

ECONOMICS OF FOOD WASTE REDUCTION AS A FUNCTION OF PACKAGING SOLUTIONS:

BUILDING THE BUSINESS CASE FOR PACKAGING SOLUTIONS TO FOOD WASTE

PRESENTED BY
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CREATED FOR

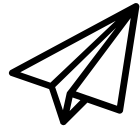


3rd INNOVATIONS IN FOOD PACKAGING
Shelf Life and Food Safety
8-10 Oct 2019, Munich, Germany

CREATED BY PTR www.PackagingTechnologyAndResearch.com

About PTR | Actionable innovation to reduce food waste with sustainable packaging solutions

Approach



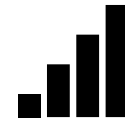
The future of more innovative food packaging is **complex, enchanting, and promising**

Numerous choices result in catharsis and focus is needed



Innovation requires a **business case**

A rational, defensible, and achievable strategy is needed



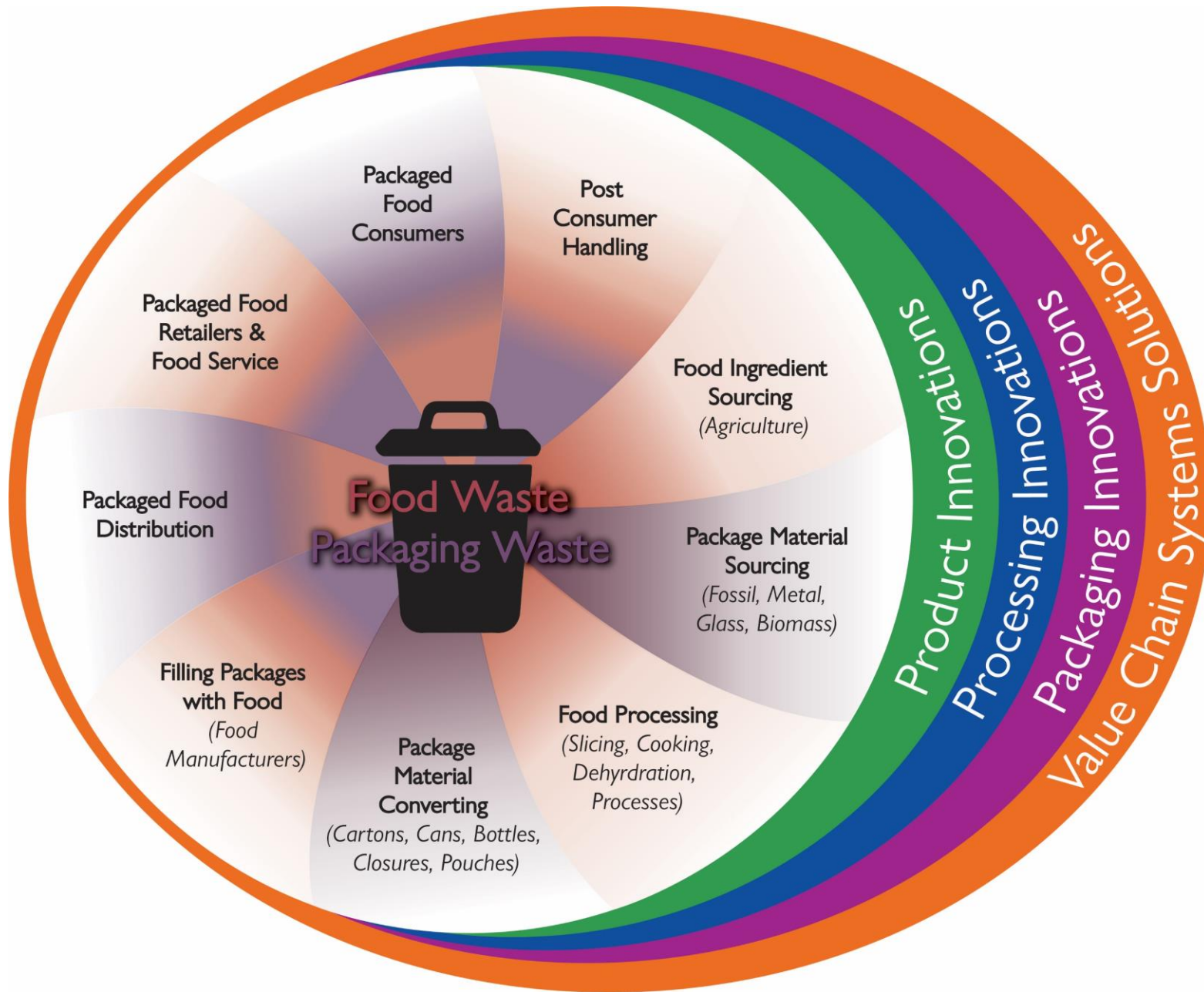
Gaps can be found

Technology can be used to **enable better alignment between consumer needs and market delivery**



Value chain connections **build in agility** for future

Hesitancy can be reduced with **more levers to drive switching**



About PTR | Dr. Claire Sand - Owner



Focused compelling food packaging expertise



Dr. Claire Sand is a Global Packaging Leader with 30+ years of broad experience in the food science and packaging spectrum. Sand leads food packaging efforts involving packaging solutions to food waste and more sustainable packaging, as well as provides compelling technology business cases and implementation roadmaps for innovative technologies. Dr. Sand is Owner and Founder of Packaging Technology and Research, LLC., and Adjunct Professor, and holds a doctorate in Food Science and Nutrition from the University of Minnesota and MS and BS in Packaging from Michigan State University.

"I am passionate about leading efforts to reduce climate change by preventing food waste with more sustainable packaging."

