

D I A L O G U E

# Pollution Prevention and Rethinking “Waste”

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## Summary

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“Reduce, Reuse, Recycle” is the call to arms of the mainstream environmental movement. While these actions may seem simple for households, decisions to reduce, reuse, and recycle in the commercial and industrial spheres require innovation, creativity, and risk. New practices in the organic waste and hazardous waste sectors have revolutionized our perspectives on waste and resource use, and contributed to reductions in pollution. On January 31, 2019, the Environmental Law Institute hosted an expert panel that explored how industrial and commercial institutions are finding sustainable, economic, and innovative solutions for recycling undesirable materials. Below, we present a transcript of the discussion, which has been edited for style, clarity, and space considerations.

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**Jim McElfish** (moderator) is a Senior Attorney and Director of the Sustainable Use of Land Program at the Environmental Law Institute (ELI).

**Linda Breggin** is a Senior Attorney and Co-Lead of the Food Waste Initiative at ELI.

**Byron R. Brown** is a Senior Counsel at Crowell & Moring LLP.

**Carol Adaire Jones** is a Visiting Scholar and Co-Lead of the Food Waste Initiative at ELI.

**Anna Vinogradova** is the Director of Sustainability at Walmart.

**Jim McElfish:** Thank you for joining us for this webinar on Pollution Prevention and Rethinking “Waste.” It’s a broad and interesting topic. It covers the elements of what we used to think of as waste streams, but that I believe we should think of as material flows.

When we think of material flows, we’re harking back to a time that predates the Environmental Law Institute’s (ELI’s) 50 years of operation. I think of the Odum brothers, Eugene and Howard, who focused on material and energy flows as ways of thinking about ecology.<sup>1</sup> Or we can hark back to the National Environmental Policy Act (NEPA),<sup>2</sup> which is also approaching its 50th anniversary. NEPA §101(b) set a national goal to enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources. So, these are old ideas, but with new solutions and new approaches. I’d like to think of this perhaps as the “sustainability of stuff.”

We have an excellent panel covering a wide variety of topics today. But as we will see, there are relationships among these topics. We’ll be talking about food and food waste. We’ll be talking about water and wastewater management, and the energy and nutrient resources that are now being recovered from wastewater processing and turned into valuable products. We’ll be talking about electronic waste in all of its many permutations and values. We’ll be talking about packaging and the circular economy, and managing product lines and product supply chains in the retail environment. Each panelist is an expert not only in one of the areas, but, in many cases, in multiple areas that we’ll be talking about.

Our first panelist will be Linda Breggin. She’s a senior attorney at ELI, and has been with the Institute for more than 15 years. Before that, she had a career in federal government, on the Hill and with the U.S. Environmental Protection Agency (EPA), and in private practice. Linda is located in Nashville, where she also assists ELI with our ongoing collaboration with Vanderbilt University Law School.

After Linda, who will primarily be addressing food and food waste issues, we’ll hear from Dr. Carol Jones, a visiting scholar at ELI for the past five years. She has had a long

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1. See, e.g., Eugene P. Odum, *Energy Flow in Ecosystems: A Historical Review*, 8 AM. ZOOLOGIST 11 (1968).  
2. 42 U.S.C. §§4321-4370h, ELR STAT. NEPA §§2-209.

career in academia and in the federal government, starting at the National Oceanic and Atmospheric Administration developing technical claims for natural resource damages suits (starting with the *Exxon Valdez* oil spill). She also managed research in agriculture and the environment with the U.S. Department of Agriculture (USDA) Economic Research Service. She'll be primarily talking about the water and wastewater sector and its Utility of the Future Initiative, and the processing of food waste and recovery of water, energy, and nutrients from byproducts associated with water and wastewater management.

Byron Brown is a Senior Counsel at Crowell & Moring here in Washington, D.C. Before joining Crowell & Moring, he had a long career at EPA and on the Hill. So, Byron brings a great wealth of experience to the issue he'll be talking about, which is management of e-waste and a lot of the challenges that are arising with material flows and handling of recycling where some of the traditional approaches that have been used recently are not available or less available than they once were.

Our final panelist is Anna Vinogradova, who is director of sustainability at Walmart, and she's joining us from Bentonville, Arkansas. Anna has had an interesting career at Walmart for many years and is also an expert in food waste. But in her role as Director of Sustainability, she's into the entire array of circular economy issues and the many goals that Walmart has set for itself and its supply chain. It's a vast array of issues ranging from packaging to consumer products, to management of in-store waste, with some very ambitious goals.

I'm going to turn it over to Linda.

**Linda Breggin:** My main objective is to talk about some of the work that is happening at the local level on food waste, because for the past several years, I've been the project coordinator for the Natural Resources Defense Council's (NRDC's) food waste pilot project in Nashville. And much of the innovative work on waste generally is happening at the local level.

To start, I want to provide a bit of basic information about food waste, because it really is an issue that only recently has garnered a lot of attention. I want to provide a very broad overview of why, from an environmental and other perspectives, we care about food waste and also what federal, state, and local regulators are doing to address the problem. Then, I want to talk about the Nashville Food Waste Initiative.

Estimates do vary, but there is a consensus based mostly on USDA data that up to 40% of the food in the United States is wasted.<sup>3</sup> Stop and consider that for a minute: 40% of our food. Waste of this magnitude obviously has huge environmental implications, but also social justice and cost

implications as well. Let's look at some of the environmental implications.

When we throw away all these things, we're essentially throwing away the natural resources that went into making them. NRDC estimates in its *Wasted* report that about 20% of all agricultural water is used to grow food that we don't eat, about 18% of all the fertilizer we use in this country is used to grow food that we don't eat, and about 19% of our cropland is used to grow food that we don't eat.<sup>4</sup>

The climate change implications are considerable. Not only are the greenhouse gas (GHG) emissions associated with growing the food we throw away high—it is estimated at about the same amount as 37 million cars on the road each year<sup>5</sup>—but almost all food waste is going to landfills or incineration, particularly landfills, and there it decomposes and produces methane. Some of you are probably familiar with the recent Project Drawdown report that finds food waste is responsible for 8% of global GHG emissions.<sup>6</sup> As they put it, if food waste were a country, it'd be the third-largest emitter worldwide.<sup>7</sup>

That is just a snapshot of why we care about this issue from an environmental perspective, but there are also very serious social justice concerns. While we're wasting all of this food, one in eight Americans is food insecure.<sup>8</sup> This is part of what makes working on this issue really easy even in this particular political climate, because even if somebody doesn't care about the environmental impacts, most people instinctively feel uncomfortable with this much waste when people in their communities are hungry.

NRDC estimates that if we could reduce food waste by even 30%, we could feed all 42 million Americans who are food insecure.<sup>9</sup> Obviously, it isn't even close to that easy; there are distributional challenges, but it gets to the magnitude of the problem. Further, food waste costs a lot. Just focusing, for example, on the household aspect, wasted food costs the average family of four about \$1,800 a year.<sup>10</sup>

When we consider how to address food waste, we typically look at EPA's Food Recovery Hierarchy.<sup>11</sup> The first thing you want to do is prevent food waste from happening to begin with, and if that is not possible, you want to feed hungry people. Next in the hierarchy is to feed animals. For example, our convention center here sends food scraps to a wildlife rehabilitation center. If that is not an option, you want to use food scraps in industrial production and, if that is not possible, you want to recycle through anaerobic digestion or composting, and there's actually a hierarchy within composting as well. The last place you want food

3. DANA GUNDERS ET AL., NRDC, *WASTED: HOW AMERICA IS LOSING UP TO 40 PERCENT OF ITS FOOD FROM FARM TO FORK TO LANDFILL* (2017), available at <https://www.nrdc.org/sites/default/files/wasted-2017-report.pdf>.

