

FOOD WASTE PREVENTION RESOURCE GUIDE SERIES: STORAGE AND FREEZING



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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 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 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.

Storage and freezing are integral to food waste prevention. Optimal storage methods maximize food freshness and shelf life, helping to extend the time food is safe for consumption and reducing the amount of spoiled food that ends up in landfills or incinerators.

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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STORAGE AND FREEZING: CLASSROOMS

Storage and freezing are integral to food waste prevention. Optimal storage methods maximize food freshness and shelf life, helping to extend the time food is safe for consumption and reducing the amount of spoiled food that ends up in landfills or incinerators.

The table below compiles free resources for teaching classrooms about sustainable storage and freezing practices to reduce waste from food spoilage.



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KEY TAKEAWAYS FOR STORAGE AND FREEZING IN CLASSROOMS

When teaching about storage and freezing, 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 improper storage and freezing practices can lead to food waste.
- ▶ Explain why food storage and freezing are necessary to prevent spoilage of perishable foods, which can protect health and save money and resources.
- ▶ Teach how different storage and freezing methods are appropriate for preserving various types of food.
- ▶ Share different methods of storing food (e.g., refrigerator, freezer, pantry) and the advantages and disadvantages of each.
- ▶ 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.

Toolkits & Similar Resources

USDA, [*Refrigeration & Food Safety*](#) (2015): Detailed guide that provides information on refrigerators and food safety.

U.S. EPA, [*Storage Tips*](#) (2023): Guide that provides tips, toolkits, and resources for storing produce, meat, poultry, and grains and using refrigerators and freezers.

Reports & Articles

NRDC, [*Freeze More. Waste Less.*](#) (2022): Article that describes how freezing food can reduce food waste.

Shaheen Hosany, [*The Conversation, How Children Are Helping to Make Their Families More Eco-Friendly - New Research*](#) (2022): Article that explains how sustainability education at school leads children to develop and implement sustainable practices at home.

Creative Media

Eat Happy Project, [*Benefits of Freezing Your Food*](#) (2016): Short video that illustrates the economic and environmental benefits of freezing food and how to freeze different types of food at home.

Chowhound, [*The Proper Way to Store Food in Your Fridge*](#) (2019): Video that shows what foods can be refrigerated and their proper placement in refrigerators.

Lesson Plans & Classroom Activities

NRDC Save the Food, [*Store It - Interactive Storage Guide*](#) (2023): Web-based interactive storage guide that allows users to get tailored information on storage of specific food items.

WWF, [*The No Food Waste Game*](#) (2020): Educational game for students that challenges players to think of different ways to prevent food waste generally.

Toolkits & Similar Resources

Partnership for Food Safety Education, [*Take a Fresh Look at Frozen Foods*](#) (n.d.): Article, flyer, and infographic that provide information on how frozen food can reduce spoilage waste.

USDA, [*Refrigeration & Food Safety*](#) (2015): Detailed guide that provides information on refrigerators and food safety.

USDA, [*Freezing & Food Safety*](#) (2013): Guide that describes how freezing preserves food, proper freezing techniques, and storage times for frozen foods.

Reports & Articles

The Scholarship System, [*5 Ways Students Can Get Involved in Politics \(And Why They Should\)*](#) (2023): Blog that explores ways students can be politically active and engage with elected officials and community members.

Creative Media

Maine Department of Education, [*Proper Food Storage with Alisa Roman*](#) (2020): Video that details how educational institutions should store produce in facilities and how to assess produce for spoilage.

Chowhound, [*The Proper Way to Store Food in Your Fridge*](#) (2019): Video that shows what foods can be refrigerated and their proper placement in refrigerators.



Elementary School

Lesson Plans & Classroom Activities

Food Standards Scotland, [*What Goes Where?*](#) (n.d.): Interactive learning activity that includes handouts, a video, an interactive game, and assessment opportunities to teach students about where different foods are stored and the importance of storage for food safety.

