



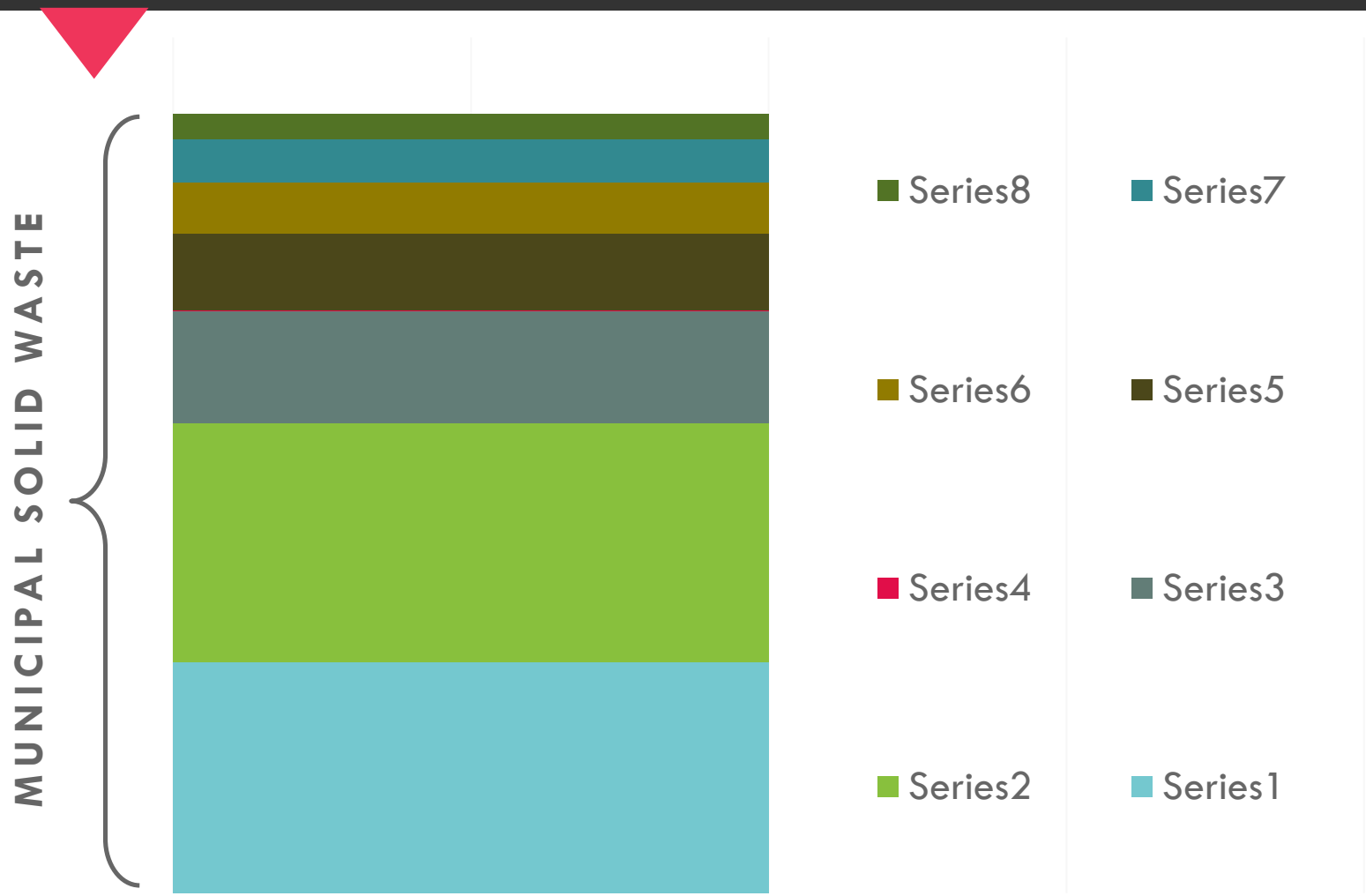
TECHNOLOGIES FOR PREVENTION, RECOVERY & RECYCLING OF FOOD WASTE

Hunt Briggs, RRS

Midwest Food Recovery Summit

September 2017

THE U.S. WASTE AND RECOVERY SYSTEM



*US EPA defines Recovery Rate as Recycling and Composting. 65% of US population has curbside access. C&D is accounted for separately.

THE U.S. WASTE AND RECOVERY SYSTEM

MUNICIPAL SOLID WASTE

34.3%
2013 US Recovery Rate*

52.8%
Landfill

12.9% Waste to Energy



8.9%
AVG ORGANICS
RECYCLING RATE



25.4%*
AVG RECYCLING
RATE

ASPIRATION

Zero Waste
Circular Economy

*US EPA defines Recovery Rate as Recycling and Composting. 65% of US population has curbside access. C&D is accounted for separately.