 SAN LUIS OBISPO CalPoly Adjunct professor	 Michigan State University Adjunct professor	 University of Minnesota Adjunct professor	 feeding the minds that feed the world IFT Fellow and monthly Packaging columnist for Food Technology magazine	 18 th World Congress of Food Science and Technology IUFoST Global Food Packaging Curricula Head	 Journal of Food Science Reviewer	 FOOD WASTE PAC Consortium on Food Waste CoChair
 Packaging Technology and Science An International Journal Packaging Science and Technology Editorial Board	 Phi Tau Sigma Strategic Relations & Affairs Chair	 Author	 Category Manager	 Principal	 Technical Business Manager	 Packaging - Gerber Baby Food

- Solutions using Strategy and Science
- Learn from PTR with presentations and articles at <http://www.packagingtechnologyandresearch.com/thought-leadership.html>

Executive Summary


ABOUT THIS PRESENTATION

30 min discussion on drivers to reduce food waste

1. More Sustainable Packaged Food

2. Drivers for Less Food Waste

3. Direction



1

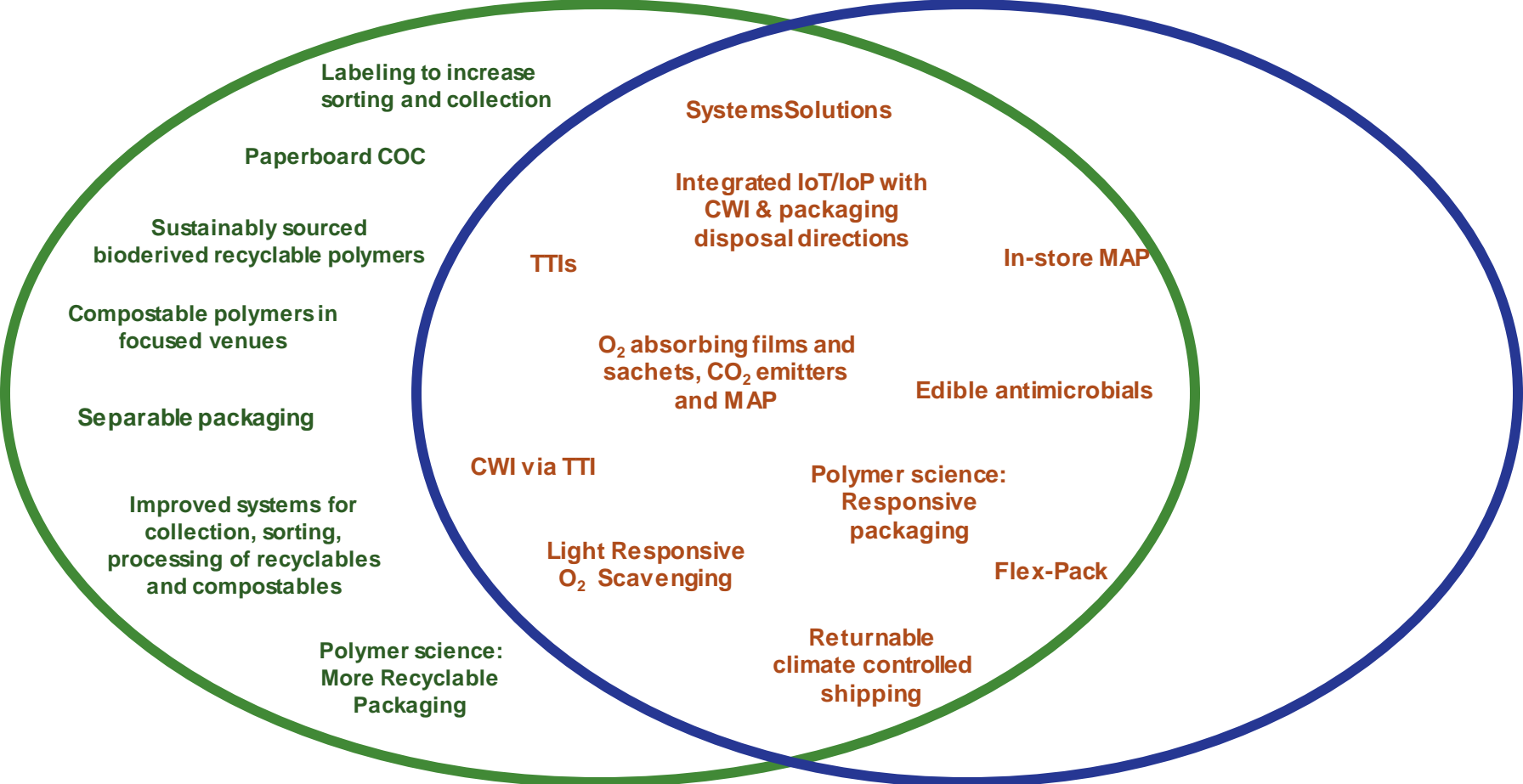
Building the business case for More Sustainable Packaged Food

Nexus of More Sustainable Packaging and Less Food Waste

More Sustainable Packaged Food = Least Food Waste with the Most Sustainable Packaging

More Sustainable Packaged Food

More Sustainable Packaging | Less Food Waste



Defining Sustainability

More Sustainable Packaged Food

The food industry is not considered wholly sustainable now

*the development that meets the needs of the present
without compromising the ability of
future generations to meet their own needs*

Brundtland Report UN (1987)

