Gold Standard, Plan Vivo Climate Action Reserve, Global Carbon Trust, Sovereign Carbon, CCER, ACR, Clean Development Mechanism, and Puro. Earth, to name a few.[36] While some carbon crediting programs have existed since the 1990s (e.g., ACR and the Clean Development Mechanism) and the early 2000s (e.g., Climate Action Reserve, Gold Standard, and Verra), new programs are continuously joining the market.[37] One analysis revealed that thirty-six new carbon crediting programs entered the market between 2019-2024, bringing the total number of carbon crediting programs to sixty-five.[38]

In the VCM, carbon crediting programs typically (1) establish standards for carbon credit issuance, (2) set rules for verifying and validating carbon credit projects, (3) certify projects under their standard, and (4) issue and track carbon credits status through a registry.[39] The carbon crediting programs have various standards that apply to the carbon credits issued and sold in the VCM depending on the project targets and size, such as Verra's Verified Carbon Standard (VCS) Program,[40] the Gold Standard for Global Goals,[41] and Plan Vivo's PV Nature.[42]

In addition to evaluating a project's emission reductions, some carbon crediting standards, such as the Gold Standard and the VCS Program, assess co-benefits or the ways a project integrates the United Nations Sustainable Development Goals, providing a more holistic view of the project by highlighting the project's positive environmental, economic, social, and cultural impacts.[43] The VCS Program also has some standards that only certify a project's co-benefits; for example, the Sustainable Development Verified Impact Standard (SD VISta) creates a unit for each specific sustainable development benefits that projects can seek to add as a label to the carbon credits the VCS program issues.[44] Project proponents can also develop projects solely using SD VISta to generate claims, labels, or assets that represent tradeable credits that correspond to the sustainable benefit, but the SD VISta credits *are not carbon credits* and cannot be traded as emission reductions credits or used for carbon offsets.[45]

Projects developed under carbon crediting standards should meet the standard's particular methodology requirements for the project type to ensure the offsets are credible. Relevant to food loss and waste, in July 2023, the VCS Program finalized a **Verified Carbon Standard Methodology for Reducing Food Loss**

and Waste (VM0046) that applies to activities that keep food in the human supply chain and out of treatment destinations, like landfills.[46] The methodology applies to activities that reduce FLW across any part of the food supply chain —recovering safe edible food from farms, transportation, storage, processing, retail, food service, or households.[47]

In August 2024, the Global Food Banking Network and Carbon Trust, in collaboration with the Global Methane Hub, released the **Food Recovery to Avoid Methane Emissions** (**FRAME)** methodology for calculating how food banks avoid methane emissions from food loss and waste — and contribute the co-benefits of reducing hunger — through food recovery and redistribution operations.[48] The FRAME methodology is not yet approved by a carbon crediting program standard and is unavailable for projects to generate carbon credits until it receives such approval.

The FRAME methodology builds from the VCS food loss and waste methodology and specifically focuses on quantifying avoided methane emissions *and* the co-benefits from food banking operations.[49] In contrast to the VCS methodology, the FRAME methodology considers suppressed demand, a concept that the Gold Standard developed to incorporate the work food recovery organizations do to improve food security in the accounting of their avoided emissions.[50] A basic explanation of the rather complex concept is that suppressed demand establishes the minimum nutritional intake (e.g., calories) for a food secure person and compares it to a baseline nutritional intake for the people that the food bank serves to calculate the gap between those two intakes.[51] Then, the methodology calculates the emissions from the food recovery activities associated with closing the food security gap and discounts those emissions from the food recovery organization's overall emissions. It is data intensive and requires food recovery organizations to monitor whether their clients consume the food the organization provides, which may not be feasible for all food banks, so the FRAME methodology treats it as optional.[52] As mentioned above, the methodology also includes a co-benefits assessment.

Third-party rating agencies are another player in the voluntary carbon market that try to clarify the market for the carbon credit purchaser by distinguishing the high-integrity, high-quality carbon credits from the low-quality, or garbage, credits. Rating agencies, such as Calyx Global, BeZero, and Sylvera, assess carbon crediting programs, methodologies, and associated carbon credit projects across various criteria to determine the validity of their claims.[53] Each rating agency has its own approach, but the ratings typically evaluate factors like the carbon credit's emission reduction claims, co-benefit impacts, and the associated risks of the project.[54] The rating agencies assign a score, typically on a letter scale; for example, Calyx uses a five point scale of *A to E*, where *A* is the highest rating, while BeZero uses a seven point scale from *AAA to D*, where *AAA* is the highest score.[55]

THE LIFE CYCLE OF A CARBON CREDIT

The following is a general overview of a carbon credit from creation to retirement, assuming that an entity purchases the carbon credit to offset emissions. Each carbon crediting program has a specific procedure for issuing carbon credits to projects. Project developers should review a program's processes before attempting to register a carbon credit project under that specific program.

