



FOOD WASTE PREVENTION RESOURCE GUIDE SERIES: PACKAGING DESIGN AND USE



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Up to **40% of the food supply** is wasted in the United States. Reducing this staggering number and meeting **national goals** to reduce food waste requires consumers to make meaningful changes to how they buy, store, prepare, and consume food. Yet, food waste remains off the radar for many consumers. According to a **2019 study**, one in five people never consider food waste in their decision-making while eating at home or grocery shopping. More than two-thirds of people never consider food waste while eating out. Providing effective education is a proven strategy to help address this lack of awareness. Consumer education **has the potential** to divert an additional 3.22 million tons of wasted food, prevent 18.7 million metric tons of CO₂ emissions, and provide a financial net benefit of \$15.8 billion. Increased consumer attention to the issue may also push businesses to operate more responsibly. The **Nashville Food Waste Initiative** (NFWI) aims to provide food waste education to everyone in Nashville, from business owners and staff to educators to students. Originally developed in 2015 as a pilot project by NRDC, NFWI is now led by **Urban Green Lab** (UGL) in partnership with the **Environmental Law Institute** (ELI). UGL offers trainings that include information on how to reduce food waste in classrooms, households, and workplaces.

ELI and UGL collaborated to create the Food Waste Prevention Resource Guide Series to help expand food waste content in UGL trainings and provide ready-to-use resources for other sustainability non-profits or similar organizations to rely upon in creating their own trainings or curriculums. The Resource Guide Series highlights five **proven** food waste prevention strategies:

packaging design and use, date labels, meal prepping and kits, storage and freezing, and plate and portion size. Each Resource Guide covers one of the five topics, includes key tips as well as a list of helpful resources, and is organized into three charts each of which is tailored to a different audience—classrooms, households, and workplaces. Some resources appear across multiple charts.

Organized by both resource type (columns) and topic (rows), the Resource Guide Series provides a straightforward way for sustainability educators to find vetted content for building effective, fact-based trainings.

Packaging is a complex aspect of food waste prevention. While it plays an important role in keeping food safe and fresh until it is eaten, packaging, especially single-use plastics, contributes significantly to landfills and ocean pollution.

NOTES: The Resource Guides provide targeted resources on specific food waste prevention strategies. More free information on food waste prevention, reduction, and recycling, including general overviews, are widely available such as from **USDA**, **NRDC**, **ReFED**, **WRAP** and **World Wildlife Fund**. Additionally, though the Resource Guides largely compile free resources from governments, NGOs, and academics, note that there are also private and/or paid resources that can provide useful information on food waste prevention (e.g., Dana Gunders' **Waste-Free Kitchen Handbook**, **LeanPath**).



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PACKAGING DESIGN AND USE: CLASSROOMS

Packaging is a complex aspect of food waste prevention. While it plays an important role in keeping food safe and fresh until it is eaten, packaging, especially single-use plastics, contributes significantly to landfills and ocean pollution.

The table below compiles free resources for teaching classrooms about sustainable choices to reduce food waste associated with packaging.



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KEY TAKEAWAYS FOR PACKAGING DESIGN AND USE IN CLASSROOMS

When teaching about packaging design and use, educators should be able to:

- ▶ Explain that food waste contributes to climate change through unnecessary use of energy and resources, as well as emissions generated during landfill decay.
- ▶ Explain how unsustainable packaging can lead to food-waste.
- ▶ Share how sustainable packaging can advance specific sustainability goals (e.g., reducing greenhouse gas emissions, reducing food waste by keeping food fresh longer, diverting waste from landfills).
- ▶ Explain the environmental impacts of different packaging options, including reduced/no packaging, and the pros and cons of various sustainable options.
- ▶ Teach how to properly handle (e.g., reuse, recycle, compost, dispose) product packaging.
- ▶ Educate students about how they can engage with elected officials and other community members to encourage sustainable practices such as reducing food waste.
- ▶ Help students understand the impacts of their own actions and how they can discuss and help implement sustainable practices at home.

“Training educators to bring a sustainable lens to the classroom is crucial for culture change in a community. If we want to push the dial for sustainability in a meaningful way, we need to ensure educators have the confidence and tools to deepen the standards they are already teaching while connecting to the real world outside of the classroom.”