Consumer Behavior Theory can Guide

More Sustainable Packaged Food

Consumers want a more sustainable food supply

Value-action gap

Metamotivation

Barriers to Sustainable Behaviors

Theory of Reasoned Action & Theory of Planned Behavior

Spillover Effect

Social Desirability Bias

Consumers Driven to Sustainability Differently

More Sustainable Packaged Food

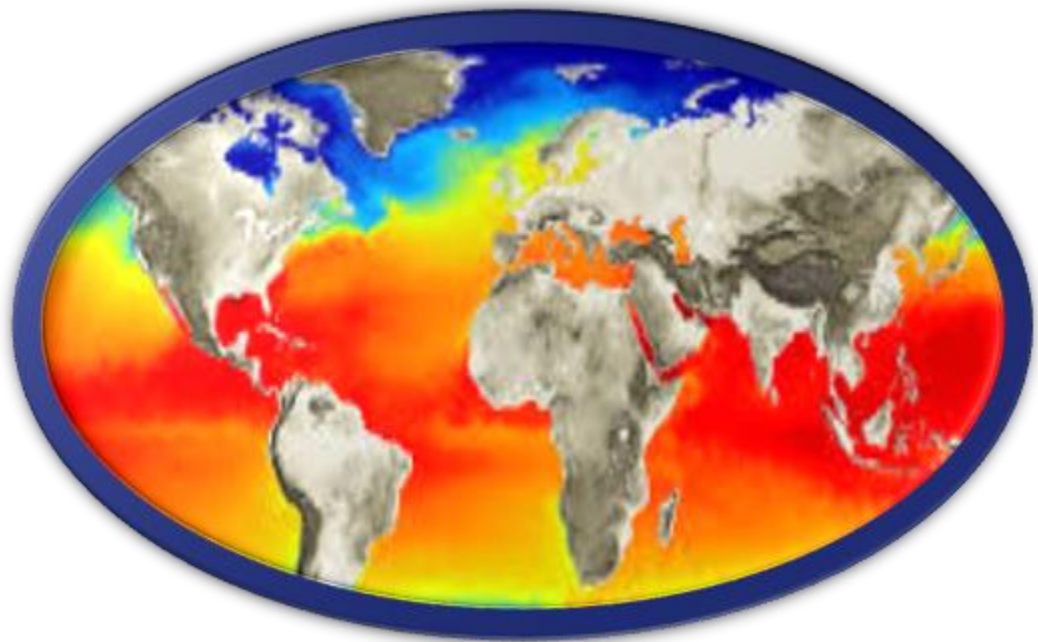
Many drivers with many solutions

Demographics

Norms and Values

income

Country of Origin



**Individual Consumer Views
on Sustainability**

2

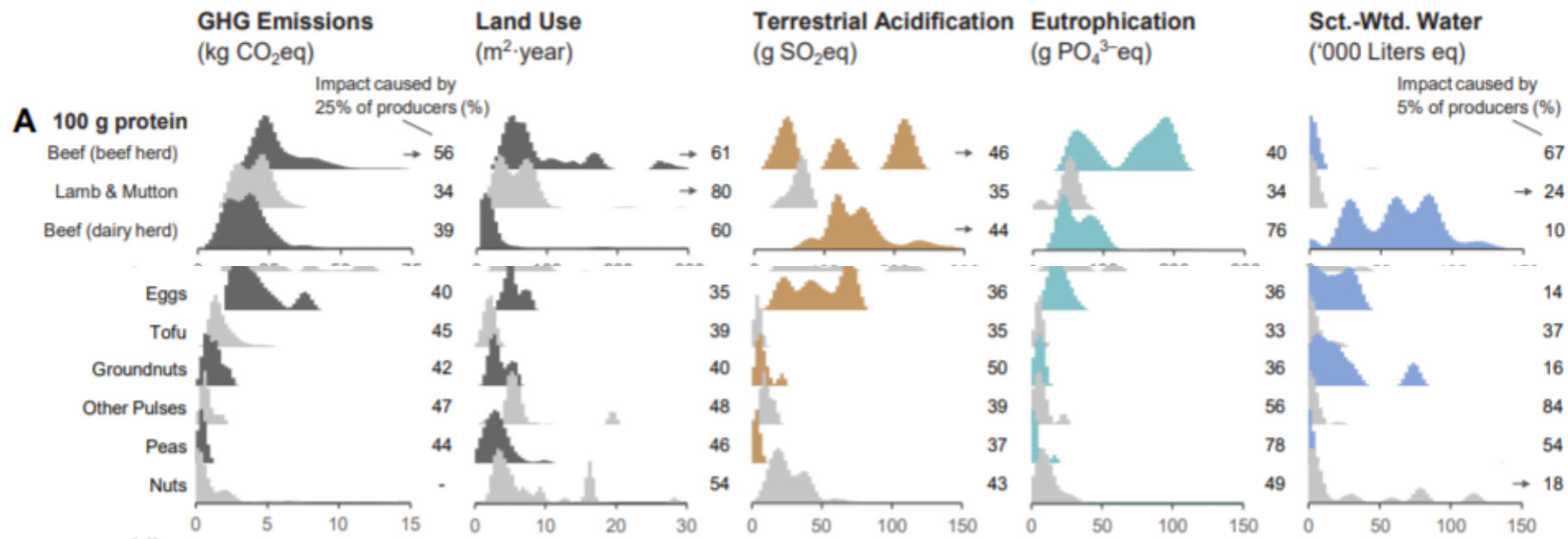
Building the business case for More Sustainable Packaged Food

Drivers for Less Food Waste

Consumers cannot see many Drivers to Reduce Food Waste

Less Food Waste

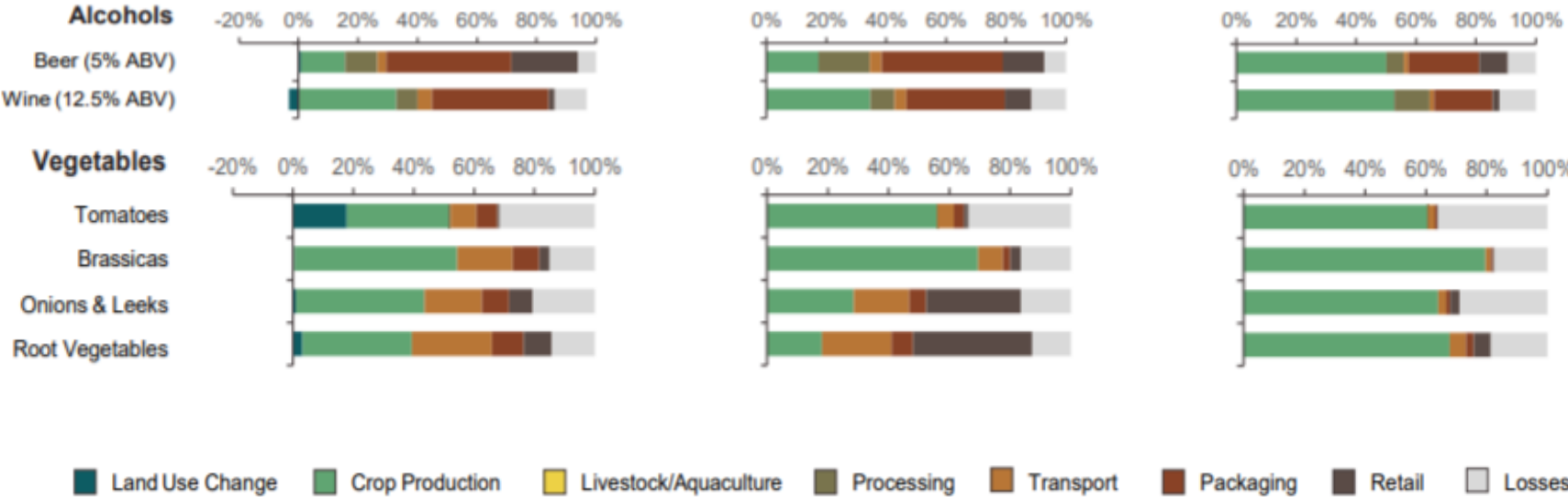
Consumers not directly impacted by environment they cannot see



Consumers have Strong Connections to Environment

Less Food Waste

- Connection to the impact of food & packaging on the environment is strong
- Consumers need information to drive their decision making
- Now it is smoke and mirrors in food as well as packaging



