Economic Instruments for Methane Reduction & Improved Food Security in Mexico

The Global Food Banking Network®

FLPC FOOD LAW and POLICY CLINIC HARVARD LAW SCHOOL

Global Methane Hub

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About The Global FoodBanking Network

Food banking offers a solution to both chronic hunger and the climate crisis. GFN works with partners in over 50 countries to recover and redirect food to those who need it. In 2023, our Network provided food to more than 40 million people, reducing food waste and creating healthy, resilient communities. We help the food system function as it should: *nourishing people and the planet together*. Learn more at foodbanking.org.

About the Harvard Law School Food Law and Policy Clinic

Since 2010, the Harvard Law School Food Law and Policy Clinic (FLPC) has served partner organizations and communities in the U.S. and around the world by providing guidance on cutting-edge food system issues, while engaging law students in the practice of food law and policy. FLPC is committed to advancing a cross-sector, multi-disciplinary and inclusive approach to its work, building partnerships with academic institutions, government agencies, non-profit organizations, private sector actors, and civil society with expertise in public health, the environment, and the economy. FLPC's work focuses on increasing access to nutritious foods, addressing the climate-related impacts of food and agricultural systems, reducing waste of healthy, wholesome food, and promoting food system justice. For more information, visit chlpi.org/food-law-and-policy.

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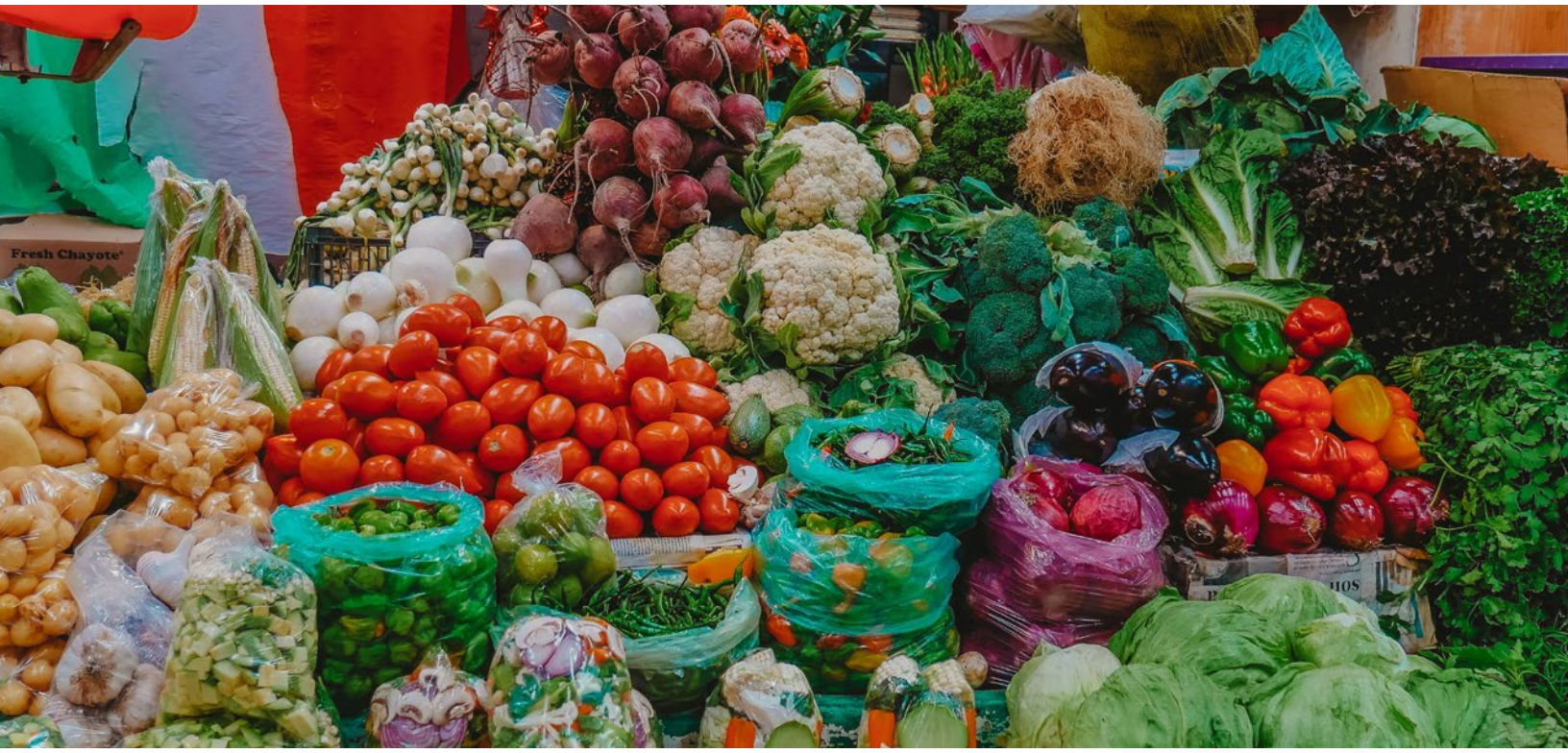
TABLE OF CONTENTS



INTRODUCTION

Communities and governments across the globe are currently engaging in conversations about ways to mitigate the impacts of climate change and increase resilience in the face of its effects. Strategies have emerged that include a wide range of practices, from endeavors like planting trees and vegetation for carbon sequestration to technological innovations like carbon capture and storage. Similarly, resilience strategies also include a range of approaches from ideas like creating sustainable infrastructure for adapting to extreme environments to full-scale efforts to move entire communities from places that are no longer habitable because of climate impacts. Food lies at the nexus of climate change mitigation and resilience, and climate strategies must include the food system to be effective. For example, ensuring that safe, nutritious food is consumed by humans keeps it out of landfills — where it decomposes and contributes to emissions of greenhouse gases, specifically methane. When people have enough food to eat, they do not have to worry about meeting a basic need, and their communities become stronger and more resilient.

To explore the role of food recovery in mitigating climate change and increasing community resilience, The Global FoodBanking Network (GFN) and the Harvard Law School Food Law and Policy Clinic (FLPC), with funding from the Global Methane Hub (GMH), examined a set of key laws and policies in Mexico that could support food recovery. While a broad constellation of polices can impact food donation and recovery, the research for this report focused on a selection of policies that use economic instruments — specifically incentives or penalties — such as carbon taxes;

carbon markets or greenhouse gas offset mechanisms; financial penalties, such as food waste deterrence policies like organic waste bans or food donation requirements; and other incentives like tax benefits to enhance food recovery. This report provides individuals, policymakers, and organizations interested in mitigating greenhouse gas emissions through food recovery with information about the relevant policies in Mexico that might help further their goals, as well as opportunities for further progress.

To help confront the most urgent and widespread legal and policy questions surrounding food recovery and donation, FLPC and GFN partnered to create The Global Food Donation Policy Atlas (Atlas Project).[1] The Atlas Project aims to identify and explain national laws relating to food donation, analyze the most common legal barriers to promoting increased food donation, and share best practices and recommendations for overcoming these barriers. The Atlas Project is mapping the laws and policies affecting food donations in countries around the world and, in 2020, it issued a legal guide detailing Mexico's relevant food donation laws and policies.[2] While the Atlas Project's Mexico Legal Guide covers an array of laws impacting food donation in Mexico, from food safety to liability protections for food donations, this report focuses only on policies that use economic instruments to either deter food waste — such as food waste deterrence laws – or to incentivize food recovery or donation — such as tax incentives or carbon offsets.

The remainder of this paper describes Mexico's approach to relevant greenhouse gas emissions reduction policies and discusses the potential role for food donations to help reduce methane emissions. It begins with a summary of the action opportunities presented throughout the paper, followed by background on methane emissions, food loss and waste, and food recovery. The remaining sections evaluate Mexico's relevant policy landscape and explore the potential for economic policy opportunities to support food donation and food waste reduction, including through carbon taxes, carbon offsets, food waste deterrence laws, and tax incentives to promote food donation**.** Each section ends with examples of action opportunities that policymakers can take to support food waste reduction and thus reduce emissions.

While this paper primarily focuses on federal policies, the research also revealed some significant policy developments at the state level that are included in the following sections as examples of potential state and federal opportunities for increasing food donation to reduce methane emissions. In addition, the carbon market space is actively developing, and there is new information available every day. Therefore, continued research and understanding of the issues outlined in the paper is encouraged.

The research and recommendations below were reviewed by leadership of the Mexican Food Banking Network (BAMX) but have not otherwise been vetted with in-country stakeholders. They were also reviewed by the *Quantifying and Growing Methane Reductions through Community-based Food Recovery and Redistribution Project's* advisory group. The findings, conclusions, and recommendations presented in this report are those of GFN and FLPC alone.

ACTION OPPORTUNITIES IN BRIEF

The action opportunities presented in this paper and summarized in brief below provide a starting point for policymakers to build on to strengthen Mexico's existing methane emissions policies by incorporating an increased focus on facilitating food donation. Policies that support food recovery and redistribution not only address social concerns such as poverty and high rates of food insecurity, but they also mitigate methane emissions by reducing the amount of organic waste decomposing in landfills. Across all opportunities, it is essential to include food banks in the policy conversation from the start to ensure effective policy implementation and increase food donations, thereby maximizing methane emissions reductions.

In addition to the action opportunities identified herein, policymakers should consider additional opportunities to advance food donation and reduce methane emissions from food waste. They should partner with and include voices from food banks and other organizations with the mission to reduce food loss and waste and increase food donation (collectively referred to as "food recovery organizations"), as well as food donors.