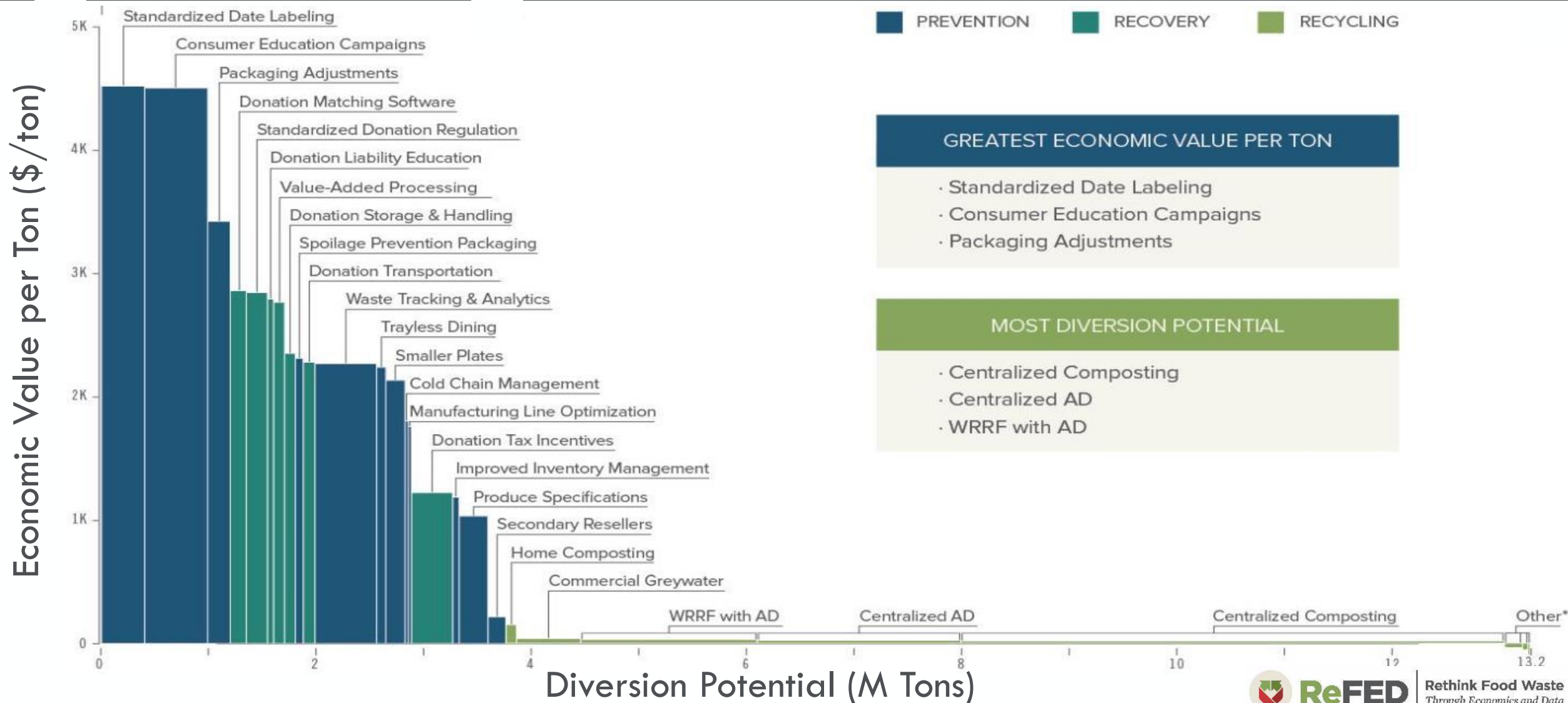
REFED'S ROADMAP TO REDUCE U.S. FOOD WASTE



THE ROADMAP TO REDUCE U.S. FOOD WASTE BY 20 PERCENT

- *A data-driven guide for businesses, government, funders, and nonprofits to collectively reduce food waste at scale*
- *Identifies the most cost-effective solutions*
- *Defines research priorities in an effort to spur multi-stakeholder action.*

MARGINAL FOOD WASTE ABATEMENT COST CURVE



27 REFED SOLUTIONS EVALUATED

PREVENTION SOLUTIONS

Packaging, Product & Portions	Standardized Date Labeling
	Packaging Adjustments
	Spoilage Prevention Packaging
	Produce Specifications (Imperfect Produce)
	Smaller Plates
	Trayless Dining
Operational & Supply Chain Efficiency	Waste Tracking & Analytics
	Cold Chain Management
	Improved Inventory Management
	Secondary Resellers
	Manufacturing Line Optimization
Consumer Education	Consumer Education Campaigns

RECOVERY SOLUTIONS

Donation Infrastructure	Donation Matching Software
	Donation Storage & Handling
	Donation Transportation
	Value-Added Processing
Donation Policy	Donation Liability Education
	Standardized Donation Regulation
	Donation Tax Incentives

Criteria for Selection

Available Data

Cost effective

Feasible

Scalable

RECYCLING SOLUTIONS

Energy & Digestate	Centralized Anaerobic Digestion (AD)
	Water Resource Recovery Facility (WRRF) with AD
On-Site Business Processing Solutions	In-Vessel Composting
	Commercial Greywater
Agricultural Products	Community Composting
	Centralized Composting
	Animal Feed
	Home Composting



ReFED

Rethink Food Waste
Through Economics and Data

REFED SOLUTIONS & THE ROLE OF TECHNOLOGY

PREVENTION SOLUTIONS	
Packaging, Product & Portions	Standardized Date Labeling
	Packaging Adjustments
	Spoilage Prevention Packaging
	Produce Specifications (Imperfect Produce)
	Smaller Plates
	Trayless Dining
Operational & Supply Chain Efficiency	Waste Tracking & Analytics
	Cold Chain Management
	Improved Inventory Management
	Secondary Resellers
Consumer Education	Manufacturing Line Optimization
	Consumer Education Campaigns

RECOVERY SOLUTIONS	
Donation Infrastructure	Donation Matching Software
	Donation Storage & Handling
	Donation Transportation
	Value-Added Processing
Donation Policy	Donation Liability Education
	Standardized Donation Regulation
	Donation Tax Incentives

Criteria for Selection
Available Data
Cost effective
Feasible
Scalable

RECYCLING SOLUTIONS	
Energy & Digestate	Centralized Anaerobic Digestion (AD)
	Water Resource Recovery Facility (WRRF) with AD
On-Site Business Processing Solutions	In-Vessel Composting
	Commercial Greywater
Agricultural Products	Community Composting
	Centralized Composting
	Animal Feed
	Home Composting



ReFED

Rethink Food Waste
Through Economics and Data

PREVENTION SOLUTIONS

MOST SCALABLE PREVENTION SOLUTIONS:

- *STANDARDIZED DATE LABELING*
- *CONSUMER EDUCATION CAMPAIGNS*
- *WASTE TRACKING & ANALYTICS*



ReFED

Rethink Food Waste
Through Economics and Data

The background of the slide is a close-up photograph of several cardboard berry containers. These containers are filled with a variety of fresh berries, including bright red raspberries, dark blue blueberries, and clusters of blackberries. Some strawberries are also visible. The berries are arranged in neat rows within the containers, which are made of light-colored cardboard. A semi-transparent teal rectangular box is centered over the image, containing the title text.

FOOD WASTE PREVENTION TECHNOLOGIES

WASTE TRACKING & ANALYTICS

Prevention

Operational
Efficiency

Waste
Tracking &
Analytics

DATA ON WASTEFUL PRACTICES
CAN INFORM BEHAVIOR AND
OPERATIONAL CHANGES



INVENTORY MANAGEMENT

Prevention

Operational
Efficiency

Inventory
Management

IMPROVING RETAILER ABILITY TO
TRACK PRODUCT SHELF-LIFE AND
DAYS ON HAND



PACKAGING ADJUSTMENTS

Prevention

Packaging
& Portions

Packaging
Adjustments

OPTIMIZING
PACKAGING
SIZE/DESIGN



SPOILAGE PREVENTION

Prevention

Packaging
& Portions

Spoilage
Prevention
Packaging

ACTIVE PACKAGING TO PROLONG FRESHNESS



ETHYLENE INHIBITION

Prevention

Extending
Shelf Life

Plant
Hormone
Inhibition

PRODUCTS THAT ABSORB OR
CONVERT ETHYLENE
(IN PACKAGE OR SEPARATE)



Source: thebluapple.com/



* Extra Life® Producer Saver



EXTENDING SHELF LIFE

Prevention

Extending
Shelf Life

Bacterial
Inhibition/Air
Circulation

BACTERIAL/FUNGAL
INHIBITION & IMPROVED
AIR CIRCULATION



SENSORY EXPIRATION DATES

Prevention

Consumer
Meal
Planning

Sensory
Expiration
Dates

CHANGES IN COLOR, TEXTURE INDICATE
WHEN A PRODUCT IS APPROACHING
OR PAST EXPIRATION



SMART APPLIANCES

Prevention

Consumer
Meal
Planning

Smart
Appliances

FEATURES INCLUDE:

- CAMERAS
- NOTIFICATIONS
- REMOTE TEMPERATURE CONTROL



CONSUMER MEAL PLANNING

Prevention

Consumer
Meal
Planning

Meal
Planning
Apps

MEAL SHOPPING & PLANNING APPS

- OFFER EDUCATION AND ADVANCE PLANNING





FOOD RECOVERY TECHNOLOGIES

RECOVERY SOLUTIONS



TOP RECOVERY SOLUTIONS

- *DONATION TAX INCENTIVES*
- *STANDARDIZED DONATION REGULATION*
- *DONATION MATCHING SOFTWARE*



ReFED

Rethink Food Waste
Through Economics and Data

DONATION MATCHING

Recovery

Donation
Infrastructure

Donation
Matching
Software

 re-plate



DONATION MATCHING

Recovery

Donation
Infrastructure

Donation
Matching
Software



DONATION MATCHING

Recovery

Donation
Infrastructure

Donation
Matching
Software



JOIN NOW

Food waste is like climate change – a complex network problem that is difficult to solve part way