- CHRISTINA LANGONE, DIRECTOR OF EDUCATION, URBAN GREEN LAB



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Key Resources on Food Waste

Lesson Plans & Classroom Activities

WWF, [*Be a Food Waste Warrior*](#) (n.d.): K-12 lessons, activities, and resources that educators can use to teach about the environmental impacts of food waste—organized by age group.

Toolkits & Similar Resources

U.S. EPA, [*Too Good to Waste Implementation Guide and Toolkit*](#) (n.d.): Comprehensive toolkit that provides strategies and resources for consumers and educators to engage in food waste reduction activities.

ReFED, [*Resources & Guides*](#) (n.d.): Compilation of online food waste tools that includes a food waste monitor, solutions database, impact calculator, and policy finder.

Reports & Articles

NRDC, [*Wasted: How America Is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill*](#) (2017): Seminal report on food waste that includes a thorough description of the problem, recent progress, and emerging solutions.

Rubicon, [*Food Waste in America: Facts and Statistics*](#) (2023): Primer on food waste in America that includes statistics and recommendations.

Bloomberg, [*The US Has a Food Waste Problem and It's Getting Worse*](#) (2023): Article that provides an overview of food waste trends and key numbers.

Creative Media

Our Changing Climate, [*Food Waste Causes Climate Change. Here's How We Stop it.*](#) (2020): Video that provides key food waste statistics and possible avenues for change.

Background Information For Educators

Lesson Plans & Classroom Activities

Project Learning Tree, [*Waste and Recycling Investigation*](#) (2016): Guide that can help educators investigate and improve the waste and recycling practices at early childhood education centers, while also engaging young students in the process.

Toolkits & Similar Resources

U.S. EPA, [*Model Recycling Program Toolkit*](#) (n.d.): Compilation of resources that will help institutions, including schools, create effective programs for recycling, composting, anaerobic digestion, reuse, repair, and waste reduction.

Cafeteria Culture, [*Plastic Free Lunch Day USA*](#) (n.d.): Toolkit for hosting a “Plastic Free Lunch Day,” that includes educational movies, template letters to families, flyers, and a step-by-step guide for implementation.

Reports & Articles

FoodPrint, [*The FoodPrint of Food Packaging*](#) (2019): Report that provides a detailed outline of the problems associated with food packaging and shares how consumers can make a difference.

StopWaste, [*Reduce Packaging Waste*](#) (n.d.): Article that offers tips for reducing packaging waste to reduce individuals’ packaging footprints.

BPI, Learn (n.d.): Articles that provide concise explanations of the following topics related to sustainable packaging: [*biodegradable vs. compostable*](#); [*composting*](#); [*organics in landfills*](#); [*reduce, reuse, recycle*](#); and [*labeling*](#).



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Lesson Plans & Classroom Activities

San Mateo Office of Sustainability, [*Wrap it Up! A Plastic Packaging Activity*](#) (2020): Classroom activity that teaches students to analyze the packaging of everyday items through the lens of waste reduction.

Waste Sorting Games (n.d.): Online games that test students' knowledge of waste sorting, tailored to local governments' waste management strategies (e.g., [*Albuquerque*](#), [*Austin*](#), [*Denver*](#), [*District of Columbia*](#), [*Nashville*](#)). Try searching for your city!

Toolkits & Similar Resources

U.S. EPA, [*Reduce, Reuse, Recycle Resources for Students and Educators*](#) (n.d.): Resource compilation that exposes teachers and students to various topics related to reducing, reusing, and recycling.

Boston Public Schools, [*Recycling Education Resource List*](#) (n.d.): Resources that cover recycling, some of which are specific to Boston and/or Massachusetts.

Creative Media

The Story of Stuff, [*The Story of Plastic*](#) (2021): Short animated video that tells the story of the lifecycle of plastic packaging and explores driving factors, current data, and potential avenues for change.