4. *Id.*

5. *Id.*

6. DRAWDOWN: THE MOST COMPREHENSIVE PLAN EVER PROPOSED TO REVERSE GLOBAL WARMING 42 (Paul Hawken ed. 2017).

7. *Id.*

8. USDA, *Key Statistics and Graphics*, <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/key-statistics-graphics.aspx> (last visited Apr. 25, 2019).

9. GUNDERS ET AL., *supra* note 3.

10. GUNDERS ET AL., *supra* note 3.

11. U.S. EPA, *Food Recovery Hierarchy*, <https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy> (last visited Apr. 25, 2019).

waste to go is a landfill. However, as I mentioned, that's where almost all of it is going.

Let's turn now to an overview of what federal, state, and local governments are doing to address food waste. This is, of course, part of what motivates companies to care about food waste, but there are also many other factors as well.

This is not an area that the federal government regulates, but it's an area that it is paying attention to. Back in 2015, the Barack Obama Administration set a goal to reduce food waste by 50% by 2030, primarily through a whole array of voluntary programs.<sup>12</sup> And then somewhat surprisingly—as this may be the only Obama environmental initiative that the Donald Trump Administration has embraced—in 2018, EPA, USDA, and the Food and Drug Administration announced the Winning on Reducing Food Waste Initiative.<sup>13</sup> It is also a nonregulatory initiative. It focuses on agency coordination and on engaging businesses.

I also want to mention that there is an enhanced federal tax deduction for food donation. There are also provisions in the recent farm bill<sup>14</sup> related to food waste that include expanded federal liability protection for certain donors who donate directly to individuals, not just to nonprofits. The farm bill also includes funding for states to address food waste.

States are also taking action on food waste. Probably the strongest measures are the organic waste bans in five states that basically prohibit the disposal of food waste in a landfill. They are structured in a variety of ways. In addition, states also have their own tax incentives for food donation and liability protection laws that can be even broader than the liability protection provided under federal law. Further, some states have date labeling requirements.

There are many ways that localities are addressing food waste. Again, some of the stronger measures have to do with mandatory food scrap recycling requirements or landfill bans on organics and food waste in particular. But localities are also adopting procurement policies, for example, that favor compost products in their landscaping and other earth-disturbing activities. Some are using “pay-as-you-throw” pricing structures or waste disposal practices that incentivize food scrap recycling. And a lot of localities are conducting public education.

Let's turn now to what's happening in Nashville at the city level. Cities are on the front lines of food waste prevention. They are responsible for waste management, and they are responsible for the food-insecure members of their communities. In Nashville, for example, we have more

than 100,000 people who are food insecure and one-quarter of them are children.<sup>15</sup>

In addition, on average, 20% of waste in landfills is food. In Nashville, our landfills are filling up. As our city grows, our waste is growing. Historically, we have had very cheap tipping fees at landfills, but that's changing as we need to find new places to put our waste. In addition, many cities like Nashville have made commitments to reduce their carbon footprint. The mayor here has set a citywide goal for reduction in GHG emissions by 2020 and 2050.<sup>16</sup> These are some of the key factors that are driving cities to want to take action.

As I mentioned, the Nashville Food Waste Initiative is a project of NRDC and our objective is to look at approaches to addressing food waste at the local level. I personally was very pleased they picked Nashville, not only because I live here, but because it isn't on the coast and it is a midsized city. I write a column for *The Environmental Forum*, ELI's policy magazine, and I could write every column about Portland, Seattle, and certain cities in California, but those are not models for cities here in the Southeast. If something can be done in Nashville, it is much harder for other cities near here to dismiss it.

The pilot was launched in 2015 and has lasted a lot longer than we anticipated, because it really gained a lot of momentum, and we are learning a lot about what works at the local level. Although this is the start of the wind-down of the pilot, over the years, we've developed and are implementing a holistic strategy along the lines of the EPA food recovery hierarchy that prioritizes prevention, then rescue of surplus food, and then recycling of food scraps. We are working closely with the Metropolitan government, with the business community, and with nonprofits.

A principal food waste prevention project that we are working on in Nashville is a Leanpath software pilot with three universities: Tennessee State University, whose food operation is run by Sodexo; Belmont University, which is run by Aramark; and Vanderbilt University, which is self-operated. These companies have agreed to use Leanpath, which is a food waste prevention platform that helps measure food waste, compiles and analyzes the data, and offers a suite of tools to drive food waste reduction behaviors. Our goal is for these companies to reduce their waste and to talk about it with other businesses. The average company that uses Leanpath reduces its food costs by 6%.<sup>17</sup>

Another prevention or measurement project that NRDC conducted in Nashville—and also Denver and New York

12. U.S. EPA, *United States 2030 Food Loss and Waste Reduction Goal*, <https://www.epa.gov/sustainable-management-food/united-states-2030-food-loss-and-waste-reduction-goal> (last visited Apr. 25, 2019).

13. Press Release, USDA, Trump Administration Launches “Winning on Reducing Food Waste” Initiative (Oct. 18, 2018), <https://www.usda.gov/media/press-releases/2018/10/18/trump-administration-launches-winning-reducing-food-waste>.

14. Pub. L. No. 115-334 (2018).

15. Feeding America, *Food Insecurity in Davidson County*, <http://map.feedingamerica.org/county/2016/overall/tennessee/county/davidson> (last visited Apr. 25, 2019).

16. Press Release, Metropolitan Government of Nashville and Davidson County, Tennessee, *Mayor Briley Marks Earth Day by Announcing Let's Move Nashville Is Equivalent to Planting 1 Million Trees*, <https://www.nashville.gov/News-Media/News-Article/ID/7443/Mayor-Briley-Marks-Earth-Day-by-Announcing-Lets-Move-Nashville-is-Equivalent-to-Planting-1-Million-Trees.aspx>.

17. Janet Haugan, *LeanPath Partners With Metro to Cut Food Waste*, FOOD WASTE INTELLIGENCE (Oct. 5, 2015), <http://blog.leanpath.com/leanpath-partners-with-metro-to-cut-food-waste>.

City—was to analyze how much potential surplus food could be rescued and fed to hungry people. In Nashville, we have a meal gap of about 19.3 million meals.<sup>18</sup> That is how many meals we would need to feed all of the people who are food insecure. NRDC research indicates that 45% of that gap is already being met by our wonderful food bank and other organizations, but we're still 10 million meals short.<sup>19</sup>

The report estimated both a maximum scenario and an ambitious scenario for how much of the available surplus food could be rescued. Under the maximum scenario, we can essentially close the meal gap entirely. Of course, that isn't realistic—we are not going to be able to rescue all the surplus food out there—but the information shows how incredible the potential is to feed people with surplus food.

Because very little prepared food is being rescued, we started an effort to try to better understand the barriers and the opportunities to rescuing prepared food in particular—not packaged and canned food—from restaurants, caterers, hotels, and sports arenas. We conducted interviews, developed surveys, and held convenings, and we learned a lot.

Among the things that we learned is that nonprofits, or the “last-mile organizations” as we call them, that feed the hungry have very diverse needs with respect to the types of food they want, how much they want, and when they want it. Understanding these needs is really important to finding the appropriate matches for businesses and nonprofits. We also found that most potential donors did not know that there are federal and state statutes that provide liability protections to food donors. Most potential donors also didn't know there is a federal tax deduction. But probably the biggest barrier is logistics: lack of storage space for food late at night in restaurants when the food becomes available, lack of ways to transport the food, and the cost, time, and materials needed to package the food.

Here in Nashville, we are working to address all the pieces of the puzzle that are needed to increase surplus prepared food rescue. We've partnered with the Metro Public Health Department on a brochure that encourages donation,<sup>20</sup> which it mailed to all of the businesses it regulates. This was incredibly important, because people expressed concern that the Department may not want them to donate food. We have also developed additional education materials on the federal tax incentive and worked with the Harvard Food Law and Policy Clinic on their fact sheets about liability protection under federal and state

law.<sup>21</sup> And we are working with industry trade associations to get this information to their members.