Poore and Nemecek, 2018

Economic Drivers to Reduce Food Waste Differ

Less Food Waste

Differing drivers are due to economic imbalance

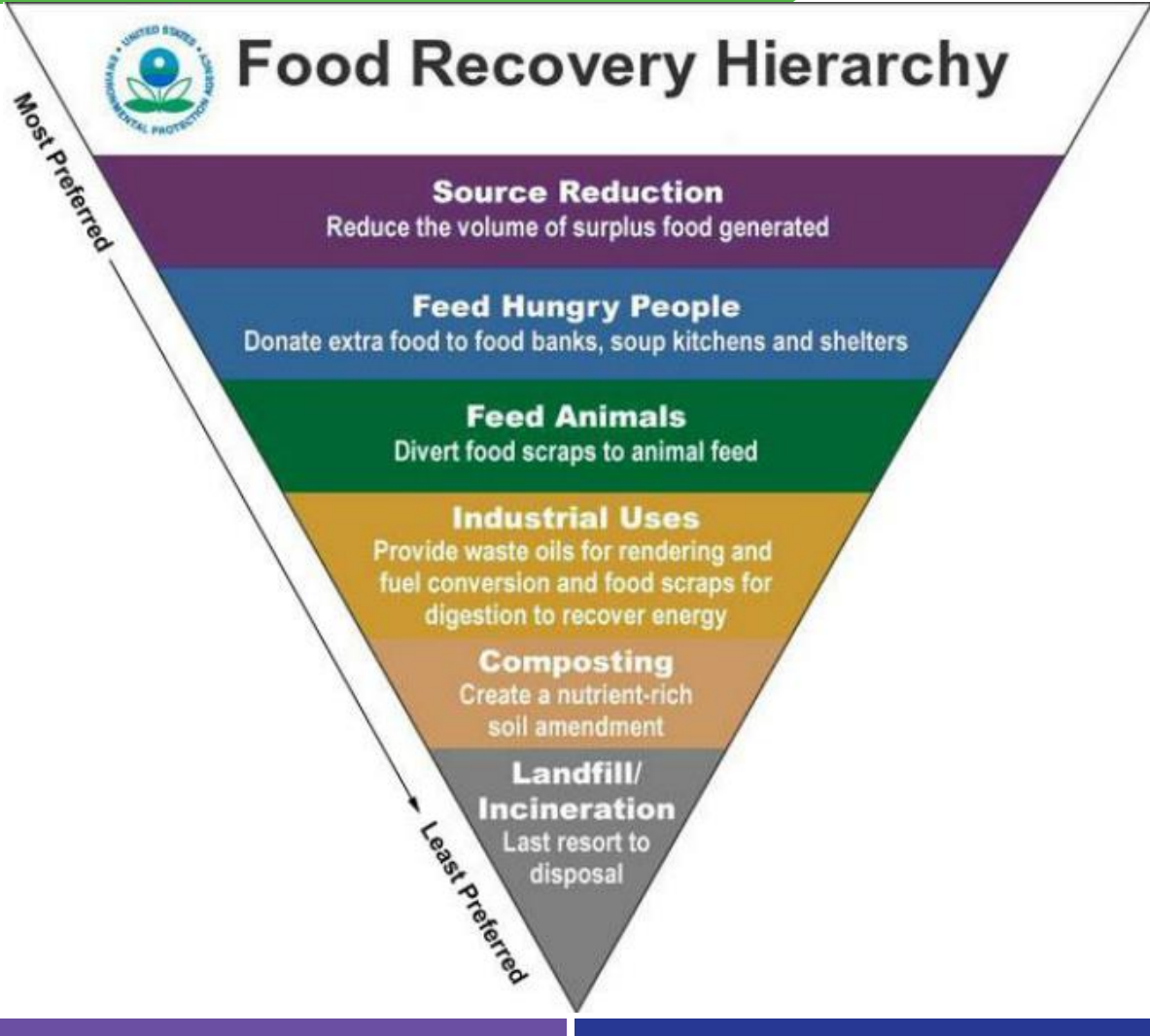
- Brand Owners
 - Have made major progress in economically driven food waste reduction from farm to retail
 - Have limited economic drivers reduce consumer-derived food waste
 - Gap in clear information filled by non-fact based misinformation
- Extending the value chain to Consumers who waste 30% of packaged food is needed
- Link to convenience and adding value of food waste reduction
 - Drivers on consumer sustainability
 - Drivers on Nutrient waste
 - WTP for less nutrient waste and less money lost on spoiled food
 - “Easy to empty” connects with consumers due to food waste reduction

Business and social drivers are increasing to Reduce Food Waste

Less Food Waste

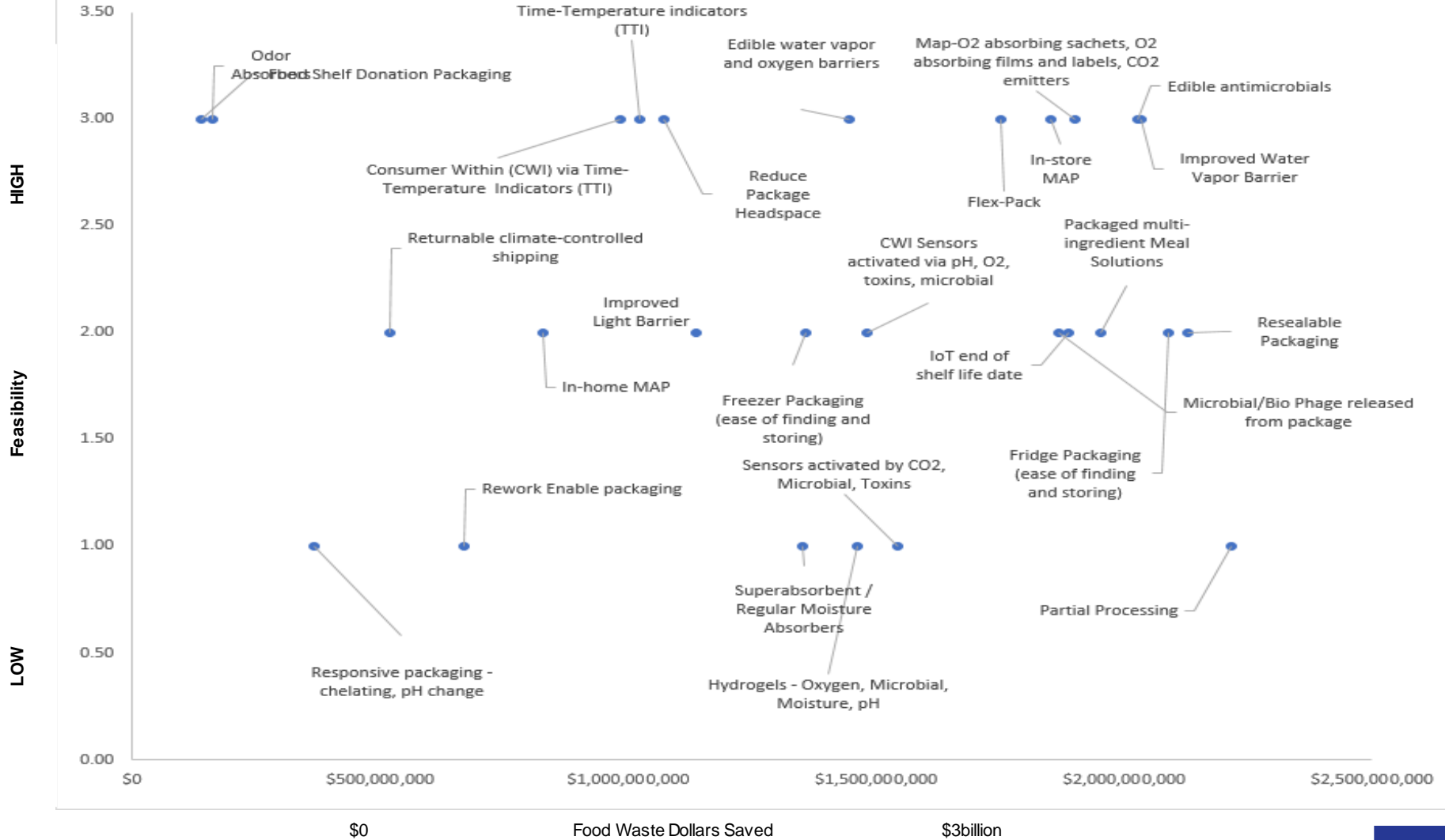
12 drivers on food systems for change, none connect to food waste (Bene, 2019)