	Lesson Plans & Classroom Activities	Reports & Articles	Creative Media
Elementary School	<p>Young People’s Trust for the Environment, <i>Lesson Plans: Food Packaging and Recycling</i> (2020): Customizable PowerPoint slides and notes for a lesson that covers food packaging and recycling and includes ideas for classroom activities.</p>	<p>National Geographic Kids, <i>How to Reduce Your Plastic at School!</i> (n.d.): Article that provides actionable steps for young students to reduce their plastic usage at school, including in their lunches.</p>	<p>Change by Degrees, <i>Plastic Free 4 Kids – Plastic and Our Food</i> (2020): Video that explains why foods are often packaged in plastic and how students can reduce plastic in their lunches.</p> <p>Project Learning Tree, <i>11 Books About Recycling for Elementary Students</i> (n.d.): List of books that cover a range of recycling topics for ages 5 to 11.</p>
Middle School	<p>Kenan Fellows Program, <i>Price Check: What is the True Cost?</i> (n.d.): Lesson plan and educational resources for a classroom unit that cover sustainable packaging for middle schoolers.</p> <p>Teaching Engineering, <i>Food Packaging</i> (2013): Lesson plan that teaches students how food packages are designed and made, with an activity for designing their own food packaging.</p>		<p>Alimentarium, <i>Food Packaging and Labels</i> (2019): Short video that explores the history and use of food packaging and labels.</p>



High School

Lesson Plans & Classroom Activities

Teaching Engineering, [*Making Decisions: Packaging and the Environment*](#) (n.d.): Hands-on learning activity for 9th grade students to redesign the packaging used in consumer products.

Toolkits & Similar Resources

Upstream, [*Community Action*](#) (n.d.): Compilation of resources that help consumers make the case for businesses to opt for reusable items over single-use packaging.

Reports & Articles

McKinsey & Company, [*Sustainability in packaging 2023: Inside the minds of global consumers*](#) (2023): Article that explores recent trends, data, and issues in the sphere of sustainable packaging.

Creative Media

CBC News, [*Why Buying Plastic Free Packaging Is So Hard*](#) (2019): Video of a news segment that challenges families to avoid plastic food packaging and discusses the socioeconomic factors involved in their decisions.

NowThis Earth, [*Why Zero-Waste Grocery Shopping Matters*](#) (2019): Short video that describes the impacts of zero-waste grocery shopping.

The Telegraph, [*Decodes: Sustainable Packaging*](#) (2020): Short video that provides background information about the current state of sustainable packaging.

For more information: Linda Breggin, ELI Senior Attorney (breggin@eli.org) and Todd Lawrence, UGL Executive Director (todd@urbangreenlab.org).



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PACKAGING DESIGN AND USE: HOUSEHOLDS

Packaging is a complex aspect of food waste prevention. While it plays an important role in keeping food safe and fresh until it is eaten, packaging, especially single-use plastics, contributes significantly to landfills and ocean pollution.

The table below compiles free resources for teaching households about sustainable choices to reduce food waste associated with packaging.



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KEY TAKEAWAYS FOR PACKAGING DESIGN AND USE IN HOUSEHOLDS

When teaching about packaging design and use, educators should help households:

- ▶ Understand that food waste contributes to climate change through unnecessary use of energy and resources, as well as emissions generated during landfill decay.
- ▶ Understand how unsustainable packaging can lead to food waste.
- ▶ Understand how sustainable packaging can advance specific sustainability goals (e.g., reducing greenhouse gas emissions, reducing food waste by keeping food fresh longer, diverting waste from landfills).
- ▶ Remember that, although packaging can help reduce food waste, single-use plastics should be avoided when possible.
- ▶ Learn how to properly handle (e.g., reuse, recycle, compost, dispose) product packaging according to local waste management regulations.
- ▶ Recognize that they should use the storage and packaging materials they already have before buying new solutions (e.g., use a plastic container until it wears out and then buy glass or stainless steel).
- ▶ Evaluate the impacts of their own actions and how they can adopt more sustainable practices at home and encourage businesses, schools, and other institutions to do the same.

"Educating residents to find simple, sustainable solutions within their homes impacts the entire city. Once sustainability has been integrated into the everyday lives and actions of households, that knowledge then pours into our relationships, neighborhoods, and communities."