On the food scrap recycling front, we're working with Metro Public Works on a task force it convened to advise it on its long-range solid waste master plan. Last year, Metro Nashville set a zero-waste goal and hired a contractor to develop a draft plan that is going to be released soon that outlines how the city can eventually (over 30 years) achieve close to zero waste. The plan is going to have to address recycling of food scraps because food is a large component of waste in landfills here, as is the case around the country. And it is worth noting that this is a trend—more and more cities are developing zero-waste plans or considering them, which in turn drives policy.

We are also in the process of wrapping up a study on barriers and opportunities with respect to both increased food scrap recycling by businesses and an enhanced food scrap recycling infrastructure. The findings have not been published, but are going to be posted on the ELI website soon. The idea is similar to the prepared food rescue study—to try to better understand the barriers to food scrap recycling and how to address them.

I want to close with some of the community involvement and engagement work we're doing here in Nashville. Mayor David Briley announced the Food Saver Challenge to the hospitality sector in November.<sup>22</sup> It followed a pilot challenge in 2017 that was very well-received. In order to participate, a business agrees to implement five measures to address food waste from a long list of options. Measures can range from measuring waste, to composting, to simply asking customers if they want bread before it is delivered to tables. Participants receive a decal for participating and there is an annual event with the mayor. Participants report biannually on their activities.

The Challenge has received a lot of press attention. In fact, Nashville Public Radio ran a local story recently that is also going to run on *Marketplace*.<sup>23</sup> A lot of cities have conferred with us about how they too can launch a challenge. What is really important about this challenge is that it is a partnership. It's not just the Nashville Food Waste Initiative and the mayor, but the independent restaurant group and the hospitality association that are also partners and are helping to educate their members. We also have

18. JOANNE BERKENKAMP & CALEB PHILLIPS, NRDC, MODELING THE POTENTIAL TO INCREASE FOOD RESCUE: DENVER, NEW YORK CITY AND NASHVILLE 23 (2017), available at <https://www.nrdc.org/sites/default/files/modeling-potential-increase-food-rescue-report.pdf>.

19. *Id.*; Interview with JoAnne Berkenkamp, Senior Advocate, NRDC.

20. METRO PUBLIC HEALTH DEPARTMENT AND NASHVILLE FOOD WASTE INITIATIVE, FOOD DONATION GUIDELINES FOR LICENSED FOOD FACILITIES, available at [https://www.eli.org/sites/default/files/docs/food\\_donation\\_guidelines.pdf](https://www.eli.org/sites/default/files/docs/food_donation_guidelines.pdf).

21. FOOD LAW AND POLICY CLINIC, HARVARD LAW SCHOOL, LEGAL FACT SHEET FOR FOOD DONATION IN TENNESSEE: LIABILITY PROTECTIONS (2018), available at [https://www.eli.org/sites/default/files/docs/research/final\\_liability\\_protections\\_fact\\_sheet\\_tn\\_11.9.pdf](https://www.eli.org/sites/default/files/docs/research/final_liability_protections_fact_sheet_tn_11.9.pdf); FOOD LAW AND POLICY CLINIC, HARVARD LAW SCHOOL, LEGAL FACT SHEET: THE BILL EMERSON GOOD SAMARITAN FOOD DONATION ACT, available at <https://www.chlpi.org/wp-content/uploads/2013/12/Emerson-Act-Legal-Fact-Sheet.pdf>.

22. Nashville Food Saver Challenge, *About*, <https://www.nashvillefoodsaver.com/about> (last visited Apr. 25, 2019).

23. *Nashville Restaurants Fighting Food Waste Can Now Hitch a Ride for Their Leftovers*, Nashville Public Radio (Jan. 24, 2019) (downloaded at <https://www.nashvillepublicradio.org/post/nashville-restaurants-fighting-food-waste-can-now-hitch-ride-their-leftovers>); *Delivery Companies Finding Ways to Help Restaurants Donate Excess Food*, Marketplace (Feb. 19, 2019) (downloaded at <https://www.marketplace.org/2019/02/19/wealth-poverty/food-delivery-companies-enable-easy-donation-restaurants-excess>).

had a lot of our high-profile celebrity chefs involved who recruit participants.

In addition to the Challenge, we have conducted public education that uses free materials, including videos and posters, that are part of a national NRDC and Ad Council campaign on food waste.<sup>24</sup> You can now notice these materials around the city—on billboards, in about 200 buses, and posted in concession stands at sports arenas and in university cafeterias.

**Carol Adaire Jones:** I am going to talk about how a sector that focuses on waste management, the wastewater sector, is revisioning itself as part of the circular economy. Specifically, I'm going to discuss the Utility of the Future Initiative, launched about six years ago, that is revisioning waste as a valuable resource and redefining the sector mission as recovering resources.<sup>25</sup> This complements Linda's talk, which focused on how to reduce the amount of food ending up in the solid waste system, either by preventing waste or donating healthy surplus of food to food-insecure people.

As she noted, after institutions have accomplished all that they can in terms of reduction and donations, some food scraps will still remain. She mentioned the movement toward recovering resources by composting food scraps, rather than sending those scraps to landfills. The wastewater sector can offer an alternative solution, and that is co-digesting the food waste along with sewage sludge. In addition to reducing the GHG emissions from landfills, co-digestion also recovers valuable resources—the energy resources as well as the nutrient resources that exist in food scraps.

My talk is based on an ELI project, funded by the Water Research Foundation, that is focusing on identifying business cases for co-digestion of food waste at wastewater treatment plants. I want to acknowledge the co-leads of my project. Ken Kirk is the past executive director of the National Association of Clean Water Agencies (NACWA). NACWA has been one of the major leaders in developing the Utility of the Future Initiative. Craig Coker is an expert on composting and anaerobic digestion.

To illustrate my points, I will highlight aspects of the wastewater treatment facility in Derry Township, Pennsylvania. It is actually located in Hershey—yes, it's that Hershey, the one where the Hershey chocolate manufacturing plant is located, which will feature in the story later.

The Derry Township Municipal Authority runs the plant, which is relatively small as wastewater plants go, treating an average of four million gallons per day. The facility, which has two anaerobic digesters, was an early adopter of co-digestion. In the 1990s, it began accepting

the chocolate food processing wastes from Hershey as well as fats, oils, and grease.

I want to highlight two important points about the wastewater sector. First, though individual facilities may be small, the wastewater sector as a whole is very large, equivalent to a Fortune 500 national company. Second, the sector has tremendous public health and environmental impacts. It affects almost all water bodies. As a result, it's one of the most regulated sectors. The main regulations impacting the wastewater sector are from the Clean Water Act (CWA)<sup>26</sup>: the CWA National Pollutant Discharge Elimination System permits cover both the liquid effluent that wastewater facilities emit and the biosolids that come out of the wastewater process.

Over the years, there's been a major transformation in the concept of the sector mission. It started out as sewage collection and treatment, which improved sanitation and yielded tremendous public health benefits. With the CWA in 1972, the focus shifted to achieving stringent water quality performance standards. With the tough new requirements came major funding. Over time, requirements increased, adding a focus on nutrients as well as the more conventional water quality criteria pollutants.

Today, there is a large funding gap for adhering to new requirements. Partly as a result of those fiscal constraints and also recognizing that they were sitting on major resources that are scarce—energy, which they're very intensive users of, as well as water—about six years ago, the sector articulated a new vision of itself as a resource recovery sector. The vision focuses on a triple-bottom-line mission for the sector, not only financial returns that enable them to keep utility rates low, but also environmental stewardship and community service.