1. **A project proponent selects (or independently develops) a relevant methodology for their project type.** For example, a food recovery and redistribution project might select the FRAME methodology (after a carbon crediting program approves it) or Verra's Verified Carbon Standard Methodology for Reducing Food Loss and Waste (VM0046).[56]

2. Using the selected methodology, the **project proponent develops a project** that establishes baseline emissions and will conduct activities that reduce emissions through GHG avoidance or removal. In the case of food recovery and redistribution, the project avoids emissions, particularly methane.[57]

3. **The project proponent registers the project** with the methodology's corresponding carbon crediting program**,** such as Verra or the Gold Standard.

4. **The carbon crediting program validates** that the project meets the methodology requirements and the carbon crediting standard requirements under the program, including any third-party monitoring, validation, and verification requirements.

5. **The carbon crediting program approves the project and issues the project carbon credits** (each credit is worth one ton of CO_2e GHG emissions).

6. **A third-party, independent rating agency may assess the project** and score its credibility (i.e., whether the project should achieve its emission reductions claims) on various criteria. Examples of rating agencies include Calyx Global, BeZero, and Sylvera.[58]

7. **An entity seeking to offset emissions purchases the carbon credit** either directly from the project proponent or through a retailer, broker, or exchange. Once the sale is final and the credit is transferred to the purchaser, the money from the transaction flows to the project proponent.

8. The purchasing entity lets the carbon crediting program's registry know it wants to use the credit to offset emissions, and **the registry retires the credit**, so it is no longer eligible for trading on the market.

ARTICLE 6 OF THE PARIS AGREEMENT PERMITS COUNTRIES TO AUTHORIZE HIGH-INTEGRITY VCM ACTIVITY TO MEET OR EXCEED THEIR NATIONALLY DETERMINED CONTRIBUTIONS

The 2015 Paris Agreement, adopted at COP21 and entered into force in November 2016, aims to limit the global temperature increase to below 2 degrees Celsius above pre-industrial levels, with countries working together to limit the increase to 1.5 degrees Celsius and to achieve and maintain net zero emissions by 2050.[59] The Intergovernmental Panel on Climate Change (IPCC) suggests that by 2030, the world needs to limit carbon dioxide (CO_2) emissions to about 45% below 2010 levels and reduce methane emissions by about 33 percent.[60]

- To achieve these goals, Article 4 of the Agreement requires signatories to establish Nationally Determined Contributions (NDCs) as a pledge for decreased emissions targets and a commitment to pursue policies that will mitigate emissions.[61] NDCs are a way for countries to communicate their climate mitigation priorities and the support that they might need to achieve those priorities.[62]

- Article 6 of the Paris Agreement encourages parties to cooperate with each other to meet their NDCs and creates a carbon crediting mechanism for countries to use emission reduction units to reduce the financial burden of ambitious emission mitigation targets.[63]

- Under Article 6, party countries may voluntarily trade emission reduction units (carbon credits) with each other and authorize the of use offsets generated from high-integrity VCM activity to fulfill their NDCs or achieve emissions reductions above their NDCs.[64]

- Article 6 requires emission reduction units to be real (represent real emissions reductions), verifiable by an independent auditor, quantifiable, additional (must represent emissions reductions above what would have occurred without the offset), enforceable, and permanent.[65]

- Article 6.4 creates a Paris Agreement Crediting Mechanism (PACM), a carbon crediting mechanism for countries to use emission reduction units to reduce the financial burden of ambitious emission mitigation targets.[66]

- At COP29 in Baku, Azerbaijan, in 2024, countries reached an agreement on standards for the PACM.[67] The PACM is a UNFCC-managed and monitored, carbon crediting framework that will allow for international carbon credit (emission reduction units) trading and will be open to countries and private actors.[68] There is still work to do before the PACM is fully operational, which could take a year or more.[69]

Article 6 does not directly regulate carbon credit trading in VCMs outside of the PACM.[70] Still, there are active initiatives working to ensure the integrity of the VCM that align with the criteria set forth in Article 6, such as the **Integrity Council for the Voluntary Carbon Market** (described in more detail in Recommendation 1B on page 15), and as the PACM further develops, it will likely interact with other voluntary carbon markets and regulated compliance markets.[71] Thus, carbon crediting projects seeking to participate in a high integrity VCM would be well-prepared if they aligned with Article 6 and the methodologies that arise from the PACM.

Article 6 also recognizes that high quality carbon credits in VCMs contribute co-benefits beyond emissions reductions alone. The Paris Agreement places renewed emphasis on the importance of activities delivering holistic benefits for climate mitigation and achievement of the United Nations Sustainable Development Goals (SDGs).[72] Activities supporting increased food donation are uniquely suited to meeting these goals, including SDG 2 (Zero Hunger), SDG 12 (Responsible Consumption & Production), and SDG 13 (Climate Action).[73] As the PACM develops and more countries begin to use to carbon credits toward their NDCs, the demand for high-integrity carbon credits with co-benefits that meet SDGs will likely increase. Food recovery organizations that

have the desire and wherewithal to implement a carbon crediting project would have several co-benefits to highlight, including positive impacts on the environment, hunger, and economics.