DOWNLOAD
WHITEPAPER

FOOD COWBOY
USES LOCATION-BASED TECHNOLOGY TO ROUTE FOOD WASTE TO ITS



"LIKE MATCH.COM FOR FOOD WASTE"

FOOD COWBOY INVESTS 2/3 OF ITS REVENUE IN FOOD CHARITIES AND WASTE-REDUCING BUSINESSES AND TECHNOLOGIES



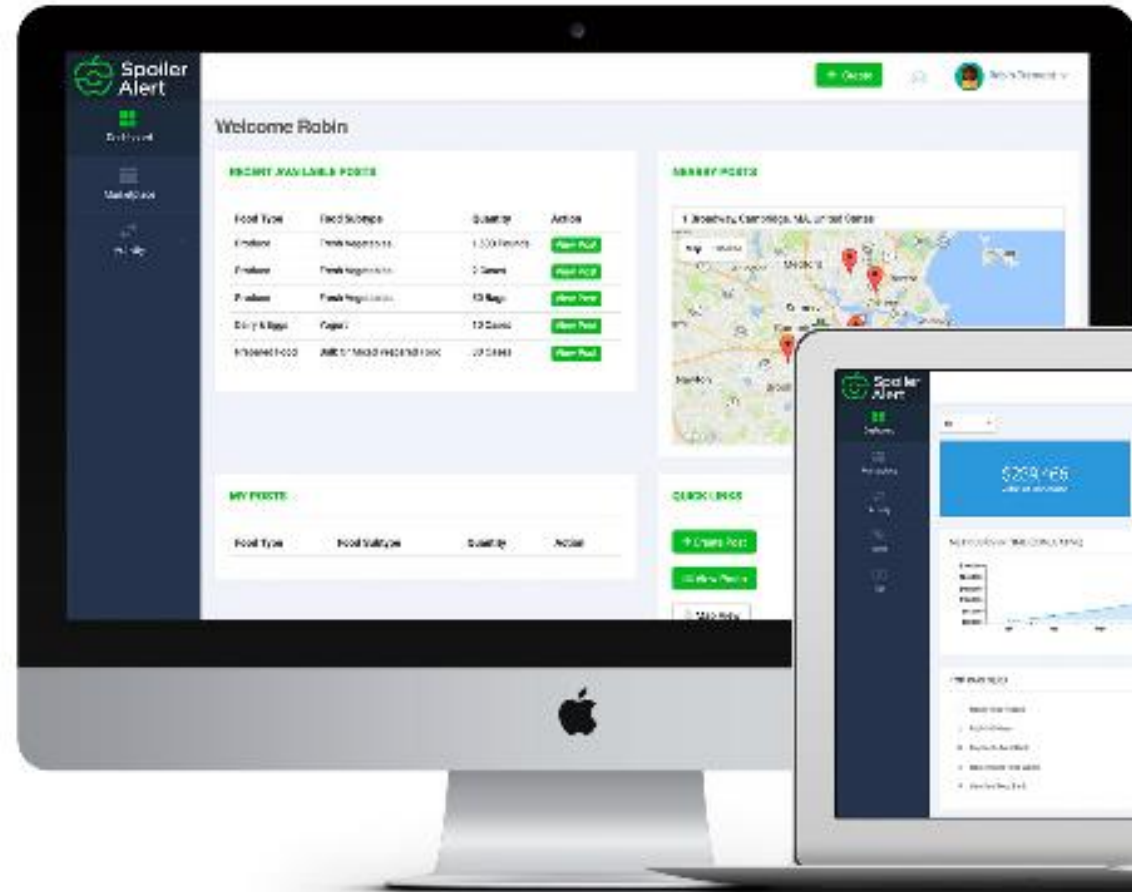


Recovery

Donation Infrastructure



Donation Matching Software

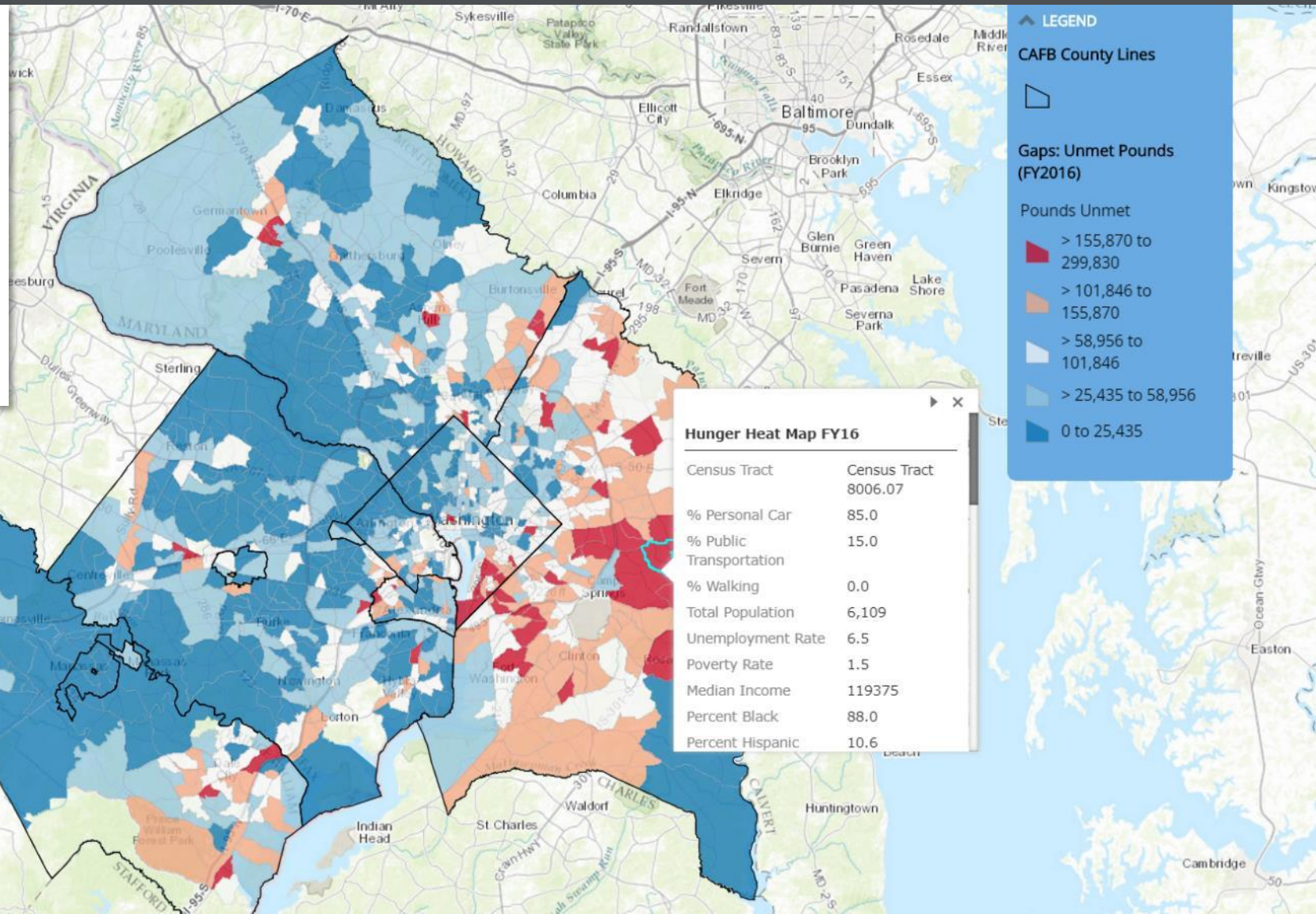


DONATION MATCHING SOFTWARE

Recovery

Donation
Infrastructure

Donation
Storage &
Handling



DONATION STORAGE & HANDLING

Recovery

Donation
Infrastructure

Donation
Storage &
Handling





FOOD RECYCLING TECHNOLOGIES

RECYCLING SOLUTIONS

MOST SCALABLE RECYCLING SOLUTIONS:

