



## Reducing Food Waste in Hawai'i: A Primer

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### I. Introduction

According to the Natural Resources Defense Council (NRDC), as much as 40 percent of all the food in the U.S., “from farm to fork to landfill,” is wasted.<sup>1</sup> Other researchers have produced somewhat lower estimates of food waste. Since different researchers define “food waste” differently, estimates of food waste can vary greatly.<sup>2</sup> Nonetheless, they all remind us that too much of our food supply eventually ends up wastefully in landfills, while one in eight Americans struggle with hunger. According to the U.S. Environmental Protection Agency (EPA), in 2014 the U.S. produced 258.5 million tons of municipal solid waste (MSW), of which 14.9% (38.4 million tons) was “food”; by far the largest amount of the food waste (over three-quarters, 29.4 million tons) went into landfills, 7.1 million tons was combusted to produce energy, and less than 2 million tons was recycled or composted. (MSW does not include industrial, con-

struction, or hazardous waste.)<sup>3</sup> University of Hawai'i at Mānoa researchers recently estimated that more than 26% of the available food supply in Hawai'i, valued at over \$1 billion, is discarded each year.<sup>4</sup> Since Hawai'i relies on imports for most of its food, most of the food waste in the Islands occurs at the consumer level. As food is more expensive in Hawai'i than on the mainland, over all the Aloha State is less wasteful than the rest of the country. In Hawai'i, the amount of food discarded per person averages around 356 pounds per year, compared to 429 pounds on the mainland.

Interest in reducing food waste has been growing across the country and, indeed, around the world.<sup>5</sup> There are numerous benefits to individuals and to society from reducing food waste: (1) it saves consumers money from buying less food; (2) it reduces the amount of landfill space required; (3) it reduces methane gas emissions that contribute to global warming; and (4) it conserves resources used to grow, manufacture, transport, and distribute food and finally haul the food waste to landfills.

1 Dana Gunders, *Wasted: How America is Losing up to 40 Percent of Its Food from Farm to Fork to Landfill*, Natural Resources Defense Council, 2012 at <https://www.nrdc.org/sites/default/files/wasted-food-IP.pdf>

2 See Marc F. Bellemare, Metin Cakir, Hikaru Hanawa Peterson, Lindsey Novak and Jeta Rudi, “On the Measurement of Food Waste,” *American Journal of Agricultural Economics*, Vol. 99, Issue 5, 1 October 2017, pp. 1148–1158. The Food and Agriculture Organization of the United Nations (FAO) makes a distinction between “food loss” and “food waste” in FAO, *Global Food Losses and Food Waste, Extent Causes and Prevention*, at <http://www.fao.org/docrep/014/mb060e/mb060e00.pdf> Briefly, food loss is food that is produced but for whatever reason is not eaten; food waste is part of food loss but is specifically food that is discarded.

3 [https://www.epa.gov/sites/production/files/2016-11/documents/2014\\_smmfactsheet\\_508.pdf](https://www.epa.gov/sites/production/files/2016-11/documents/2014_smmfactsheet_508.pdf)

4 Matthew K Loke and PingSun Leung, “Quantifying food waste in Hawaii's food supply chain,” *Waste Management & Research*, 2015, Vol. 33 (12) pp. 1076–1083. Loke and Leung define food waste as “the edible portion of food, post-harvest, that is available for human consumption, but is not consumed for any reason.”

5 Food and Agriculture Organization of the United Nations (FAO), *Global Initiative on Food Loss and Waste Reduction*, Rome: 2015, at <http://www.fao.org/3/a-i4068e.pdf>

Depending on what is done with the food that would have been wasted, it may (4) provide food to the needy and contribute to food security and (5) support agriculture if used as animal feed.

“Reduce, reuse, and recycle” encapsulates EPA’s preferred hierarchy of food-waste reduction (recovery) as depicted in Figure 1. The goal is first to reduce waste generation at the source or, failing that, to achieve higher value added by reusing and recycling uneaten food. The least preferred option is landfilling or incineration.

In the U.S., food-waste reduction is still in its early days.<sup>6</sup> While more than one-third of the MSW in the U.S. is currently being recycled or composted, the rate of food recovery remains significantly below that level, at 5.1% in 2014, although it improved from 2.2% in 2000 and 2.7% in 2010.<sup>7</sup> A 2015 survey of 115 mid-sized U.S. cities with populations between 100,000 and one million found that 46 of the cities have active food-scrap programs of some kind, including educational programs (42), free or discounted backyard composting bins (22), free or discounted in-home storage bins (2), drop-off facilities (9), and curbside collection of food scraps (21).<sup>8</sup> This article compares how the four counties in Hawai'i manage their food waste.

