



# The Environmental Impact of Food Waste

A presentation to Connecticut Department of Energy & Environmental Protection's Increase Reuse and Recycling Working Group



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Climate Manager

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February 27, 2024



## WHO WE ARE

ReFED is a national nonprofit working to catalyze the food system toward evidence-based action to stop wasting food.

## OUR VISION

A sustainable, resilient, and inclusive food system that optimizes environmental resources, minimizes climate impacts, and makes the best use of the food we grow.



## DATA & INSIGHTS

Leveraging data and insights to highlight supply chain inefficiencies and economic opportunities



## CAPITAL & INNOVATION

Catalyzing capital to spur innovation and scale high-impact initiatives



## BUSINESS INITIATIVES

Enabling waste generator adoption of viable solutions through measurement, advisory, and internal capacity building



## COLLECTIVE ACTION

Mobilizing and connecting stakeholders to learn, share, and collaborate on targeted action

# Food Loss and Waste:

**A** Climate Change  
Environmental  
Social **Problem**  
Economic  
Sustainable Development



## Global Food Waste

$\frac{1}{3}$  of all food  
produced<sup>1</sup>

**\$1T** in value<sup>2</sup>

**8%** of global  
GHG  
emissions<sup>3</sup>

# GHG Emissions by Country

If food waste were a country, it would be the third largest GHG emitter in the world.



Source: CAIT, 2015, FAO 2015 Food wastage footprint & climate change. Rome: FAO

Food waste is STILL ranked **#1 of 93** global solutions for reversing climate change globally by Project Drawdown.<sup>1</sup>

	Rank	Solution	Gigatons Mitigated (2020-2050)
Top 10 Solutions	<b>1</b>	<b>Reduced Food Waste</b>	<b>88.50</b>
	2	Plant-Rich Diets	78.33
	3	Family Planning and Education	68.90
	4	Refrigerant Management	57.15
	5	Tropical Forest Restoration	54.45
	6	Onshore Wind Turbines	46.95
	7	Alternative Refrigerants	42.73
	8	Utility-Scale Solar Photovoltaics	40.83
	9	Clean Cooking	31.38
	10	Distributed Solar Photovoltaics	26.65

# Feeding More People with Fewer Resources

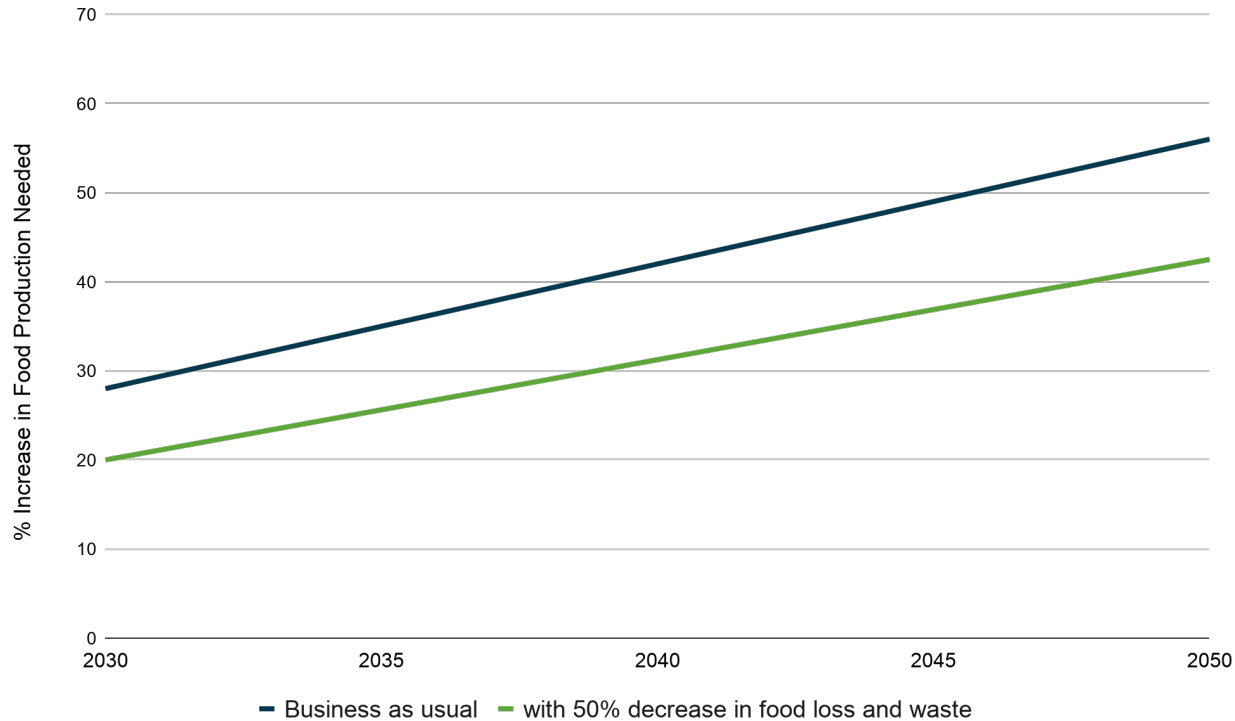
50%

The United Nations predicts we'll need to increase global food supply by this amount to feed the population in 2050...

Yet a new study is showing that agricultural productivity has decreased by this amount due to the impacts of climate change:

21%

# Feeding More People with Fewer Resources



Estimated  
**24%**  
reduction in  
supply needed if  
food waste is  
cut in half.