FOOD RECOVERY ORGANIZATIONS ARE ATTEMPTING TO TAP INTO THE VOLUNTARY CARBON MARKET

The **Mexican FoodBanking Network** (*Red de Banco de Alimentos de México*, BAMX) was the first food banking organization in the world to earn carbon credits for food recovery activities. BAMX has been active in the voluntary carbon credit market since January 2023, and each carbon credit it offers represents one ton of rescued food. BAMX worked with CoreZero, a Miami-based climate-tech company, to quantify the emissions saved from BAMX's food recovery activities (221,800 tons of CO_2) and then monetize the impact of food donation to translate the reduced emissions into carbon credits (221.800 credits).[74] EcoEngineers verified the project.[75]

In August 2023, the **Peru Food Bank** (*Banco de Alimentos Peru*) also entered the voluntary carbon market, earning carbon credits for diverting food and other goods from landfills. The Peru Food Bank also worked with CoreZero, and Verico SCE verified the project.[76]

In 2023, six food banks participated in a pilot project for the Food Recovery to Avoid Methane Emissions (FRAME) methodology, developed by the Global FoodBanking Network and Carbon Trust to quantify the avoided emissions and co-benefits of food recovery activities that redistribute safe, edible food to feed people.[77] The FRAME methodology is not yet approved by a carbon crediting program for use in the VCM; the pilot project sought to establish proof of concept. Completed in 2024, the pilot phase of the FRAME methodology demonstrated that food banking activities play a role in reducing emissions while also achieving the co-benefits of reducing food insecurity.[78] The participating food banks (five **BAMX food banks** and one food bank in **Quito, Ecuador** (**Banco de Alimentos Quito**)) recovered over 30 million kilograms of food to avoid 816 metric tons of methane, or nearly 20,400 tons of CO_2 equivalent.[79]

In the **United States**, **Brightly** has submitted a project for approval on the Verra Registry using the Verified Carbon Standard Methodology for Reducing Food Loss and Waste (VM0046).[80] As the project developer, Brightly aims to help food recovery organizations across the United States access financing from carbon credits by aggregating and analyzing the food recovery data the organizations collect; calculating the emission reductions achieved from the food recovery and redistribution activities; and managing the project verification. Brightly will also coordinate the carbon credit sales and share revenue with the food recovery organizations proportionately based on their contributed emissions reductions.[81]

The above examples demonstrate that it is possible for food recovery organizations to enter carbon markets and provide carbon credit purchasers an opportunity to support food donation as an emissions reduction tool. Still, there are challenges and risks that food recovery organizations should consider before entering the voluntary carbon market. The next section highlights some of those issues.

THE VOLUNTARY CARBON MARKET LACKS STANDARDIZATION

As mentioned above, the voluntary carbon market (VCM) generally operates independent of regulatory frameworks and targets entities striving to meet their internal emissions goals.[82] A carbon crediting program issues carbon credits to projects that remove or avoid emissions, creating the carbon credit supply, and then the buyers purchase the carbon credits at market price either directly from the project developer or through a carbon credit retailer, broker, or exchange. Each carbon credit represents one ton of carbon equivalent (CO_2e) GHG emissions; the credit purchaser can retire the carbon credit to offset one ton of their own emissions or sell it to another purchaser. The projects providing the carbon credits —and the methodologies that establish their emission reductions — vary greatly.[83]

There is currently no global standardization for the VCM or the projects selling credits in the VCM. Rather numerous independent carbon crediting programs, standards, methodologies, projects, rating agencies, and brokers exist in the VCM. It can be challenging to navigate the supply side of the market with confidence, which has led to widespread confusion and distrust of the VCM. For example, the variety of carbon crediting programs (the number was up to 65 at the end of 2024) makes it difficult for a VCM novice to know where to begin, and just figuring out the best starting point can take hours of research.[84] Additionally, the project methodologies are often highly technical and can be confusing for the average carbon credit purchaser, creating the perception that the carbon crediting process lacks transparency and leading market participants to question if they are genuinely offsetting their emissions.[85] The confusion disincentivizes participation in the VCM and can lead companies to believe that not acting is better than purchasing potentially unreliable carbon credits in a VCM. Further, the VCM's lack of global standardization and perceived opaqueness diminish its credibility, inviting greenwashing criticisms at best, and at worst, risking faulty claims of emission reductions when it is unclear how the carbon credit equates to a real, additional reduction of one ton of GHG emissions.[86]

DEMONSTRATING ADDITIONALITY CAN POSE A CHALLENGE FOR FOOD RECOVERY PROJECTS

As noted above, it is generally agreed upon that there are six criteria for high quality carbon credits: real (represent real emissions reductions), verifiable, quantifiable, enforceable, permanent, and additional. Additionality represents the additional emissions reductions that are only possible because of the funding generated by selling the emissions reduction unit or offset. Additionality is an essential criterion for confirming an offset project's credibility in the marketplace — without it the emissions offsets are illusory.[87]

To satisfy additionality, the project must achieve emissions reductions beyond those that were already occurring in the baseline scenario or that were going to occur absent funding from the carbon credit's sale.[88] In other words, the entity purchasing the carbon credit cannot claim an offset if the emission reduction covered by the credit was already occurring or was going to occur anyway.[89] High-quality offset projects demonstrate additionality by showing that the finance from the offset unit is necessary to achieve the emission reductions. Critics of carbon markets often raise concerns with additionality; a best practice to address such concerns is for carbon credit projects to be prepared with precise data to support the project's additionality claims.[90]

Carbon credit projects should assess additionality across multiple scenarios according to their methodology requirements. Most credible VCM standards and methodologies incorporate additionality requirements, and potential carbon market participants should review them.