A mantra of the circular economy, as I said, is recognizing that valuable resources can be recovered from waste products. Figure 1 illustrates that wastewater resource recovery facilities (WRRFs) take in items traditionally considered to be wastes (e.g., wastewater) and transform them into valuable resources (e.g., recycled water).<sup>27</sup> Wastewater is the traditional sector input. Now, the sector is also taking in various food wastes, which, as we'll see later, have much higher energy content than sewage sludge. The plants recover valuable resources: reclaiming and reusing water, capturing the latent energy in the feedstocks to produce renewable energy products, and reclaiming nutrients from the biosolids and the bioliquids.

About recovering water: this practice is still in its infancy in the United States, but it's growing rapidly, particularly in areas with water stress. Wastewater plants are adopting technologies to treat water for non-potable uses, and, in some cases, for potable uses so the water can be returned to the aquifer. In terms of benefits, this practice obviously

24. Material is available for download at <https://savethefood.com> (last visited Apr. 15, 2019).

25. NATIONAL ASSOCIATION OF CLEAN WATER AGENCIES, WATER ENVIRONMENT RESEARCH FOUNDATION, AND WATER ENVIRONMENT FEDERATION, *THE WATER RESOURCES UTILITY OF THE FUTURE: BLUEPRINT FOR ACTION* (2013), available at [https://wef.org/globalassets/assets-wef/direct-download-library/public/03---resources/waterresourcesutilityofthefuture\\_blueprintforaction\\_final.pdf](https://wef.org/globalassets/assets-wef/direct-download-library/public/03---resources/waterresourcesutilityofthefuture_blueprintforaction_final.pdf).

26. 33 U.S.C. §§1251-1387, ELR STAT. FWPCA §§101-607.

27. Ed McCormick, President, Water Environment Federation, Presentation at the Michigan Water Environment Association Annual Conference (June 2015), available at [https://www.mi-wea.org/docs/McCormick-WEF\\_Address.pdf](https://www.mi-wea.org/docs/McCormick-WEF_Address.pdf).

**Figure 1. Co-Digestion of Food Wastes and Resource Recovery at WRRFs**  
(Reprinted with permission by the Water Environment Federation)



addresses water scarcity. It also provides a better use for the nutrient-rich waters that can cause problems with meeting CWA requirements. And the aquifer recharge can prevent salt intrusion.

However, I want to focus on anaerobic digestion and the benefits it can provide. Anaerobic digestion is a process where microbes convert organic matter (e.g., sewage sludge) to carbon dioxide and methane in an oxygen-free environment. The direct products are biogas, which can be used for renewable energy, and the biosolids and the bioliquids that I've talked about. The direct benefits of anaerobic digestion, before we get to the products, include that it reduces odor associated with the output. It also stabilizes biosolids, which can be costly to dispose, by reducing biosolid volume and pathogens.

With additional investment, the plants can create renewable energy products from the biogas. If wastewater facilities invest in boilers, then they can produce heat. If they invest in cogeneration engines or microturbines or other engines, they can produce combined heat and power, hence, electricity. The benefits include energy cost savings or revenue, reduction in GHG emissions, and if the electricity is used on-site, resilience to grid outages.

One energy product that plants are beginning to focus more on is renewable natural gas for biofuel—produced by removing the carbon dioxide and other contaminants from

the biogas—which can be sold for direct vehicle use or by injection into natural gas pipelines. In 2014, the federal Renewable Fuel Standard (RFS) approved a cellulosic pathway for generating the very valuable D3 category of Renewable Identification Numbers (RINs), the trading currency for the RFS. The federal RFS, as well as the Low Carbon Fuel Standards in California and other states, create substantial financial incentives for renewable fuel production.<sup>28</sup>

The Derry wastewater plant has a combined heat and power (CHP) system that generates electricity. For CHP engines to run reliably, biogas must be cleaned by having certain contaminants removed. Use of biogas in the CHP engines has reduced Derry's electricity purchases.

Another output of anaerobic digestion that can create value is biosolids. As I said, the end-uses of biosolids are regulated by the CWA. So, depending upon the quality of biosolids and the regulations in the particular area, the facility may be able to land-apply them or they may be landfilled or incinerated.

However, with additional processing, it is possible to create higher-value products, turning biosolids into compost for example. And bioliquids can be concentrated and

28. U.S. EPA, *News, Notices and Announcements for the Renewable Fuel Standard*, <https://www.epa.gov/renewable-fuel-standard-program/news-notice-and-announcements-renewable-fuel-standard> (last visited Apr. 25, 2019).

**Figure 2. Circular Economy: Derry WRRF Food Waste to the Community as Fertilizer**

sold as nutrient-rich fertilizer, which has the benefit of addressing potential nutrient load in effluents, as well as the product sales.

The Derry Township Municipal Authority has developed a biosolids management program focused on recycling an organic and nutrient-rich material in an environmentally safe and beneficial manner (see Figure 2).<sup>29</sup> The resulting product is a dry granular, high-quality fertilizer product known as Clearwater SteadiGro.<sup>30</sup>

So, that covers products from the anaerobic digestion process. The other part of the story is expanding the inputs to anaerobic digestion beyond sludge to include food wastes. I want to highlight how co-digesting food waste multiplies the biogas recovery potential. What we mean by co-digesting is the addition of high-strength wastes to anaerobic digesters that are already digesting wastewater sludge, or in the case of farm digesters, digesting manure. At this time, the more dominant food waste feedstocks are the liquid ones—fats, oils, and grease, and food processing residuals. They are generally regulated through the wastewater regu-

latory system. They may need pre-processing before going into the digester, but they conveniently are in liquid form.

Food scraps are less frequently used. Part of that has to do with the fact that food scraps are not generally available for co-digestion without source-separated organics solid waste collection, and that is not widely available in this country except where organics recycling policies are in place. Four New England states, California, New York, and a handful of cities have either recycling mandates or organics landfill bans. The small number of recycling mandates limits the opportunities for co-digestion to a great extent. Food scraps are also a solid waste, so they have to be converted to a liquid form in order to be added to the digester, and, as with the liquid products, they may have contamination issues. In addition to these challenges, solid wastes are handled by a separate utility from wastewater, which can make coordination difficult.

But a major benefit of co-digestion is that there's a tremendous increase in biogas with food waste. Food scraps generate three times as much biogas as sewage sludge, because they have much more organic material.<sup>31</sup> And fats, oils, and grease are another eight times that.<sup>32</sup> Note that

29. Trudy Johnston, Material Matters, Inc., and Wayne A. Schutz, Derry Township Municipal Authority, Presentation at the Water Environment Federation Residuals and Biosolids Conference (May 23, 2010), available at [https://materialmatters.com/download.php?file=WEF\\_DTMA\\_MM\\_2010\(5-23-10\).pdf](https://materialmatters.com/download.php?file=WEF_DTMA_MM_2010(5-23-10).pdf); Derry Township Municipal Authority, *Biosolids Management Program*, <http://www.dtma.com/our-services/for-the-environment/biosolids-management-program/> (last visited May 20, 2019).

30. *Biosolids Management Program*, *supra* note 29.

31. U.S. EPA, *The Benefits of Anaerobic Digestion of Food Waste at Wastewater Treatment Facilities*, <https://www.epa.gov/sites/production/files/documents/Why-Anaerobic-Digestion.pdf>.

32. M. Charles Gould, *Chapter 18—Bioenergy and Anaerobic Digestion*, in *BIOENERGY: BIOMASS TO BIOFUELS* (Anju Dahiya ed. 2015).

the main feedstock in farm digesters, livestock manure, generates less biogas per unit than sewage sludge.