The paper suggests action opportunities in the following areas:

Carbon Tax

To improve the carbon tax framework and enhance methane emissions reductions, policymakers in Mexico could:

- *Revise the Law on the Special Tax on Production and Services (Ley del Impuesto Especial Sobre Producción y Servicios, LIEPS) to require the executive branch to use the carbon tax revenues for environmental purposes and climate adaptation projects rather than collecting them in the general fund.*
- *Add language in federal and state carbon tax policies directing a certain percentage of carbon tax revenues toward food waste deterrence projects that holistically address the social, environmental, and economic impacts of food loss and waste*.

  Ensuring that carbon tax revenue funds food waste reduction projects is one way that additional funding could be directed to food banks to bolster their infrastructure and support their methane-reducing activities.
- *Replicate strong state-level carbon tax policies.*

  For example, Queretaro has implemented a high carbon price with the ability to reduce tax liability through carbon offsets (such as purchasing carbon credits from food banks).

Carbon Markets

To support food banks' participation in carbon markets, policymakers could:

- *Provide grants and other financial support to reduce the fiscal and administrative burdens of entering the carbon market.*

  Considering the high costs around project development, data collection, monitoring, and third-party verification, policymakers could provide grants or other financial assistance to

food banks and other food recovery organizations interested in participating in carbon markets.

- *Include food banks in the stakeholder outreach when developing regulations for compliance markets.*

  Food banks have invaluable experience and insight on how to manage food recovery strategies. As Mexico further develops its carbon market policies to meet its emissions reduction goals, policymakers should engage food banks in stakeholder outreach to learn how to use food donation as an emissions reduction tool.

Methane Regulation

To bolster the methane regulations policymakers could:

- *Include the waste sector in methane regulations.*

  Regulating methane emissions from the waste sector, including landfill emissions, has the added benefit of incentivizing reductions in food waste disposal because food waste is a key methane emitter in landfills.

- *Codify the commitments in the Global Methane Pledge and the Declaration on Reducing Methane from Organic Waste and incentivize using food donations to help meet methane emission reduction targets.*

Food Waste Deterrence & Other Policies to Promote Food Donation

To promote food recovery activities and deter food waste from emitting methane in landfills, policymakers in Mexico could:

- *Reform the General Law for the Prevention and Comprehensive Management of Waste to prohibit food waste generators from disposing of their food waste, whether edible or inedible, in landfills.*

  Prohibiting food waste in landfills or increasing the cost of food waste disposal encourages food waste generators to divert food to its most beneficial use — feeding people.

- *Support municipalities in calculating appropriate surcharges and taxes to impose on businesses in addition to landfill tipping fees for organic waste disposal.*

  Ensuring that waste disposers bear the burden of paying the full cost of disposal eases pressure on current waste management systems while providing a source of funding to improve or expand food recovery or organic waste separation, collection, or recycling infrastructure.

- *Issue regulations on the General Law on Adequate and Sustainable Food that address compliance and enforcement.*

  The law prohibits commercial establishments from discarding edible food, but it says little about compliance or enforcement of the prohibition. Compliance can be encouraged through outreach to facilitate private sector cooperation and providing guidance on how businesses must comply. Enforcement plays a critical role in ensuring the efficacy of policies that aim to reduce or eliminate the disposal of food in landfills. The regulations

could further detail compliance and enforcement mechanisms related to the prohibition on edible food disposal.

To improve the food donation policy framework to increase food donations to food banks and reduce methane emissions from landfills, policymakers in Mexico could:

- *Issue regulations on the General Law on Adequate and Sustainable Food that direct commercial establishments to prevent and reduce food waste in accordance with the food recovery hierarchy.*

  The food recovery hierarchy, published by the Food and Agricultural Organization (FAO) of the United Nations, is a food-use-not-waste hierarchy that visually demonstrates the best environmental practices for approaching food waste reduction from "most preferred" to "least preferred," prioritizing the prevention and reduction of food waste, followed by the redistribution of food safe for human consumption, then moving to the repurposing and recycling of food unsafe for human consumption.[3] The regulations could explicitly require commercial establishments to donate surplus, edible food to the maximum extent possible before taking other actions lower in the hierarchy.

- *Enact new and strengthen existing state level food donation laws.*

  States can act by enacting laws requiring the donation of edible surplus food in states that do not currently have food donation requirements or by shifting to requiring donation in states with existing laws that encourage (but do not mandate) food donation. States with existing food donation mandates could strengthen compliance and enforcement through implementation reforms.

To improve the relevant tax incentives and encourage more methane-mitigating food donations, policymakers could:

- *Increase the existing tax deductions for food donations.*

  The existing tax deduction could be increased from the current 5% of the market value of the food donation to 50-100% of the market value. The incentive also could be expanded to allow donors to claim deductions for those activities associated with the storage, transportation, and delivery of donated food to help offset donation expenses.

- *Amend federal tax law to add a tax credit for food donations made to authorized donees and other food recovery organizations.*

  Adding a tax credit would particularly help smaller donors that do not have sufficient income to benefit from Mexico's tax deductions.

- *Promote food donation by offering state level incentives in states that do not have such incentives.*

  States could model new state level tax incentives on the one offered in Nuevo León, which allows food donors to deduct 50-100% of the donated food's value from their state payroll tax liability.

To enhance food recovery from agricultural producers, policymakers in Mexico could:

- *Advance low-cost policies to increase agricultural food recovery and donation, such as enhanced tax incentives.*

  To ensure that agricultural producers are sufficiently incentivized to donate crops and other products, the federal government could provide an enhanced tax deduction for the expenses incurred in the activities associated with the harvest, storage, transportation, and delivery of donated food.

- *Support existing food recovery operations, such as those established and operated by food banks, with government grants and investments to scale up food recovery from the agricultural sector.*

  Such investments could provide the additional warehouse space, cold storage, transportation, or staffing needed to coordinate with local producers.

- *Foster collaboration with food banks, government agencies, agricultural producers, and academic institutions to develop further data to understand the existing levels of food loss, food recovery, and food redistribution from the agricultural sector.*

  Robust data can lead to stronger policies targeting the recovery of fresh foods from agricultural producers.

METHODOLOGY

To obtain the necessary data for this paper, the Harvard Law School Food Law and Policy Clinic (FLPC):

- Reviewed the relevant existing FLPC materials, such as the Global Food Donation Policy Atlas legal and policy briefs.
- Conducted a high-level literature review to identify and understand the scope of emissions in Mexico, Mexico's approach to greenhouse gas emissions reduction policies, and the potential role of food banks in using food donations to help reduce methane emissions.
- Scanned the following databases to identify greenhouse emissions reduction policies and economic instruments in Mexico: CarbonPulse, Elsevier, Science Direct, Westlaw Edge, LexisNexis, HeinOnline, JStor, Social Science Research Network, ResearchGate, Harvard University HOLLIS Library Catalogue, Taylor Francis Online, ProQuest, and Wiley Online Library.

TERMINOLOGY

This section provides an understanding of basic terminology used throughout the paper.

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 incorporates the cost of emissions into 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) voluntary carbon markets (VCM).[4] 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. Voluntary carbon markets (VCM) do not require participation from specific emitters but rather enable various stakeholders to participate voluntarily and offset their emissions based on verifiable standards.

Typically, in both compliance and voluntary markets, one carbon credit represents one metric ton of carbon dioxide equivalent that the relevant project either removes from the atmosphere or ensures are avoided altogether, such as when edible food is diverted from the landfill to the food bank for human consumption and methane emissions are avoided.[5]

What is a carbon tax?

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.[6] Carbon taxes vary in price and, if set too low, may not cover the true cost of the negative externalities from the emissions.[7] The International Monetary Fund has posited that the world needs to implement a global carbon tax of about USD 75/ton of CO2 by 2030 — with plans to increase the rate after 2030 — if the globe is to maintain temperature rises below 2 degrees Celsius.[8]

What is a compliance carbon market?

Under an ETS, or compliance carbon market, the governing body establishes a total cap on emissions. It then issues the regulated entities (emitters) carbon credits (like a permit) that are also limited to align with the total cap in emissions. There are a set number of permits determined by the governing body of an ETS. Regulated entities that wish to exceed their emissions cap must purchase (trade) permits from other regulated bodies that have available credits/permits or otherwise risk a fine for noncompliance. The carbon price in an ETS changes according to the market demand for emissions.[9]

What is a voluntary carbon market (VCM)?

The VCM is a voluntary market that targets governments, private investors, nongovernmental organizations, and businesses and enables them to purchase carbon offsets to offset their emissions. Numerous standards apply to VCMs, depending on the project targets and size, such as Verra's Verified Carbon Standard (VCS) Program,[10] the Gold Standard,[11] and Plan Vivo.[12] Projects developed under the standards should meet methodology requirements. For example, as of July 2023, the VCS Program has finalized their Verified Carbon Standard Methodology for Reducing Food Loss and Waste, which applies to activities that keep food in the human supply chain and out of landfills.[13] There is currently no global standardization for VCMs. There is potential to regulate the VCM that would not mandate participation but would instead provide guardrails to ensure integrity in the marketplace.

WHY TARGET METHANE?