- Generally, projects first establish the baseline scenario and project boundary to determine what would

happen if the carbon credit project didn't exist and evaluate the additional emission reductions that are possible with the project's implementation.

- Next, the project should complete a financial analysis to show it cannot complete the project activities without revenue generated by selling the carbon credit.
- Finally, the project should ensure that existing laws and regulations do not mandate the project activities that generate the carbon credits, and if there are existing laws and regulations that relate to the project's activities, the project must only sell carbon credits that correspond to project activities that go above and beyond any legal requirements.[91]

As mentioned above, Verra has approved the **Verified Carbon Standard Methodology for Reducing Food Loss and Waste (VM0046)**, which is a methodology for measuring net emission reductions from reducing the amount of food discarded, and therefore increasing the amount of food available for human consumption.[92] The methodology is applicable to project activities that reduce FLW across the human supply chain — and can be applied to projects that ensure safe, edible food is diverted from high GHG-producing destinations (like landfills) to feed hungry people whether recovered from farms, transportation, storage, processing, retail, food service, or households.[93]

The methodology specifically addresses additionality and how FLW reduction projects can demonstrate it by identifying the investment, institutional, or cultural and social barriers that would prevent the project activities from happening unless the project participated in the carbon market.[94] In other words, entities should prove that carbon market participation eases specific barriers that would otherwise prevent the project's activities.[95] For example, an investment barrier noted in the Verra methodology that is applicable to food donation is that "similar activities in the region have been implemented only with grants or other non-commercial finance terms."[96]

In addition to the objective barriers analysis, the Verra methodology requires projects to determine whether the project activities are "common practice." It defines common practice as activities with "greater than 20 percent adoption rate in the applicable geographic area based on the amount of food being recovered relative to the quantity wasted."[97] If a carbon credit project's activities, such as food recovery and redistribution activities, are common practice within the project boundary, then it is less likely that the activities are additional because they probably would have happened on a regular basis without the incentive of the carbon credit financing.[98]

Additionality is a particular concern for food recovery projects in the VCM because defining a reliable baseline scenario may be challenging given that most food recovery organizations rely on short-term grants and a varied cadence of donations for financial viability, and the food recovery activities may vary in magnitude from year to year, or even month to month. Further, the baseline emissions scenario — determined by the destination from where the recovered food is diverted — may vary if there is a regulatory framework governing food waste (or food donation) that requires diversion from landfill or food recovery.

Food banks that want to participate in a high-quality carbon market should collect precise data that demonstrates the food recovery activities and related emission reductions could not have occurred without the finance from the carbon credit. The food bank might satisfy additionality by showing that it needs the carbon credit investments to overcome financial, institutional (e.g., lack of adequate cold storage), or social (e.g., retail is more likely to throw away food than donate) barriers to its food recovery activities, and the emissions avoided by the carbon credit investment would not be replacing emissions avoided due to one of the food bank's already existing funding streams, such as existing grant funding.[99]

One way to address the financial portion of the additionality analysis is to maintain accurate records of the various funding streams that show the specific food recovery and donation operations each funding stream

supports — so that it is clear the food recovery activities supported by government programs, grant funding, or annual charitable donations are separate from any food recovery activities that earned the carbon credits available for purchase in the VCM. The **FRAME methodology** suggests that food banks that are wholly reliant on volunteers and donations could show how costly operations would be if they paid the volunteers as employees, indicating that the food bank needs the carbon credit revenue to sustain itself beyond its dependency on volunteers to function.[100]

As noted above, the additionality analysis should assess how the governing legal and regulatory framework impacts the food recovery project's baseline scenario.[101] Achieving "regulatory" additionality may be challenging where policies require food waste diversion, which is the case in a growing number of countries. The regulatory additionality analysis is potentially even more complex when a law requires food recovery. For example, in a jurisdiction that bans organic waste from landfills and requires a certain percentage of edible food be recovered and redistributed, like the **state of California in the United States**, food recovery projects would likely need to show that the carbon credits represent emission reductions from food recovered only from entities that are not mandated food donors under the law.[102] As part of the additionality analysis, food recovery organizations interested in participating in the voluntary carbon market should consider if any laws govern food waste and food donation, and if so, what the law requires, which entities are subject to the law, and how the law might change the baseline emissions scenario for a potential food recovery carbon credit project.

ENTERING AND PARTICIPATING IN THE CARBON MARKETPLACE REQUIRES SIGNIFICANT RESOURCE COMMITMENTS FROM PARTICIPATING ENTITIES, SUCH AS FOOD BANKS OR FOOD RECOVERY ORGANIZATIONS

Food recovery organizations that want to enter a credible carbon market need to consider available methodologies to establish and confirm their proposed project provides high-quality carbon credits that are real (represent real emissions reductions), verifiable by an independent auditor, quantifiable, additional, enforceable, and permanent. The carbon credit's environmental integrity is crucial for ensuring the market mechanism is effective, and food banks as participants should work with credible carbon crediting programs and verification bodies to ensure robust data collection and verify their projects meet the highest quality standards.