Reports & Articles

Stephen Bosi, [*The Conversation, Curious Kids: How Do Freezers Work?*](#) (2021): Article for children that provides an overview of solids, liquids, and gases to explain how freezers keep foods cold.

Middle School

Unique Learning System, [*Safely Storing Food*](#) (2020): Lesson that covers safe storage of food in freezers, refrigerators, and pantries with instructional targets, activities, handouts, and a teaching model.

Food Standards Scotland, [*Fridge Facts*](#) (n.d.): Interactive game that educates children ages 10 to 12 about safe ways to store food in the fridge.

Academy of Nutrition and Dietetics, [*Refrigerate – The Basics*](#) (2023): Article that covers the basics of refrigeration, including general tips on refrigerator storage.



High School

Lesson Plans & Classroom Activities

Food Standards Scotland, [*Storage Solutions*](#) (n.d.): Interactive lesson that teaches students about correct food storage conditions for common household items with guidance on set-up, activities, and assessment opportunities.

Foodspan & John Hopkins Center for a Livable Future, [*Our Wasted Food*](#) (2023): 50-minute lesson plan that teaches students about food waste and possible solutions, with extension projects that will further empower students to take action.

The Centre for Science Education, Sheffield Hallam University, [*Food Preservation: Teacher's Notes*](#) (n.d.): Unit plan that covers the role of food preservation in preventing spoilage with activities, handouts, teaching models, and objectives.

Toolkits & Similar Resources

North Dakota State University, [*Food Storage Guide*](#) (2023): Comprehensive guide that lists storage times and handling tips for different foods in cupboards, refrigerators, and freezers.

Creative Media

Eat Happy Project, [*Benefits of Freezing Your Food*](#) (2016): Short video that illustrates the economic and environmental benefits of freezing food and how to freeze different types of food at home.


Reports & Articles

University of Nebraska, [*Refrigerator and Freezer Storage*](#) (n.d.): Article that describes correct temperatures and best practices to keep food fresh longer in refrigerators or freezers.

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



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STORAGE AND FREEZING: HOUSEHOLDS

Storage and freezing are integral to food waste prevention. Optimal storage methods maximize food freshness and shelf life, helping to extend the time food is safe for consumption and reducing the amount of spoiled food that ends up in landfills or incinerators.

The table below compiles free resources for teaching households about sustainable storage and freezing practices to reduce waste from food spoilage.



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KEY TAKEAWAYS FOR STORAGE AND FREEZING IN HOUSEHOLDS

When teaching about storage and freezing, 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.
- ▶ Recognize how improper storage and freezing practices can lead to food waste.
- ▶ Understand optimal storage and freezing methods for different types of food to extend shelf life.
- ▶ Learn different techniques (e.g., freezing, canning, drying) for preserving perishable food to prevent spoilage, which in turn can protect health and save money and resources.
- ▶ Understand that preventing food waste at home requires keeping food fresh as well as inventorying current food supplies and using them up.
- ▶ 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	Ready-to-Use Resources	Toolkits & Similar Resources	Articles
<p>NRDC, <i>Wasted: How America Is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill</i> (2017): Seminal report on food waste that includes a thorough description of the problem, recent progress, and emerging solutions.</p>	<p>ReFED, <i>Resources & Guides</i> (n.d.): Compilation of online food waste tools that includes a food waste monitor, solutions database, impact calculator, and policy finder.</p>	<p>U.S. EPA, <i>Too Good to Waste Implementation Guide and Toolkit</i> (n.d.): Comprehensive toolkit that provides strategies and resources for consumers and educators to engage in food waste reduction activities.</p>	<p>Rubicon, <i>Food Waste in America: Facts and Statistics</i> (2023): Primer on food waste in America that includes statistics and recommendations.</p>
<p>Creative Media</p>			
<p>Our Changing Climate, <i>Food Waste Causes Climate Change. Here's How We Stop it.</i> (2020): Video that provides key food waste statistics and possible avenues for change.</p>			<p>Bloomberg, <i>The US Has a Food Waste Problem and It's Getting Worse</i> (2023): Article that provides an overview of food waste trends and key numbers.</p>



Freezing

Reports & Case Studies

Gorter et al., [*Measurement of Frozen versus Fresh Food Waste at the Retail and Consumer Levels: A Critical Review and Meta Analysis*](#) (2023): Literature survey that finds retail and consumer waste rates are lower for frozen food than fresh food.