## II. Reducing Food Waste in Hawai'i

Lily Pollans and her co-authors note that big cities in the U.S. manage municipal waste differently than small cities, towns, and unincorporated areas. In big cities, the city government typically manages the collection of municipal waste, at least residential waste; in small cities, towns and unincorporated areas, individual hauling contracts and drop-off services are often employed for waste and recycling services.<sup>9</sup> This distinction exists be-

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6 Lily Baum Pollans, Jonathan S. Krones, and Eran Ben-Joseph, “Patterns in municipal food scrap programming in mid-sized U.S. cities,” *Resources, Conservation & Recycling*, 125, October 2017, pp. 308–314, at <http://isiarticles.com/bundles/Article/pre/pdf/143464.pdf>

7 EPA uses the term food “recycling” to include composting of food scraps from grocery stores, restaurants, cafeterias, lunchrooms, and private residences, as well as the use of food scraps to feed farm animals. Food recycling does not include backyard composting of food scraps or the use of rescued food for human consumption (e.g., in food banks).

8 Pollans et al. (2017).

tween the City and County of Honolulu and the neighbor island counties. The story of food-waste management by local governments in Hawai'i is essentially a “Tale of Two Cities,” with Honolulu being one and the neighbor island counties, collectively, the other.

There is one other major distinction between the two. In the City and County of Honolulu, the completion of H-POWER—a waste-to-energy facility—in 1990 was a game changer.<sup>10</sup> Refuse that used to be dumped in the municipal landfill—Waimanalo Gulch Sanitary Landfill (WGSL)—could now be incinerated at H-POWER to produce electricity that was sold to the local electric utility company. After H-POWER came into operation, very little food waste was disposed of at WGSL. The *2006 Waste Characterization Study* for the county estimated 118,175 tons of food waste (98.3%) were received at H-POWER compared to 2,075 tons (1.7%) received at WGSL.<sup>11</sup> The first phase of H-POWER could not accept all the trash generated in the city, but expansion of H-POWER began in 2009 and was completed in 2012. In theory, no food waste in Honolulu goes into the municipal landfill today. By contrast, the neighbor island counties have no waste-to-energy facility like H-POWER, so most of their municipal solid waste, including food waste, is still landfilled.

### City and County of Honolulu

The decision to build H-POWER was arguably more political than financial. Building new landfills or expanding existing ones in a land-scarce island state is a huge political challenge. “No community wants a landfill in its backyard,” said the sitting Honolulu County mayor following the Hawai'i Supreme Court’s 2012 decision overturning a previous Land Use Commission (LUC) ruling which required Honolulu’s WGSL to stop ac-

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9 Pollans et al. (2017), p. 309.

10 For the history of H-POWER, see [https://swana.org/Portals/0/awards/2016/winners/CityandCountyofHonolulu\\_WastetoEnergy.pdf](https://swana.org/Portals/0/awards/2016/winners/CityandCountyofHonolulu_WastetoEnergy.pdf). Briefly, for more than a decade before 1977, the City had conducted studies to find a solution to a growing solid waste problem. In 1978 a Request for Proposals (RFP) was issued for H-POWER, and the construction contract was awarded in 1985.

11 R.W. Beck, *2006 Waste Characterization Study, City and County of Honolulu, Final Report*, April 2007, at [http://opala.org/pdfs/solid\\_waste/2006%20Final%20Waste%20Characterization%20Report.pdf](http://opala.org/pdfs/solid_waste/2006%20Final%20Waste%20Characterization%20Report.pdf)



**Figure 1. Food Recovery Hierarchy.**

Source: EPA website at <https://www.epa.gov/sustainable-management-food/links-and-resources-about-food-recovery-honolulu>

cepting municipal waste later in the year.<sup>12</sup> While the mayor was happy with the court ruling, the residents of communities near the landfill were not. In November 2017, the new mayor rejected rankings of potential new municipal landfill sites submitted by the 2012 Mayor's Advisory Committee on Landfill Site Selection and announced that he opposed the construction of a new landfill anywhere in the county.<sup>13</sup>

<sup>12</sup> <http://www.hawaiinewsnow.com/story/18152300/state-supreme-court-overturns-waimanalo-gulch-landfill-ruling>

<sup>13</sup> For landfill capacity, see R.M. Towill Corporation and SMS Research Services, *Assessment of Municipal Solid Waste Handling Requirements for the Island of Oahu*, prepared for the Department of Environmental Services, City and County of Honolulu, November 2017.