Ensuring this integrity in a VCM requires carbon credit suppliers (project developers and project participants) to keep track of detailed data and reporting in order to ensure the credits they sell are credible, which can require significant upfront investment. In the food loss and waste context, food banks or food recovery organizations that hope to participate in a carbon market and supply carbon credits will therefore likely work with a third-party consulting organization to facilitate their carbon market entry, but they still must devote time and administrative resources to calculating the emissions reductions from their food donation activities to determine the market value of their credits. The consultants would likely have fees that add to the food banks' costs, and the fees could vary depending on the project's size and location.

Most carbon market standards — both in compliance markets and VCMs — require third-party auditors to verify the project's emissions reductions, which would also add to the cost. Administering carbon credit sales and tracking emissions reductions also requires dedicated resources from the food bank or food recovery organization, including potential investments in technology infrastructure. Considering many food banks rely on volunteer labor, it may take time and resources to train volunteers in proper data collection in addition to their regular duties.

For carbon market participation to make sense, food recovery organizations would need to sell enough credits to cover the costs of data collection, monitoring, and verification requirements while still being able to bolster their food recovery operations with the revenue. But the cost of the credit may not be known until the process

has started, and even then, the organizations must be willing to put in the time, money, and labor resources into the project without a guarantee that the carbon credits will sell at all.

Given these costs and considerations, it can be even more challenging to make the project financially net positive if the baseline scenario is anything other than sending food to landfill. When the wasted food's destination in the baseline scenario is different than landfill, such as composting, anaerobic digestion, or animal feed, fewer emissions are avoided because of the food recovery, and more food recovery activities are needed to avoid a ton of CO_2 equivalent emissions. Therefore, the revenue potential is limited if a food recovery organization is avoiding food from going to destinations that generate smaller amounts of GHG than the landfill destination and carbon prices are also low (see next section).

CARBON PRICES ARE OFTEN LOW , AND CARBON CREDIT REVENUE POTENTIAL CAN BE UNCERTAIN

The global carbon price signals the market value of carbon emissions, potentially influencing the price of carbon credits to align with that value, especially for high-quality, credible projects in the VCM. Still, the over issuance of "garbage," or low quality, cheaper credits, can reduce the average carbon credit price, incentivizing entities to purchase more credits at the lowest price to meet their emissions goals, albeit artificially, and interfering with the price and potential availability of high-quality carbon credits.

When the carbon price is set too low, it likely does not cover the true cost of the negative externalities from the targeted emissions — or the benefit of the emissions reduction activity — nor does it promote behavior change amongst polluters.[103] For example, low carbon prices are likely to create scenarios where it is cheaper to pollute and buy offsets than to address emissions internally, which incentivizes polluters to purchase an abundance of carbon credits to offset their emissions instead of seeking ways to achieve real emission reductions in their internal supply chains. The carbon price needs to be high enough to force entities to prioritize their transition to net zero emissions — otherwise, the cost of the polluting will be less than the cost of decarbonization .

The carbon price not only has the potential to drive behavior change among companies, but it also determines whether it is worthwhile for projects to participate in carbon markets. If the price is too low to cover the costs of participation and provide meaningful financial support of the project's activities, it is likely not worth the effort for the organization to coordinate a project and offer carbon credits in the market. Accurately assessing the potential revenue for a carbon credit project could be challenging because food recovery organizations may not know in advance how much they can sell carbon credits for or how much that price will change over time (given that the market drives the carbon credit price on the VCM).

As described above, the project's costs may outweigh its returns even more in areas where robust alternatives to landfill exist or policies incentivize diversion from landfill. If the donation of surplus food does not keep food out of high-GHG emitting destinations (e.g., landfill) but instead diverts food from lower-GHG emitting destinations (e.g., compost, anaerobic digestion), the overall emissions reductions from the donation are relatively lower. In this case, more donations are needed to produce a carbon credit, and it may be challenging to generate sufficient carbon credits to offset the cost related to developing and certifying a project.

RECOMMENDATIONS

1. TO PROMOTE TRANSPARENCY, TRUST, AND INTEGRITY IN THE VOLUNTARY CARBON MARKET, COUNTRIES SHOULD:

1A. REGULATE THE VOLUNTARY CARBON MARKET TO PROVIDE GUARDRAILS AND ENHANCE CREDIBILITY

The Voluntary Carbon Market (VCM) does not have to operate independent of standardization or even regulatory frameworks, and there are calls to create unified, standardized VCMs that function in specific areas or industries.[104] Standardizing VCMs could improve their credibility and transparency among participants and critics. Carbon credit purchasers need to be sure that they are genuinely offsetting their emissions, and carbon credit sellers need to be confident in the product that they are offering. Standardization would also potentially alleviate some of the criticisms about the VCMs' credibility related to greenwashing and credits failing to mitigate climate change as claimed.