- *Centralized Composting*
- *Centralized Anaerobic Digestion (AD)*
- *Co-digestion Water Resource Recovery Facility*



ReFED

Rethink Food Waste
Through Economics and Data

CENTRALIZED COMPOSTING

Recycling

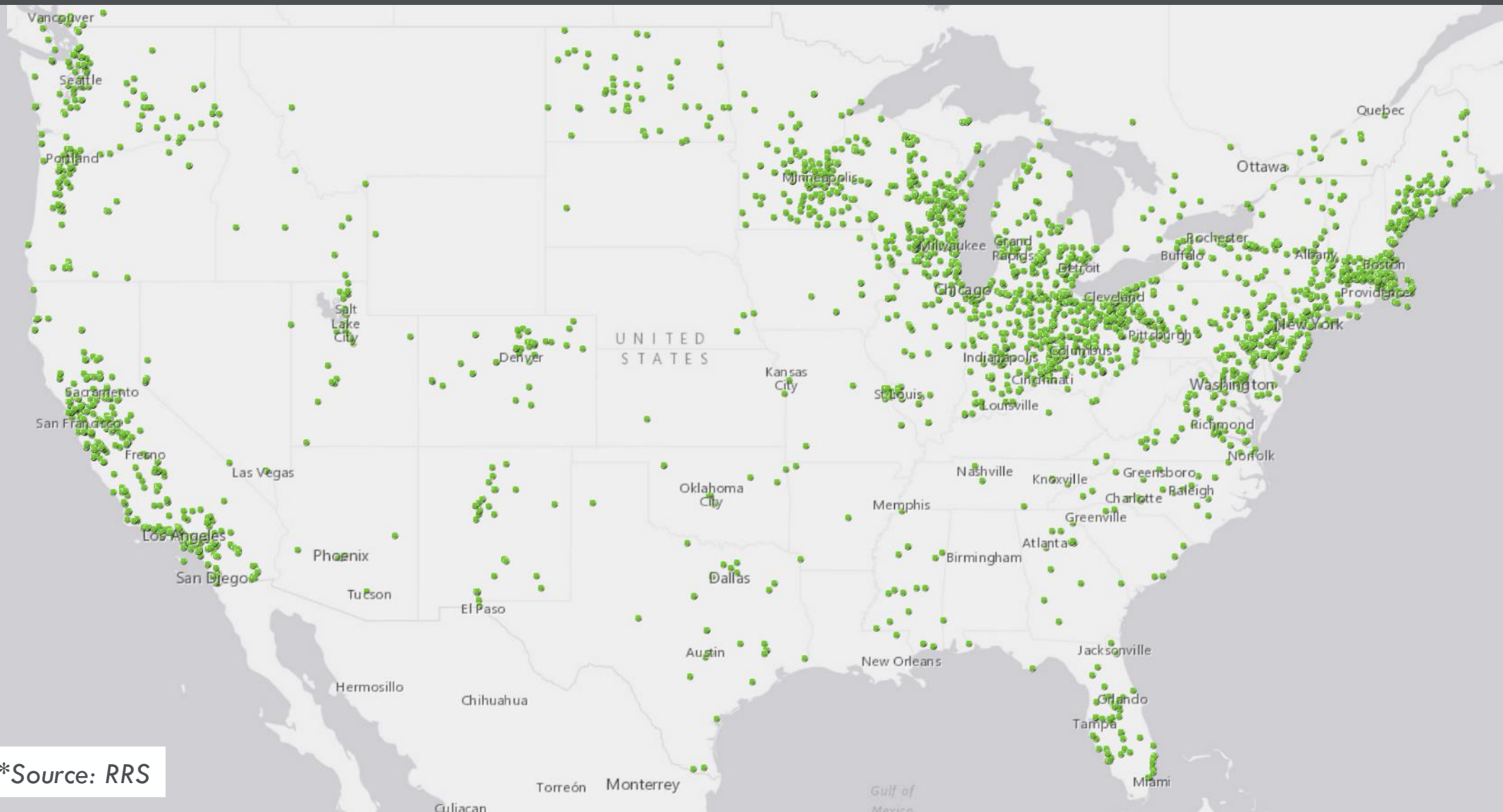
Agricultural
Products

Centralized
Composting



U.S. Army Corps of Engineers photo by Carol E. Davis

COMPOSTERS IN U.S.



*Source: RRS

IN-VESSEL COMPOSTING

Recycling

Agricultural
Products

Centralized
Composting



ANAEROBIC DIGESTION

Recycling

Energy &
Digestate

Anaerobic
Digestion
(AD)