- Shared value
- Social welfare
- Less climate change
- Food equity
- Environmental capital



Results – Snapshot of Total Food Waste Reduction as a function of Feasibility

Path Forward



Results – Impact of Package Solutions

Reduce Food Waste

		Scalable			PILOT			RESEARCH		
Category		Flex-Pack [\$1.7 B]	Time-Temperature Indicators (TTI) [\$1.0 B]	O2 absorbing sachets, CO2 emitters and MAP [\$1.9 B]	Edible antimicrobials [\$2.0 B]	Consume within via Time-Temperature Indicators (TTI) [\$1.0 B]	Fridge pack [\$2.1b]	IoT end of shelf life [\$1.9B]	CWI Sensors activated via pH, O2, toxins, microbial [\$958 M]	Microbial/Bio Phage released from package [\$1.8 B]
Supermarkets	Bakery									
	Dairy									
	Frozen foods									
	Meat									
	Produce									
	Seafood									
	Quick Serve Restaurant									
	Restaurants									
	Meal kits delivery									

>\$300M
 \$100M+
 <\$100M

Scalable Packaging Solutions to Food Waste

Reduce Food Waste

Scalable Solutions	Reduced Food Waste for Consumers	Reduced Food Waste for Supermarket	Reduced Food Waste for Restaurant	Total Reduced Food Waste	Total feasibility to Reduce more Food Waste
Resealable Packaging	\$1,095,133,320	\$450,491,688	\$581,538,462	\$2,127,163,470	
Improved Water Vapor Barrier	\$1,034,162,554	\$418,952,475	\$581,538,462	\$2,034,653,490	
Map-O2 absorbing sachets, O2 absorbing films and labels, CO2 emitters	\$884,293,744	\$433,883,841	\$581,538,462	\$1,899,716,046	
Flex-Pack	\$896,359,617	\$273,467,945	\$581,538,462	\$1,751,366,023	
Edible water vapor and oxygen barriers	\$446,254,803	\$419,899,801	\$581,538,462	\$1,447,693,066	
Improved Light Barrier	\$366,241,082	\$188,140,852	\$581,538,462	\$1,135,920,396	
Reduce Package Headspace	\$887,174,809	\$185,792,449	\$0	\$1,072,967,258	
Time-Temperature indicators (TTI)	\$219,276,551	\$224,021,084	\$581,538,462	\$1,024,836,096	
Odor Absorbers	\$100,696,804	\$60,808,515	\$0	\$161,505,319	

Low total feasibility in reducing more food waste	
Medium total feasibility in reducing more food waste	
High total feasibility in reducing more food waste	

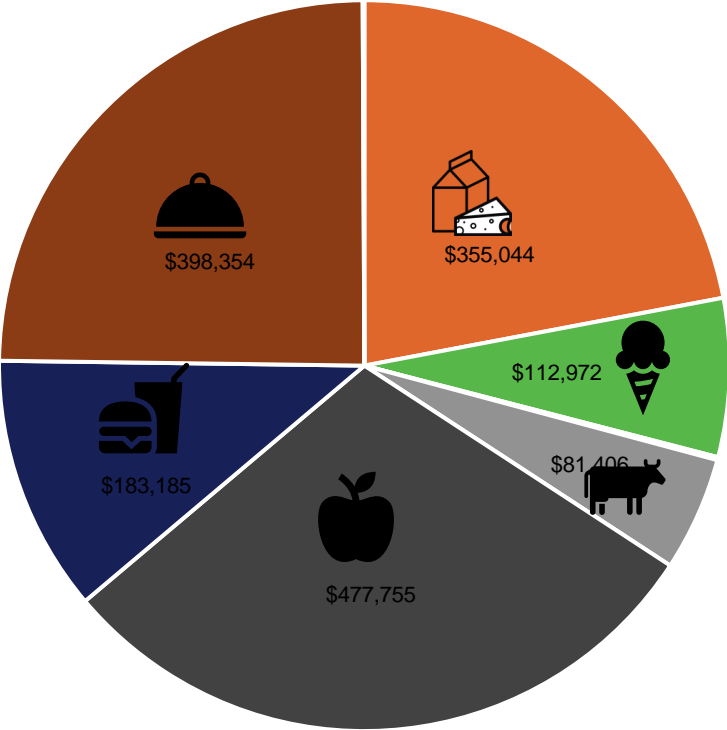
TTIs

Reduce Food Waste

BUSINESS CASE – SCALABLE

TTIs

- Degradative food reactions are a function of both **time and temperature** and provide an accurate depiction of product safety and quality to decrease food waste
- TTIs provide direction for sale at retail as well as for consumption after purchase by consumers with minimal environmental impact