VCM regulations do not have to mandate market participation. Some countries have chosen to create a regulated market that is still voluntary but has guardrails to establish integrity in the marketplace. For example, **Australia** developed the Australian Carbon Credit Unit (ACCU) Scheme to encourage GHG reduction projects, including waste reduction projects.[105] Project proponents register their project with the Australian National Registry of Emission Units, which then tracks the ACCU transfers. Project proponents can either sell their ACCUs to the Australian Government through a carbon abatement contract or to individuals or businesses trying to offset their emissions through the voluntary carbon market.[106] Once the project proponent sells the ACCU on the carbon market, it must cancel it so it is no longer tradeable, and the purchaser can credit it toward their emission reductions.[107]

Additionally in **Ecuador**, the government has chosen an innovative approach, called the Zero Carbon Program (*Programa Ecuador Carbono Cero*, (PECC)), to incentivize emissions reductions and help entities achieve carbon neutrality.[108] The PECC program is a voluntary verification program that promotes emissions reductions through three stages: (1) Quantifying Emissions, (2) Reducing Emissions, and (3) Carbon Neutrality through Compensation. The PECC's carbon footprint neutrality component incorporates offset elements like a voluntary carbon market within a more structured framework that includes guardrails to bolster the credibility and integrity of emissions reductions.[109] It resembles a regulated voluntary carbon market because while participation is voluntary, the government has established a centralized offset registry that it regulates.

Although the compensation stage resembles a VCM because it allows entities to elect to pay for emissions reductions that they are unable to achieve on their own, it is distinguishable from a VCM in two significant ways. First, while the regulations refer to offset emissions units as Emission Compensation Units (*Unidades de compensación de emisiones* (UCEs)) that are equal to one ton of CO2 equivalents,[110] the guidance makes clear that the UCEs are not tradeable or marketable as a commodity between entities, which distinguishes them from carbon credits or offsets in a carbon market.[111]

Second, the PECC's requirements for offset projects are more robust than a traditional voluntary carbon market. For instance, the program requires "implementers," or those who undertake projects to reduce GHG emissions, to include co-benefits in their projects that promote at least one other environmental, social, or cultural improvement beyond the project's emissions reductions.[112] The regulations include a non-exhaustive

list of co-benefits, which for food recovery organizations may include working with local communities and groups experiencing an unmet need; supporting poverty reduction and community improvement; and empowering women by increasing equality in decision-making, or implementing other efforts to reduce gender disparities.[113] The PECC regulations also outline that all projects in the Offset Portfolio must ensure that food production did not occur on land deforested after 2018 and must mitigate and account for other potential indirect effects of the project that could increase GHG emissions.[114]

While Ecuador's government is still developing and finalizing technical guidance to implement the PECC, the regulations make clear that the government will play an important role in ensuring transparency and boosting credibility in the program.[115]

1B. IN LIEU OF REGULATING, ADOPT PROGRAMS THAT PROMOTE A CREDIBLE VOLUNTARY CARBON MARKET

Countries that want to avoid regulation of the VCM can still take action to improve the market's credibility by endorsing a carbon market standard (or set of standards) and providing guidance for participating in a VCM. Governments can make it more likely that entities will participate in a high-integrity VCM if they help set a baseline for what standards entities should use for credible market participation, thereby clarifying the starting place (and process) for entering the market and shedding some light on an otherwise confusing and opaque process. Companies might be hesitant to participate in the VCM until their government signals that a particular standard is appropriate, or companies might avoid the VCM out of fear that future emissions regulations may negate their carbon crediting investments. When countries endorse a highly rated carbon crediting standard, they streamline the process for companies and help build trust in the carbon credits offered in the VCM.

As more countries endorse a particular standard or set of standards, momentum would likely build behind it, and the standard should receive more attention and potentially gain credibility among companies, investors, and consumers. For example, as the **Article 6 Paris Agreement Crediting Mechanism** (PACM) continues to develop in the near term, countries and companies may look to VCM standards and certifications that align with the PACM, increasing demand and raising the quality floor to the PACM level.

Private standards are also emerging to ensure integrity and credibility in the market while still allowing for voluntary participation. For example, the **Integrity Council for the Voluntary Carbon Market** has developed the Core Carbon Principles (CCP) and the accompanying Assessment Framework to offer an example of standardization for VCMs.[116] The CCP assesses carbon crediting programs on governance, emissions impact, and sustainable development.[117] Carbon-crediting programs apply to receive a CCP-eligible certification, and programs with methodologies that meet the Assessment Framework criteria receive the certification and use the CCP-Eligible label.

The Integrity Council also assesses the categories of carbon credits under the CCP-Eligible program, and credits that align with the Assessment Framework earn the CCP-approved tag for the program to use.[118] The intention is for the CCP label to offer carbon credit buyers a recognizable way to differentiate high integrity projects with real, additional, quantifiable emissions reductions from questionable projects that exaggerate emission reductions.[119] The CCP label is voluntary and carbon credit programs choose to apply for the certification. To include transparency in their approach, the Integrity Council for the Voluntary Carbon Market used a public consultation process for their CCP proposals that mimicked a public notice and comment regulatory process.[120] Countries could adopt a similar practice for stakeholder input if they choose to implement a regulated voluntary carbon market. Alternatively, countries could incorporate the CCP Assessment Framework into their regulations as a floor for criteria that carbon crediting projects must meet.