Methane is the world's second-largest contributor to global warming after carbon dioxide, contributing 20-30% of the global climate change over the last 200 years, and as mentioned above, methane emissions from landfills alone are expected to increase by about 70% as the population increases through 2050.[14] Although carbon dioxide is more abundant than methane in the atmosphere, a single molecule of methane more effectively traps heat than a single molecule of carbon dioxide. Methane traps over 80 times more heat than carbon dioxide over the first twenty-year period, making it a much more concerning climate pollutant in the short-term.[15]

But the lifetime of a methane molecule is shorter than a carbon dioxide molecule because natural chemical processes scrub methane out of the atmosphere more quickly than carbon dioxide. Therefore, if methane emissions were to decline and the natural chemical scrubbing of methane maintained, atmospheric methane could decrease dramatically in just 10 years.[16] Decreasing the amount of methane put into the atmosphere could have a significant and nearly immediate impact on reducing the near-term effects of climate change and should contribute to keeping global temperature change below 2 degrees Celsius.[17] Meeting the below-2-degrees-Celsius target will be challenging without incorporating methane reduction strategies.

Food waste that decomposes in landfills is a significant source of methane, and diverting edible food from landfills through food donation is a powerful lever for reducing methane emissions. As mentioned above, FLW emissions accounted for 8-10% of global anthropogenic greenhouse gas emissions (carbon dioxide, methane, and nitrous oxide) between 2010 and 2016.[18] Using baseline data from 2015, methane emissions from municipal solid waste management are predicted to nearly double by 2050.[19] Significant reductions in methane emissions can be achieved through improved landfill management.[20] Assuming it is possible to increase infrastructure to source separate, recycle, and implement waste-to-energy recovery across the globe, including a prohibition on sending organic waste to landfills in the next 20 years, the potential exists to reduce 2050 baseline methane emissions by 80%.[21]

Redirecting edible food so it avoids landfills and instead feeds hungry people has the co-benefits of mitigating methane emissions' contribution to the rise in global temperature and reducing

food insecurity. As policymakers are becoming increasingly aware of methane's potency and role in climate change, the amount of methane emissions caused by landfills, and the potential opportunities to use economic policies to divert food waste from landfills, governments are progressively enacting laws and regulations requiring organic waste diversion, imposing financial penalties for wasting food, or mandating the donation of edible, surplus food.[22] Food banks play a critical role in facilitating increases in food donation that result from such policies.

Scope of Emissions in Mexico

While Mexico only contributes 1-2% of global GHG emissions, it is the second largest GHG emitter in Latin America.[23] Mexico's emissions are primarily from the energy and transportation sectors, but agriculture and waste are the third- and fifth-biggest contributors to Mexico's emissions, respectively.[24] The food waste that ends up in landfills is included in the waste category of emissions. The research has not revealed any data that isolates methane emissions from FLW in Mexico, but satellite data from Mumbai, India, and Buenos Aires, Argentina, indicates that emissions from organic waste in landfills account for more than 25% of their total urban emissions.[25]

2021 Mexico Greenhouse Gas Emissions[26]

	Carbon	Methane	Total GHG[27]
Waste	Not available	47.3 Mt CO_2e	49.3 Mt CO_2e
Agriculture	Not available	61.8 Mt CO_2e	99.3 Mt CO_2e
Energy	388 Mt CO_2e	39.1 Mt CO_2e	431 Mt CO_2e
Land-Use Change and Forestry	14.4 Mt CO_2e	760.7 kt CO_2e	16.0 Mt CO_2e
Industrial Processes	19.6 Mt CO_2e	92.3 kt CO_2e	43.3 Mt CO_2e
Total	422 Mt CO_2e	149 Mt CO_2e	639 Mt CO_2e

The above data from Climate Watch[28] demonstrates that waste is a key source of methane emissions in Mexico, much of which comes from food waste.[29]

FOOD LOSS & WASTE IS ALSO A SIGNIFICANT PROBLEM

Food loss and waste (FLW) is one of the most significant food system challenges, occurring at every stage of the supply chain and generating significant social, environmental, and economic costs.[30] 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 edible food each year, much of which ends up in landfills where it emits methane, a potent greenhouse gas with a concentrated global warming potential.[31] Aggregated data from 2007-2015 indicates that landfills are responsible for approximately 15% of global anthropogenic methane emissions, and research suggests that the contributions of landfills will likely increase as the global population increases.[32] Further, FLW emissions accounted for 8-10% of global anthropogenic greenhouse gas emissions between 2010 and 2016.[33]

At the same time, 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.[34] One out of every eleven people in the world experienced hunger in 2023.[35] 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.[36] The past decade has seen an exponential increase in attention toward preventing 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).[37] By redirecting food (that would otherwise be lost or wasted) to those who are hungry, the world can jointly resolve the related issues of FLW and hunger.

Mexico's FLW and Food Security Rates

Trends are similar in Mexico, where about 35% of food is lost or wasted, amounting to approximately 20.4 million tons annually.[38] Meanwhile, 7.8 million people were undernourished between 2019 and 2021, while roughly 32 million people (25% of the total population) experienced some level of food insecurity.[39]

FOOD RECOVERY IS A CRITICAL PART OF THE SOLUTION

Thoughtful public policies, including carbon pricing and other emissions reduction policies, can mitigate methane emissions while addressing the troubling mismatch between rates of food waste and rates of extreme hunger. Including food recovery in the policy framework is critical to the solution. Reducing food loss and waste 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. Additionally, diverting food from landfills mitigates methane emissions, making food donation an essential climate solution as well.

MEXICO'S COMMITMENT TO CLIMATE MITIGATION

This section describes the Paris Agreement that the parties at the United Nations Climate Change Conference (COP21) adopted in December 2015, the pathways that Article 6 of the Agreement opens for emissions trading between countries, and the requirements that Mexico must meet as a party to the Agreement, specifically related to the country's Nationally Determined Contributions (NDCs) toward the Agreement's climate mitigation goals.

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 as well as achieve and maintain net zero emissions by 2050.[40] 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 emission by about 33%.[41]

To achieve these goals, Article 4 of the Agreement requires signing countries to establish Nationally Determined Contributions as a pledge for decreased emissions targets and a commitment to pursue policies that will mitigate emissions.[42] NDCs contain information on the country's targets, policies, and measures for reducing emissions and often include information on the country's financial and technical needs to meet their goals. They are a way for countries to communicate their climate adaptation priorities and the support that they might need to achieve those priorities.[43] As of 2020, countries are supposed to submit new NDCs to the Secretariat of the United Nations Framework

Convention on Climate Change (UNFCC) every five years (following guidance from the Katowice climate package), and the subsequent NDCs must be more ambitious than the previous NDCs.[44]

Article 6 of the Agreement, which is described in more detail below, recognizes that it is likely impossible for countries to meet their NDCs entirely from publicly financed projects. It encourages parties to cooperate with each other to meet their NDCs and creates a framework for countries to use economic instruments to reduce the financial burden of ambitious emission mitigation targets.[45] Guidance emerged from COP26 in Glasgow that provided direction related to VCMs.[46]

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.[47] Furthermore, the guidance from COP26 expects that market-based cooperation activities between parties will positively contribute to sustainable development and poverty reduction.[48] The Agreement places renewed emphasis on the importance of activities delivering holistic benefits for climate mitigation and achievement of the United Nations Sustainable Development Goals.[49] Additionally, COP 28 established the Food Systems and Agriculture Agenda, formally recognizing that food system transformation is necessary to meet global climate goals and committing to develop policies and implementing practices that reduce FLW.[50] Activities supporting increased food donation are uniquely suited to meeting these goals.

While the Glasgow guidance was a good start in 2021, it took countries until COP29 in Baku, Azerbaijan, in 2024 to reach an agreement on standards for the Paris Agreement Crediting Mechanism (PACM) established under Article 6.4.[51] 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.[52] There is still work to do before the PACM is fully operational, which could take a year or more, but establishing the standards was hailed by the negotiators as significant progress at COP29.[53] The United Nations Development Program also created the National Carbon Registry (NCR) as open-source software that is accredited as a digital public good and will serve as a data management tool for carbon trading.[54] The NCR can integrate with other measurement, reporting, and verification systems to help countries advance carbon markets, setting and meeting even more ambitious NDC goals.[55]

Mexico's Nationally Determined Contributions

Mexico submitted an updated Nationally Determined Contributions to the UNFCC on November 17, 2022.[56] In Mexico's 2022 updated NDCs, the country recognizes the need to reduce economy-wide emissions of methane and other short-lived climate pollutants by 30% to meet the IPCC target of limiting global warming to 1.5 degrees. The 2022 NDCs replaced Mexico's 2020 NDCs that a Mexican court invalidated because they were less ambitious than the prior NDCs and in violation of the Paris Agreement and the General Law on Climate Change (*Ley General de Cambio Climático*, LGCC).[57]

According to Climate Action Tracker, Mexico's updated NDCs increased the business as usual (BAU) baseline, making the 2022 NDCs less ambitious than the 2016 targets and resulting in higher emissions levels, despite the appearance of increased targets.[58]

Mexico's 2022 NDCs also include food systems and food security as an adaptation and resilience area, illuminating the value of addressing climate impacts from the food system — such as methane emission from FLW — and the resulting co-benefit of contributing to food security in the country.[59] Specifically, the 2022 NDCs recognize food as a fundamental human right and commit to including climate change risks in investment plans for the food production value chain.[60] The NDCs also promote sustainable agricultural practices, including capturing and converting biogas from livestock waste to avoid methane emissions.[61]

ECONOMIC INSTRUMENTS IN MEXICO'S CLIMATE POLICY FRAMEWORK

This section describes the economic instruments that Mexico has adopted as part of its climate mitigation strategy, as well as the political developments that facilitated their adoption. It begins with an overview of the General Law on Climate Change and the political landscape that fostered the law's adoption, setting the foundation for these economic mechanisms. Then, it describes the Mexican carbon tax, before highlighting the details of the carbon markets — voluntary and compliance — currently active in the country.