- KARISSA HAMPTON, SUSTAINABLE HOUSEHOLDS MANAGER, URBAN GREEN LAB



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Key Resources on Food Waste

Reports & Case Studies

NRDC, [*Wasted: How America Is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill*](#) (2017): Seminal report on food waste that includes a thorough description of the problem, recent progress, and emerging solutions.

Ready-to-use Resources

ReFED, [*Resources & Guides*](#) (n.d.): Compilation of online food waste tools that includes a food waste monitor, solutions database, impact calculator, and policy finder.

Toolkits & Similar Resources

U.S. EPA, [*Too Good to Waste Implementation Guide and Toolkit*](#) (n.d.): Comprehensive toolkit that provides strategies and resources for consumers and educators to engage in food waste reduction activities.

Articles

Rubicon, [*Food Waste in America: Facts and Statistics*](#) (2023): Primer on food waste in America that includes statistics and recommendations.

Bloomberg, [*The US Has a Food Waste Problem and It's Getting Worse*](#) (2023): Article that provides an overview of food waste trends and key numbers.

Creative Media

Our Changing Climate, [*Food Waste Causes Climate Change. Here's How We Stop it.*](#) (2020): Video that provides key food waste statistics and possible avenues for change.



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Understanding Consumer's Impact

Reports & Case Studies

FoodPrint, *[The FoodPrint of Food Packaging](#)* (2019): Report that provides a detailed outline of the problems with food packaging and shares how consumers can make a difference.

Ready-to-use Resources

Plastic Free Foundation, *[Plastic Free July](#)* (n.d.): Website that offers resources and instructions for participating in an annual challenge to reduce plastic consumption during the month of July.

Toolkits & Similar Resources

Green Living Toolkit, *[Waste](#)* (n.d.): Tools that help consumers reduce single use plastics, reuse products, and correctly recycle.

Upstream, *[Community Action](#)* (n.d.): Compilation of resources to help consumers make the case for businesses to opt for reusable items over single-use packaging.

Articles

Eco & Beyond, *[The Packaging Problem](#)* (n.d.): Article that describes consumer best practices for reducing packaging and how to move towards a zero-waste lifestyle.

Creative Media

The Telegraph, *[Decodes: Sustainable Packaging](#)* (2020): Short video that provides background information about the current state of sustainable packaging.



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Reports & Case Studies

Cavaliere et al., Sustainability, [*Do Consumers Really Want to Reduce Plastic Usage? Exploring the Determinant of Plastic Avoidance in Food-Related Consumption Decisions*](#) (2020): Academic study that finds that environment- and health-related concerns drive consumers to avoid single-use plastics while grocery shopping.

Articles

Laurie Fanelli, [*Seven Ways to Reduce Grocery Store Waste*](#) (n.d): Blog post that gives tips for ways to reduce waste while grocery shopping.

Sophie Hirsh, [*Six Tips For Zero-Waste Grocery Shopping, Even if You Don't Have a Bulk Section*](#) (2020): Blog post that provides information on how to reduce waste in grocery stores both with and without bulk sections.

StopWaste, [*Reduce Packaging Waste*](#) (n.d.): Article that offers tips for reducing packaging waste to reduce individuals' packaging footprints.

Ready-to-use Resources

GreenPeace USA, [*Shopping for Plastic: The 2021 Supermarket Plastics Ranking*](#) (2021): Site that scores 20 major US grocery stores based on their efforts to reduce their reliance on plastics.

Creative Media

NowThis Earth, [*Why Zero-Waste Grocery Shopping Matters*](#) (2019): Short video that describes the impacts of zero-waste grocery shopping.

Food Packaging Waste Management

Reports & Case Studies

The Sustainability Institute, [*Engaging Consumers to Reduce and Recycle*](#) (n.d.): Research insights that reveal how to encourage consumers to reduce and recycle by using “nudges,” and raising awareness.

Ready-to-use Resources

Waste Sorting Games: Online games that test students’ knowledge of waste sorting, tailored to local governments’ waste management strategies (e.g., [*Albuquerque*](#), [*Austin*](#), [*Denver*](#), [*District of Columbia*](#), [*Nashville*](#)).
Try searching for your city!