Creative Media

Eat Happy Project, [*Benefits of Freezing Your Food*](#) (2016): Short video that illustrates the economic and environmental benefits of freezing food and how to freeze different types of food at home.

Ready-to-Use Resources

NRDC Save the Food, [*Store It - Interactive Storage Guide*](#) (2023): Web-based interactive storage guide that allows users to get tailored information on storage of specific food items.

Toolkits & Similar Resources

North Dakota State University, [*Food Freezing Guide*](#) (2019): Resource guide that covers information on freezing food.

Articles

NRDC, [*Freeze More. Waste Less.*](#) (2022): Article that describes how freezing food can reduce food waste.

USDA, [*Freezing & Food Safety*](#) (2013): Guide that describes how freezing preserves food, proper freezing techniques, and storage times for frozen foods.

Refrigeration

Reports & Case Studies

Ohio State News, [*Much Fridge Food 'Goes There to Die'*](#) (2019): Survey that finds that households used significantly less of the meat, vegetables, fruit, and dairy in their refrigerators than they projected.

Creative Media

Chowhound, [*The Proper Way to Store Food in Your Fridge*](#) (2019): Video that shows what foods can be refrigerated and their proper placement in refrigerators.

Ready-to-Use Resources

NRDC, [*The Refrigerator Demystified*](#) (2013): Infographic that visualizes temperature differences across refrigerator compartments and the optimal placement for different types of food.

Toolkits & Similar Resources

USDA, [*Refrigeration & Food Safety*](#) (2015): Detailed guide that provides information on refrigerators and food safety.

Articles

Real Simple, [*The Ultimate Guide to Storing Every Type of Food in the Refrigerator for Long-Lasting Freshness*](#) (2023): Guide that explains how to store different types of food in the refrigerator, with tips on placement and storage times, and packaging.

Shelf-Stable Food

Ready-to-Use Resources

My Pantry Tracker, [*My Pantry Tracker Application*](#) (2023): Mobile or web browser application that allows users to track pantry items' quantities, best-by dates, and purchase dates by scanning item barcodes.

Toolkits & Similar Resources

Los Angeles Regional Food Bank, [*A Shelf Life Guide*](#) (2018): Guide that lists the shelf life of shelf-stable foods when properly stored, including information on refrigeration storage times after opening.

Articles

USDA, [*Shelf-Stable Food Safety*](#) (2015): Guide that covers the production, safety, and storage of canned and dried foods, including a shelf-stable food storage chart.

EatingWell, [*7 Pantry Mistakes You're Probably Making*](#) (2023): Article that describes top mistakes leading to wasted pantry food and how households can resolve them.

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



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STORAGE AND FREEZING: WORKPLACES

Storage and freezing are integral to food waste prevention. Optimal storage methods maximize food freshness and shelf life, helping to extend the time food is safe for consumption and reducing the amount of spoiled food that ends up in landfills or incinerators.

The table below compiles free resources for teaching workplaces about sustainable storage and freezing practices to reduce waste from food spoilage.



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KEY TAKEAWAYS FOR STORAGE AND FREEZING IN WORKPLACES

When teaching about storage and freezing, 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 improper storage and freezing practices can lead to food waste.
- ▶ Decide on specific workplace sustainability goals (e.g., preventing food spoilage, avoiding food surplus through storage inventory, keeping food fresh).
- ▶ Use optimal storage and freezing methods for different types of food or require use of such methods by contractors (e.g., caterers, hotels that host conferences), in order to reduce food waste, protect health, and reduce food and storage costs.
- ▶ Inform food orders by regularly tracking food waste and stock inventories.
- ▶ Consult case studies of businesses in similar sectors that have made the switch to more sustainable storage and freezing practices.
- ▶ Understand the ability of workplaces to reduce food waste through sustainable choices and knowledge-sharing within their workforce, customer base, 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.