* Values are given at sale in thousands

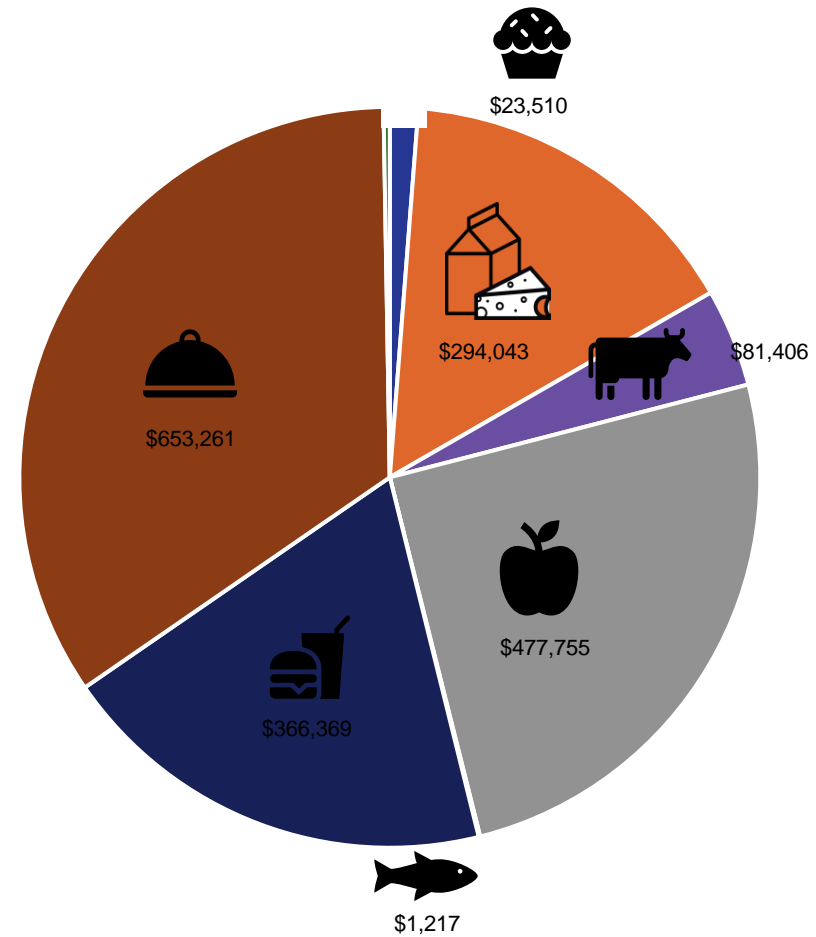
O₂ Absorbing Sachets, CO₂ Emitters and MAP

Reduce Food Waste

BUSINESS CASE - SCALABLE

O₂ absorbing sachets, CO₂ emitters and MAP

- Oxygen related spoilage is the primary cause of food spoilage
- Sachets are **drop-in solutions** to absorb O₂, release CO₂, ethanol, ethylene that to decrease food waste with minimal environmental impact



* Values are given at sale in thousands

Pilot Packaging Solutions to Food Waste

Reduce Food Waste

Pilot Solutions	Reduced Food Waste for Consumers	Reduced Food Waste for Supermarket	Reduced Food Waste for Restaurant	Total Reduced Food Waste	Total feasibility to Reduce more Food Waste
Fridge Packaging (ease of finding and storing)	\$1,054,707,290	\$454,202,956	\$581,538,462	\$2,090,448,708	
Edible antimicrobials	\$969,781,136	\$477,741,560	\$581,538,462	\$2,029,061,158	
Packaged multi-ingredient Meal Solutions	\$916,805,691	\$456,279,032	\$581,538,462	\$1,954,623,185	
In-store MAP	\$837,405,046	\$433,883,841	\$581,538,462	\$1,852,827,349	
Freezer Packaging (ease of finding and storing)	\$720,152,591	\$56,709,461	\$581,538,462	\$1,358,400,513	
Consumer Within (CW) via Time-Temperature Indicators (TTI)	\$315,089,591	\$343,713,481	\$326,630,769	\$985,433,841	
Returnable climate-controlled shipping	\$472,097,278	\$46,406,998	\$0	\$518,504,276	
Food Shelf Donation Packaging	\$83,701,725	\$54,872,330	\$0	\$138,574,055	

Low total feasibility in reducing more food waste	
Medium total feasibility in reducing more food waste	
High total feasibility in reducing more food waste	