Standards are also developing on the demand side of the market. The **Voluntary Carbon Markets Integrity Initiative** (VCMI) created a VCMI Claims Code of Practice that provides evidence-based guidance for companies on how to use carbon credits as part of their decarbonization transition and make credible climate claims related to their market participation.[121] VCMI also offers support to countries looking to engage in VCMs with confidence as part of their NDCs or other climate commitments through the VCMI VCM Access Strategy Toolkit.[122] Countries could incorporate standards like the VCMI Claims Code of Practice into emissions reporting regulations or into regulations that govern how companies may use carbon credits to offset their carbon tax liability.

Endorsing specific standards and high integrity carbon credits is even more important when carbon credits are used to offset an entity's legal obligations. While VCMs are generally unregulated by governments, some countries allow VCM credits to offset liability under other carbon pricing mechanisms. For example, **South Africa** and **Canada** authorize the use of carbon credits from approved carbon crediting standards for carbon tax compliance purposes.[123] **Mexico** permits regulated emitters to use certified emissions reductions from Mexican projects and carbon credits from MÉXICO2, the country's voluntary carbon credit exchange, to offset their carbon tax liability, and the **state of Querétaro** has implemented an Emissions Offsetting System and a Low Carbon Seal (*Sello de Bajo Carbono*) to allow carbon offsets (such as purchasing carbon credits from food banks) to reduce carbon tax liability at the state level in Mexico.[124]

On the one hand, allowing carbon credits to offset carbon tax liability might defeat the purpose of the tax by minimizing the deterrence factor of the policy and effectively minimizing the burden on companies, potentially adding to the problem rather than addressing it. On the other hand, allowing regulated entities to use carbon credits to offset their tax liability may reduce resistance from the regulated entities and increase the likelihood of success for the carbon tax policy. Setting standards for how carbon credits can offset an entity's tax liability could also increase demand for higher-quality carbon credits and promote a credible VCM.

Carbon Tax Policies Should Include Emissions from Wasted Food

A carbon tax levies a price on carbon consumption (generally fossil fuels), and governments collect the tax from emitters as set forth in the law or implementing regulation. While the name references carbon, a carbon tax can apply to other types of greenhouse gas emissions, like methane emissions from landfills, agriculture, or industry.[125]

Carbon taxes vary in price and scope globally. There are thirty-nine countries with carbon taxes in effect at the national or subnational level, including Finland, Sweden, Mexico, Argentina, South Africa, Columbia, Chile, Japan, Norway, Ukraine, France, United Kingdom, Ireland, Iceland, Latvia, Portugal, Canada, and Uruguay.[126]

Carbon taxes do not typically target food waste-related emissions, and there is an opportunity for carbon tax policies to expand their scope to include methane emissions from food waste. The policies could specifically include language mentioning or directing a certain percentage of the carbon tax revenues toward food waste deterrence projects that holistically address the social, environmental, and economic impacts of FLW. Ensuring that carbon tax revenue funds food waste deterrence projects that keep food out of landfills is one way that additional funding could be directed to food banks to bolster their infrastructure and support their methane reducing activities (i.e., food donation that diverts food from landfills).

2. TO SUPPORT FOOD RECOVERY ORGANIZATIONS AIMING TO ENTER CARBON MARKETS, AND MAKE IT WORTHWHILE FOR ORGANIZATIONS WITH LIMITED RESOURCES TO PARTICIPATE, COUNTRIES SHOULD:

PROVIDE GRANTS AND OTHER FINANCIAL SUPPORTS TO REDUCE THE FINANCIAL AND ADMINISTRATIVE BURDENS OF ENTERING THE CARBON MARKET

Collecting data and verifying projects for the VCM costs money upfront, often before a food recovery organization can be sure that someone will buy their carbon credits at a worthwhile cost. Moreover, most carbon credit standards require third-party auditors to verify the offset project's emissions reductions, which would also add to the costs borne by a participating entity. Administering emission credit sales and tracking emissions reductions also requires dedicated resources from the food bank, including possible investments in technology. These added costs can be particularly difficult for nonprofit entities, such as food banks and food recovery organizations, who are operating with limited resources.