Shipping Honolulu trash to a Washington State landfill was an option contemplated by the City. But that attempt ended abruptly when the U.S. Department of Agriculture revoked the interstate waste transfer permit following a federal court order.<sup>14</sup> Bales of refuse prepared to be shipped languished in Honolulu and eventually were incinerated at H-POWER. Politically, H-POWER was the most feasible solution. Today, most of the general municipal solid waste disposed of at WGSL is H-POWER ash and residue and bulk refuse. The City notes that although a landfill is still required for emergency purposes, "H-POWER has made possible

<sup>14</sup> M. Cooper, "Ready to ship in Hawaii: 20,000 tons of garbage," *New York Times*, May 22, 2010, at <http://www.nytimes.com/2010/05/23/us/23garbage.html>

the consideration to close the landfill.”<sup>15</sup>

The State of Hawai'i (Hawaii Revised Statutes, Chapter 342G) and EPA consider H-POWER as disposal and not recycling.<sup>16</sup> The City maintains that discarded food incinerated to produce energy is not the same as landfilling; it is a form of recycling.<sup>17</sup> Bellemare et al. argue that “as long as food does not end up in a landfill, it is not wasted.”<sup>18</sup> If keeping food waste out of the landfill is the ultimate goal of waste management, then Honolulu has succeeded with H-POWER. Others agree.<sup>19</sup> Critics of waste-to-energy facilities disagree;<sup>20</sup> they prefer food waste be composted, as in San Francisco, California.<sup>21</sup>

To encourage more recycling, Honolulu City and

15 [https://swana.org/Portals/0/awards/2016/winners/CityandCountyofHonolulu\\_WastetoEnergy.pdf](https://swana.org/Portals/0/awards/2016/winners/CityandCountyofHonolulu_WastetoEnergy.pdf) at pg. 14.

16 State of Hawai'i, Department of Health Office of Solid Waste Management, *Report to the Twenty-Eighth Legislature State of Hawaii, 2016*, Honolulu: December 2015, p. 17, at [https://health.hawaii.gov/shwb/files/2013/06/2016\\_OSWM\\_Annual\\_Report.pdf](https://health.hawaii.gov/shwb/files/2013/06/2016_OSWM_Annual_Report.pdf); see also Crystal Kua, “City calls HPOWER recycling,” *Honolulu Star Bulletin*, August 26, 2006, at <http://archives.starbulletin.com/2006/08/26/news/story06.html>

17 For the purpose of compliance with the food-waste ordinance, food establishments cannot send their waste to H-POWER and claim that they are recycling as required by the ordinance. H-POWER is not an approved food-waste recycling facility.

18 Bellemare et al., October 2017, p. 1152.

19 Lavonne Leong, “Should Honolulu’s recycling program go up in flames?” *Honolulu*, July 22, 2015, at <http://www.honolulumagazine.com/Honolulu-Magazine/July-2015/Should-Honolulus-Recycling-Program-Go-Up-in-Flames/>; see also Scott Cooney, “The economics of recycling,” *Hawaii Business Magazine*, August 6, 2012, at <https://www.hawaiibusiness.com/the-economics-of-recycling-in-hawaii/>

20 See, for example, Ana Baptista, “Garbage in, garbage out: Incinerating trash is not an effective way to protect the climate or reduce waste,” *The Conversation*, February 27, 2018, at <https://theconversation.com/garbage-in-garbage-out-incinerating-trash-is-not-an-effective-way-to-protect-the-climate-or-reduce-waste-84182>

21 EPA, *Managing and Transforming Waste Streams – A Tool for Communities. Zero Waste Case Study – San Francisco* at <https://www.epa.gov/transforming-waste-tool/zero-waste-case-study-san-francisco> In 2009, San Francisco passed its Mandatory Recycling and Composting Ordinance, the first and largest urban food scraps composting collection program in the U.S.

County lawmakers passed the first mandatory business food-waste ban/recycling law (Chapter 9, Section 9-3.5) in the country effective January 1, 1997. The year before, lawmakers enacted City Ordinance 9-3.1, which required liquor-serving establishments to recycle glass containers and office buildings with 20,000 square feet or more of space to recycle office paper, newspaper, and corrugated cardboard.<sup>22</sup>

*Chapter 9, Section 9-3.5* of the Revised Ordinances of Honolulu requires large food establishments (including hotels, restaurants, grocery stores, hospitals, food courts and food manufacturers and processors that meet certain size criteria) to recycle food waste and deliver the waste to a recycling facility.<sup>23</sup> A recycling facility includes “a composting facility, waste bioconversion facility, rendering facility, pig farm or other agricultural facility that uses food waste as animal feed or for other agricultural purposes, or any other facility that recycles food waste and is approved by the director for that purpose.”