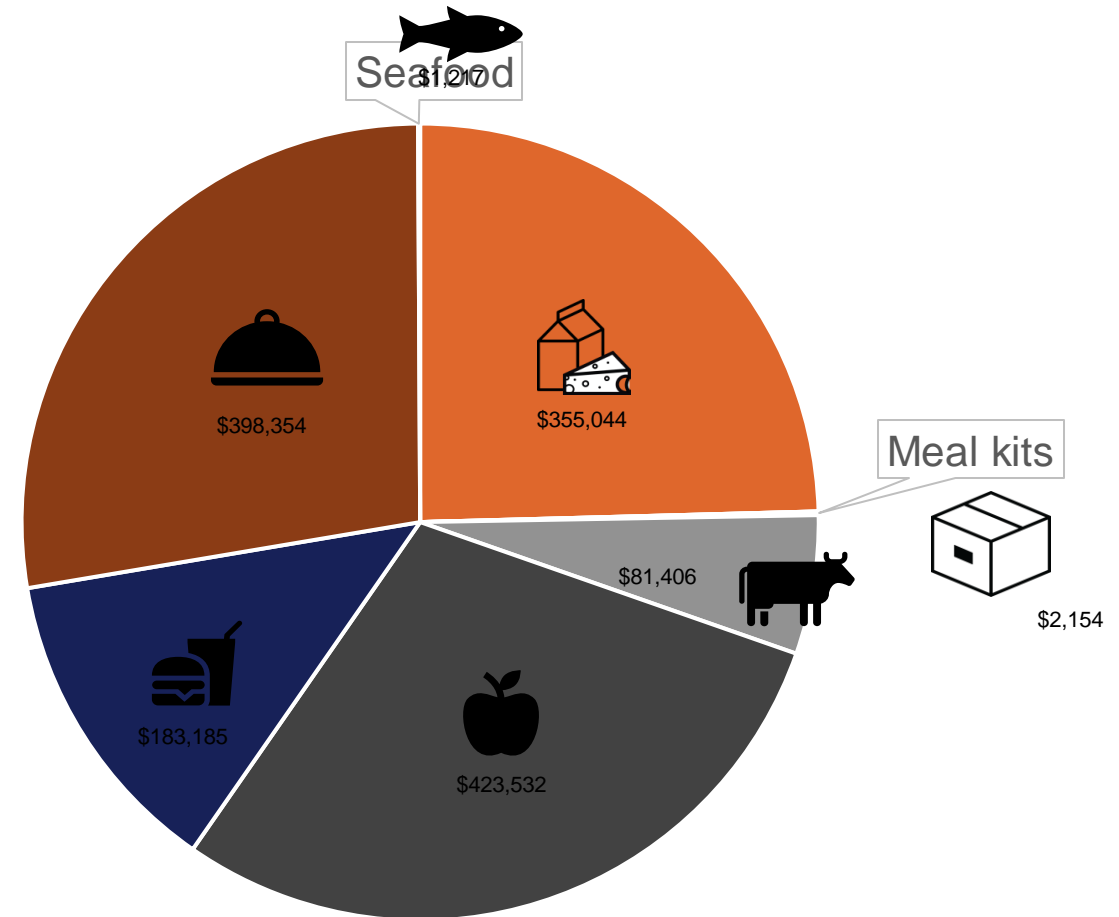
CWI via TTI

Reduce Food Waste

BUSINESS CASE – PILOT

CWI via TTI

- Most degradative food reactions are a function of both time and temperature and provide an accurate depiction of product safety and quality to decrease food waste
- CWI TTIs provide direction for the **actual date of consumption** after purchase by consumers with minimal environmental impact



* Values are given at sale in thousands

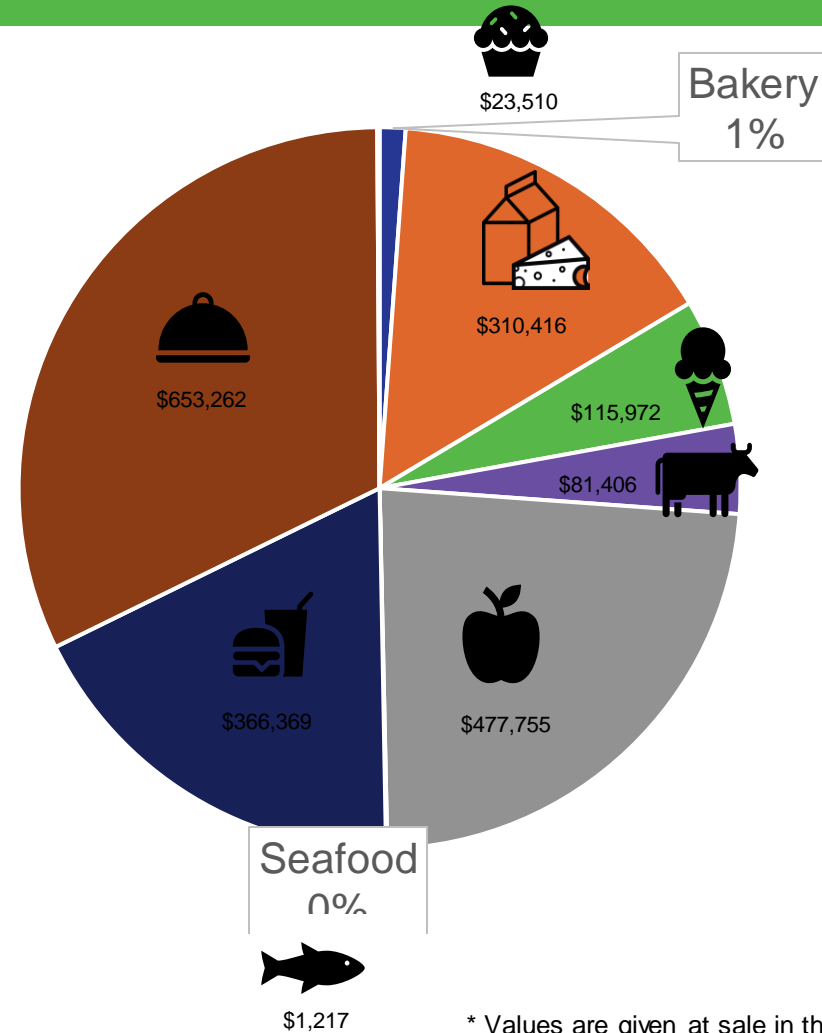
Edible Antimicrobials

Reduce Food Waste

BUSINESS CASE – PILOT

Edible Antimicrobials

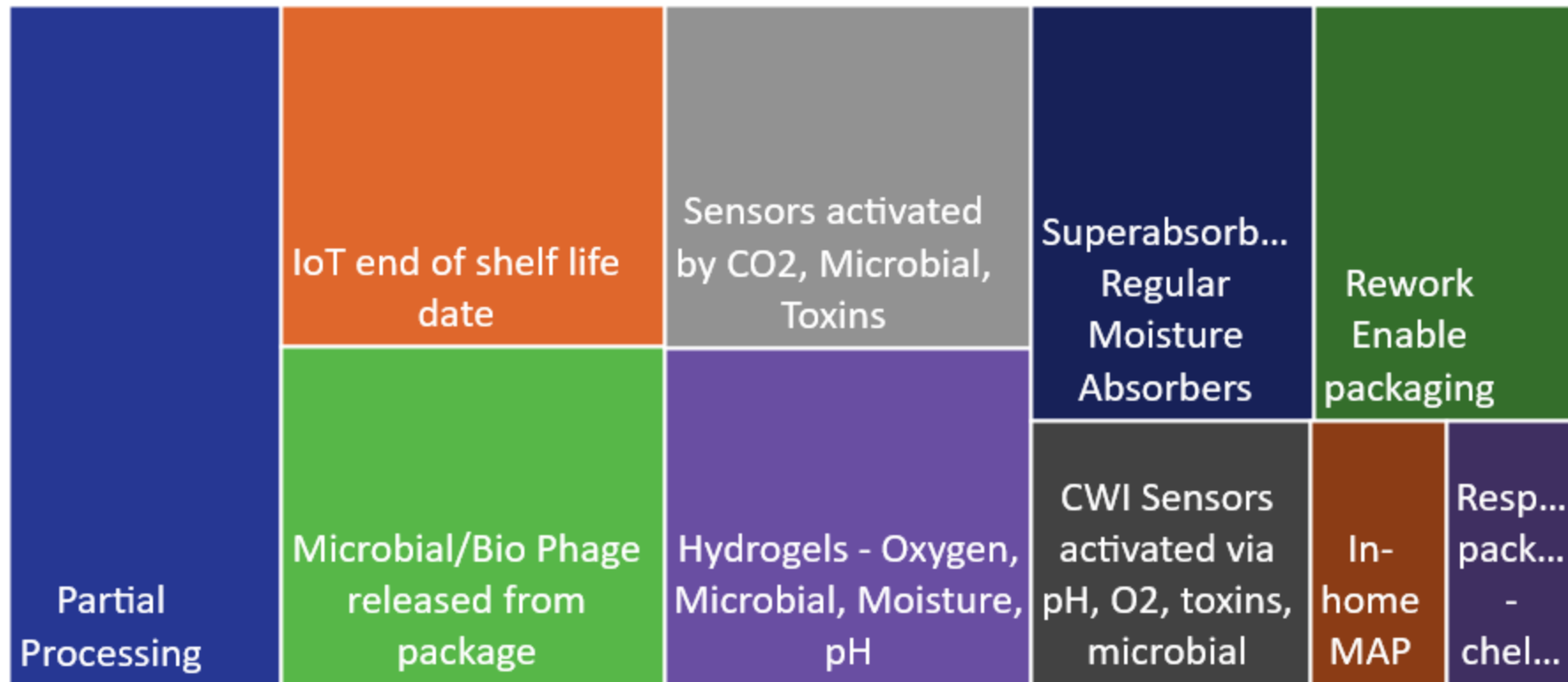
- Microbial growth is a major food safety issue
- Edible (FDA & EU approved) antimicrobials can eliminate and keep microbial activity low extending the shelf life and making foods safer with less traditional packaging