# 50%

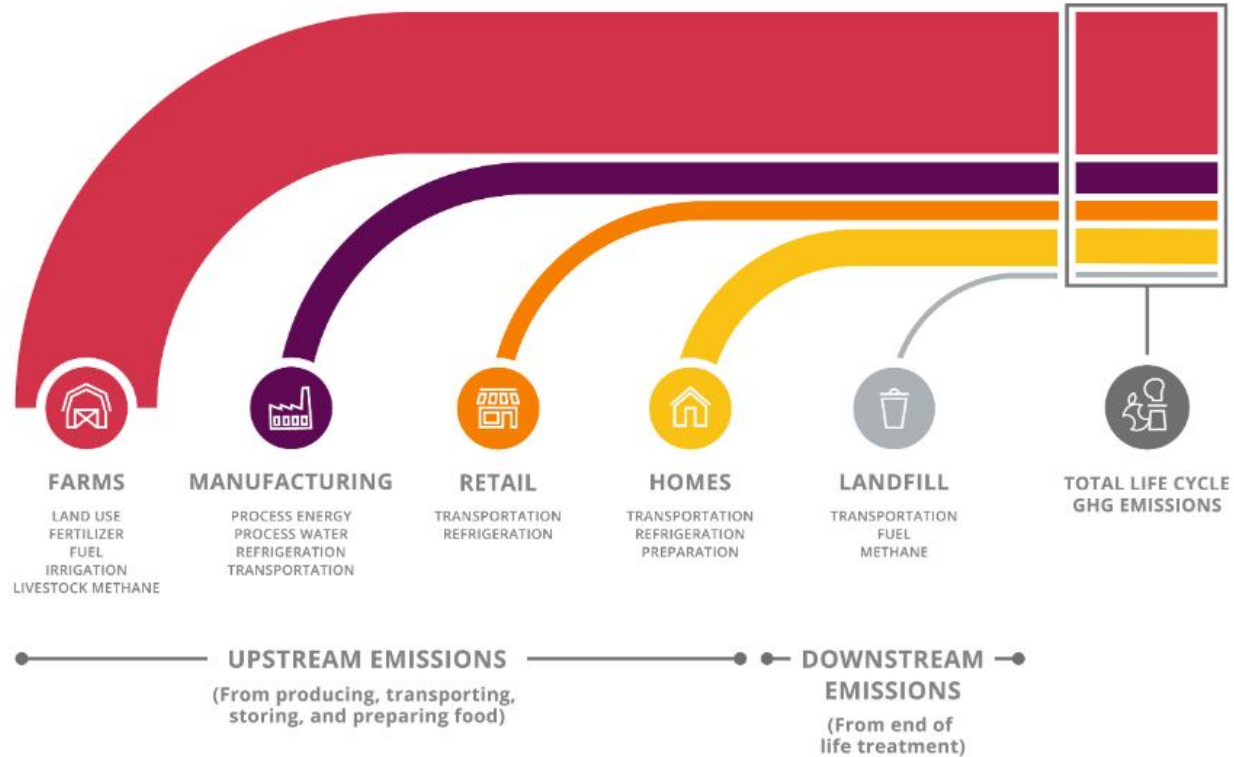
National and international goal for the amount of food waste that must be reduced by the year 2030



# Environmental Impacts of Food Loss and Waste



# Food accumulates emissions as it moves along the value chain, and the relative contribution to life cycle emissions varies by sector



In the U.S....



38%

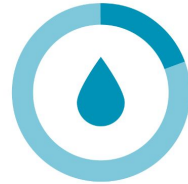
of all U.S. food goes  
unsold or uneaten



16%

of U.S.  
Cropland Use  
(EPA Estimate)

An area the size of  
**California and  
New York**  
combined



22%

of all  
Fresh Water Use

As much water as  
**California, New  
York, and Texas**  
combined



6%

of U.S. GHG  
Emissions

Equivalent to driving  
**86 million cars**  
over the year



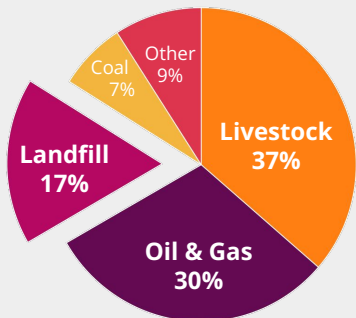
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Source: USDA/2022

# Addressing Food Waste Reduces Emissions in 3 Distinct Ways

## Eliminates Landfill Methane

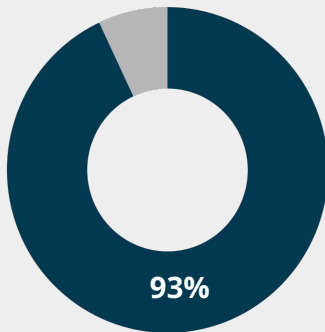
Food is the #1 material in landfills (24% of incoming trash)



Landfills are the 3<sup>rd</sup> largest source of U.S. methane emissions. A recent EPA report found that 58% of landfill methane emissions are attributable to food inputs.<sup>1</sup>

## Avoids Upstream Emissions

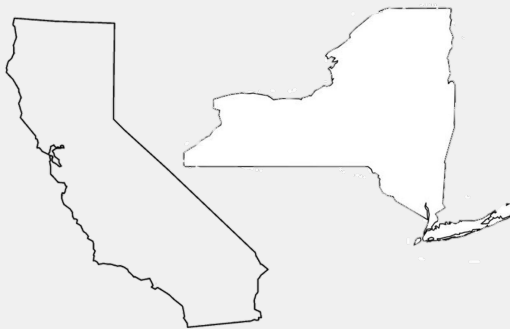
93% of life cycle emissions are accumulated by the time food exits the home.<sup>2</sup>



Further emissions from production, transport, storage, and preparation of additional food are prevented if food is consumed rather than wasted.

## Maximizes Land Use

The land used to grow food that ultimately is not eaten makes up 16% of U.S. agricultural land.<sup>3</sup>



This is an area the size of New York and California combined.