Items that can be recycled include vegetable and fruit waste, eggs, meat and fish waste, dairy waste, bakery waste, noodles, rice and cooking oil. Food establishments affected by the ordinance must file a brief “Food Waste Recycling Compliance Form” (either online or by mail) every year confirming that “[the] business is in compliance—food waste is not disposed with refuse” and provide an estimate of the quantity of food waste recycled per month.<sup>24</sup>

Food establishments that fail to comply can be fined of up to \$250 per violation, though in practice violators are rarely fined. A fine is imposed only if violators fail to make changes in a follow-up inspection. In FY2018, out of 70 food establishments that were inspected, a dozen violations were found but only two businesses

22 There are also volume limits on some targeted materials. See Department of Environmental Services, *Report on the Enforcement of Mandatory Business Recycling Ordinances, Fiscal Year 2018*, at [http://www.opala.org/solid\\_waste/pdfs/2018%20Report%20on%20Mandatory%20Business%20Recycling%20FINAL.pdf](http://www.opala.org/solid_waste/pdfs/2018%20Report%20on%20Mandatory%20Business%20Recycling%20FINAL.pdf)

23 [http://www.honolulu.gov/rep/site/ocs/roh/ROH\\_Chapter\\_9\\_.pdf](http://www.honolulu.gov/rep/site/ocs/roh/ROH_Chapter_9_.pdf) For example, a market that occupies 18,000 square feet or more of floor area, a restaurant with 5,000 square feet or more of floor area that serves 400 or more prepared meals per day, and a hospital that serves 400 or more prepared patient meals a day are all required to comply.

24 <http://www.honolulu.gov/opala/compliance.html>

were fined after their “new” management failed to act on earlier notification of non-compliance.<sup>25</sup> The City’s Department of Environmental Services (ENV), which is in charge of enforcing the ordinance, states, “The goal of the City’s enforcement efforts is to ‘catch them recycling,’ not to penalize businesses for non-compliance.” This is to say the inspectors favor seeing the recycling process during site visits.

The law allows several exemptions/waivers. First, the ordinance does not apply to any church or nonprofit organization, except hospitals. Second, establishments that serve food and drink at self-serve counters are also exempt, except markets and food courts. Third, the establishment is exempt if it can show either that recycling service is unavailable or that there is insufficient capacity to recycle the food waste. Fourth, a food establishment is exempt if it would have to pay more to recycle the food waste than to dispose of it. In other words, according to the law, recycling should be accomplished without additional costs to food-waste generators. ENV also does not enforce the ordinance on federal government properties (e.g., military bases) or public school cafeterias staffed by state workers.<sup>26</sup>

Over the years, few establishments that met the size criteria applied for waivers, indicating that recycling food waste is either profitable and/or that most affected food establishments support the environmental goals of the law. Because there is no way for ENV to independently verify that a food establishment is required to comply, Honolulu’s mandatory food-waste recycling ordinance is essentially based on an honor system. In its annual reports, ENV notes that “businesses appear to be generally supportive of recycling . . . . The majority of the inspected businesses have established recycling programs and were in compliance with the recycling ordinance.” Indeed, in FY2018, 308 food establishments reported that they were in compliance and only 3 were not in compliance; a year earlier, 330 were in compliance, with no establishment failing to comply.<sup>27</sup>

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25 Email from Evan Bisho (ENV recycling specialist) to James Mak on August 30, 2018.

26 Email from Evan Bisho (ENV recycling specialist) to James Mak on August 31, 2018.

27 Information from internal records provided by Evan Bisho, recycling specialist with the ENV.

How effectively the mandatory food-waste ordinance has worked is unclear. Figure 2 displays annual recycling data on the five “targeted materials” covered by the 1996 and 1997 mandatory recycling ordinances: food waste, glass, corrugated cardboard, newspaper, and office paper.

Of the five targeted items, food-waste and newspaper recycling have declined in volume since the mandatory recycling ordinances were enacted, while glass, corrugated cardboard, and office paper all increased in volume recycled. The recycling data also exhibit considerable volatility, probably reflecting substantial annual variations in compliance rather than short-term economic fluctuations.<sup>28</sup> Recycling of food waste exhibits greater volatility than that of corrugated cardboard (but only barely) and newspaper, but less volatility than recycling of glass and office paper.<sup>29</sup> It is more volatile than general-materials (i.e., all) recycling.