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.

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.

The 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.

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.



Employee and Customer Education

Reports & Case Studies	Ready-to-Use Resources	Toolkits & Similar Resources	Articles
<p>Gorter et al., <i>Measurement of Frozen versus Fresh Food Waste at the Retail and Consumer Levels: A Critical Review and Meta Analysis</i> (2023): Literature survey that finds retail and consumer waste rates are lower for frozen food than fresh food.</p> <p>Martindale & Schiebel, <i>The Impact of Food Preservation on Food Waste</i> (2017): Study that finds that frozen food can significantly reduce food waste as compared to fresh food.</p>	<p>NRDC Save the Food, <i>Store It - Interactive Storage Guide</i> (2023): Web-based interactive storage guide that allows users to get tailored information on storage of specific food items.</p> <p>U.S. Food and Drug Administration, <i>Social Media Toolkit for Food Loss and Waste</i> (2022): Toolkit that includes model social media posts on food waste including those on date labels.</p>	<p>Virginia Cooperative Extension, <i>Food Storage Guidelines for Consumers</i> (2018): Guide that educates consumers about recommended storage methods for various foods, with a food storage chart.</p> <p>Creative Media</p> <p>Eat Happy Project, <i>Benefits of Freezing Your Food</i> (2016): Short video that illustrates the economic and environmental benefits of freezing food and how to freeze different types of food.</p> <p>Chowhound, <i>The Proper Way to Store Food in Your Fridge</i> (2019): Video that shows what foods can be refrigerated and their proper placement in refrigerators.</p>	<p>USDA, <i>10 Smart Tips to Keep Your Restaurant Leftovers Safe</i> (2021): Article that provides tips on storing restaurant leftovers safely.</p>



Food Storage in Commercial Settings

Ready-to-Use Resources

U.S. EPA, [*Food Loss Prevention Options for Restaurants*](#) (2016): Checklist that includes a section on preparation and storage tips for restaurants to prevent food loss and waste.

U.S. EPA, [*Food Loss Prevention Options for Grocery Stores*](#) (2016): Checklist that includes a section on preparation and storage tips for grocery stores to prevent food waste.

Toolkits & Similar Resources

North Dakota State University, [*Food Storage Guide*](#) (2023): Comprehensive guide that lists storage times and handling tips for different foods in cupboards, refrigerators, and freezers.

Articles

University of Nebraska, [*Refrigerator and Freezer Storage*](#) (n.d.): Article that describes correct temperatures and best practices to keep food fresh longer in refrigerators or freezers.

Creative Media

Food Standards Agency, [*Chilled Storage and Display*](#) (2012): Video that explains how businesses can keep foods cold in a fridge or display unit.

Food Standards Agency, [*Chilling Foods*](#) (2012): Video that includes tips on how businesses can chill prepared foods as quickly as possible.



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Inventory Management

Reports & Case Studies

RIS News, [*Albertsons Completes Rollout of Predictive Ordering and Inventory Management Software Platform*](#) (2023): Article that explores a case study of Albertsons' new software to manage, produce and deliver fresher products to customers.

Ready-to-Use Resources

UpMenu, [*Restaurant Inventory Management Template*](#) (2023): Free Google Sheets template that provides restaurants a structure for recording and tracking inventory data such as best-by dates and storage location.

Toolkits & Similar Resources

UpMenu, [*Restaurant Inventory Management \(Complete Guide & Template\)*](#) (2023): Guide that covers restaurant inventory management and its importance to food waste reduction and food safety.

Articles

Forbes, [*7 Ways to Minimize Inventory Waste*](#) (2020): Article that explains how effective inventory management can reduce businesses' food spoilage and waste.

Creative Media

National Restaurant Association, [*Inventory Food and Track Food Waste*](#) (2013): Video strategies for food inventory and food waste tracking so businesses can reduce food spoilage and save money.

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



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THANK YOU

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