# Impact of Reducing Food Waste by 50%

Reduce Land Use by at least  
(an area the size of Arizona)<sup>2</sup>

9%

Reduce Threats to Biodiversity<sup>1</sup> by

17%

Reduce Water Use by<sup>3</sup>

11%



2.6 million acres of grassland were plowed up from 2018-2019, primarily to make way for row crop agriculture. This is an area larger than Yellowstone National Park. Restoring the full amount of carbon to croplands can take 350 years.<sup>4</sup>

# Understanding Food Loss and Waste





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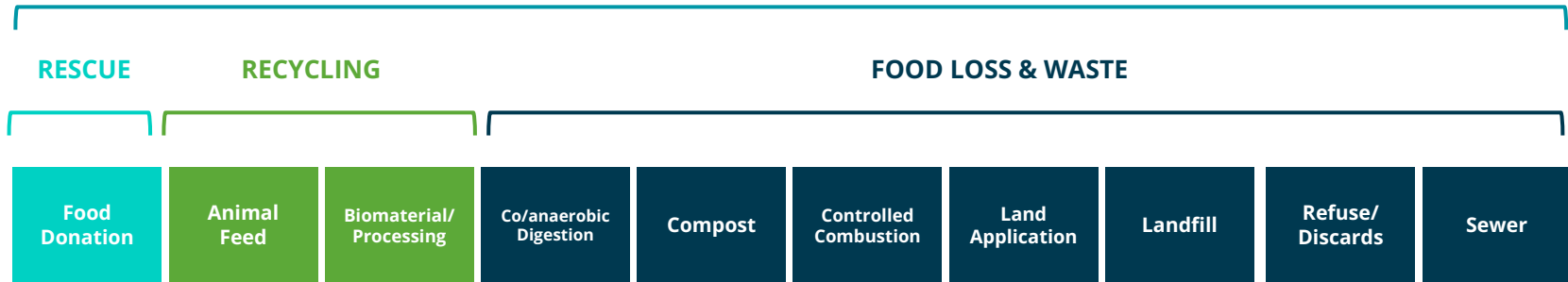
## COLLECTIVE ACTION

Mobilizing and connecting stakeholders to learn, share, and collaborate on targeted action

## What is “Surplus Food”?

All food that goes *unsold* or *unused* by a business or that goes *uneaten* at home – including food and inedible parts (e.g., peels, pits, bones) that are fed to animals, repurposed to produce other products, composted, or anaerobically digested. It also includes food that is *donated*.

### SURPLUS FOOD





2030 goal aims to cut in half food waste going to these destinations from retail, food service, and residential sectors

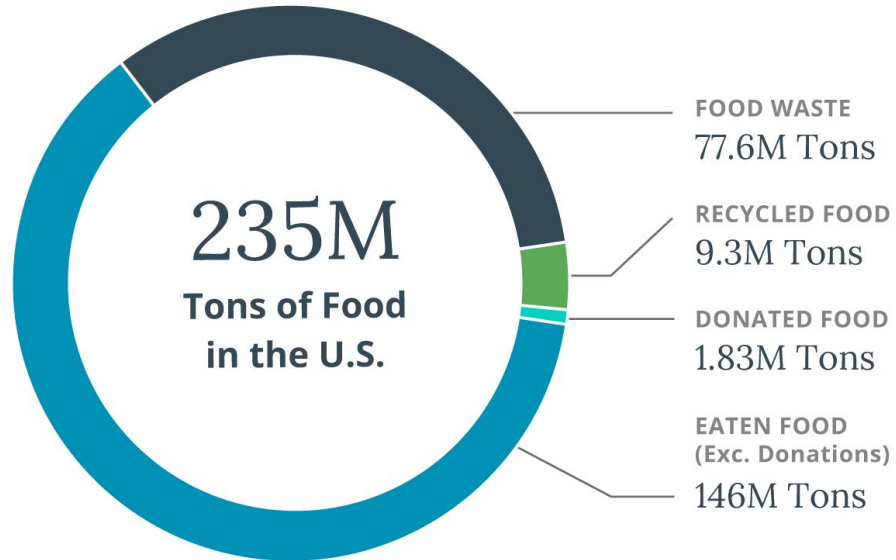


SURPLUS FOOD

FOOD LOSS & WASTE FROM ALL SECTORS

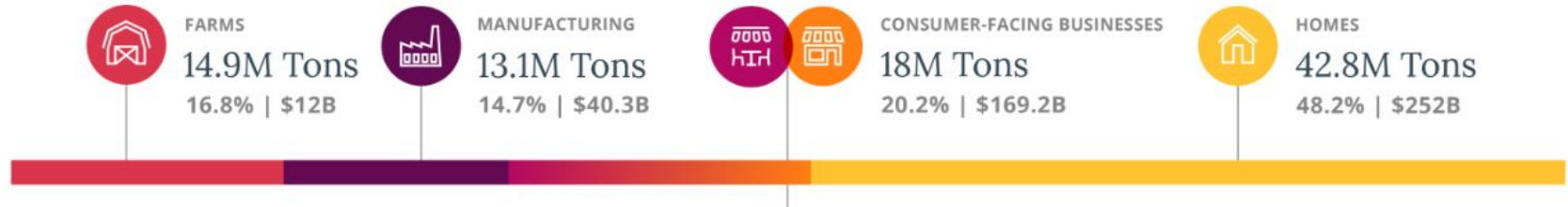


## What's happening to food in the U.S.?



Source: ReFED/2022 Data (Published 11/23)

Surplus food occurs across the supply chain.



Surplus food occurs across the supply chain.