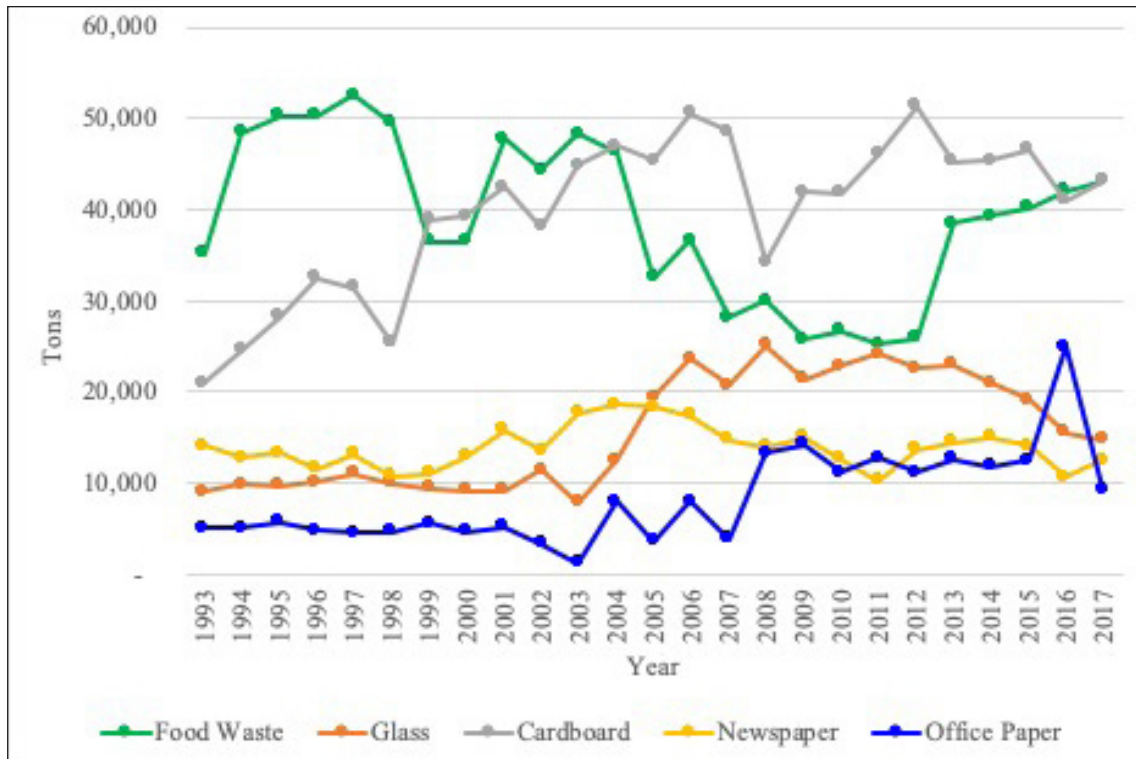
One would reasonably expect mandatory recycling to increase, not decrease, the volume of targeted items recycled. The shift to digital circulation and the demise of one of the two large daily newspapers in Honolulu in 2010 likely explain the decline in newspaper recycling, but the sharp decline in food-waste recycling is puzzling. Skeptics of the food-waste recycling ordinance might argue that it had no effect on recycling because the law is “toothless.” The law only pretends to be doing something when it is not: food establishments that were in compliance were already recycling; others simply ignored the law. However, that only explains why the volume of food waste recycled did not increase; it does not explain why it decreased.

How the recycling data in Figure 2 are collected provides a hint of an explanation for the decrease in food-waste recycling in ENV’s data. The food-waste data displayed in Figure 2 are obtained not from food establishments but from certified recycling facilities. If a food establishment recycles food waste on its own premises, the amount is not included in Figure 2 because it was never received at a recycling facility. Additionally, if the ordinance encouraged food establishments to generate

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28 The correlation between the volume of food waste recycled and the state’s per capita real income is negative rather than positive.

29 The comparison of their volatility relies on computed coefficient of variation (CV) for the five data series between 1993 and 2017. Office paper recycling is the most volatile among the five series.



**Figure 2. Recycling of Select Items in Honolulu, 1993–2017.** Source: City and County of Honolulu, Department of Environmental Services, Report on the Enforcement of Mandatory Business Recycling Ordinances, Fiscal Year 2018, at [http://www.opala.org/solid\\_waste/pdfs/2018%20Report%20on%20Mandatory%20Business%20Recycling%20FINAL.pdf](http://www.opala.org/solid_waste/pdfs/2018%20Report%20on%20Mandatory%20Business%20Recycling%20FINAL.pdf)

less waste at the source, resulting in less waste sent to recycling facilities, then ENV’s data on food-waste recycling also understate the effect of the ordinance. ENV’s annual reports on the enforcement of mandatory business recycling offer anecdotal evidence of food-waste prevention and in-house recycling.<sup>30</sup> Whether these factors are sufficient to explain the decline in ENV’s recycling data requires more rigorous research.