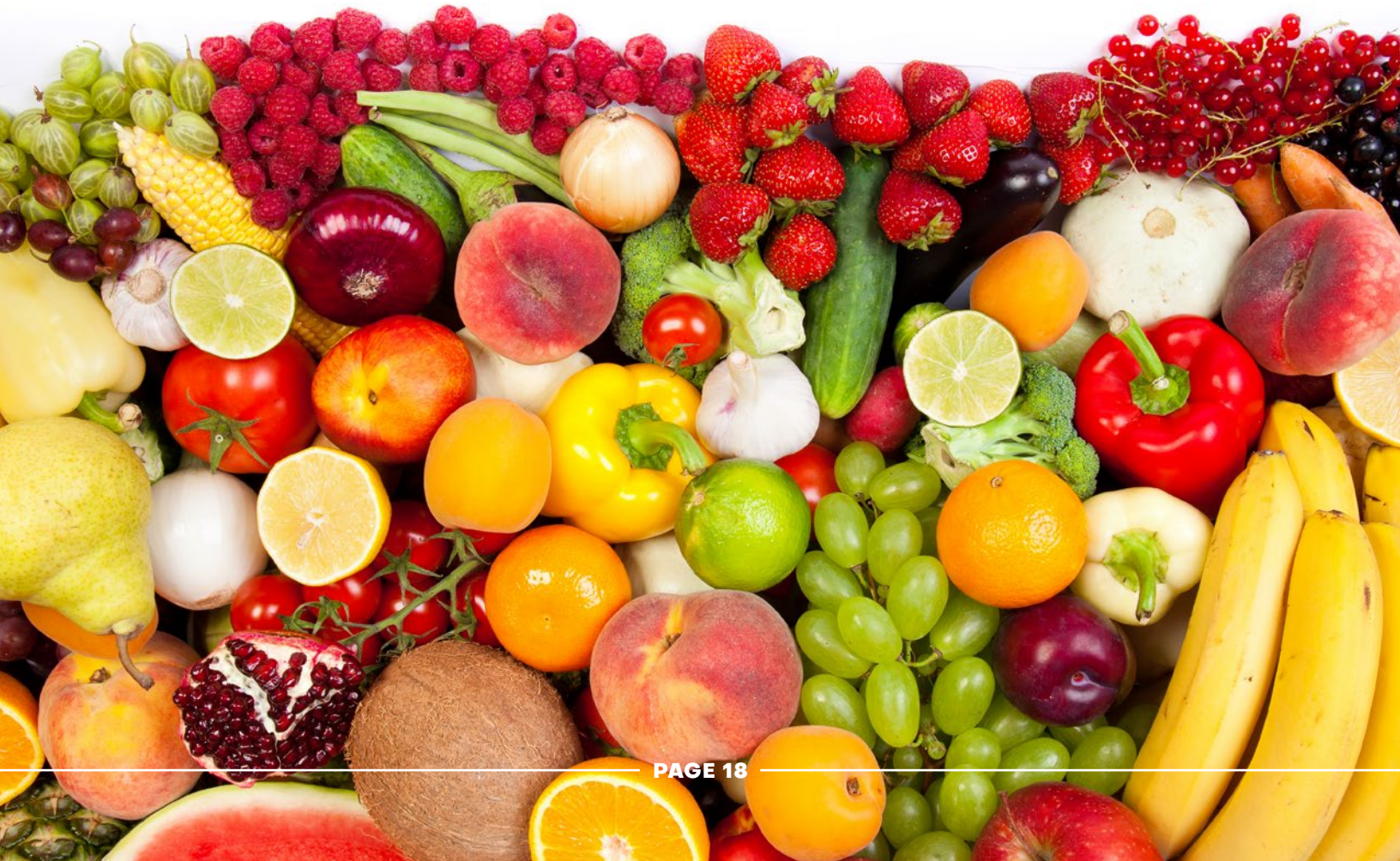
While food banks would likely have to pay most costs on the front end of entering the market, the increased revenues from the carbon credit sales could mitigate the costs if the price for the emission credits is high enough and the food bank has the capacity to offer and sell enough credits to cover their upfront costs, but whether the food banks will recoup their costs and benefit from participating in the carbon market sales is uncertain. Food banks will need to consider if participation in the emissions credit or offset market is a worthwhile investment by comparing the costs of data collection, monitoring, and verification requirements with the expected price and sales of the offset credit, while balancing the risk that the credits do not sell as expected.

Considering the significant resource commitments food banks must make to enter the carbon market, food banks and food recovery organizations may be slow to leverage carbon markets. But given the high impact of reducing methane emissions in the short term and the array of co-benefits that accompany food donation, policymakers have a strong incentive to want to promote food bank participation in carbon markets. Leveraging carbon credit revenue can be a way to increase the scale and availability of food donation, beyond what the nonprofit sector or government has the resources to support directly.

To support food bank participation in carbon markets, policymakers could provide grants or other financial assistance to food recovery organizations interested in participating in carbon markets. Grants and financial assistance could help offset some of the food bank's startup costs, including any technology improvements and data management infrastructure. Such an upfront investment from government could help unlock sustainable funding to support food recovery organizations, as these organizations could use funds from the sale of carbon credits to support ongoing food recovery operations and bolster the community's capacity to respond to hunger emergencies — potentially reducing the amount of resources that the government would need to allocate toward fighting hunger in the longer term.

CONCLUSION

There is an opportunity for food recovery organizations to leverage carbon credit sales as an additional revenue stream to expand their capacity to reduce methane emissions and increase food security, but it is not without its challenges. Entering and participating in carbon markets can require considerable resources for quantifying, verifying, and monitoring emission reductions. Further developing a project can be risky because the costs are mostly upfront, and it is unclear if there will be demand for the credits. The carbon credits need to be priced to sell, while being high enough to cover the food recovery project's expected costs and still provide a worthwhile investment in the food recovery's methane emission reducing activities. While the voluntary carbon market has credibility and transparency issues, countries can support high-integrity carbon markets with regulations and guidance related to carbon crediting programs and standards. Additionally, government grants and incentives could help food recovery organizations enter the market and would provide the government an opportunity to support a climate mitigation project with economic, environmental, and social benefits.



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