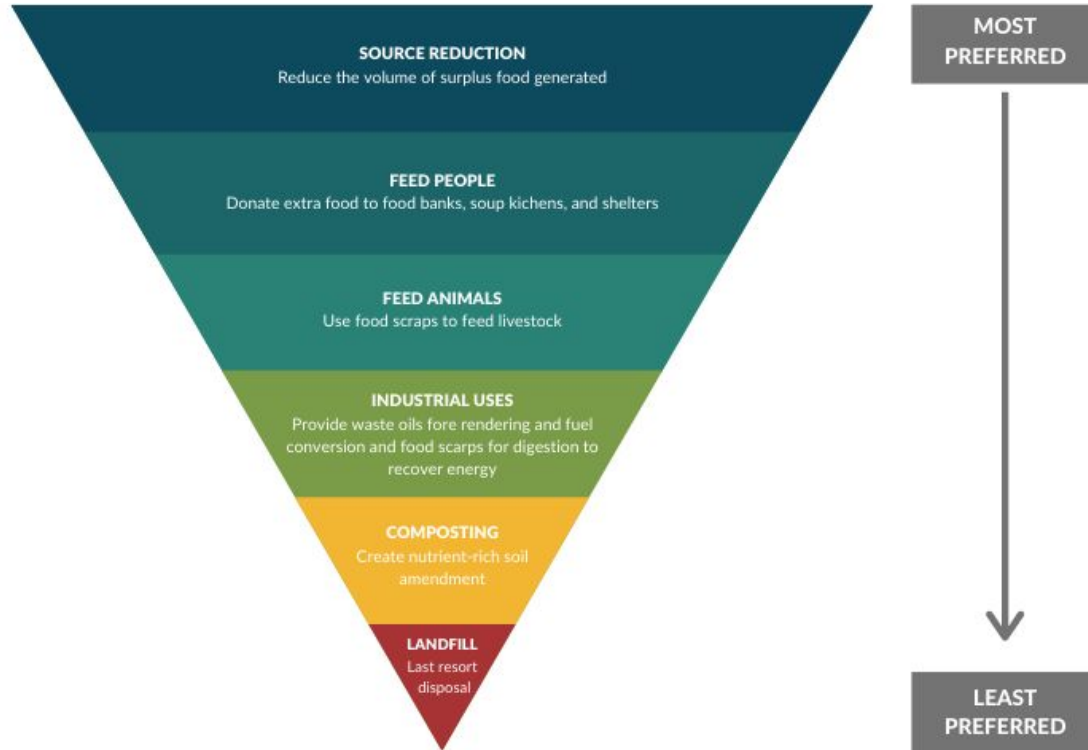


More than half is edible.

70% in restaurants is plate waste.

Households are the largest contributor.

# Reduce Reuse Recycle

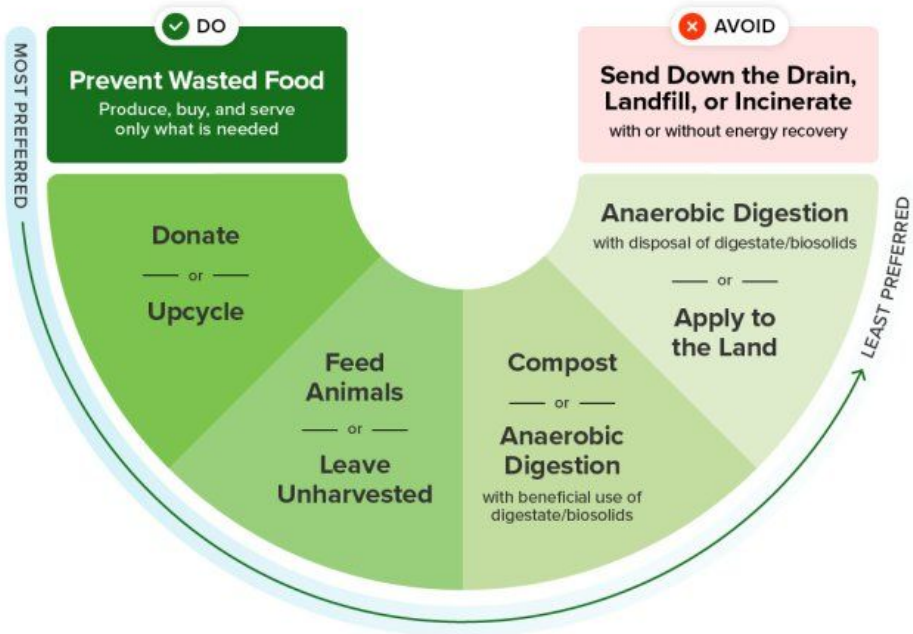


# EPA Wasted Food Scale



## Wasted Food Scale

How to reduce the environmental impacts of wasted food



October 2023

The most preferred pathways – prevent wasted food, donate and upcycle food – offer the most benefits to the environment and to a circular economy.

These “top” pathways prioritize using food for its intended purpose: to nourish people.



# Barriers to Addressing Food Waste

- Misalignment of costs and benefits
- Low cost of food and disposal
- Disaggregated supply and demand information and data gaps
- Competing cultural priorities and expectations
- Organizational silos
- Low priority and capacity within food industry to monitor and make change



# Working to Reduce Food Loss and Waste



# Food Loss and Waste:



# A Blueprint for Action

7

ReFED outlined seven key action areas for the food system to focus its efforts over the next ten years to *prevent*, *rescue*, and *recycle* food at risk of going to waste.