So, what are the benefits of co-digestion? Operational benefits include leveraging unused digester and energy generation capacity, recycling waste products that cause problems in the sewers or landfills where they are currently disposed, recycling waste products that may be subject to regulatory mandates to find new disposal strategies, and increasing biogas production. Financial benefits include tipping fees from the feedstocks and boosting increased energy cost savings or revenues. Environmental benefits and community benefits include providing a service, for example, to food scrap generators who have been told by the regulators that they need to recycle this and need a place to send it.

Those all sound like good reasons to adopt co-digestion, but we need a reality check. Adoption, in fact, is limited. One out of 10 of the 14,000 WRRFs have anaerobic digestion.<sup>33</sup> However, anaerobic digestion is concentrated in larger U.S. facilities; as a result, in fact, one-half of U.S. wastewater is sent through anaerobic digestion. But of those plants with anaerobic digestion, fewer than one in 10 co-digest.

Nonetheless, plants *are* co-digesting, and they are dispersed throughout the country as demonstrated by Figure 3.<sup>34</sup> California has a very broad policy portfolio that incentivizes co-digestion. But states with policies centered around Renewable Portfolio Standards setting goals for renewable electricity, particularly in the Midwest and Northeast, have also experienced growth in co-digestion.

The question is, how does a plant construct a winning business case so that this untapped potential is realized? The first point is each plant needs to leverage the available drivers that are in sync with its mission. And the drivers in each location are going to vary with state and local policies and market conditions.

And of course, utilities have to address the financial value proposition. On this score, co-digestion can create energy cost savings and/or energy revenues, and revenues from nutrient products and from the tipping fees for accepting food waste feedstocks. But also really critical are the financial incentive programs that are encouraging these environmentally sustainable activities that, otherwise, the plants may not be financially rewarded for.

Finally, another important reason is to achieve compliance with regulations. Increased requirements for sludge and biosolids management by wastewater plants may be a driver in a given location. Also, increased requirements on food waste generators regarding where they can dispose of their food waste may be a driver. And if a utility has committed to the triple-bottom-line mission, then commitments to environmental stewardship and to community service are important levers.

There are various impediments. I think for the operational risks and the regulatory compliance risks, research exists to solve the challenges that may arise. For stakeholder concerns, part of the solution is to have meetings early and often to understand and address specific concerns, and to communicate how co-digestion projects are consistent with the mission of a given utility. Those are solvable. Really, the critical issues in the sector seem to be economic concerns.

For economic challenges, I want to highlight the potential contributions that can be made by the public-private partnerships we see developing for feedstock supply and for energy generation and distribution. We are seeing product innovation in the solid waste sector to provide anaerobic digester-ready food scrap products by pre-processing to mitigate contamination and turn scraps into a liquid slurry. This is costly. It happens in markets where the policy regime is in place to require recycling of food scraps. The firm that is most commonly noted for that is Waste Management, one of the top three solid waste companies in the United States. They have a patented process for developing a food scrap slurry product. But where the policy regime is in place to require organics recycling, other solid waste companies are entering the market, both national firms as well as local or regional firms.

The other innovation I want to highlight is the use of public-private partnerships to put in place, and in some cases operate and finance, energy infrastructure. The Derry wastewater plant is currently in the process of developing a partnership for a major expansion of its anaerobic digestion capacity plus its energy infrastructure, and it's also expanding its capacity to bring in new feedstocks. The utility has developed a partnership that is transferring the investment risk to the developers through the Pennsylvania state version of an energy service contract.<sup>35</sup>

So, to summarize our findings for the question, what does it take to move toward the circular economy? We've probably studied 30 to 40 plans within the sector. We have found there is no simple menu of business cases (A, B, C) to choose from. Each utility has its own unique features, so it needs to pull together the business case based on its context. It's challenging and so a champion is necessary, but a champion is not sufficient. You have to have stakeholder buy-in. You have to make the economics work. Some public incentives programs supporting investment in improved environmental outcomes are key. Where the policy structure is in place to reward the innovation to implement the circular economy, we are really seeing innovation arising.

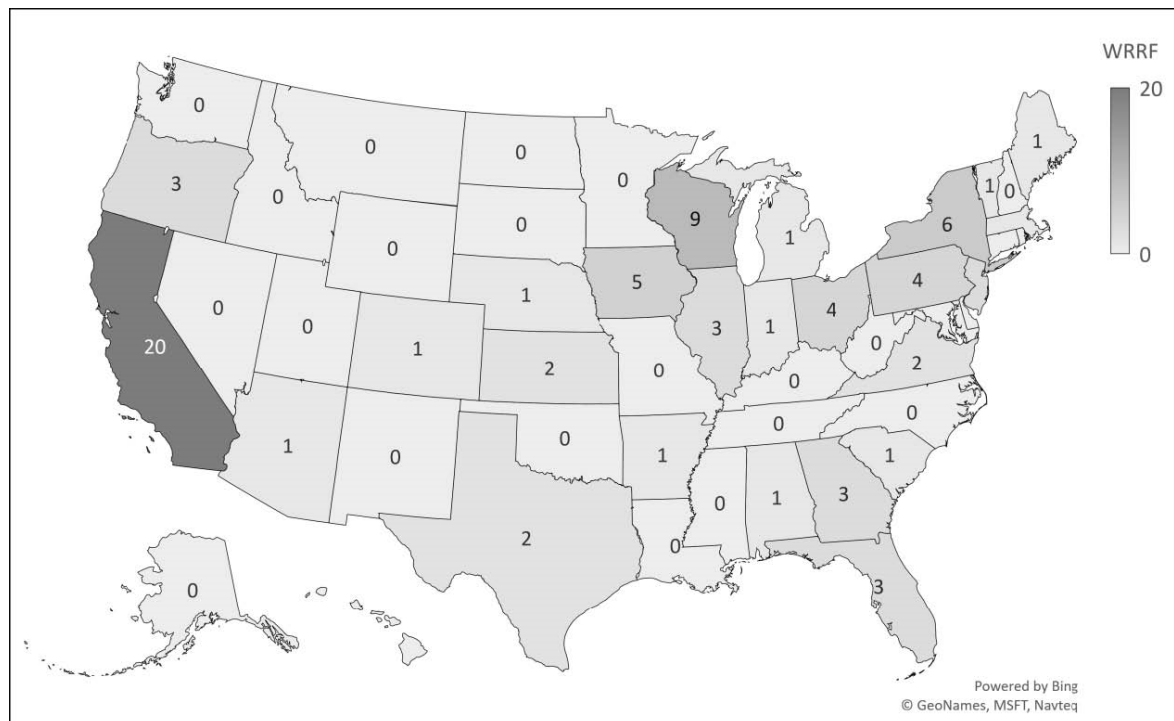
**Byron R. Brown:** As you know, I'm a Senior Counsel from the firm Crowell & Moring. Until a few months ago, I served at EPA as the Deputy Chief of Staff for Policy. Earlier in my career, I spent more than a decade in EPA as an attorney in the Office of General Counsel where I worked on a range of issues, including congressional investigations and rulemaking under a variety of environmental statutes.

33. YINAN QI ET AL., *BIOGAS PRODUCTION AND USE AT WATER RESOURCE RECOVERY FACILITIES IN THE UNITED STATES* (2013).

34. U.S. EPA, *ANAEROBIC DIGESTION FACILITIES PROCESSING FOOD WASTE IN THE UNITED STATES IN 2015* (2018) (EPA 903-S-18-001).

35. Guaranteed Energy Savings Act, 62 Pa. C.S. §3751 (1998).



**Figure 3. Operating WRRF Food Waste Co-Digestion Systems by State in 2015**

I also worked on congressional staffs for the House Natural Resources Committee and more recently on the staff for the Senate Committee on Environment and Public Works, where I worked on waste issues, issues involving the Superfund program, contaminated sites, brownfields, waste-to-energy, and recycling issues. One of the things I worked on was legislation amending the Resource Conservation and Recovery Act (RCRA)<sup>36</sup> to allow states and the federal government to issue permits to dispose of coal ash generated by electric power plants. I'm excited to be here today talking about the things that are happening in the recycling field, specifically as it relates to electronic waste and plastic issues.