The General Law on Climate Change (Ley General de Cambio Climático, LGCC)

The groundwork for Mexico's carbon pricing policies started in the late 1990s with early discussions around establishing an Emissions Trading System (ETS) in the country. In the early 2000s, the Fox Administration established an economic policy analysis group in the Secretariat of Environment and Natural Resources (*Secretaría de Medio Ambiente y Recursos Naturales*, SEMARNAT), the primary agency responsible for environmental regulation. Issues regarding carbon emissions became more front and center under the Calderón administration efforts to reform and address Mexico's state-dominated energy sector from 2006-2012.[62]

In 2012, at the end of the Calderón administration, the Mexican Congress passed the General Law on Climate Change (*Ley General de Cambio Climático*, LGCC), making it the first country in Latin America, and the second country in the world, to pass a comprehensive climate change law.[63] The LGCC provided the institutional framework and legal authorization to use carbon pricing policies to target emissions. It created the National Registry of Emissions (*Registro Nacional de Emisiones*, RENE) and established the now abolished Fund for Climate Change (*Fondo para el Cambio Climático*, FCC).[64] The FCC's purpose was to manage financial resources that would support Mexico's climate adaptation and mitigation activities.[65] The LGCC set an original target of 30% emissions reduction below BAU by 2020 and a 50% emissions reduction below 2000 levels by 2050.[66] The LGCC adoption in 2012 is notable because it predated the 2015 Paris Agreement and was passed in the absence of any concrete international climate mitigation obligations attributed to Mexico.[67] Scholars suggest that the Calderón Administration was interested in establishing Mexico as a global leader in climate change issues to boost the country's international reputation and attract the ever-growing pool of financial support for climate mitigation projects to the country.[68] Motivations for the law notwithstanding, the LGCC set the foundation for Mexico to implement a carbon tax and carbon markets.

Carbon Tax

The political economy in Mexico was ripe for the carbon tax because energy reforms to insulate the public electricity company limited revenues that the government could generate, and the carbon tax presented an opportunity to fill the gap.[69] At the beginning of the Peña Nieto Administration (late 2012-early 2013), officials at the Secretariat of Finance and Public Credit (*Secretaría de Hacienda y Crédito Público*, SHCP) worked with a private research institution in Mexico City, Centro Mario Molina (CMM), to investigate the carbon tax's feasibility.[70] The SHCP requested a green tax reform package from the CMM that could be a part of a larger energy reform that the administration could present to Congress.[71] The carbon tax was a part of the green tax reform package that CMM prepared. The proposal that the Peña Nieto Administration sent to Congress argued that the carbon tax would be easier to implement and more flexible than an ETS.[72]

At the end of 2013, because of tax and energy reforms fostered by the Peña Nieto Administration, the Mexican Congress amended the Law on the Special Tax on Production and Services (*Ley del Impuesto Especial Sobre Producción y Servicios*, LIEPS) to include the first national carbon tax in North America.[73] The carbon tax applies to the fossil fuels produced in and imported into Mexico, covering both industries and individuals. It exempts (or zero rates) natural gas because of fervent lobbying from industry, which limits the tax's effect considering Mexico generates most of its electricity from natural gas.[74] While excluding natural gas limits the tax's revenue generating capabilities, it also prevented increases in electricity costs at the consumer level.

Compliance with the carbon tax law began in January 2014. While the original proposal called for a higher carbon price (USD 5.30/CO2 ton), after extensive lobbying from industry stakeholders, the Mexican carbon tax passed with one of the lowest rates in the world (about USD 3.50/CO2 ton).[75] It continues to be one of the lowest rates today.[76] Because of the zero rates for natural gas, the tax is based on the fuel's carbon content relative to the carbon content of natural gas, and it does not tax the complete carbon content of the fossil fuel.[77] Commentary suggests that zero rating natural gas has incentivized many regulated entities to commit to natural gas as a main fuel source.[78] The tax rates coal lower than other fuels as well because of cost.[79] In March 2022, the government temporarily exempted gasoline and diesel from the tax through 2024.[80]

The carbon tax covers about 44% of Mexico's GHG emissions.[81] Mexico allows emitters to use certified emissions reductions (CERs) from Mexican projects and carbon credits from MÉXICO2, the country's voluntary carbon credit exchange (discussed below in voluntary carbon market section), to offset their carbon tax liability.

The government currently combines the carbon tax revenues with other federal tax revenues in a general fund rather than reserving them for other climate mitigation purposes.[82] In 2020, the government abolished the FCC, and it remains defunct after the Mexico Supreme Court denied advocates' request for an injunction to revive it.[83] Without the FCC, the potential opportunity to funnel carbon tax revenues to a fund dedicated to climate mitigation projects is nonexistent. If a future administration were to re-establish the FCC or create a similar climate-focused fund, it could revise the tax structure so the carbon tax would funnel support toward climate mitigation projects. For the time being, the carbon tax revenues fund general government operations, and the climate projects are subject to discretionary funding.[84]

There has also been carbon tax movement at the state level in Mexico. As of January 2025, the State of Mexico,[85] Durango,[86] Tamaulipas,[87] Querétaro,[88] Yucatan,[89] Zacatecas,[90] Guanajuato,[91] San Luis Potosí,[92] Colima,[93] and Morelos[94] have passed state carbon taxes. Jalisco is also considering adopting a carbon tax, following an emissions inventory from industry.[95] Jalisco was supposed to adopt the tax earlier, but there has been a delay because of the slow economic recovery following the COVID-19 pandemic's impacts in the state.[96]

Queretaro's carbon tax is the highest carbon price in Latin America, reaching USD 35/CO_2 ton at the end of July 2024.[97] Querétaro has implemented an Emissions Offsetting System and a Low Carbon Seal (*Sello de Bajo Carbono*), allowing most entities to use carbon offsets from registered projects to reduce up to 20% of their carbon tax liability, with an exception for large emitters of natural gas, which can use carbon offsets to reduce up to 80% of their carbon tax liability.[98] The Ministry of Sustainable Development approves the Registry of Offset Projects in the state.[99] The requirements for getting a project on the Registry include information such as the project details, emissions methodology and standards, and emission reduction calculations.[100] Colima's carbon tax, set to start in 2025, is the second-highest state-level carbon tax in Mexico (USD 26/ CO_2 ton), and entities can reduce up to 50% of their carbon tax liability with carbon offsets from certified projects.[101]

The funds from the state carbon taxes are used for programs that mitigate climate impact.[102] Mexico is the only country in the Latin American region (and one of the only countries in the world) with state-level carbon taxes.[103] At the end of 2024, Mexico City also passed a carbon tax, establishing carbon taxes at the municipal level.[104]

Action Opportunities

To improve the carbon tax framework and enhance methane emissions reductions, policymakers in Mexico could:

- *Revise the Law on the Special Tax on Production and Services (Ley del Impuesto Especial Sobre Producción y Servicios, LIEPS) to require the executive branch to use the carbon tax revenues for environmental purposes and climate adaptation projects rather than collecting them in the general fund.*

- *Add language in federal and state carbon tax policies directing a certain percentage of 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 (e.g., food donation that diverts food from landfills).

- *Replicate strong state-level carbon tax policies in states that do not currently impose carbon taxes.*

  For example, Querétaro has implemented a high carbon price with the ability to reduce tax liability with carbon offsets (such as purchasing carbon credits from food banks).[105]

Considering the slower pace of climate policy actions at the federal level, working to push forward state level policies could be more fruitful in the near term.

Carbon Markets

In addition to the carbon tax, Mexico also has both voluntary and compliance carbon markets that are ideal avenues for food banks to receive financial support for their food recovery efforts that actively reduce methane emissions.

Entering and participating in the carbon marketplace requires significant resource commitments from the food bank. While food banks will likely work with a consulting organization to facilitate their emissions reduction projects, the food banks must devote time and administrative resources to calculate the emissions reductions from their food donation activities to determine the market value of their credits. The consultants may also have fees that add to the food bank's costs. Administering carbon credit sales and tracking emissions reductions also requires dedicated resources from the food bank, including investments in technology. Still, the increased revenues from the carbon credit sales may surpass the costs enough for food banks to increase their methane-reducing activities and make participation in the market a worthwhile investment.

Considering the Paris Agreement requires emission reduction units to be real (represent real emissions reductions), verifiable by an independent auditor, quantifiable, additional, enforceable, and permanent, food banks that want to enter a credible carbon market would need to consider available methodologies to establish and confirm their proposed project provides high-quality carbon credits that could be available for countries to use towards their NDCs if they choose. Even if the NDCs are not an issue, the carbon market's environmental integrity is crucial for ensuring the market mechanisms are effective, and food banks should work with credible certification agencies to verify the project meets high quality standards.

Additionality is an essential criterion for confirming a project's credibility in the marketplace—without it the emissions reductions are illusory.[106] In other words, the entity purchasing the carbon credit cannot claim an offset if the emission reduction was already occurring or was going to occur anyway.[107] Critics of carbon markets often raise concerns with additionality, and potential carbon market participants should be prepared with data to support their project's additionality claims as a best practice.[108] Most credible VCM standards and methodologies incorporate additionality standards that align with Article 6's additionality requirement, and potential carbon market participants should review them.