## PREVENTION



Optimize  
The  
Harvest



Enhance  
Product  
Distribution



Refine  
Product  
Management



Maximize  
Product  
Utilization



Reshape  
Consumer  
Environments



Strengthen  
Food  
Rescue



Recycle  
Anything  
Remaining

## RESCUE

## RECYCLING

# Solutions Database: Explore solutions



ACTION AREA ▼	SOLUTION NAME ▼	NET FINANCIAL BENEFIT ▼
	Portion Sizes	\$ 9B
	Meal Kits	\$ 6.55B
	Consumer Education Campaigns	\$ 6.08B
	Enhanced Demand Planning	\$ 5.19B
	Imperfect & Surplus Produce Channels	\$ 5.08B
	Donation Education	\$ 4.52B
	Waste Tracking (Foodservice)	\$ 3.82B
	Markdown Alert Applications	\$ 3.81B
	Buyer Specification Expansion	\$ 2.69B
	Manufacturing Byproduct Utilization (Upcycling)	\$ 2.69B
	Intelligent Routing	\$ 2.69B

## WHAT'S NEEDED

**\$18.4B**

INVESTMENT ANNUALLY

\$4.8B PUBLIC

\$11.2B PRIVATE

\$2.4B PHILANTHROPIC

**40+**  
SOLUTIONS

## WASTE REDUCTION

**21M**  
ANNUAL FOOD WASTE  
DIVERSION (TONS)

## IMPACT PER YEAR



**\$78B** NET FINANCIAL BENEFIT



**6T** GALLONS IN WATER SAVINGS



**113M** TONS GHG EMISSION REDUCTION  
POTENTIAL (MT CO2e)



**4.2B** MEALS FOR PEOPLE IN NEED



**58K** JOBS CREATED THROUGH FULL  
SOLUTION IMPLEMENTATION

Source: ReFED, 2023

# ReFED Insights Engine: *The System Tool Driving Change*



## Understand the Problem

[Visit the Food Waste Monitor](#) ▶



## Explore the Solutions

[Visit the Solutions Database](#) ▶



## Find Solution Providers

[Visit the Solution Provider Directory](#) ▶



## Calculate Impact

[Visit the Impact Calculator](#) ▶



## Track Capital

[Visit the Capital Tracker](#) ▶



## Review Policies

[Visit the Policy Finder](#) ▶

[Launch Insights Engine](#)