As a preliminary matter, I think you're all aware that the federal laws governing waste and recycling are somewhat limited. There are clear national policy statements both within RCRA and the Pollution Prevention Act<sup>37</sup> that pollution should be prevented and recycling is encouraged. There's really no mandate to require recycling at the federal level, but RCRA mentions recycling dozens of times in different contexts. One of the main features is to figure out when something is being discarded and then when something is being repurposed or reclaimed in an environmentally responsible manner.

I will spend a bit of time talking about some of the recent developments in this space. One of the ways that the federal government is able to influence recycling rather than through a mandate is through the federal purchasing

plans that are in place for products that have recycled content in them. There are a number of requirements in place concerning testing and purchasing of the materials that are recycled or that contain recovered materials. That is in a bit of a state of flux right now.

In May 2018, the president issued Executive Order No. 13834,<sup>38</sup> which concerns the efficient federal operations of government agencies. It directed that agency heads have to continue to implement waste prevention measures especially as it relates to acquisition policies. But it does away with previous Executive Order No. 13693<sup>39</sup> that was issued by President Obama, which had very specific targets for GHG reductions, efficiency standards, and recycling content for federal purchasing programs.

So, we're not entirely sure how the new federal purchasing requirements are going to play out. The Executive Order that was issued in May of last year is pretty generic. It doesn't have a lot of details. The Council on Environmental Quality, which is responsible for implementing this initiative, is in the process of developing guidance for implementing the order. But that guidance is still pending at the Office of Management and Budget and hasn't been issued yet. It remains to be seen what exactly agencies will be told they need to do especially in the area of purchasing products that have recycled content, a major driver for the industry.

One of the things that has been getting a lot of attention globally over the past year or two on the issue of waste

36. 42 U.S.C. §§6901-6992k, ELR STAT. RCRA §§1001-11011.

37. 42 U.S.C. §§13101-13109.

38. Exec. Order No. 13834, 83 Fed. Reg. 23771 (May 22, 2018).

39. Exec. Order No. 13693, 80 Fed. Reg. 15869 (Mar. 25, 2015).

management is how it relates to plastic. News organizations have reported on the issue. *National Geographic* had a very provocative issue on the topic, with a cover that looked like a plastic bag.<sup>40</sup> It looked like it was an iceberg that was a plastic bag floating in the water. That has gotten a lot of attention. According to a new study by researchers at the University of Georgia, the amount of plastics that's been generated since 1950 has gone from about two million metric tons to more than 322 million metric tons a year.<sup>41</sup> That's about a total of 8.3 billion metric tons of plastics that have been created. It's estimated that only about 9% of plastic is actually recycled globally, and around eight million metric tons ends up in the oceans annually.<sup>42</sup>

One of the things that has gotten attention in the past year is the amount of plastic and other waste that is exported from this country to China. On the international level, this has been going on for decades really. But over the past year, China has become more restrictive in what kind of imports it will accept. On January 1, 2018, a ban went into effect affecting 20 categories of recyclable materials that included several categories of scrap paper, scrap textiles, things like that.<sup>43</sup>

In 2018, China also strengthened its requirements for the type of contamination it would allow in recycled materials. So, if the materials are commingled, perhaps they're not cleaned properly, they're sent through a disposal or recycling facility, and they're commingled—if they weren't dirty before, they might get dirty in that process. And China has instituted a number of restrictions on the amount of contamination that would be allowed in recycled products that are sent to that country. That includes clamping down on contamination in plastic recyclables and paper. So, a lot of that material is no longer being accepted by China.

You're seeing plastic and other recyclable materials being stalled at ports on the West Coast and other places. You're starting to see some collection programs stopping the collection of plastics that are no longer being accepted in China. The foreign impacts of this, though, aren't really known yet. It's certainly having reverberation across the recycling stream not just in this country and China, but also in other parts of Asia.

I've seen countries like Vietnam and Thailand taking the excess recycled material that otherwise would have gone to China. These are often identified as the same countries that are largely responsible for the plastic marine debris issue; countries in Southeast Asia are largely believed to be responsible for the majority of the marine pollution with

plastic. So, because China is no longer taking in plastic, you're seeing it being diverted to these other countries. It's now creating some challenges for the global distribution system and the infrastructure for recycling in this country and abroad.

A few other things have been happening over the past year affecting recycling and how waste is being managed. Notably, the European Parliament late last year agreed on a ban of several categories of single-use plastics. These are often the same plastics that are found contaminating the ocean—plastic cutlery and things like that. They've also been working to reduce consumption of other categories of plastic by 2025.<sup>44</sup>

The issue has also gotten the attention of policymakers here in the United States. The issue of marine debris was included in the new United States, Mexico, and Canada free trade agreement that was announced last fall.<sup>45</sup> President Trump signed legislation that was sponsored by Sens. Dan Sullivan (R-Alaska) and Sheldon Whitehouse (D-R.I.) called the Save Our Seas Act that reauthorized the Marine Debris Program.<sup>46</sup> It provided tools to promote the cleanup of plastic marine contamination at different locations across the country if there's some spill or contamination problem.

And just this past month, a coalition called the Alliance to End Plastic Waste was launched. It's a group of about 30 companies that have pledged to contribute more than \$1 billion to try to fight plastic marine waste at the source, so trying to improve infrastructure, for example, in Southeast Asia, so plastic is not ending up in the ocean to begin with.<sup>47</sup>

Recycling of plastics has been happening globally. But another issue that has been around for a number of years is the issue of electronic waste and how it's being managed. Domestically, there's 25 states and the District of Columbia that have laws on the books requiring recycling of electronic waste in some form.<sup>48</sup> EPA estimates that for every one million phones that are recycled, there are about 35,000 pounds of copper, 772 pounds of silver, and more than 30 pounds of palladium that are recovered.<sup>49</sup>

So, there's a lot of valuable minerals in cell phones, and of course other electronic materials, that are able to be recycled. There is no federal legislation requiring the recycling of electronic waste. States have responded. They largely follow the "extended producer responsibility model," whereby

40. National Geographic, *Forever Is a Long Time*, <https://www.nationalgeographic.com/magazines/1/plastic-sub/index-ps.html> (last visited Apr. 25, 2019).

41. Amy L. Brooks et al., *The Chinese Import Ban and Its Impact on Global Plastic Waste Trade*, 4 SCIENCE ADVANCES eaat0131, available at <https://advances.sciencemag.org/content/4/6/eaat0131>.

42. Laura Parker, *A Whopping 91% of Plastic Isn't Recycled*, NAT'L GEOGRAPHIC, Dec. 20, 2018, available at <https://news.nationalgeographic.com/2017/07/plastic-produced-recycling-waste-ocean-trash-debris-environment/>.

43. Adam Redling & DeAnne Toto, *China Announces Import Ban on an Additional 32 Scrap Materials*, RECYCLING TODAY, Apr. 19, 2018, available at <https://www.recyclingtoday.com/article/china-bans-solid-waste-imports/>.

44. EUROPEAN COMMISSION, A EUROPEAN STRATEGY FOR PLASTICS IN A CIRCULAR ECONOMY (2018), available at <http://ec.europa.eu/environment/circular-economy/pdf/plastics-strategy.pdf>.

45. Agreement Between the United States of America, the United Mexican States, and Canada, U.S.-Can.-Mex., Nov. 30, 2018.

46. Pub. L. No. 115-265 (2018).

47. Alliance to End Plastic Waste, *Home Page*, <https://endplasticwaste.org/> (last visited Apr. 25, 2019).

48. Jennifer Schultz, *Electronic Waste Recycling*, NATIONAL CONFERENCE OF STATE LEGISLATURES, Sept. 17, 2018, <http://www.ncsl.org/research/environment-and-natural-resources/e-waste-recycling-legislation.aspx>.