Additionality is a particular concern for food recovery projects in both compliance markets and VCMs because the demonstration of it requires significant data collection and potential adjustments to food recovery processes. Food banks that want to participate in a high-quality carbon market should develop a project that demonstrates additionality by showing that emission reductions could not have occurred without the finance from the carbon credit. In other words, the food bank would satisfy additionality by showing that the food bank needs the carbon credit investments to overcome a financial, institutional, or social barrier to its food recovery activities, and the carbon credit investment would not be replacing one of the food bank's already existing funding streams

(such as grant funding).[109] One way to address additionality 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 that the food donations supported by grant funding or charitable donations are separate from any food donations funded by carbon credit investments. More research is necessary to support food banks in developing carbon market projects that meet additionality criteria.

Voluntary Carbon Market

The 2012 LGCC authorized the SEMARNAT to develop a voluntary carbon market at its discretion.[110] SEMARNAT worked with SIF ICAP, a joint venture between the Mexican Stock Exchange (BMV) and ICAP, a trader based in Britain, to create a voluntary carbon credit exchange called MÉXICO2, which provides carbon credits to companies that develop environmentally friendly projects in the country.[111] MÉXICO2 is a subsidiary of the BMV.[112] Regulated entities can use the carbon credits to offset costs from Mexico's carbon tax.[113] Carbon credits in the voluntary marketplace range in value (e.g., USD $2- USD 12/CO2 ton), depending on the project.[114] Carbon credit purchasers lean toward projects with a social impact. Food recovery projects that affect poverty, economic development, and food insecurity in conjunction with climate mitigation can help meet this demand for social impact carbon credit projects.

The Mexican Food Banking Network (BAMX) has been active in the voluntary carbon credit market since January 2023. BAMX is the first food banking organization in the world to earn carbon credits for food recovery activities, and the potential for the credit sales to bolster the food bank's financial infrastructure is positive. BAMX receives one carbon credit for every ton of food it recovers.[115] BAMX worked with a consultant to quantify the emissions saved from BAMX's food recovery activities (221,800 tons of CO_2 from January 1, 2021, through June 30, 2022) and then monetize the impact of food donation to translate the reduced emissions into carbon credits (221.800 credits).[116] EcoEngineers verified the project.[117]

In 2023, five BAMX 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.[118] 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.[119] 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.[120]

Mexico's Compliance Market – Emissions Trading System (ETS)

In 2018, Congress amended the LGCC to require the establishment of national ETS.[121] SEMARNAT developed the ETS legislative proposal with significant input from a variety of affected industry stakeholders.[122] While the stakeholder input facilitated the law's adoption, it also led to the amendment including provisions that prevented the ETS from affecting the regulated industries' competitiveness on the international market.[123] According to the law, SEMARNAT must develop the

ETS with private sector input. The private sector was also able to secure a three-year pilot period without economic effects on the regulated industries before the ETS could be implemented.[124] SEMARNAT promulgated regulations for the ETS in 2019. There are three phases in the ETS's development: (1) pilot, (2) transitional, and (3) operational.[125] SEMARNAT designed the program to avoid economic impacts to regulated entities, but non-compliant entities cannot carry over unused emission allowances to the later phases (as compliance entities can).[126] Non-compliant entities also receive fewer emission allowances in the operational phase.[127] SEMARNAT was supposed to publish rules for the operational phase in 2023, but it announced on August 14th of that year that the rules would be postponed until 2024.[128] The enforcement mechanisms in the rules will likely inform the ETS's effectiveness.[129]

Because BAMX has started participating in Mexico's VCM, it should be a manageable transition to earn approval for participation in the ETS. Since the rules are postponed, there is potential opportunity for stakeholders, like food banks, to engage with policymakers to ensure that their interests are considered in the process.

Action Opportunities

To support food banks' participation in carbon markets, policymakers could:

- *Provide grants and other financial support to reduce the financial and administrative burdens of entering the carbon market.*

  Considering the high costs around project development, data collection, monitoring, and third-party verification, policymakers could also provide grants or other financial assistance to food banks and other food recovery organizations interested in participating in carbon markets, to help offset some of their startup costs.

- *Include food banks in stakeholder outreach when developing regulations for compliance markets.*

  Food banks have invaluable experience and insight on how to manage food recovery strategies. As Mexico further develops its carbon market policies to meet its emissions reduction goals, policymakers should engage food banks in stakeholder outreach to learn how to use food donation as an emissions reduction tool.

METHANE REGULATION

Mexico's legal and regulatory framework for explicitly addressing methane emissions is limited in scope. In 2014, Mexico established a National Emissions Registry through its Regulations of the General Law on Climate Change (Reglamento de la Ley General de Cambio Climático en Materia del Registro Nacional de Emisiones) that requires waste sector entities emitting at least 25,000 metric tons CO_2 equivalent to report the direct and indirect GHG emissions related to their waste management activities, including methane emissions.[130] Since 2018, Mexico has regulated methane emissions across its oil and gas supply chain to help the country meet its trilateral agreement with the United States and Canada to reduce methane emissions 40-45% by 2025.[131] The regulations

solely target the oil and gas sector. Mexico is also a signatory to the 2021 Global Methane Pledge, which commits countries to reducing methane emissions by at least 30% by 2030.[132] In November 2024, Mexico joined 34 other countries as a signatory to the COP29 Declaration on Reducing Methane from Organic Waste, supporting the Global Methan Pledge and confirming a commitment to formulate NDC targets for reducing methane from organic waste.[133]

Some states have also pledged to decrease methane emissions. In September 2023, Querétaro and Yucatan signed onto the Subnational Methane Action Initiative (SMAI), a state-level commitment to reducing methane emissions that the U.S. state of California launched as a supplement to the Global Methane Pledge. The SMAI also includes signatories from the United States (California), South Africa (Gauteng), Brazil (Espirito Santo), Nigeria (Cross River State), and India (Delhi).[134]

Action Opportunities

To bolster methane regulations policymakers could:

- *Include the waste sector in methane regulations.*

  Considering the urgent need to mitigate rising global temperatures and the significant progress that reducing methane emissions makes toward that goal, there is room for Mexico to expand its methane regulation to cover emissions from the waste sector, such as landfill emissions. Regulating methane emissions from the waste sector beyond reporting requirements has the added benefit of incentivizing reductions in food waste disposal, as food waste is a key methane emitter in landfills. Landfills are capable of capturing methane emissions, and the technology exists to monitor methane emissions from landfill, such as surface emissions monitoring.[135]

- *Codify the commitments in the Global Methane Pledge and the Declaration on Reducing Methane from Organic Waste and incentivize using food donations to help meet methane emission reduction targets*.

FOOD WASTE DETERRENCE AND OTHER POLICIES TO PROMOTE FOOD DONATION

Food waste deterrence laws and policies are a body of laws and policies that aim to reduce food waste and increase food recovery by prohibiting food waste or making it financially burdensome.[136] Food waste deterrence laws may restrict or ban organic waste disposal, require food donation, penalize food waste, or use other policy designs.[137] In 2024, Mexico enacted a federal law prohibiting commercial establishments from discarding food that is fit for human consumption.[138] The General Law on Adequate and Sustainable Food (*Ley General de la Alimentación Adecuada y Sostenible*) recognizes the connection between food loss and waste and the right to food, and provides that all potential measures should be used to avoid food waste.[139] The law directs the head of the Federal Executive Power to issue regulations within 180 days (by October 15, 2024) and directs states to promote policies and actions to reduce food loss and waste, but regulations have not been issued yet.[140]

Even before the enactment of the General Law on Adequate and Sustainable Food, many states had exercised their powers to enact laws mandating altruistic food donation and prohibiting food waste.[141] These state-level policies, which are discussed below, prohibit the destruction of edible food and mandate food donation. While organic waste bans, food donation requirements, and financial repercussions for disposing or destroying food operate to disincentive food waste and increase food donation, a range of other economic policy levers can also be used in its place.

This section begins by delving into Mexico's current waste management landscape, focusing particularly on the disposal of organic and food waste. Also discussed are Mexico's state laws mandating the donation of surplus edible food. Tax policies can be strategically implemented to incentivize and offset the costs associated with food donation. Mexico's prevailing tax policies as related to food donation are discussed before narrowing the focus to discuss food recovery from agricultural producers, an issue with unique considerations distinct from those encountered with other actors in the food system.