Toolkits & Similar Resources

US EPA, [*Model Recycling Program Toolkit*](#) (n.d.): Compilation of resources that will help institutions, including schools, create effective programs for recycling, composting, anaerobic digestion, reuse, repair, and waste reduction.

Articles

Eco & Beyond, [*Disposing of Compostable Packaging, The Compost Conundrum*](#) (n.d.): Article that explains how to responsibly discard compostable packaging materials.

Creative Media

Oregon Metro, [*Recycling Tips: Food Packaging in the Kitchen*](#) (2020): Short video that demonstrates how to properly discard common food packaging, some of which is specific to the Oregon Metro area.

For more information: Linda Breggin, ELI Senior Attorney (breggin@eli.org) and Todd Lawrence, UGL Executive Director (todd@urbangreenlab.org).



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PACKAGING DESIGN AND USE: WORKPLACES

Packaging is a complex aspect of food waste prevention. While it plays an important role in keeping food safe and fresh until it is eaten, packaging, especially single-use plastics, contributes significantly to landfills and ocean pollution.

The table below compiles free resources for teaching workplaces about sustainable choices to reduce food waste associated with packaging.



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KEY TAKEAWAYS FOR PACKAGING DESIGN AND USE IN WORKPLACES

When teaching about packaging design and use, educators should help workplaces:

- ▶ Understand that food waste contributes to climate change through unnecessary use of energy and resources, as well as emissions generated during landfill decay.
- ▶ Understand how unsustainable packaging can lead to food waste.
- ▶ Identify specific sustainability goals (e.g., reduce greenhouse emissions, eliminate single-use plastic, increase recyclability of packaging).
- ▶ Learn about how to use the least amount of material to contain products safely and avoid packaging with multiple materials (e.g. soup boxes) and/or require use of such practices by contractors.
- ▶ Understand the sustainable packaging options appropriate for a product/service that will achieve sustainability goal(s), including for one-time packaging (e.g., compostable, recyclable, plastic alternatives) and reusable packaging (coupled with a reuse system).
- ▶ Apply lessons learned from case studies of businesses in similar sectors that have switched to more sustainable packaging.
- ▶ Educate customers/consumers about sustainable packaging and how to properly handle product packaging (e.g., reuse, recycle, compost, dispose).
- ▶ Understand the ability of workplaces to reduce food waste through sustainable choices and knowledge-sharing within their workforces, customer bases, and business communities.

"It's a wonderful experience to distill complex scientific information into tangible actions for citizens to digest and utilize in their own way. If an attendee walks away from one of my trainings doing just one or two new sustainable activities that add value to their life, that's a huge win. Connecting people to resources in sustainability that are vetted and accurate is one of the best things we can do to empower them to make long-lasting changes."

- JACQUELINE GOODWIN, ASSISTANT DIRECTOR OF WORKPLACES, URBAN GREEN LAB



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Key Resources on Food Waste

Reports & Case Studies

NRDC, *Wasted: How America Is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill* (2017): Seminal report on food waste that includes a thorough description of the problem, recent progress, and emerging solutions.

Toolkits & Similar Resources

U.S. EPA, *Too Good to Waste Implementation Guide and Toolkit* (n.d.): Comprehensive toolkit that provides strategies and resources for consumers and educators to engage in food waste reduction activities.

Ready-to-use Resources

ReFED, *Resources & Guides* (n.d.): Compilation of online food waste tools that includes a food waste monitor, solutions database, impact calculator, and policy finder.

Chancery Lane Project, *Reducing Supply Chain Food Waste* (2022): Model contractual clause that can be used by businesses to reduce food waste in their supply chains in order to reduce greenhouse gas emissions and realize financial benefits.

Articles

Rubicon, *Food Waste in America: Facts and Statistics* (2023): Primer on food waste in America that includes statistics and recommendations.

Bloomberg, *The US Has a Food Waste Problem and It's Getting Worse* (2023): Article that provides an overview of food waste trends and key numbers.

Creative Media

Our Changing Climate, *Food Waste Causes Climate Change. Here's How We Stop it.* (2020): Video that provides key food waste statistics and possible avenues for change.