51,805

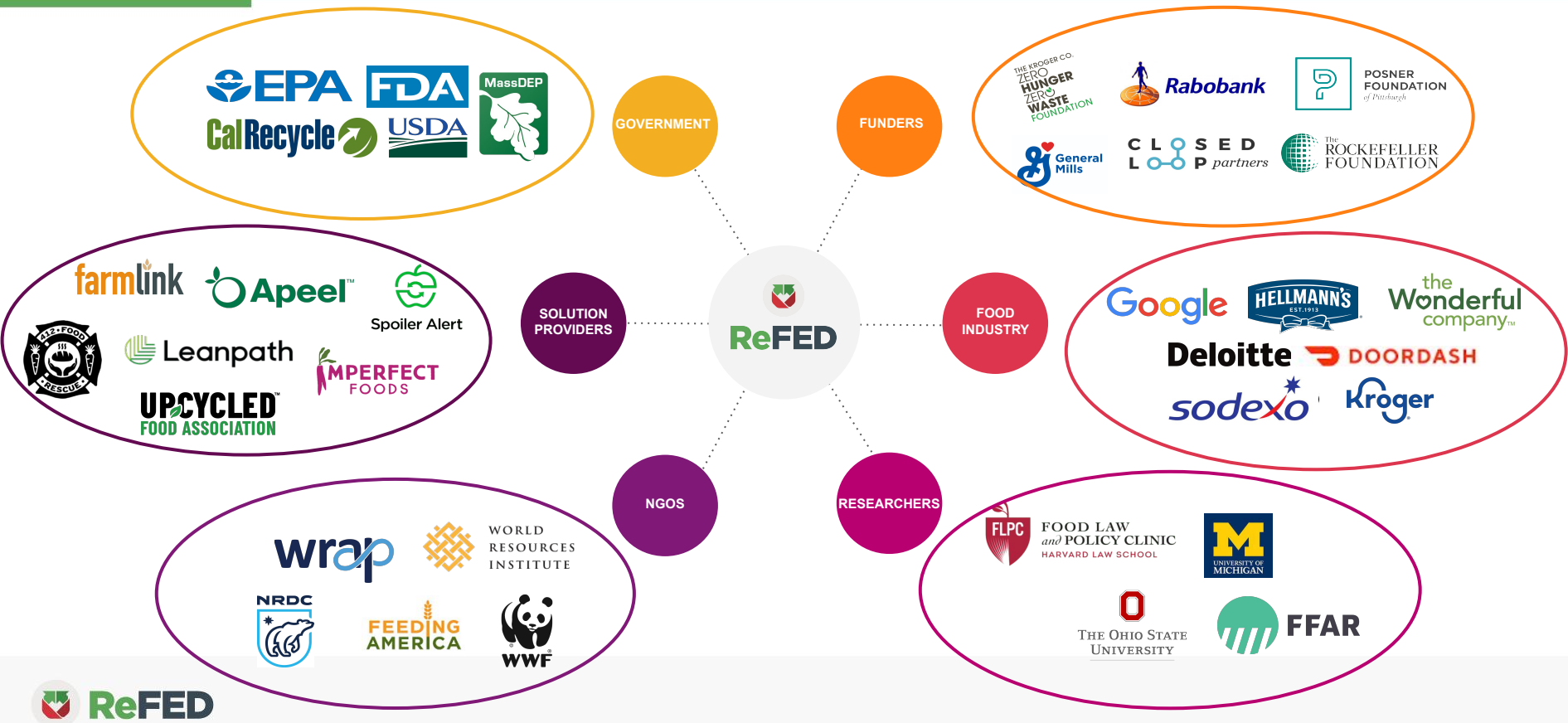
users; 2000+ new users monthly



6 countries requested international IE



# ReFED is the Epicenter of the Food Waste Ecosystem

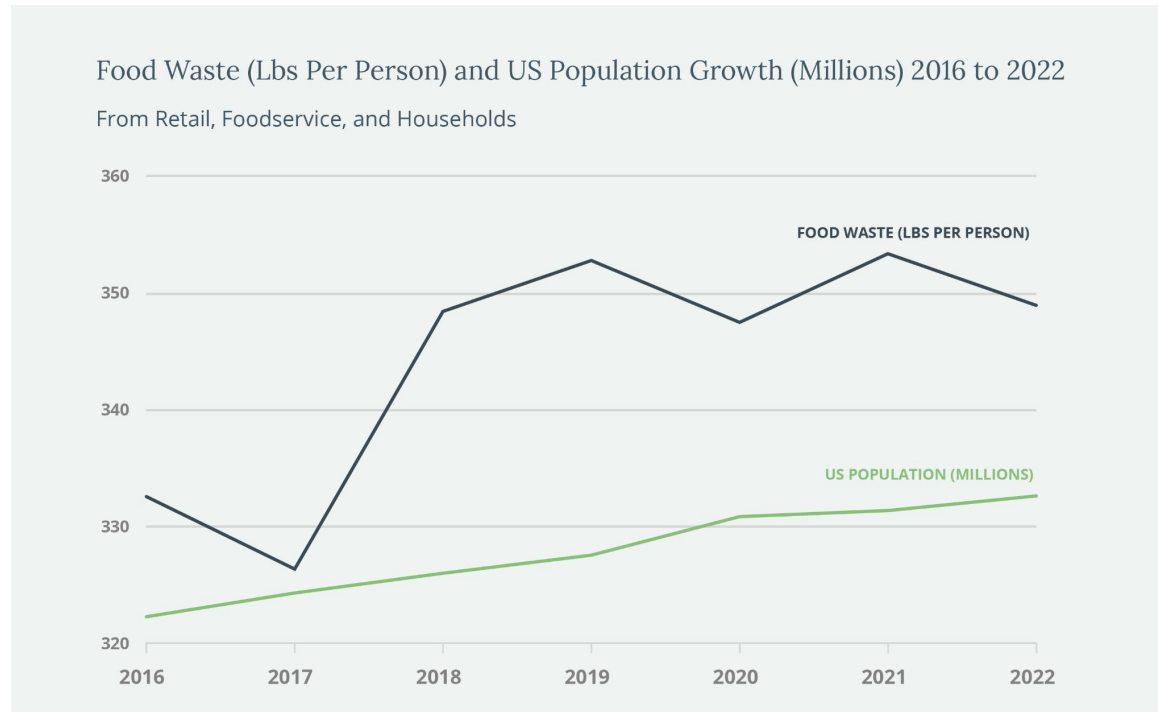




So...how are we doing?



Despite increased awareness and reduction efforts, surplus food has increased since 2016... but after peaking in 2019, a potential downward trend may be starting?



*The dip in 2020 is likely due to COVID-19 disruptions, and we're eager for the next few years of data to see if the trend will be a resumed increase or if we reached an inflection point.*

There's significant opportunity to shift the volumes of food going to less preferred destinations



# Corporate and Municipal Commitments



2030 Champions (U.S.)



200+  
COMPANIES

44+  
COMPANIES

15  
COMPANIES

16  
CITIES

Actual Reductions



(SINCE 2020)

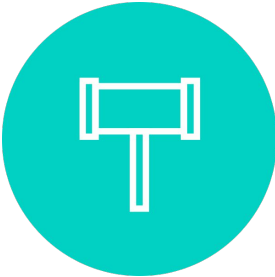


(SINCE 2017)



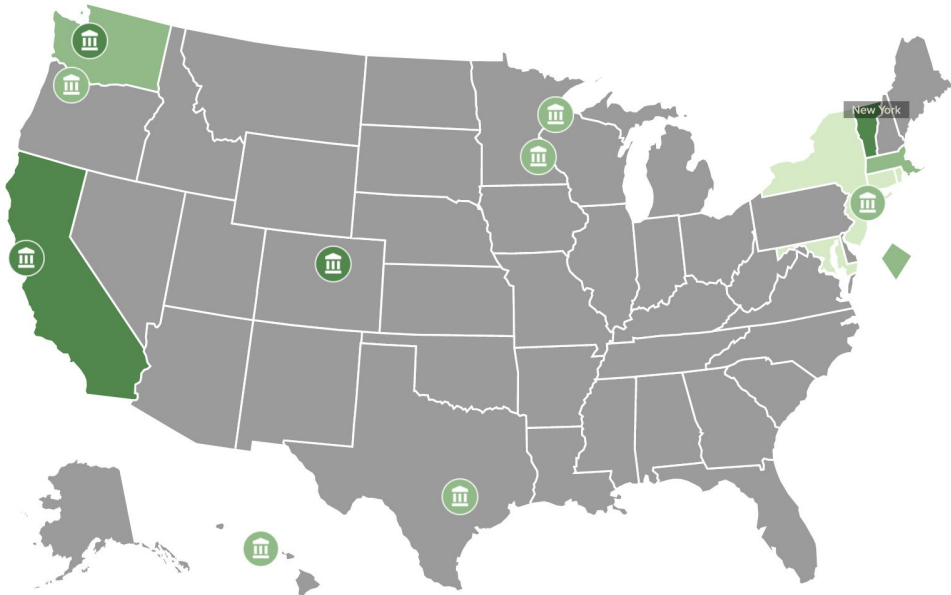
(SINCE 2017)