CENTRALIZED AD

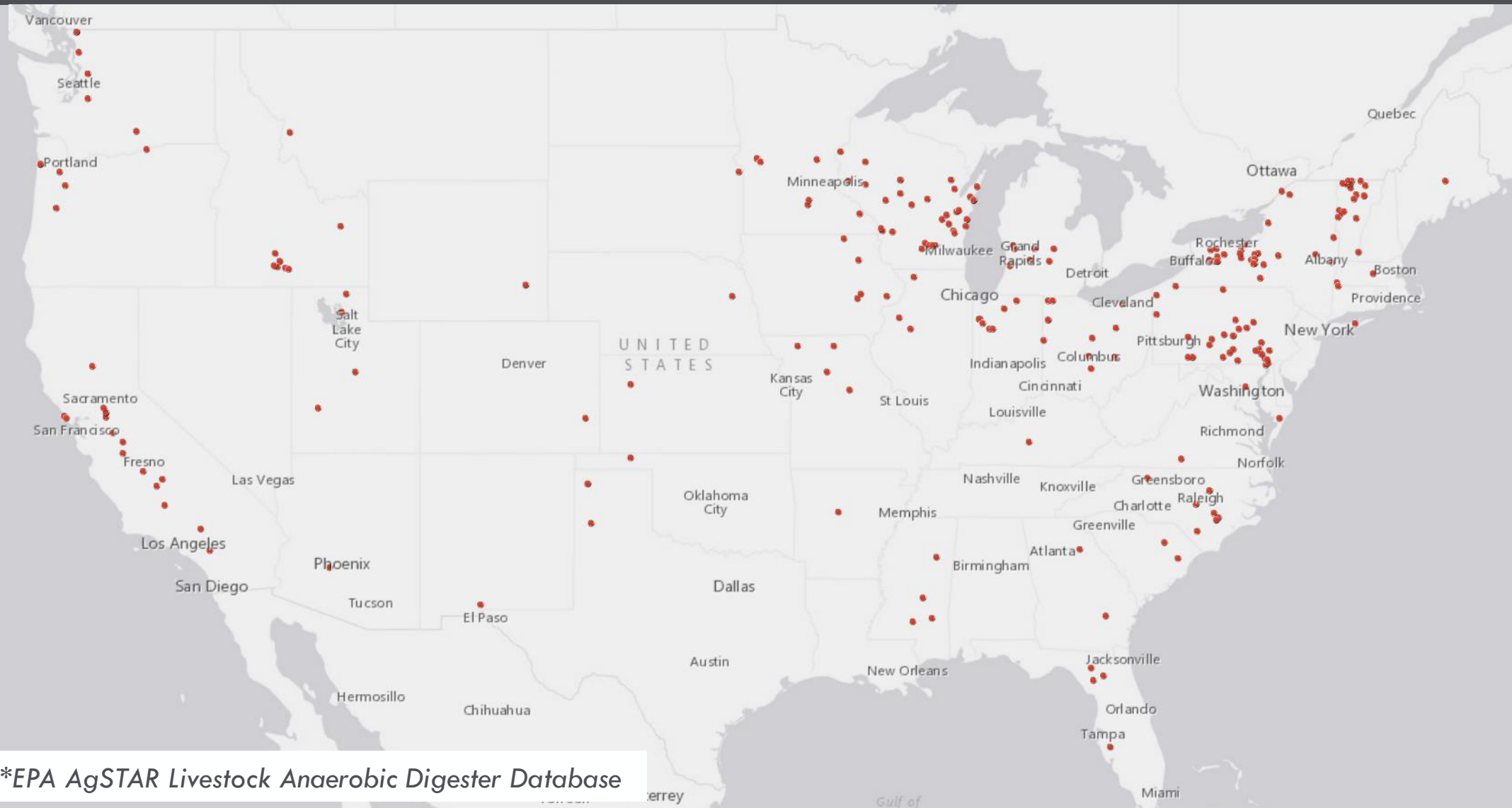
Recycling

Energy &
Digestate

Anaerobic
Digestion
(AD)



AGRICULTURAL DIGESTERS IN U.S.



**EPA AgSTAR Livestock Anaerobic Digester Database*

WRRF CO-DIGESTION

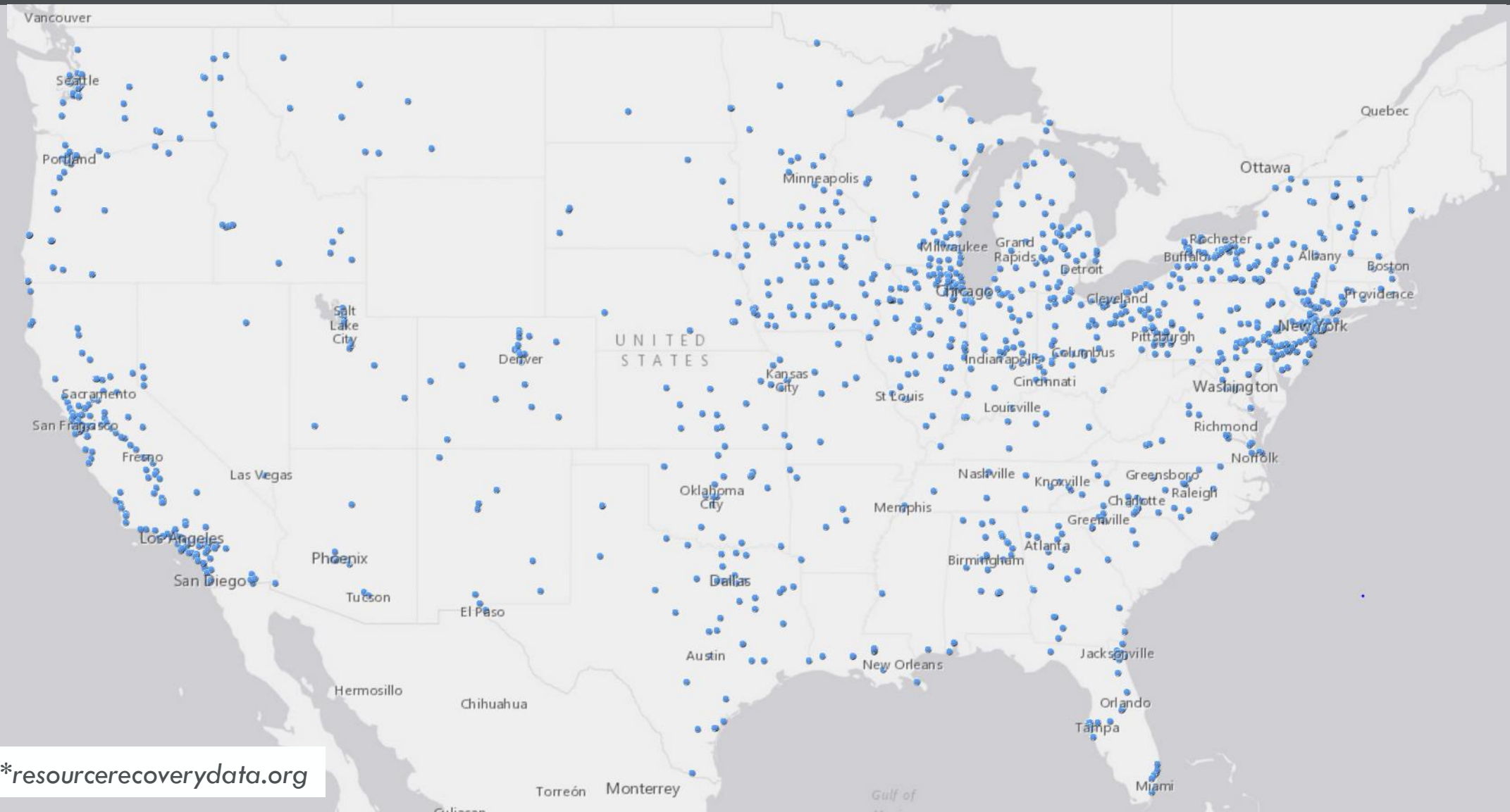
Recycling

Energy &
Digestate

Anaerobic
Digestion
(AD)



WATER RESOURCE RECOVERY FACILITIES WITH AD



*resourcerecoverydata.org

DISTRIBUTED AD TECHNOLOGIES LOOK TO PROCESS ORGANICS ON-SITE

EXAMPLES:

- *IMPACT BIOENERGY, HORSE*
- *SEAB, MUCKBUSTER*



ONSITE SOLUTIONS

Recycling

On-Site
Business
Processing

Various
Solutions

ONSITE PRE-PROCESSING
& ADVANCED STORAGE

DEWATERING

ONSITE
PROCESSING
TECHNOLOGIES

AEROBIC DIGESTERS

DEHYDRATION



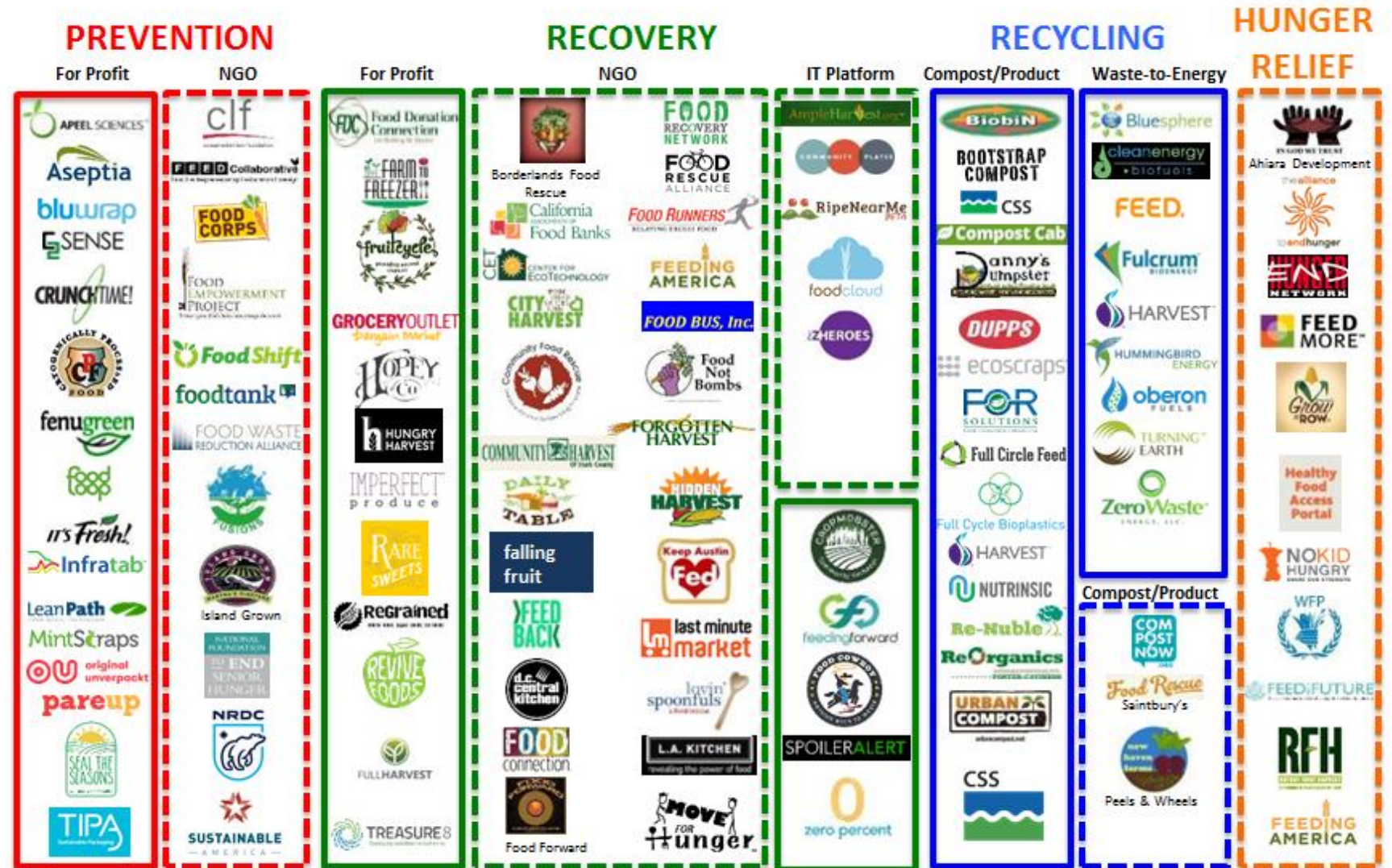
INNOVATING SOLUTIONS FOR FOOD WASTE

INNOVATION



Big Opportunity:

- Packaging & Labeling
- IT-enabled Transportation & Storage
- Logistics Software
- Valued-add Compost Products
- Distributed Recycling

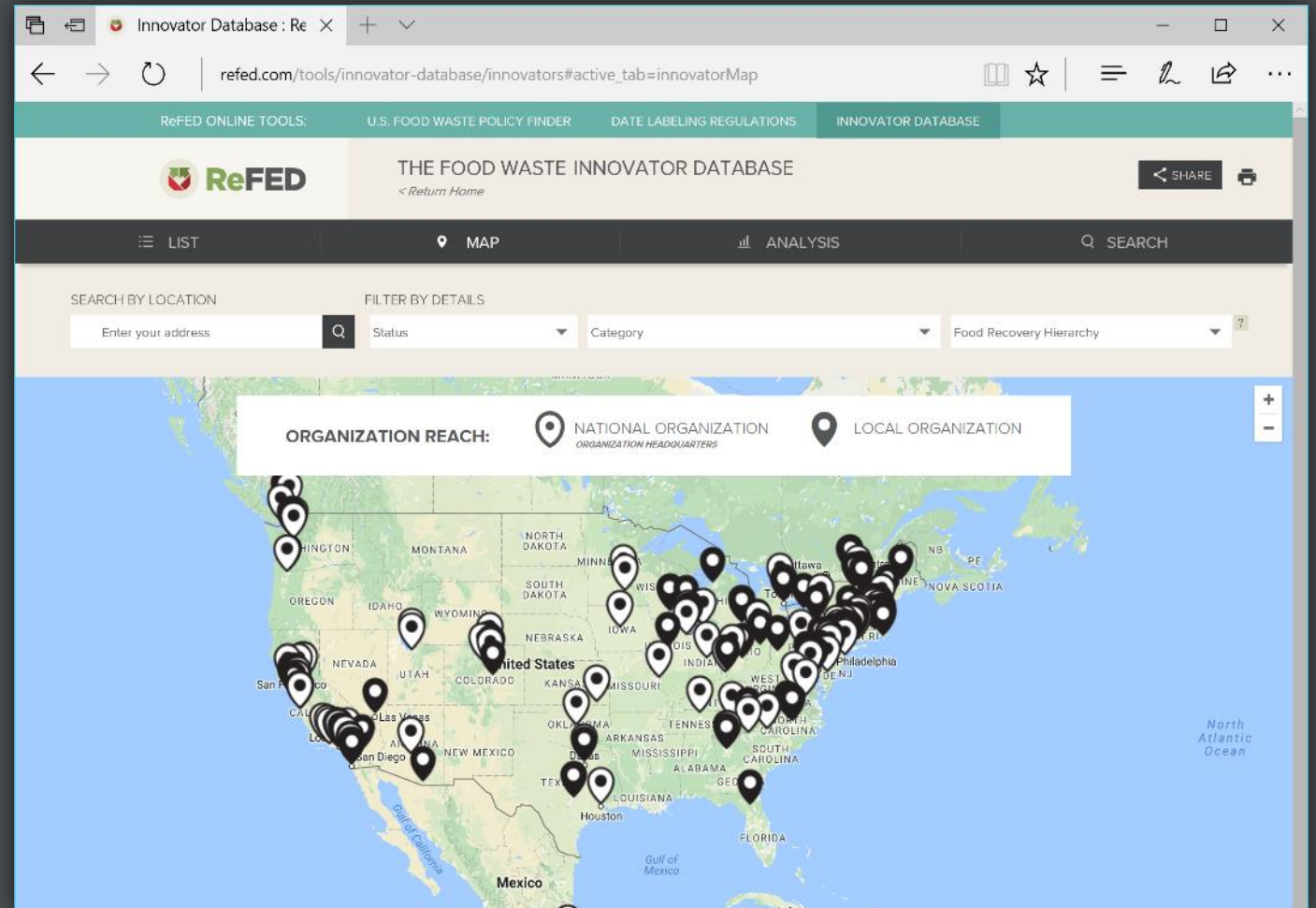


REFED INNOVATOR DATABASE

Focus on food
waste innovation

+

Complementary
tools that list
additional
organizations
tackling food
waste.