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Reports & Case Studies

McKinsey & Company, [*Sustainability in Packaging 2023: Inside the Minds of Global Consumers*](#) (2023): Article that explores recent trends, data, and issues in the sphere of sustainable packaging.

FoodPrint, [*The FoodPrint of Food Packaging*](#) (2019): Report that provides a detailed outline of the problems with food packaging and shares how consumers can

Ready-to-use Resources

Waste Sorting Games (n.d.): Online games that test students' knowledge of waste sorting, tailored to local governments' waste management strategies (e.g., [*Albuquerque*](#), [*Austin*](#), [*Denver*](#), [*District of Columbia*](#), [*Nashville*](#)).
Try searching for your city!

Toolkits & Similar Resources

US EPA, [*Model Recycling Program Toolkit*](#) (n.d.): Compilation of resources that will help institutions, including schools, create effective programs for recycling, composting, anaerobic digestion, reuse, repair, and waste reduction.

Articles

The Sustainability Institute, [*Engaging Consumers to Reduce and Recycle*](#) (n.d.): Research insights that reveal how to encourage consumers to recycle by using “nudges,” and raising awareness.

Creative Media

The Telegraph, [*Decodes: Sustainable Packaging*](#) (2020): Short video that provides background information about the current state of sustainable packaging.

Sustainable Packaging Options

Reports & Case Studies

Guillard et al., [*The Next Generation of Sustainable Food Packaging to Preserve Our Environment in a Circular Economy Context*](#) (2018): Paper that reviews major challenges to sustainable food packaging and proposes specific solutions and tools.

Grönman et al., [*Framework for Sustainable Food Packaging Design*](#) (2012): Journal article that proposes a process for sustainable food package design that considers the entire life cycle of the product–package combination.

Santi et al., [*Sustainable Food Packaging: An Integrative Framework*](#) (2022): Journal article that proposes a framework for designing and evaluating food packaging products.

Ready-to-use Resources

The Recycling Partnership, [*Plastic IQ*](#) (n.d.): Data-driven digital tool that allows U.S. companies making and selling packaged goods to analyze the environmental footprint and cost of plastic packaging.

Articles

Michael Dillon, Meyers, [*The Switch to Sustainable Packaging: A Guide for Your Business*](#) (2023): Comprehensive guide that explains the basics of sustainable packaging, reviews various options, and suggests strategies.

Toolkits & Similar Resources

Upstream, [*Business Resources*](#) (n.d.): Variety of case studies, toolkits, articles, podcasts, vlogs, and livestreams that can help businesses make the switch from single-use to reusable items.

BPI, [*Home Page*](#) (n.d.): Home page of an organization that provides a certification for compostable packaging, a search engine for certified products, and advocacy information for businesses.



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Packaging Design And Use Best Practices

Reports & Case Studies

Repak, [*Case Studies & Best Practice Guides*](#) (n.d.): Case studies from a cross-section of industries and sectors that include best practices guides for retail, hotels, offices, restaurants and grocery retailers on reducing packaging waste.

Sustainable Packaging Coalition, [*Best Practices for Designing Packages to Prevent and Divert Food Waste*](#) (2022): Report that provides best practices for grocery environments on use of packaging design to both prevent/divert food waste and educate consumers about food waste.

Ready-to-use Resources

U.S. EPA, [*Reducing Wasted Food & Packaging: Guide for Food Services and Restaurants*](#) (2014): Toolkit that includes best practices, templates, and case studies to help food service establishments and commercial kitchens reduce wasted food and packaging.

Articles

Plastic Pollution Coalition, [*Plastic Free Eateries*](#) (n.d.): Article that lists steps restaurants and other food businesses can take to reduce plastic use and educate customers.

Toolkits & Similar Resources

Natural Products Insiders, [*Sustainable Packaging Toolkit*](#) (2020): Toolkit that can aid suppliers interested in improving and innovating packaging.

For more information: Linda Breggin, ELI Senior Attorney (breggin@eli.org) and Todd Lawrence, UGL Executive Director (todd@urbangreenlab.org).



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THANK YOU

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