# State Policy Action

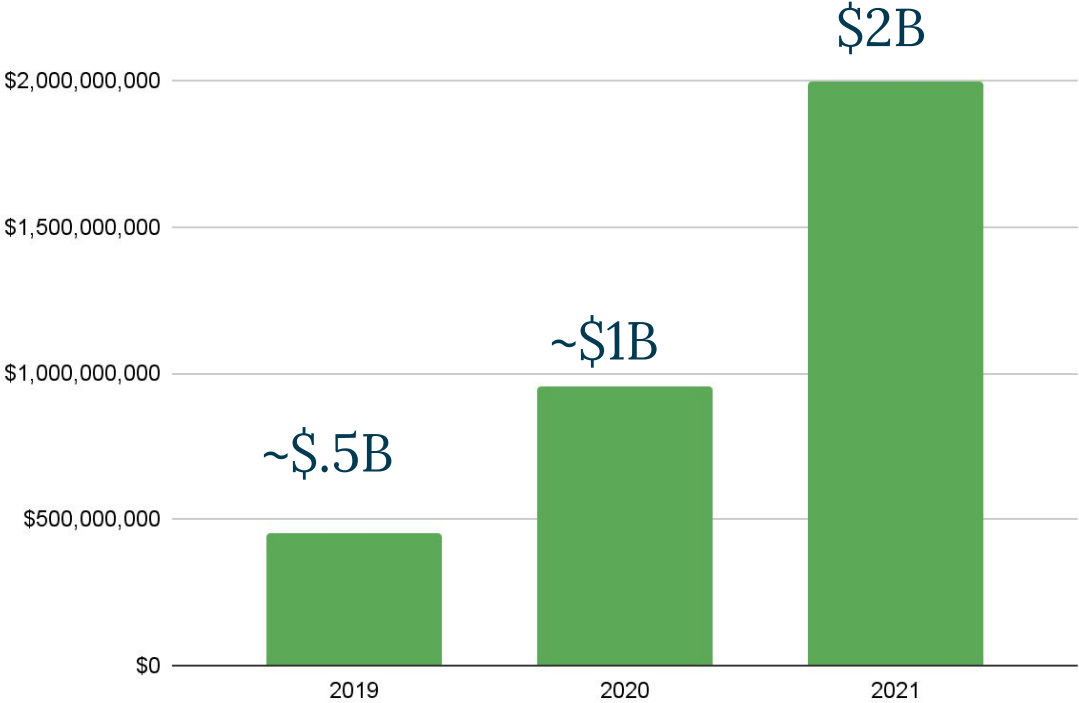


99 Bills introduced

28 Bills passed



# Huge uptick in private capital




# Case Studies - Successful Solutions Adoption in Action

**CASE STUDY**

## Using Artificial Intelligence to Reduce Food Waste in Grocery Retail

Progress on the Path to Cut Food Waste in Half by 2030



**PACIFIC COAST**  
Food Waste Commitment


Fall 2022

Two retailers used artificial intelligence solutions, Shelf Engine and Afresh, to improve their order accuracy, leading to a **14.8% average reduction in food waste per store**.

**CASE STUDY**

## Institutionalizing a Waste Reduction Culture in Food Manufacturing

A three-pronged strategy of education, company-wide engagement, and quick-win implementation to achieve meaningful food waste reductions



**PACIFIC COAST**  
Food Waste Commitment


Fall 2022

Bob's Red Mill collected 176 food waste reduction ideas through an employee campaign and **saw a 70%+ reduction in food waste** by testing one idea on the manufacturing line.

**CASE STUDY**

## A Closer Look at Sprouts' Food Waste Reduction Commitment & Best Practices

Progress on the Path to Cut Food Waste in Half by 2030



**PACIFIC COAST**  
Food Waste Commitment


Fall 2022

Sprouts identified **food waste reduction best practices**, such as storewide waste “Scorecards”, optimizing container sizes and load weights, reducing the distance between stores and distribution centers, and more.