49. U.S. EPA, *Electronics Donation and Recycling*, <https://www.epa.gov/recycle/electronics-donation-and-recycling> (last visited Apr. 25, 2019).

industry is largely funding the collection programs in different states.

California is a bit of an outlier in this area. They've had an electronic waste recycling law since the early 2000s.<sup>50</sup> Their law takes a different approach. It requires that a consumer pay an electronic recovery fee at the time he or she makes a purchase at the retailer level. That fee is then used by the state to reimburse the cost associated with recycling.

So, California has been through this consumer fee system, and the California program has led to video display devices of a certain size. It is pretty limited in scope, and the state has been discussing ways they can expand the program to make it more relevant to the issues that are facing consumers today. One of the models that is being looked at is in New York and other big states, where many actors are required to provide recycling programs. New York, for example, in a law passed a couple of years ago,<sup>51</sup> established targets for recycling and banned the disposal of electronic wastes in landfills.

California is certainly a big player on this topic and because they're wrestling with what to do with their laws, there are discussions that are happening across industry and states and other policymakers about what the appropriate response is for managing electronic wastes. Should it be some sort of national legislation that would maybe preempt different state approaches? Or should there be something that might incentivize additional state approaches rather than having a one-size-fits-all national approach?

In California, one issue that they have identified is with the requirements for the use of energy. There's an expectation that there's going to be a lot of solar panels and lithium ion batteries that would have to be managed at some point in the future. So, how do they have an electronic recycling program that is developed today that can address whatever the future challenges are going to be with electronic waste in that state?

One of the problems they found is that when the first law was created in 2003, people were really focused on their video display monitors and how to recycle them. But fast-forward from 2003 to 2019, and everyone has smartphones. There are industrial solar panels at people's homes. People have Teslas, you know, battery-powered cars. So, is an electronics recycling program going to manage that kind of evolution in technology and not be out of date as soon as it gets implemented?

Policymakers in California and throughout the country are struggling with these issues on how to incentivize manufacturers, for example, to develop products that are easy to repair. There are frequent complaints that smartphones become obsolete after a year or two. It's something that's really designed into the product by the manufacturer. How

do you incentivize having a product to have longer life, or that is easy to repair, or making sure that they are easier to restore, because a lot of manufacturing products are very difficult to open and repair, and to strip out valuable commodities for recycling?

These are some of the things that are being talked about nationally and in places like California about how to incentivize manufacturers and how to make it easier for consumers to know whether a product is something that could be recycled. Should there be labeling that is required? Is that something that should be tackled by a manufacturer, or should that just be at retailer level? There are a number of things to take into account.

If you look back over the years, there have been efforts to tackle plastic waste—I remember maybe not quite two decades ago, the attention was placed on plastic ring holders for canned beverages.<sup>52</sup> Just a couple of years ago, there was a microbead prohibition for home and beauty products.<sup>53</sup> So, there have been legislative responses to these issues. The Save Our Seas Act that was originally passed is more of a research and collaborative type of legal authority. It's not any sort of ban on plastics. Senator Sullivan is introducing a new Save Our Seas Act that builds upon the most recent legislation.

At the confirmation for Andrew Wheeler to be EPA Administrator, they were talking about how to bolster the work of the U.S. Agency for International Development trying to manage waste internationally. What sort of infrastructure improvements could be placed or developed in Thailand or Vietnam to try to address marine pollution from the sources?

They're also talking about ways to incentivize technological developments and bio-alternative plastics, plastics that would actually degrade in the ocean rather than just break down, and thus not be environmentally harmful. It may be a challenge, but that will be available for researchers. They're trying to think of ways to bring this issue to the forefront and find some relevant technologies.

**Anna Vinogradova:** Everything that Linda, Byron, and Carol were talking about is definitely influencing our business here in the United States and internationally. I've had the chance to work with Walmart in several different countries. I worked in Asia for three years and for some time in Latin America. For the past several years, I have led Walmart's Zero Waste Program here in the United States and those supporting our international markets. I want to talk about how we are thinking about preventing pollution and rethinking waste from the business perspective, and specifically from the retail perspective, which hopefully will be an interesting way to look at it.

50. California Department of Resources Recycling and Recovery, *Electronic Waste Recycling Act of 2003*, <https://www.calrecycle.ca.gov/electronics/act2003> (last visited Apr. 25, 2019).

51. New York State Department of Environmental Conservation, *Electronic Waste Recycling*, <http://www.dec.ny.gov/chemical/65583.html> (last visited Apr. 25, 2019).

52. 42 U.S.C. §6914b; see also Sarah Gibbens, *Are Plastic Six-Pack Rings Still Ensnaring Wildlife?*, NAT'L GEOGRAPHIC, Sept. 19, 2018, <https://www.nationalgeographic.com/environment/2018/09/news-plastic-six-pack-rings-alternatives-history/>.

53. Pub. L. No. 114-114, 129 Stat. 3129 (2015).

We announced three aspirational sustainability goals in 2005. The first goal was to create zero waste in our own operation. The second goal was to be operated with 100% renewable energy. We then expanded that goal to a broader goal to reduce emissions, where renewable energy became one of the strategies together with energy efficiency, better refrigeration, and managing efficiency in our fleet. The third goal was to sell products that sustain people and the environment.

Since we announced our goals in 2005, we have made a lot of progress. Globally, we are diverting from incineration and landfills 78% of materials like packaging and unsold products that are generated in our stores. These numbers are different market by market, as you would imagine. It's a little bit different from what we are seeing depending on the availability of infrastructure. Some of our markets are way ahead, such as Japan, the United Kingdom, and the United States. Some of our other markets, like Argentina and China, are still at a lower percent, but they're definitely moving as fast as the infrastructure allows them.

For our energy-efficiency or renewable energy goals, we just reported that 25% of our operations are being supplied by renewable energy. Our next goal is to focus on getting to 18% emissions reduction by 2030, which is actually in line with the science-based targets. At the same time, we'll set up a goal for our own supply chain on emissions reduction.

Three years ago, we also reported that 35 million metric tons of GHGs are being removed from our supply chain, and we've been able to announce an even bigger commitment via Project Gigaton, where we challenge our suppliers to join us in the journey to work on reducing GHG emissions. We want to eliminate one billion metric tons of GHGs by 2030. We've already been joined by 200 suppliers, which we are really excited about. It's a big target for us, and there are different ways suppliers can do it.

Another thing that I want to focus on is our Zero Waste Program. As you can imagine, at the back of our stores, at the back of our shops, and in distribution centers, we manage pretty much every material or product that you have in your homes as a customer, or any type of packaging. In some developed countries like the United States, we're managing more than 50 different types of waste as we're starting to segregate that. We're starting with food waste, and I'll talk about that in more detail going forward.

Packaging, the major contributor there, includes cardboard and plastic. There are trade-in products—products that are being brought to us by customers. Depending on the regulations, country by country, market by market, we take back some products. We take back some packaging from customers and manage that packaging inside our stores.

We are trying to minimize unsold products, but still that's in major retail. There is some percentage of the product that's always unsold, whether electronics or food, that we need to manage at the end of life. We have programs through which we either donate them, resell them, or seg-

regate them into different materials and then recycle them along with other recyclables.

These are the types of products that we're working with. As I mentioned, recycling of our packaging is the biggest program, the biggest contributor. We then have programs to manage food waste through composting, animal feed, or anaerobic digestion.