Honolulu’s food-waste recycling ordinance set up a government recycling program. Honolulu does not have a formal government program aimed at food-waste prevention.<sup>31</sup> In a 2017 audit of the City’s recycling pro-

gram, the Auditor argued that the City should do more to encourage residents “through community education and support of legislative change” to reduce waste at the source.<sup>32</sup> ENV has a website with information on waste prevention.<sup>33</sup> The City has also produced a cookbook and food tips guide (*Food: Too Good to Waste*) to educate residents on how to reduce food waste in the kitchen.<sup>34</sup>

In the 2017 audit, the City Auditor also concluded that incinerating all burnable refuse at H-POWER to

at [https://www.honolulu.gov/rep/site/oca/oca\\_docs/City\\_Recycling\\_Program\\_Final\\_Report\\_rev\\_102717.pdf](https://www.honolulu.gov/rep/site/oca/oca_docs/City_Recycling_Program_Final_Report_rev_102717.pdf), p. 25.

30 On the mainland, the Kroger grocery chain recently announced its own Zero Hunger, Zero Waste Plan to eliminate hunger in its communities and eliminate food waste within its company by 2025. See <https://www.thekrogerco.com>

32 Office of the City Auditor, City and County of Honolulu, *Audit of the City’s Recycling Program*, Report No. 17-06, October 2017.

33 [http://www.opala.org/solid\\_waste/Waste\\_Prevention.html](http://www.opala.org/solid_waste/Waste_Prevention.html)

31 Office of the City Auditor, City and County of Honolulu, *Audit of the City’s Recycling Program*, Report No. 17-06, October 2017,

34 [http://www.honolulu.gov/rep/site/envref/envref\\_docs/food\\_too\\_good\\_to\\_waste.pdf](http://www.honolulu.gov/rep/site/envref/envref_docs/food_too_good_to_waste.pdf)

generate electricity could greatly reduce disposal costs.<sup>35</sup> That includes incinerating food waste as well. If City lawmakers agree, then the mandatory food-waste recycling law will be rendered unnecessary.

### The Neighbor Island Counties

The less populated and more rural neighbor island counties of Maui, Hawai'i, and Kaua'i do not have waste-to-energy facilities. Consequently, most of their refuse and food waste goes into their aging landfills, some of them close to approaching their maximum capacities.

Kaua'i County has one county landfill—Kekaha Landfill—and four county refuse transfer stations which deliver their collected refuse to the landfill. Kekaha Landfill is close to reaching its capacity. Environmentally conscious Kaua'i County encourages its residents to do home composting using food waste and yard trimmings by offering free backyard composting bins to residents; the only requirement is to watch a 10-minute video on how to use the bin, called the Earth Machine.<sup>36</sup> To date about 6,100 bins, each of 80-gallon capacity, have been distributed, and among these about 1,870 were distributed 10 years ago or earlier (bins have expected life of 10 years.)<sup>37</sup> The home composting program is the sole county initiative that addresses food specifically. Curiously, however, the EPA does not consider home composting as recycling. There is also one private composting company in Kaua'i County, Heart & Soul Organics, that is permitted to receive food waste.

As on all Hawaiian Islands, on Kaua'i some food waste is fed to pigs. Pig farmers supply food establishments with scrap bins that are picked up daily. This practice keeps food waste out of dumpsters and out of the landfill. Kaua'i County also has a website that offers tips on how best to minimize food waste.<sup>38</sup>

The County has adopted a modest Pay-As-You-Throw (PAYT) program, which charges higher monthly trash collection fees for larger bins (\$18 for 96-gallon vs \$10 for 64-gallon), to encourage waste reduction.<sup>39</sup> The 2017 County of Kaua'i *Waste Characterization Study* found that in FY2016, 8,635 tons of “food” comprising 10.3% of total material waste (including C&D waste) was disposed of at the Kekaha Landfill compared to 12,176 tons of food waste generated. The amount of “food” diverted from the landfill was 3,541 tons, for a diversion rate of 29%, compared to an average diversion rate of 44% for all materials deposited at the county landfill.<sup>40</sup>

Maui County owns four landfills on three islands which process residential and commercial refuse. (A private landfill disposes of construction and demolition debris for a separate fee.) Recycling of municipal solid waste in Maui County is largely driven by private-sector efforts. Currently, the County of Maui *Recycling, Refuse & Landfill Guide* provides a directory of organizations/businesses that provide recycling and diversion services to residents. To promote food recycling, residents interested in recycling cooking oil and grease are referred to Pacific Biodiesel, those interested in donating usable produce and packaged foods are referred to the Maui Food Bank, and those offering food waste to pig farms are referred to Pua'a Recycling & Farm.