Mexico's Waste Management Landscape and Organic Waste Disposal Policies

According to 2017 data, Mexico generates about 44 million tons of waste each year and this amount is expected to reach 65 million by 2030.[142] Nearly one-third of Mexico's waste is generated in the States of Mexico, Mexico City, and Jalisco.[143] According to the Secretariat for the Environment and Natural Resources, around 90% of all waste is sent to landfills (70%) or illegal dump sites (20%) while only 10% is recycled.[144] An estimated 46.42% of Mexico's waste is organic, with food waste accounting for 33.07% of this organic waste.[145] The Western and Central regions of Mexico generate the most organic waste, while the Northeast region generates the least organic waste.[146]

Mexico's waste is managed based on the waste stream and waste is classified as hazardous, special management, or solid waste. The 2003 General Law for the Prevention and Comprehensive Management of Waste (*Ley General para la Prevención y Gestión Integral de los Residuos, LGPGIR*) establishes this management framework as well as setting policies for waste prevention.[147] Under this framework, hazardous waste is managed at the federal level while states are generally responsible for special management waste streams, such as waste generated by entities producing more than 10 tons of waste per year. This includes: fishing, agricultural, poultry and livestock waste, and waste from large department stores or shopping centers.[148] Municipalities are responsible for solid waste management, such as household waste,[149] and waste from micro- and small generators, those generating less than 10 tons of waste per year.[150] The intent behind the LGPGIR is to establish an integrated approach to waste management, from generation to disposal, that maximizes environmental, economic, and social impacts across all of the efforts that are required for effective implementation of waste policy (e.g., financing, planning, administering, enforcing, monitoring, and evaluating).[151]

Despite the LGPGIR directing municipalities to incentivize waste reduction, facilitate the segregation

of waste, and implement economic instruments that promote integrated solid waste management, [152] these directives are not fully actualized. In Mexico, most cities do not impose fees for waste collection, transportation, or disposal.[153] While some jurisdictions, such as Mexico City (formerly the Federal District), mandate the separation of organic and inorganic waste, these requirements often fail to result in effective source separation as the practice is inconsistently utilized.[154] The collection equipment used is typically incapable of segregating organic waste,[155] resulting in segregated organic waste collection being available in only 144 of the more than 2,400 municipalities in the country.[156]

In 2007, the federal government launched a National Program for the Prevention and Management of Waste to increase the participation of states, municipalities, and the private sector in waste management.[157] The program's goals included — among others — reduced waste generation, improved source-separation, and increased recycling.[158] Strategies for achieving these goals included building new infrastructure (e.g., composting and waste to energy facilities) and updating legal and administrative frameworks.[159] According to 2020 data from the Secretariat of the Environment and Natural Resources (*Secretaría de Medio Ambiente y Recursos Naturales*) (SEMARNAT), Mexico has a total of 47 plants in 15 states whose sole purpose is to recycle both organic and inorganic waste.[160] Most infrastructure for waste valorization (such as separation, composting, and anaerobic digestion) is concentrated in Mexico City, the State of Mexico, and the State of Jalisco.[161] Mexico City has seven composting plants and one anaerobic digestion plant for the recycling of food waste.[162]

In early 2019, SEMARNAT released its National Vision toward a Sustainable Management: Zero Waste.[163] The aim of the plan is to transition from the existing waste management system to a circular economy model, foster the responsible use of natural resources, and promote sustainable development.[164] Under the plan, manufacturers, distributors, consumers, and other users now share responsibility for the management of special waste and solid waste with the government.[165]

One of the current challenges with implementing this plan is that Mexico's waste management is likely underfinanced.[166] This lack of sufficient financing impacts the capacity of Mexico's local governments to support source separation, food recovery, recycling, and food waste to energy projects as well as reduce the amount of organics send to landfills.[167] A report analyzing business opportunities for the Netherlands in Mexico's waste management sector recommended that Mexico implement a federal law requiring municipalities to collect fees for waste disposal.[168] Currently, most municipalities do not assess fees for waste collection, treatment, and disposal despite LGPGIR's suggestion that waste policies be designed to transfer the costs of disposal to the waste generator.[169] SEMARNAT has reported wide variations in the ways that local governments calculate the cost of disposal, with some failing to account for the costs of land leases for waste disposal sites or the depreciation and replacement of infrastructure for the collection, transportation, and processing of waste.[170]

The existing framework discussed above could be strengthened through policies that increase the cost of organic and food waste disposal. Imposing waste disposal fees that account for all waste disposal costs would not only support improved waste management but also deter disposal by making it more financially burdensome for waste generators to dispose of food and other organic

waste.[171] Waste disposal surcharges or landfill taxes can be implemented via levy fees, specific to organic matter or food waste, on entities or individuals for each unit (e.g., kilograms or liters) of trash they dispose.[172] These additional charges would be in addition to regular landfill tipping fees and are usually geared toward businesses.[173]

Pay-as-you-throw policies that charge entities, households, or individuals a fee for sending organic waste to landfills can also be used to support waste management and to deter disposal of food waste.[174] While numerous waste collection systems employ a flat rate, pay-as-you-throw policies charge individuals according to the quantity of waste they dispose.[175]

The General Law on Adequate and Sustainable Food provides the foundation for an even stronger policy by prohibiting commercial establishments from discarding food that is suitable for human consumption.[176] Regulations issued by the Federal Executive Power could strengthen the law by setting up enforcement mechanisms and providing guidance on how commercial establishments should avoid discarding food.

Action Opportunities

To promote food recovery activities and deter food waste from emitting methane in landfills, policymakers in Mexico could:

- *Reform the General Law for the Prevention and Comprehensive Management of Waste to prohibit food waste generators from disposing of food, whether edible or inedible, in landfills.*

  Prohibiting food waste in landfills or increasing the cost of food waste disposal encourages food waste generators to prevent and divert food to its most beneficial use — feeding people.[177]

- *Support municipalities in calculating appropriate surcharges and taxes to impose on businesses, in addition to landfill tipping fees, for organic waste disposal.*

  Ensuring that waste disposers bear the burden of paying the full cost of disposal also eases pressure on current waste management systems while providing a source of funding to improve or expand food recovery or organic waste separation, collection, and recycling infrastructure.

- *Issue regulations on the General Law on Adequate and Sustainable Food that address compliance and enforcement.*

  The law prohibits commercial establishments from discarding edible food, but it says little about compliance or enforcement of the prohibition. Compliance can be encouraged through outreach to facilitate private sector cooperation and providing guidance on how businesses must comply. Enforcement plays a critical role in ensuring the efficacy of policies that aim to reduce or eliminate the disposal of food in landfills. The regulations could further detail compliance and enforcement mechanisms related to the prohibition of edible food disposal.

Food Donation Requirements

Food donation mandates can be enacted either in conjunction with organic waste bans or as a stand-alone policy and serve as a strong policy tool to divert food waste away from landfills. Mandating that businesses and institutions donate surplus edible food can significantly boost the quantity of food diverted from landfills and redirected to people who need it.[178] Integrating food donation obligations into legal frameworks also advances sustainability and institutional change by focusing the attention of businesses on the amount of surplus food that must be managed.[179]

Like the federal Law on Adequate and Sustainable Food, several states have enacted laws to prohibit the waste of food suitable for human consumption.[180] Aguascalientes,[181] Baja California,[182] Chiapas,[183] Chihuahua,[184] Coahuila de Zaragoza,[185] Colima,[186] Durango,[187] Jalisco,[188] Mexico City[189] Nayarit,[190] Oaxaca,[191] Quintana Roo,[192] Sinaloa,[193] Tamaulipas,[194] and Yucatán[195] generally prohibit disposal or destruction of food suitable for human consumption that could be donated. For example, the Law for the Altruistic Donation of Food in the State of Chihuahua (*Ley para la Donación Altruista de Alimentos en el Estado de Chihuahua*) prohibits the irrational and unjustified waste of food that should instead be donated.[196] Donors are exempt from responsibility under the law if they show that they offered the food for donation to a government-recognized organization registered to accept food donations.[197] The law further provides that food donors may be recognized for their social responsibility when donating, or conversely sanctioned for participating in the unjustified or irrational waste of food.[198] Some states, like Durango and Sinaloa, prohibit the irrational and unjustified waste of food that is acceptable for donation but have not provided for sanctions or other consequences for violations.[199]

States have been criticized for failing to implement their laws.[200] Sergio Augusto López Ramírez, a politician from the Ecologist Green Party, described Aguascalientes' law as "decorative" because despite approval of the law nothing had been done to make it operational.[201] Aguascalientes has since reformed its law to add entities to its State Commission to Prevent Food Waste, which is responsible for defining related food and nutritional norms, promoting food security, and providing incentives for food donations.[202] Because reform occurred in May 2023, it is too early to tell whether this change will lead to improved implementation. Research did not reveal any states that have adopted regulations prohibiting the destruction of edible food or donation mandates. Food bank partners in Mexico City report that food donation mandates are not being implemented or enforced in their region.[203]

Several states have opted to encourage donations through cooperative agreements or fiscal measures rather than donation requirements. For example, Nuevo León encourages food donation through promoting collaboration agreements, incentives, and tax benefits.[204] Sonora[205] and the State of Mexico[206] also have laws promoting, encouraging, or regulating food donation but not requiring it.

Action Opportunities

Although food donation requirements are a relatively new policy tool, some best practices can be discerned from the examples of these policies that have been implemented around the globe. Some of the considerations that should be kept in mind when planning or implementing food

donation requirements include: (1) requiring that food donations comply with health and safety requirements and that any remaining food scraps be recycled; (2) using a tiered and phased in approach that initially targets larger businesses and allows governments and communities time to adapt; (3) promoting outreach and education as a primary tool for ensuring compliance; and (4) providing a mechanism to monitor and track the law's impact.[207]

To improve the food donation policy framework to increase food donations to food banks and reduce methane emissions from landfills, policymakers in Mexico could:

- *Issue regulations on the General Law on Adequate and Sustainable Food that direct commercial establishments to prevent and reduce food waste in accordance with the food recovery hierarchy.*

  The food recovery hierarchy, published by the Food and Agricultural Organization (FAO) of the United Nations, is a food-use-not-waste hierarchy that visually demonstrates the best environmental practices for approaching food waste reduction from "most preferred" to "least preferred," prioritizing the prevention and reduction of food waste, followed by the redistribution of food safe for human consumption, then moving to the repurposing and recycling of food unsafe for human consumption.[208] The regulations could explicitly require commercial establishments to donate surplus, edible food to the maximum extent possible before the businesses take other actions lower in the hierarchy.

- *Enact new and strengthen existing state level food donation laws.*

  States can act by enacting laws requiring the donation of edible surplus food in states that do not currently have food donation requirements or by shifting to requiring donation in states with existing laws that encourage (but do not mandate) food donation. States with existing food donation mandates could strengthen compliance and enforcement through implementation.