The EPA hierarchy that Linda mentioned is exactly the same hierarchy we are using in our own operation. We think that first and foremost source reduction is important. The source reduction for retailers pertains to saving costs and not having unsold food that needs to be managed at the end of life. The reduction is really done through effective, right business processes—right ordering, optimization, food handling, and reduction of the price. These are all the parts that would help us to actually sell food and have the right amounts of food, and to not have that surplus that we need to manage in the end.

But as I mentioned, as a retailer, you will always have that margin. We need to have enough food that when customers go to the store, the expected food is there. There is a small percent that we are not able to sell. We have a really strong partnership here in the United States with Feeding America and a variety of other local food banks who come to our stores at least once a week, depending on the size of the store. Sometimes, at the large supercenters, they come twice a week. They're taking the food that wasn't sold. We handle it through different ways. If it is dry grocery, for example, it can just sit there and wait for the food bank to come. For meat and bakery, we need to freeze it, and then we send it to food banks already frozen.

Last October, we celebrated a big milestone for us when we provided the four-billionth meal since 2015. That was our goal by 2020, but we hit our milestone early. It was something that we celebrated with Feeding America.

At the same time, something that would probably be familiar for some business organizations, we have our foundation team that also focuses on food waste prevention, zero-waste programs, and circular economy, but more through the philanthropic landscape. With the programs that we drive in the business philanthropy, we look at what is currently missing in the industry and that can support us through the funds and work through other organizations to make the system better so that it benefits not only Walmart, but also all other organizations. It's a strong partnership that we have here specifically on food waste, on hunger relief. We're working hand-in-hand on that, and working to leverage our business trends and our foundation.

Food is our number-one goal. We're trying as much as possible to get it to people in need. But there is definitely some damaged food that we cannot donate for food safety reasons and other reasons that we need to turn to organics. So, in 2008, we started to establish our organics program, and now it's fully functional across all stores in the United States. The important things as we were setting the program up were getting the right equipment

to the stores, having the right contracts, and having the right waste providers. We are sending it to animal feed, anaerobic digestion, and organics. Depending on what's available locally, that's what we're choosing, and we're also designing the program in a way that it could go through the most direct requirements, which are usually animal feed. Sometimes it requires us to be more stringent than if we were to be sending the waste to anaerobic digestion. But we want to make sure that we design the program that works all around that nationwide.

One of the ongoing considerations for the organics program involves training and associate engagement. We need to be really clear and simple in the back of the store, so we use color coding and simple standard operating procedures on how to handle the waste. Another consideration is feedback from data: What has happened to the waste? How many meals have been provided locally? Where did the food waste go? What exactly has been used? It's really important to close that loop and send that signal back to our stores.

In the past 17 years, as we worked on this program, we learned a lot. We want to support our stakeholders upstream and downstream on moving together toward the circular economy. We are working with our suppliers, and when they are manufacturing the products, we talk to them throughout the design and manufacturing process—What materials are they choosing? What packaging are they choosing? Are they putting some information about recycling in the hands of customers? At the same time, we can also work with our customers downstream on helping them to manage products and packaging at the end of life.

The main way we do this currently is through correct labeling. But we're also starting to introduce some programs like, for example, the e-commerce program that was launched by one of the companies that is part of our ecosystem now—Bonobos, an apparel brand that we purchased two years ago. The program takes back apparel from customers, so Bonobos is actually managing the end of life of that apparel. We're learning from the program and seeing something that we could implement across our bigger fleet.

I want to spend a few minutes on packaging specifically, and I know Byron talked about the plastic waste rise. It's definitely a big issue. If you look at overall plastic waste, you would see that 40% belongs to packaging.<sup>54</sup> Packaging has a really short shelf life, and usually is used only once. Therefore, industry is focusing a lot on how to make packaging recyclable to manage that end of life.

A few years ago, we developed the Packaging Optimization Playbook or Packaging Design Guide, a really detailed playbook for our private brand suppliers and our national brand suppliers.<sup>55</sup> Optimizing design by making sure the design actually helps to protect the product is really impor-

tant. There have been some changes to the packaging done in the very beginning of the industry's journey to sustainable packaging (e.g., light weighting) that resulted in lots of damages happening in the supply chain. We don't want that to happen.

The key areas of focus for our sustainable packaging strategy are to source sustainably by maximizing recycled and sustainably sourced renewable content, and enhance material health, and to support recycling by designing for recyclability and communicating recyclability.

We have also partnered with the Sustainable Packaging Coalition, and we are encouraging our private brand and national brand suppliers to put their "How2Recycle" label on packaging to make it simple for our customers to know what can and cannot be recycled, and to support the stronger recycling market by bringing the right materials there.

**Jim McElfish:** We've received a number of questions. The first one is whether there is anything that you've done related to "best if used by" dates or expiration dates related to food and food sales. Are there things that need to be done to educate the public, manufacturers, or retailers? I'll start with Linda, but perhaps Anna would have something to add.

**Linda Breggin:** That's a great question. It's not something that we work on very much at the local level. But it is a serious problem, and the data show that a lot of food that is thrown away by consumers is thrown away because of misunderstanding about these dates, especially the "best if used by" date. But there's tremendous inconsistency, and also sort of a patchwork at the state level.

There's been a lot of work going on to try to get national uniformity on this. Some progress has been made on this point. But to give you a sense on the federal level, there really is no requirement for date labeling. It was all voluntary, and it was really only baby formula that had dates on it. Anna, you may have a sense of the current state on progress being made. I know that there were some voluntary agreements in the industry, so that might be the degree to talk about.

**Anna Vinogradova:** We definitely know this is a challenge. When some research was done, I think there were more than 20 or 30 different labels that were found around the United States. Currently, the two labels that are encouraged by the Food Marketing Institute (FMI) and the Grocery Manufacturers Association (GMA) are the "best if used by" for quality and "use by" for safe end use of the product.

We actually were a part of a project that ReFED and Ohio State University led on developing a methodology to quantify customer food waste reduction due to standardized date labeling. There are some exciting results that will be released in the next few months, but I would say our simple message at this point to our suppliers would be that we will look for recommendations from FMI and GMA,

54. National Geographic, *Planet or Plastic?*, <https://www.nationalgeographic.com/environment/planetorplastic/>.

55. Walmart, *Sustainable Packaging Playbook*, [https://corporate.walmart.com/media-library/document/sustainable-packaging-playbook-deep-dive/\\_proxy/Document?id=00000169-15fc-dd5e-a3eb-75fc34d80000](https://corporate.walmart.com/media-library/document/sustainable-packaging-playbook-deep-dive/_proxy/Document?id=00000169-15fc-dd5e-a3eb-75fc34d80000).

and try as much as possible to switch to the two standardized labels—“best if used by” and “use by.”

**Jim McElfish:** This question relates to food rescue. Does the effort of food rescue generate additional forms of waste along the lines of single-use plastics? Are there things associated with food rescue that cause unintended consequences for the rescue?

**Linda Breggin:** I think it’s a gripping question. There has been some life-cycle analysis done on this, and we do have to think about this a lot. As a general matter, the transportation does not appear to make sense to rescue food, but it depends how you’re doing it.

One of the things we’re doing here that is really exciting is talking to companies like Postmates and DoorDash that are out there and have cars on the road. These networks guide whether we could work with them on food

rescue. I know that they are piloting, for example, in L.A. something called FoodFight!, which is part of Postmates, where at the end of the day if you’re a restaurant that works with them, a notification pops up on your screen that says, “We’re coming to do our last pickup. Do you want to donate anything? Do you have any surplus? Push this button,” because those drivers are out there already. But I think it’s a really important question.

We also are looking at the packaging. In fact, we have a report coming out soon on best practices for packaging for food rescue. Our data show that it is much more cost effective and environmentally effective to try to use reusable packaging for food rescue. It is something we very much need to be thinking about.

**Jim McElfish:** This will not be our last panel on zero waste. It’s certainly a timely topic. Thank you to our panelists.