**CASE STUDY**

## Food Waste Reduction Commitment & Upcycling Initiatives

Progress on the Path to Cut Food Waste in Half by 2030



**PACIFIC COAST**  
Food Waste Commitment

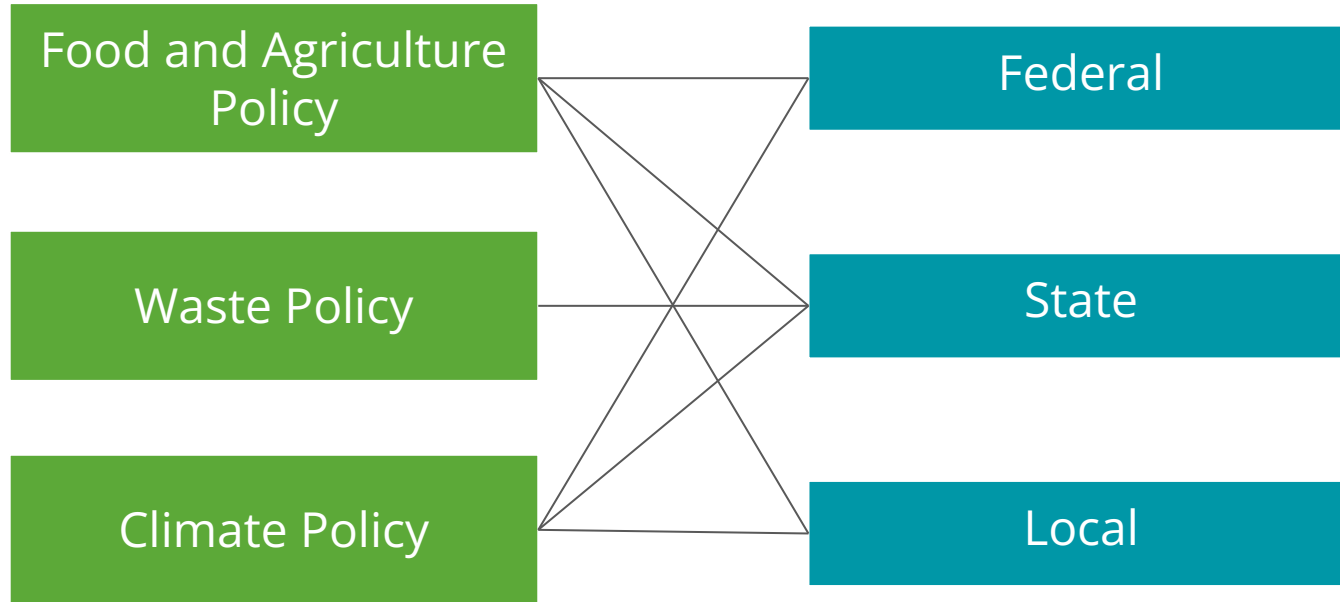
Spring 2023

New Seasons Market's upcycled pulled chicken program has turned more than **20,000 pounds of surplus rotisserie chicken** into a new pulled chicken product—resulting in new revenue and a **25% increase in sales** of rotisserie chickens.



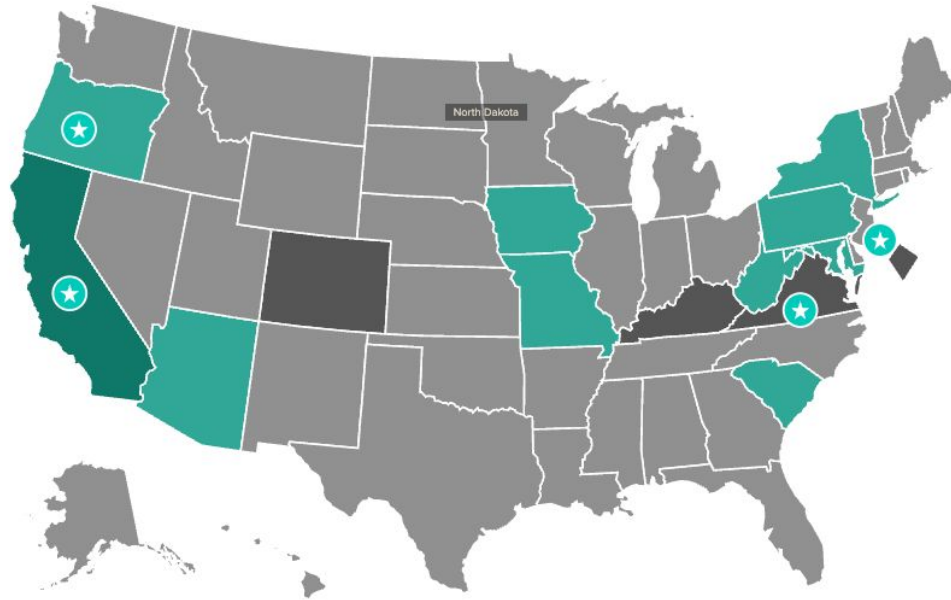
# U.S. Policy Landscape for Food Loss and Waste

# Policy falls under mixed jurisdictions





# Tax Incentives for Food Donations



Federal and state incentives

California and New York mandate food donation

## STATES OFFERING ADDITIONAL TAX INCENTIVES FOR FOOD DONATION

Federal policy provides businesses with a tax incentive for food donations. States shaded above offer additional tax incentives for food donations.



# Federal Activity

## Recent Federal Progress

1. Increased Federal Funding (ARPA, IRA, BIL)
2. Food Donation Improvement Act
3. Lowering Organic Waste Methane Initiative
4. Sunnylands Statement – Methane target commitment
5. USDA/EPA/FDA Draft National Strategy

## Active Legislation Opportunities

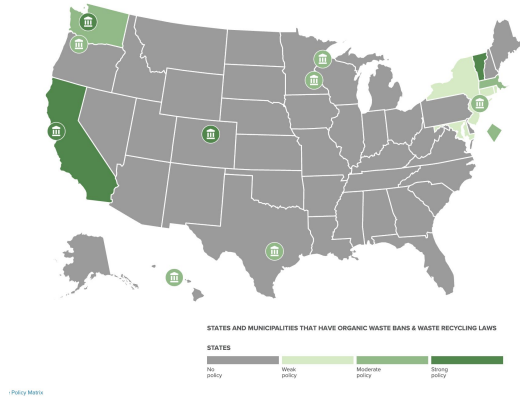
1. Zero Food Waste Act
2. Food Date Labeling Act
3. Reduce Food Loss and Waste Act
4. Farm Bill

# Government can impact private sector waste through:

1. Public-private partnerships, which join and motivate businesses while also providing a forum for policymakers to understand where they can change policy.
2. Additional outreach through existing extension services, health inspectors, and other avenues to promote best practices.

# Further Resources

## ReFED Policy Finder



<https://policyfinder.refed.org/>



## Zero Food Waste Coalition

Two fact sheets from the Zero Food Waste Coalition. The top sheet is titled "ZERO FOOD WASTE COALITION'S TOP FARM BILL PRIORITIES" and is dated April 2023. The bottom sheet is titled "ACHIEVING ZERO FOOD WASTE: A State Policy Toolkit" and is dated May 2023. Both sheets feature logos for NRDC, FLPCL (Food Law and Policy Clinic), ReFED, and WWF.

**ZERO FOOD WASTE COALITION'S TOP FARM BILL PRIORITIES**

In the United States, approximately 38 percent of all food goes uneaten, which releases greenhouse gas emissions equivalent to 372 million tons of carbon dioxide across its lifecycle. We also spend \$44.4 billion annually to produce, distribute, and dispose of it. Despite the surplus of food produced, 10.5 percent of American households face food insecurity.

**ACHIEVING ZERO FOOD WASTE**

**A State Policy Toolkit**

MAY 2023

<https://zerofoodwastecoalition.org/>

For further information, please contact:

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refed.org  
insights.refed.org



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