Tax Benefits for Food Donation and Recovery

Food donation can be expensive because food donors must allocate time and money to sort, package, store, and transport surplus food that otherwise would be discarded at no cost. Therefore, it is often easier and less expensive for farmers, businesses, and private individuals to throw away food instead of donating it. Tax incentives are an example of a policy that can remove the financial barriers to food donation, making food donation more cost effective and economically beneficial for donors while providing significant support for food donation efforts and for the reduction of food loss and waste. For example, corporate donors may be more likely to donate surplus food to food recovery organizations if they receive a charitable deduction to offset the cost of transportation and logistics. Mexico offers food donors tax incentives, and this section provides an overview of those incentives.

Mexican law provides tax incentives to donors and intermediaries through the Income Tax Law (*Ley del Impuesto Sobre la Renta*). Still, food donors often find that these benefits are not sufficient to overcome the actual or perceived costs of donation.[209] Individuals and corporations in Mexico can claim an annual deduction for the total value of donations made to qualified nongovernmental organizations that have registered as "authorized donees" (*donatarias autorizadas*) with the Tax Administration System (Sistema de Administración Tributaria or SAT).[210] The deduction is up to 7% of the donor's taxable income (for an individual) or taxable profit (for corporations) from the previous year.[211] The Income Tax Law (*Ley del Impuesto Sobre la Renta*) outlines this benefit. Additionally, donors of food and other basic goods for human subsistence can claim an extra monthly deduction of up to 5% of the market value of the total donation.[212] However, donors are only eligible for this benefit if the gross profit margin for selling the donated food would have been at least 10%. Otherwise, the deduction is reduced to 50% of the expected profit margin.[213]

According to Articles 108 and 109 of the Regulations of the Income Tax Law (*Reglamento de la Ley del Impuesto Sobre la Renta*), persons seeking the charitable deduction must inform SAT that they intend to donate packaged food products at least five days before the expiration date.[214] Additionally, Article 32-F of the Federal Tax Code (*Código Fiscal de la Federación*) elaborates that the donor must extend the donation offer to an authorized donee that is registered with the SAT.[215]

Under Article 27, taxpayers are further encouraged to pursue donation before discarding food. The article allows taxpayers to still claim the 7% tax deduction if they destroy or discard food that has lost commercial value, provided that the taxpayer first offered this food for donation to an authorized donee, i.e. food recovery organizations.[216] Authorized donees may refuse to accept the donations for several reasons, including a lack of resources or capacity to receive, handle, store, and distribute the food. However, food donors that have offered safe, surplus food for donation may still claim the tax benefit even if the food is ultimately wasted.

Mexico's Income Tax Law also provides tax benefits for authorized donees; article 79 of the Income Tax Law provides tax benefits for the charitable and NGO institutions that are registered under the Federal Law for the Promotion of Activities Carried Out by Civil Society Organizations (*Ley Federal de Fomento a las Actividades Realizadas por Organizaciones de la Sociedad Civil*) to receive and distribute food donations. This exemption permits authorized donees to collect donations, membership fees, bank interest, income from the sale of property, and income from

leasing of property without paying taxes.[217] Additionally, authorized donees are exempt from state and municipal taxes and duties.[218]

While the law does not explicitly reference food banks or other food recovery organizations, it does apply to social assistance organizations that promote access to food and other basic necessities, consistent with the Social Assistance Law and General Health Law.[219] The Mexican Food Banking Network (Asociación Mexicana de Bancos de Alimentos, BAMX), for example, is an active member of the Registry of Civil Society Organizations under the Federal Law for the Promotion of Activities Carried Out of Civil Society Organizations, and is thus eligible for the above-mentioned benefits.[220]

At the state level, Nuevo León encourages actors to reduce food waste through fiscal incentives such as tax benefits. Nuevo León's Law on the Right to Adequate Food and Combatting Food Waste (*Ley del Derecho a la Alimentación Adecuada y Combate Contra el Desperdicio de Alimentos para el Estado de Nuevo León*) allows food donors to deduct 50-100% of the donated food's value from their state payroll tax liability.[221] This incentive is in addition to the federal tax incentives described above. Though it was expected that the economic incentives available in the Nuevo León law would encourage support for food recovery, Nuevo León stakeholders report that they are not aware of any business that has utilized the payroll tax incentive.[222]

Action Opportunities

Tax policy can be used to create financial incentives that motivate individuals and companies to donate rather than discard surplus food. Global best practices for designing effective tax policies to increase food donation and support food recovery focus on ensuring that food donation is an economically viable alternative to disposing surplus food. Policies should factor in the expenses incurred when donating food, such as transportation costs, as well as offer incentives for smaller businesses that may not benefit from an income tax deduction.[223]

There is a concern that Mexico's existing incentives are insufficient to offset the perceived costs of donation and do not benefit smaller businesses that may not generate sufficient income to benefit from tax deductions.[224]

To improve the relevant tax incentives and encourage more methane-mitigating food donations, policymakers could:

- *Increase the existing tax deductions for food donations.*

  The existing tax deduction could be increased from the current 5% of the market value of the food donation[225] to 50-100% of the market value. The incentive also could be expanded to allow donors to claim deductions for those activities associated with the storage, transportation, and delivery of donated food to help offset the cost of donating food.

- *Amend federal tax law to add a tax credit for food donations made to authorized donees and other food recovery organizations.*

  Adding a tax credit would particularly help smaller donors that do not have sufficient income to benefit from Mexico's tax deductions.

- *Promote food donation by offering state level incentives in states that do not have such incentives.*

  States could model new state level tax incentives on the one offered in Nuevo León, which allows food donors to deduct 50-100% of the donated food's value from their state payroll tax liability.

Enhancing Food Recovery from Agricultural Producers

Despite limited data on food loss at the producer level, the World Bank considers primary production a hotspot and high priority for food loss in Mexico.[226] A variety of market and institutional failures lead to food loss, including challenges in meeting food quality or safety standards as well as logistical food distribution issues.[227] A lack of information, knowledge, and skills means that many smaller producers may experience barriers meeting food quality and safety standards or invest time and resources producing products for which there is not a sufficient market.[228] Also, quick product maturation and short windows of time for harvesting combined with insufficient staffing or equipment sometimes forces farmers to forego harvesting.[229]

The consequent amount of food loss can be significant but is also difficult to quantify. In a case study focused on food loss in the state of Jalisco, one of Mexico's most significant agricultural production regions, researchers found that approximately 14% of agricultural products are not consumed due to loss.[230] This loss occurs through all stages of agricultural production, from planting to harvesting to transporting.[231] The Jalisco case study caveats its calculation of food loss as many small-scale farmers do not record losses, and 37% of the food produced by the farmers in the study were not intended for human consumption so therefore were not accounted for when estimating food loss.[232]

While certain states in Mexico witness some level of food redistribution from agricultural producers, limited food donation incentives might be hindering the full extent of food recovery and repurposing efforts.[233] Some data and information on agricultural recovery exists specific to the state of Jalisco, where farmers report that only 7% of their unsold produce is donated.[234] However, despite low donation rates, nearly 60% of the 114 farmers surveyed were aware that food banks are a potential resource for recovery and redistribution of food.[235] Barriers to food donation included increased costs for agricultural producers and the need for an "efficient, structured, and transparent system" for food donation.[236] An improved understanding of the current levels of redistribution from the agricultural sector in other regions, possibly informed by data from food banks, academic institutions, and the Mexican National Council of Science and Technology or other government agencies, could provide the foundation for further policy development.[237]

In an assessment of potential food loss and waste solutions in Mexico, ReFED analyzed several applicable to agricultural food recovery and donation.[238] Solutions, like the donation tax incentives discussed above, demonstrate relatively low upfront costs and operating expenses, coupled

with substantial benefits.[239] Other highlighted solutions, including donation matching software (software that allows donors and food recovery organizations to exchange real-time information to coordinate and track food donations[240]), value-added processing (processing to extend the shelf life of perishable foods[241]), donation transportation, and donation storage and handling (warehouses, cold storage, and labor to process, package or label foods[242]) could be supported through governmental policies providing infrastructure support and funding.[243] Government grants for food recovery initiatives, infrastructure, and organizational support can help build capacity for enhanced agriculture recovery. Some effective solutions for reducing food loss and increasing food recovery may require expanded infrastructure, such as roads and electricity.[244] Because these solutions demand significant public investment, they are more difficult to implement.[245]

Under prior government administrations, the federal government allocated funds to support food bank infrastructure and expand food recovery efforts.[246] Research did not identify federal financial support explicitly tailored to assist on-farm produce recovery or provide funding for food recovery organizations and donation initiatives. However, current and past presidential administrations have supported initiatives aimed at supporting marginalized and/or small agricultural producers as outlined below.

President Andrés Manuel López Obrador has prioritized enhancing the well-being of small-scale agricultural producers in economically disadvantaged regions of Mexico.[247] Shortly after assuming office, his administration introduced several agricultural support programs aimed at increasing rural incomes, enhancing food security, and promoting self-sufficiency in the production of specific commodities.[248] Some of these programs are updated versions of previous initiatives from prior administrations.[249] Aligning with the administration's stated objectives, these agriculture programs primarily concentrate on providing assistance to marginalized and small-scale farmers, with particular focus on supporting small producers in the southern and central states of Mexico.[250] Thus, moving forward administrations may be receptive to initiatives to reduce food loss that are framed as agricultural initiatives supporting small-scale producers in economically disadvantaged communities.