[Refed.com/tools](https://refed.com/tools)



ReFED

Rethink Food Waste
Through Economics and Data

REFED INNOVATOR DATABASE

TRACKS 300+ COMMERCIAL AND NON-PROFIT FOOD WASTE INNOVATORS

TOP RECYCLING CATEGORIES:

Agricultural Products



Energy & Digestate



Value-Added Recycling



TOP RECOVERY CATEGORIES (DONATION):

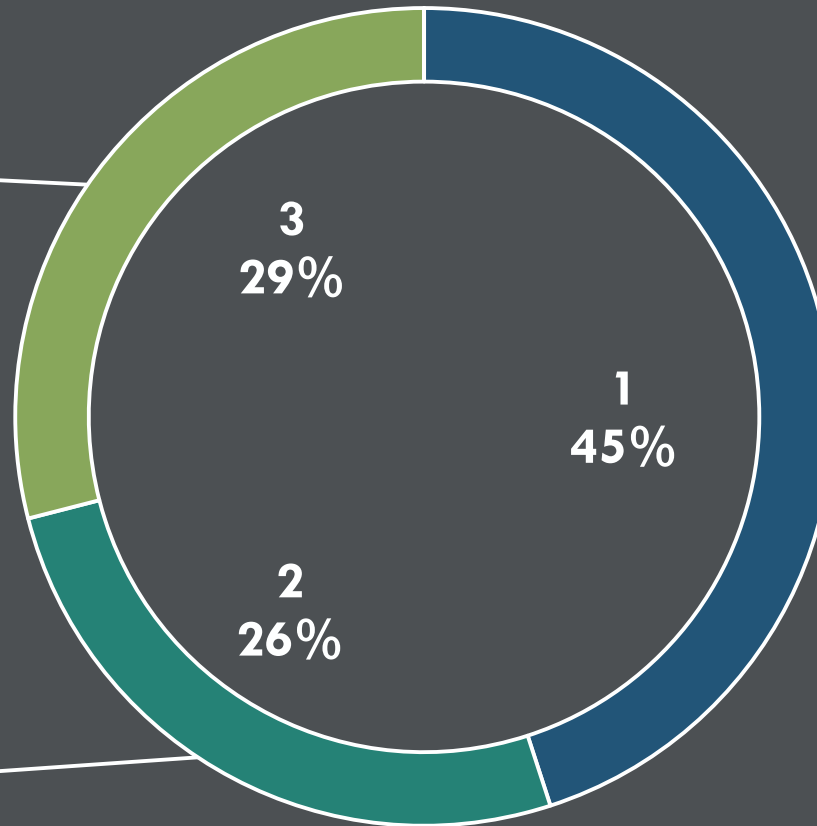
Matching Platforms



Transportation



Storage & Handling



TOP PREVENTION CATEGORIES:

Upcycling Edible Food Scraps



Operational & Supply Chain Efficiency



Secondary Online Marketplaces



FOOD WASTE ALLIANCE | OPENIDEO FOOD WASTE CHALLENGE

The Fink Family
Foundation

Pisces Foundation

ReFED

The Rockefeller
Foundation

OpenIDEO

foodwaste.openideo.com/#join-us

The screenshot shows the OpenIDEO website for the Food Waste Challenge. The header includes the OpenIDEO logo and navigation links: Challenges, Chapters, About Us, Community, and Stories. A search bar and a 'SIGN UP or LOGIN' button are in the top right. The main banner features a collage of fresh vegetables and the challenge title: 'How might we dramatically reduce waste by transforming our relationship with food?'. Below the banner is a progress bar with six stages: Research (269 contributions), Ideas (455 ideas), Feedback (455 final ideas), Refinement (41 final ideas), Final Feedback (41 final ideas), and Top Ideas (Announced!). The 'Top Ideas' section includes a congratulatory message and a paragraph about the Food Waste Alliance. Below this is a 'RESOURCES' section with three links: 'Read the Food Waste Challenge Look Back Report', 'Learn more about the Food Waste Alliance', and 'Download the Top Ideas Showcase'. The bottom section displays '12 CONTRIBUTIONS' sorted by comments, with three featured ideas: 'RISE', 'COATING THE PROCESS', and 'A Robust System for Re-Plating Surplus Meals'.

OpenIDEO - How might we dramatically reduce waste by transforming our relationship with food?

OpenIDEO is an open innovation platform. Join our global community to solve big challenges for social good. [Sign up](#), [Login](#) or [Learn more](#).

Research 269 contributions Ideas 455 ideas Feedback 455 final ideas Refinement 41 final ideas Final Feedback 41 final ideas Top Ideas Announced!

Top Ideas

Congratulations to our Top Ideas and to our entire community for your efforts creating, collaborating, building and refining throughout the challenge.

We are excited to share that this global food waste innovation momentum is continuing! Following the Food Waste Challenge, we invited a cohort of the best and brightest ideas, startups, and efforts to join us in the Food Waste Alliance to catalyze ongoing food waste impact. Currently in beta testing phase with a targeted community of Innovators, we expect to launch the Food Waste Alliance community globally during the summer of 2017.

We hope you will join us in designing a future without waste!

RESOURCES

- Read the Food Waste [Challenge Look Back Report](#)
- Learn more about the [Food Waste Alliance](#)
- Download the [Top Ideas Showcase](#)

12 CONTRIBUTIONS SORTED BY COMMENTS

RISE

RISE + Feedback + Wine update - October 13

We turn organic by-products into healthy and

COATING THE PROCESS

UPDATED: Our Sustainable dehydration turns post-harvest food waste into profits for producers and nutrition for People! (Comments on

A Robust System for Re-Plating Surplus Meals

(Update: 10/15/2016 Notes from App Critique)

FURTHER WITH FOOD

PARTNERS

 Academy of Nutrition and Dietetics

 FEEDING AMERICA

 FMI
THE VOICE OF FOOD RETAIL

 GMA
The Association of Food, Beverage and Consumer Products Companies

 INNOVATION
CENTER FOR U.S. DAIRY
HEALTHY PEOPLE • HEALTHY PRODUCTS • HEALTHY PLANET

 NCL
NATIONAL CONSUMERS LEAGUE

 NATIONAL
RESTAURANT
ASSOCIATION

 NRDC

 USDA

 EPA
United States
Environmental Protection
Agency

 WORLD
RESOURCES
INSTITUTE

 WWF



Resources - Further Wit x

Resources - Further With Food

ABOUT THIS SITE HOW TO USE THIS SITE

Search

FIND RESOURCES SHARE RESOURCES FIND EVENTS UNDERSTAND THE ISSUE

Resources

FILTER

SORT: Date Name Recommendations

Viewing: 1-10 of 195

- + Topics
- + Audiences
- + Sources
- + Types
- Authors
- Tags

A Rocket composter landing in New York City's Meatpacking District

Date: 2017

Food Waste Experts

Global Food Waste: The Numbers Behind The Problem

Date: 2017

InSinkerator

ReFED Food Waste Policy Finder Webinar

Date: 2017

ReFED

OPPORTUNITIES TO REDUCE FOOD WASTE IN THE 2018 FARM BILL

Based on the 2018 report by the USDA and the Farm Bill

Wasted Food, Wasted Nutrients: Nutrient Loss from Wasted Food in the United States and Comparison to Gaps in

SCHOOL FOOD DONATION

Oakland Unified

Oakland Unified School District Food Donation Guide

Date: 2017

Nancy Deming



HUNT BRIGGS

Senior Consultant

828.423.0542

HBRIGGS@RECYCLE.COM

DONATION MATCHING

Recovery

Donation
Infrastructure

Donation
Matching
Software



Carrier 4:31 PM

Waste No Food

Welcome haldiram

Meals Picked Up	39
No. of Charities	36
No. of Donors	56

Reserve Food Accepted Donations

0 miles 34.9 miles 40 miles

12-18-2014	test prod	>
09/22/2014	100 pizzas	>

Carrier 4:30 PM

Waste No Food

Welcome rohit

Meals Picked Up	39
No. of Charities	36
No. of Donors	56

Donate My Donations

Food Description Enter Details

Approximate Value Enter Food Value

Photo

Pickup Date Select Date

Pickup Time Specify Time Range

Special Instructions Enter Details

Carrier 4:30 PM

Waste No Food

Diverting excess food to hungry people

Waste No Food is a registered nonprofit that provides a web-based "marketplace" allowing excess food to be donated from the food service industry to qualified charities that work with the needy.