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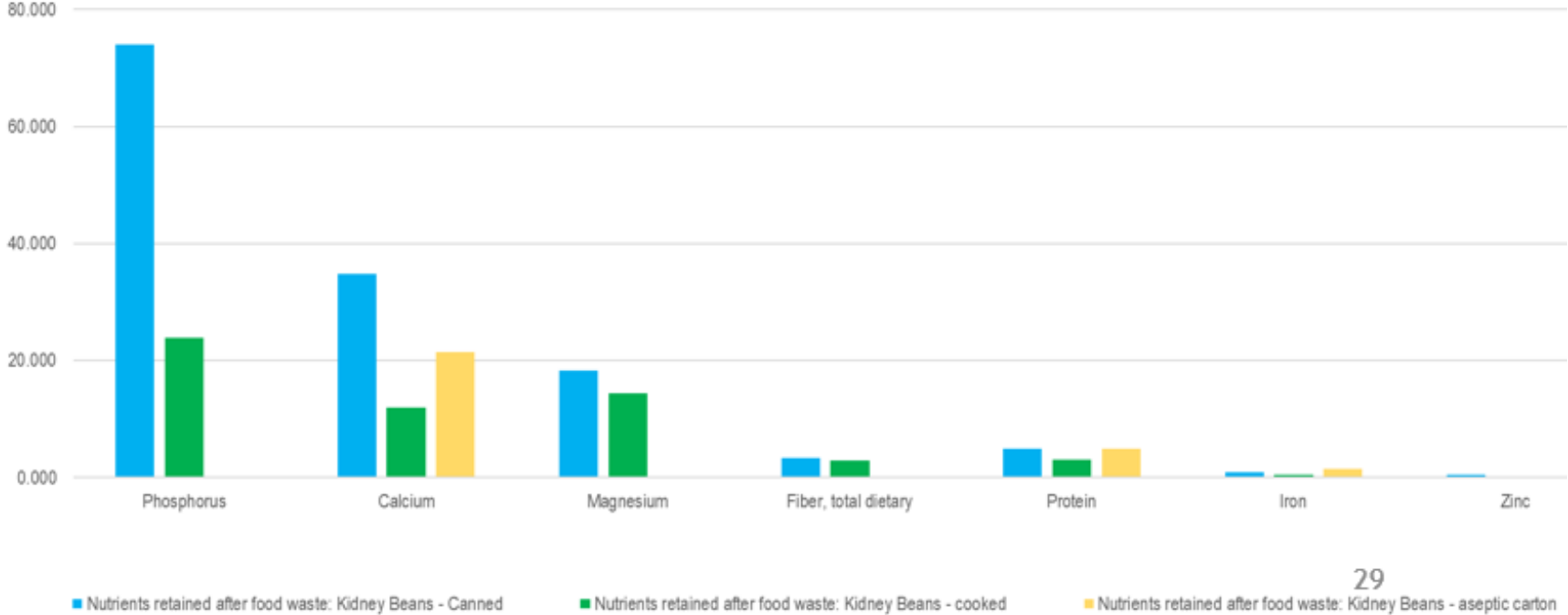
Substantial Research Investment-Packaging Solutions to Food Waste

Reduce Food Waste



Nutrient Waste is Relevant to Consumers

Less Food Waste



Canned kidney beans retain more nutrients when food and nutrient waste are combined

3

Consumer/Market Drivers and Direction for More Sustainable Packaged Food

Direction

Direction-Consumers

Path Forward

- Engage with consumer meaningfully on sustainability
 - Buy-local
 - Local
 - Mailing in empty packaging is not more sustainable than current options and we need local infrastructure
 - Flexitarian
 - Global impacts more clearly understood
- Realize that Consumers see packaging as a window into a Brand's positioning on sustainability
- Extend value chain beyond Retail to Consumers at Food Banks and Food Donations
 - Food waste from Retail to Food Banks is high

Direction-Leadership

Path Forward

- Leadership is needed for uniform assessment tools
 - LCAs and DEA on product and package
 - LCAs and DEA on packaging versus “wag the dog” material switches
- Respect Consumer need for clear communication
 - Clarity drives change
 - Voluntary carbon-footprinting (UK) and How2Recycle labels, and EPR fees guide
 - Universal (nonculture-specific) to identify more sustainable packaging
- Employ value chain linked intelligent packaging
 - Decrease time and effort to recycle on consumer recycling rate
 - Link food track-&-trace with consumer incentives for proper package disposal

Direction-Leadership

Path Forward

- Systems Solutions
 - Rethink who needs what shelf life
 - Urban vs Rural specific packaging
 - Change packaging consumers have to handle
- Category-wide initiatives on food waste reduction and more sustainable packaging
- Use Food Service as means to guide Consumers
 - Food waste reduction at Consumer and BOH & FOH Food Service level
 - Opportunity and value drivers are higher

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