Also, the 2024 General Law on Adequate and Sustainable Food directs states to develop programs to improve infrastructure for food storage and transportation to reduce losses.[251] There are several existing examples of state governmental support for initiatives that facilitate enhanced food recovery, including from agricultural producers. For example, Nuevo León recently reformed its food donation law in 2022 to allow its Secretariat of Equality and Inclusion to enter into agreements with food banks to rescue from agricultural producers.[252] As previously mentioned, Nuevo Leon's law offers one of the most robust tax incentives for food donation in the country.[253] This incentive allows for a payroll tax deduction ranging from 50 to 100 percent of the value of the donated food, as determined by the food bank upon receipt.[254] The reformed law further provides for the allocation of public funds for the food bank's operational expenses related to agricultural food recovery.[255] The amount of the allocated budget to support agricultural recovery is to be determined by the Secretariat in collaboration with food banks.[256] Nuevo León's law (discussed in the text box on the next page) provides an example of enhanced agricultural policies that can be used as a model for other states.

LAW ON THE RIGHT TO ADEQUATE FOOD AND COMBATING FOOD WASTE FOR THE STATE OF NUEVO LEÓN

(Ley del Derecho a la Alimentación Adecuada y Combate Contra el Desperdicio de Alimentos para el Estado de Nuevo León)

Nuevo León's state law, enacted in 2017 and last amended in 2023, connects the right to adequate food to food waste reduction.[257]

The law establishes norms for food bank operations including for the donation and distribution of food. Food banks must register with the Secretariat of Equality and Inclusion (La Secretaría de Igualdad e Inclusión del Estado de Nuevo León) and demonstrate that they have the necessary staff, infrastructure, and equipment to distribute food safely and sustainably to populations experiencing food insecurity.[258] Food banks are required to track and report to the Secretariat of Equality and Inclusion on the food donations that they receive.[259] They must also provide donors with invoices and records of their food donations.[260]

To encourage food donations, the law vests the Secretariat of Equality and Inclusion with responsibility for: coordinating and promoting collaboration agreements between the state government, potential food donors, and food banks; creating and maintaining a registry of donors and food banks; tracking, monitoring, evaluating, and reporting on the law's impact; and educating donors and food banks on the law and its benefits.[261] The Secretariat of Equality and Inclusion may contract with food banks to recover food from agricultural producers and allocate government funding to cover the operational expenses that food banks incur when rescuing agricultural products.[262] The Secretariat of Agricultural Development (Secretario de Desarrollo Regional y Agropecuario) serves as a liaison to the agricultural sector to encourage food donations, including receiving notice of crops that are available for donation.[263] Using the law's budgetary authority, in 2023 Nuevo León allocated 145 million pesos to the Zero Hunger Program (Programa Hambre Cero) to address food insecurity and food waste in the state.[264]

To encourage private entities to donate (rather than waste) surplus edible food, the law includes two types of incentives: public recognition and tax benefits. Entities that make the greatest amount of food donations to food banks are publicly recognized by the Secretariat of Equality and Inclusion.[265] Entities that donate edible foods can deduct from their payroll taxes 50-100% of the food's value.[266] It is up to the food bank to evaluate how long the donated food will remain edible and to determine what percentage of the food is suitable for human consumption; this in turn determines the amount that will be tax deductible.[267] The food bank's valuation is based on the weight and cost of the donated food as well as the valuation of specific foods according to the Federal Consumer Protection Agency or the National System of Information and Market Integration.[268]

Food banks may be sanctioned for diverting, wasting, or mishandling donated food, but the law does not include any sanctions for food entities or agricultural producers that unjustifiably waste food.[269]

In states like Tlaxcala and Jalisco, the government has committed funding that directly and indirectly supports food recovery from agricultural producers. Tlaxcala is supporting the development of a food bank in its state where an estimated 67% of residents lack sufficient access to food.[270] Tlaxcala's governor Lorena Cuéllar Cisneros stressed the critical role that the food bank will play in improving food security and supporting the local government's efforts to improve access to nutritious, quality food.

Food bank partners report that Tlaxcala is planning to replicate (with the support of state funding for, among other things, transportation infrastructure) agricultural recovery programs that have been in place for nearly eight years at the Banco de Alimentos Puebla.[271] The food bank works with the agricultural sector to recover surplus food from farms, orchards, and greenhouses.[272] Banco de Alimentos Puebla reports that it currently recovers more than 1,500 tons of food each month, 60% of which is perishable food.[273]

In Jalisco, one of Mexico's leading food production regions, the state government supported the recent construction of a 33,000 square meter food bank facility in the city of Guadalajara.[274] Banco de Alimentos Guadalajara has been operating since 1992, and over time it has gradually grown, expanding its operations to serve more than 135,000 people.[275] The state government's investment of 340 million pesos, including the value of state donated land, directly contributed to the construction of nearly one-third of the new food bank facility.[276] During the inauguration ceremony, the state governor expressed his support for state officials for their role linking state government and the food bank in a collective effort to eliminate hunger in the state.[277] State government funding empowers existing food bank programs to develop and scale their programs, including agricultural food recovery projects.

Action Opportunities

To enhance food recovery from agricultural producers, policymakers in Mexico could:

- *Advance low-cost policies to increase agricultural food recovery and donation, such as enhanced tax incentives.*

  To ensure that agricultural producers are sufficiently incentivized to donate crops and other products, the federal government could provide an enhanced tax deduction for the expenses incurred in the activities associated with the harvest, storage, transportation, and delivery of donated food.

- *Support existing food recovery operations, such as those established and operated by food banks, with government grants and investments to scale up food recovery from the agricultural sector.*

  Such investments could provide additional warehouse space, cold storage, transportation, or staffing needed to coordinate with local producers.

- *Foster collaboration with food banks, government agencies, agricultural producers, and academic institutions to develop further data to understand the existing levels of food loss, food recovery, and food redistribution from the agricultural sector.*

  Robust data can lead to stronger policies targeting the recovery of fresh foods from agricultural producers.

CONCLUSION

Mexico has committed in its NDCs to reduce emissions of methane and other short-lived climate pollutants by 30% to help meet the IPCC's target of limiting global warming by 1.5 degrees Celsius. Mexico's NDCs recognize food systems and food security as an area in which it could further strengthen the country's resilience to climate change.[278] Food banks can serve as key partners in helping Mexico meet these goals. Mexico's food banks have a long history of working to ensure that edible, surplus food suitable for human consumption is directed to people experiencing food insecurity. The social and economic impacts of increased food donation and recovery rates in a country where roughly one out of four people are food insecure combined with the environmental impacts of reducing the amount of methane emissions from landfills make food donation policies highly impactful.

Mexico's leaders have been crafting and implementing innovative policies targeted at the environmental and social costs of food waste, including policies with the potential to reduce methane emissions. The recent enactment of the General Law on Adequate and Sustainable Food connects the issue of food loss and waste to the right to food. The forthcoming regulations and implementation of the law offer new opportunities at the federal and state levels to leverage the above policy recommendations to bolster the financial infrastructure of food recovery organizations, increase food donations, and reduce methane emissions.

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[258] Nuevo León Food Donation Law, art. 8.
[259] Nuevo León Food Donation Law, art. 12.
[260] Reglamento de la Ley del Derecho a la Alimentación Adecuada y Combate Contra el Desperdicio de Alimentos Para el Estado de Nuevo León, arts. 39-41, Publicado en Periódico Oficial num. 25-III, de fecha, 27 de febrero de 2019, http://sistec.nl.gob.mx/Transparencia_2015/Archivos/AC_0001_0004_0167333-0000001.pdf.
[261] Nuevo León Food Donation Law, arts. 7, 11, 13.
[262] Nuevo León Food Donation Law, art. 11.
[263] Nuevo León Food Donation Law, art. 15.
[264] Ley de Egresos del Estado de Nuevo León Para Ejercicio Fiscal 2023 Decreto Número 330, art. 34, Publicado en Periódico Oficial Número 004-V, de fecha 11 de enero de 2023, http://sistec.nl.gob.mx/Transparencia_2015/Archivos/AC_0001_0002_0171161-0000001.pdf.
[265] Nuevo León Food Donation Law, art. 25.
[266] Nuevo León Food Donation Law, arts. 4, 19-24.
[267] Nuevo León Food Donation Law, art. 19-24.
[268] *Id.*
[269] Nuevo León Food Donation Law, art. 31.
[270] *Tlaxcala Announces the Creation of a Food Bank to Combat Food Insecurity*, Ganar-Ganar (Jul. 11, 2023) https://ganar-ganar.mx/2023/07/11/tlaxcala-anuncia-la-creacion-de-un-banco-de-alimentos-para-combatir-la-inseguridad-alimentaria/.
[271] FLPC conversation with food bank partners in August 2023, notes on file with authors.
[272] *Quienes Somos*, Banco De Alimentos Puebla, https://www.bapuebla.org.mx/somos.
[273] *Quienes Somos*, Banco De Alimentos Puebla, https://www.bapuebla.org.mx/somos.
[274] Press Release, Government of the State of Jalisco (May 23, 2023), https://www.jalisco.gob.mx/es/prensa/noticias/159760.
[275] Press Release, Government of the State of Jalisco (May 23, 2023), https://www.jalisco.gob.mx/es/prensa/noticias/159760.
[276] *Id.*
[277] *Id.*
[278] *Mexico: Latin America & the Caribbean*, UN Dev. Programme Global Climate Promise, https://climatepromise.undp.org/what-we-do/where-we-work/mexico (last visited Mar. 29, 2024).

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