The Guide advises that “food scraps, yard trimmings, shredded paper & junk mail can be composted at home” and lists a telephone number and a website where residents can find workshops on composting. The Olowalu Recycling and Refuse Convenience Center accepts recyclable materials from residents, including yard trimmings, but will not accept “food residue.” A joint composting project between the County and Maui EKO Systems for over two decades that processes green waste

35 Office of the City Auditor, City and County of Honolulu, *Audit of the City's Recycling Program*, Report No. 17-06, October 2017.

36 <https://www.kauai.gov/Composting>; also [http://www.earth-machine.com/how\\_to\\_compost.html](http://www.earth-machine.com/how_to_compost.html) An Earth Machine can be purchased for about \$100.

37 The information in this and next paragraph was kindly supplied by Keola Aki, recycling specialist with the County of Kaua'i Solid Waste Division, in a private email to Matthew Loke on June 21, 2018.

38 <https://www.kauai.gov/foodwaste>

39 <https://www.kauai.gov/RefuseCollection> Modest, because by comparison, Portland charges \$37.65 cents per month for a 60-gallon roll cart and \$44.15 for a 90-gallon roll cart. The smallest cart, a 20-gallon roll cart, is priced at \$27.15 per month. At <https://www.portlandoregon.gov/bps/article/492501> In Seattle, a micro-can (12 gallons) costs \$23.30 per month; the fee for a 96-gallon can is \$111.45 per month. At <http://www.seattle.gov/util/MyServices/Garbage/HouseResidentsGarbage/GarbageRates/index.htm> Kaua'i residents can also opt to transport their trash to a county transfer station for a lower fee.

40 Cascadia Consulting Group. *County of Kauai West Characterization Study, 2017 Final Report*, May 2017.

and undried sewage sludge at the Central Maui Landfill into compost for sale to landscapers and farmers does not use any food waste as input.<sup>41</sup> Food waste that is collected by or turned in to the County is disposed of in landfills. A 2012 waste composition analysis at the Central Maui Landfill found that 17% of the refuse was food waste, third after yard waste (23%), and cardboard, newspaper & office paper (20%). A 2013 *Maui Diversion Update* reported 42.9% of Maui County solid waste, including construction and demolition waste (375,000 tons), was diverted from landfills; 1.4% (or 5,250 tons) was food waste.<sup>42</sup>

The County of Hawai'i does not provide curbside business or household rubbish or recyclable collection services; households and businesses must arrange for their refuse to be delivered, either personally or by a private hauling company, to one of two landfills or to one of 22 Recycling & Transfer Stations.<sup>43</sup> Most, if not virtually all, the food waste in this county ends up in landfills. A 2008 waste-composition study estimates that discarded food comprised 34,000 tons, or 16 percent of refuse disposed at county landfills.<sup>44</sup>

Hawai'i County has an active green-waste disposal/composting program. Businesses can drop off green waste at the West Hawai'i Organic Facility or the East Hawai'i Organic Facility and pay a green-waste disposal fee at a substantially lower rate than the regular garbage disposal fee at the county landfills. However, food waste is not accepted at the Organic Facilities for recycling.<sup>45</sup>

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41 Maui EKO Systems argues that composting sludge together with green waste yields more nitrogen than composting just green waste. A proposed renewable energy project by Anaergia Services at the Wailuku-Kahului Wastewater Reclamation Facility threatens to put Maui EKO Systems out of business. Maui EKO Systems acknowledges that food scraps can be used instead of undried sludge with green waste, manure, and crop residues to produce compost. (At <http://www.mauinews.com/news/local-news/2018/02/anaergia-maui-eko-open-green-waste-dialogue/>)

42 <http://mauicounty.us/wp-content/uploads/2015/04/6.-Presentation-from-DEM-dated-October-14-2013-to-the-IEM-Committee.pdf>

43 <http://www.hawaiiizerowaste.org/facilities/>

44 [https://www.hawaiiizerowaste.org/site-content/uploads/1-IRSWMP\\_Plan\\_Dec2009.pdf](https://www.hawaiiizerowaste.org/site-content/uploads/1-IRSWMP_Plan_Dec2009.pdf)

45 <http://www.hawaiiizerowaste.org/recycle/greenwaste>

Like the other neighbor island counties, Hawai'i County recommends backyard composting or vermicomposting (composting using worms) and provides information on where composting bins can be purchased.<sup>46</sup> In sum, recycling food waste apparently has not been a priority in the neighbor island counties.