Donor Charity Volunteer

Username

Password

Login

Forgot Password

Don't have an Account?

Sign Up

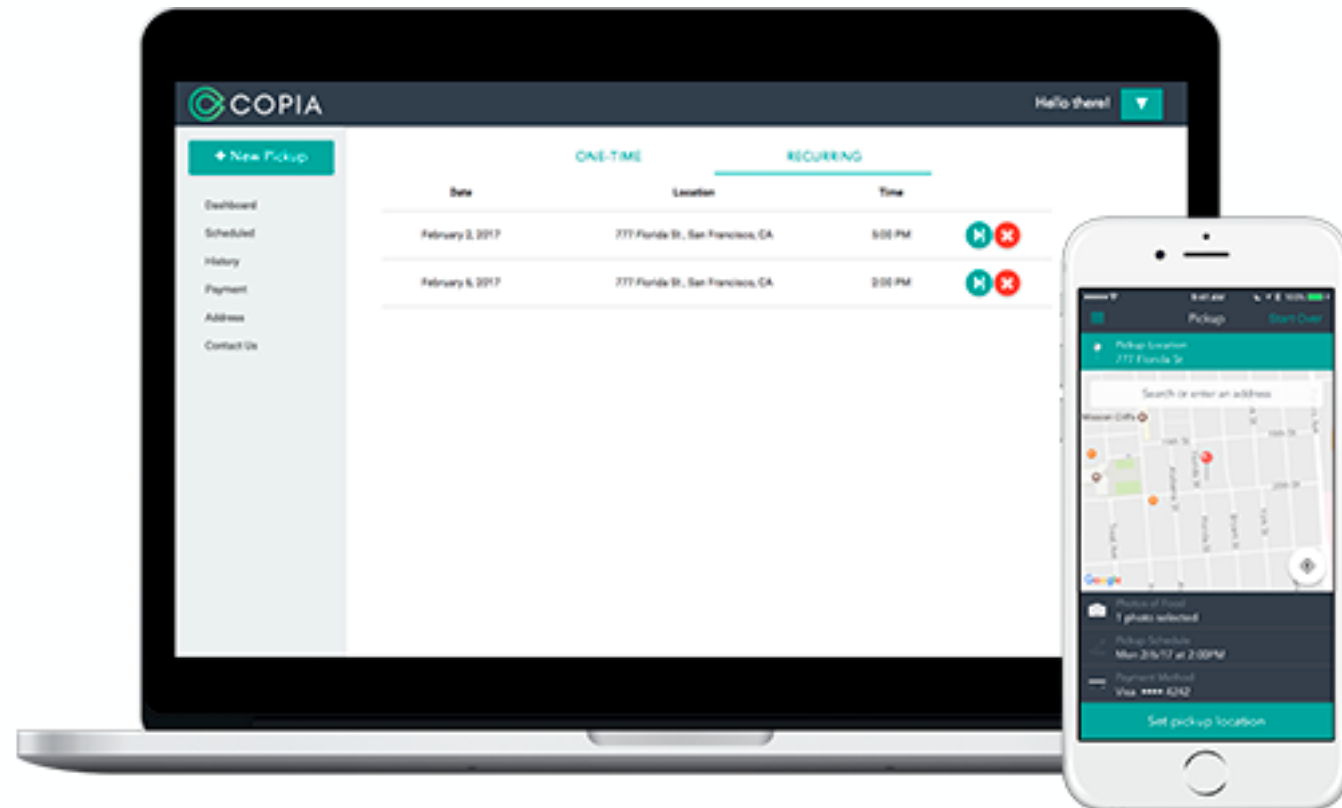
f WasteNofood @WasteNoFood

DONATION MATCHING

Recovery

Donation
Infrastructure

Donation
Matching
Software



PRESERVATION

Recovery

Preservation

Coatings & Stabilization

PRESERVATION & STABILIZATION

PS COATING THE PROCESS

This is PS Coating:
Our Safe, Natural, GMO free,
Proprietary protein coating.

Shields foods from bacteria
and oxygen,

Allows coated foods to be
dehydrated sustainably
using only airflow,

While maintaining full
nutritional value!

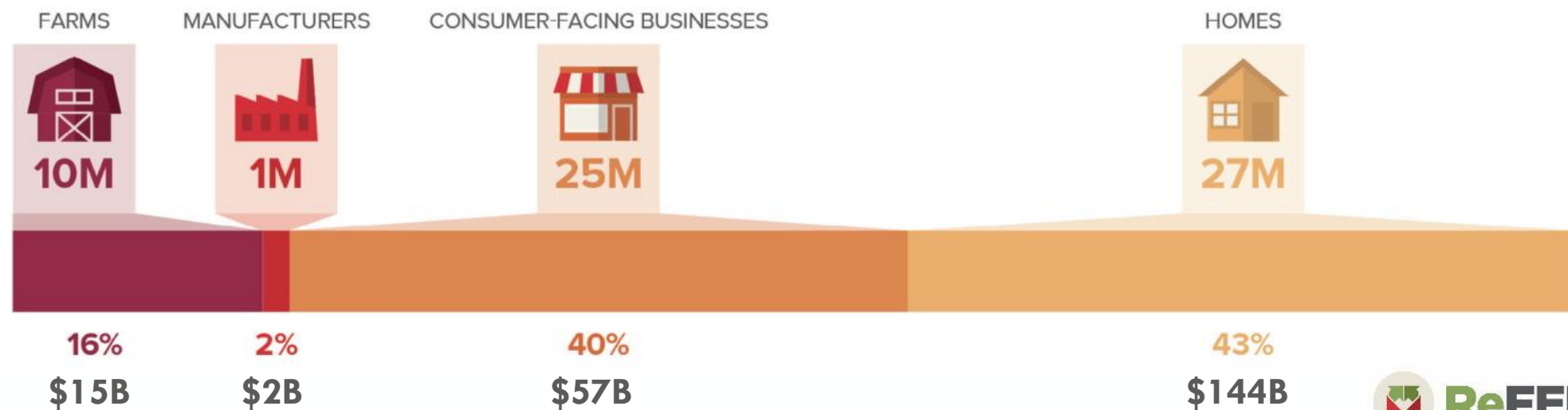
THE PRODUCT



MOST WASTE OCCURS AT THE CONSUMER LEVEL



FOOD WASTED BY WEIGHT — 63 MILLION TONS (\$218 BILLION)





IDEAS

- Ideas – Techbridge was B2C Matching
- Cold Chain Technology
- Module in SAP system for food recovery (tweak operating systems).
 - Hard to get them to use another system
 - Hilton –sustainability platform “Lightstay”. Created disposition within their platform to create ‘donation’ tag and that would link Good360
 - Wholesome Weight – Program for Snap users to use at farmers markets