### III. Conclusion

In the U.S., interest in diverting food waste from landfills has gained interest recently. Among the four Hawai'i counties, two distinct approaches describe how food waste is handled. In the City and County of Honolulu, the completion of H-POWER in 1990 was a game changer; food waste that was once landfilled is now incinerated with other residential and commercial trash to produce electricity. Waste-to-energy is deemed to be the most cost-effective way to dispose of food waste. Honolulu is first among U.S. states and cities in mandating food-waste recycling for large food establishments. Whether a mandate/regulation is an effective way to reduce food waste requires more research.

In the rural neighbor island counties, the mode of choice in waste disposal is landfilling. Large-scale food-waste recycling has not received much government attention. Backyard composting is encouraged, especially in Kaua'i County where compost bins are available free to residents who request them. How best to reduce waste materials going into aging neighbor island landfills is gaining urgency. Shipping trash to H-POWER is an idea worth considering; whether it will be acceptable to O'ahu residents is another matter. Shipping trash between geographic locations is often viewed as undesirable due to possible spread of pathogens and invasive species in the waste material.

According to EPA, the best way to divert food waste from landfills is to reduce the volume of waste produced, namely source reduction. Since most of the food waste in Hawai'i is generated at the consumer level, targeting consumers would likely be the most effective strategy. Arguably the best way to do that is through community education. EPA has developed an excellent website providing links, resources, and referrals on who to contact

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46 [http://www.hawaiiizerowaste.org/recycle/greenwaste/#Mulch\\_Pick-Up\\_and>Loading\\_Information](http://www.hawaiiizerowaste.org/recycle/greenwaste/#Mulch_Pick-Up_and>Loading_Information); a few hundred backyard composting machines were given to residents and schools as of 2008.



and how to reduce food waste in Honolulu. The website also contains information on some food-recovery alternatives in the Honolulu area.<sup>47</sup> The counties have put out similar information. One problem is finding adequate funding to organize public campaigns to broadcast the merits of food-waste prevention.

The Harvard Food Law and Policy Clinic issued a report in 2016 directed at policy-makers on how to keep food out of landfills. These include changing state and local liability laws on food donations, providing tax incentives on food donations, changing date labeling laws, reducing barriers created by food safety regulations, reviewing state animal feed laws, imposing organic waste bans and waste recycling laws, repurposing K–12 school food waste, and providing funding for food-recovery programs. A single brief paragraph in the Harvard report offers a suggestion that is worth considering for Hawai'i, namely to adopt the Pay-As-You-Throw system (PAYT)—also known as unit-based pricing or variable-rate pricing. Simply put, PAYT asks people to pay more if they put out more refuse.<sup>48</sup> A modest form of it is in use in Kaua'i County. PAYT programs have been shown to reduce waste disposal by up to 17%.<sup>49</sup> Over 7,000 local governments in the U.S. have already implemented such plans.<sup>50</sup> The way to begin in Hawai'i is to reduce the local property tax by the amount of tax revenues currently spent on refuse collection, and then institute the PAYT system. Fees collected under the PAYT system can be also be used to fund community education programs to reduce waste generation. Food waste reduction still has a long way to go in Hawai'i, especially on the neighbor islands.

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47 <https://www.epa.gov/sustainable-management-food/links-and-resources-about-food-recovery-honolulu>

48 The City and County of Honolulu contracted with R.W. Beck, Inc. to conduct a solid waste user-fee study, completed in 2010; however, it was not a PAYT system, in that the residential rate is a flat monthly fee. See [http://www.opala.org/solid\\_waste/pdfs/Solid\\_Waste\\_User\\_Fee\\_Study\\_Feb\\_2010.pdf](http://www.opala.org/solid_waste/pdfs/Solid_Waste_User_Fee_Study_Feb_2010.pdf)

49 Harvard Food Law and Policy Clinic, *Keeping Food Out of the Landfill, Policy Ideas for States and Localities*, October 2016, p.1 at [https://www.chlpi.org/wp-content/uploads/2013/12/Food-Waste-Toolkit\\_Oct-2016\\_smaller.pdf](https://www.chlpi.org/wp-content/uploads/2013/12/Food-Waste-Toolkit_Oct-2016_smaller.pdf)

50 Neil Seldman, "Gold in the garbage: How recycling rates could be a lot higher," *Governing*, at <http://www.governing.com/gov-institute/voices/col-pay-as-you-throw-higher-recycling-rates.html>