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Zero Wastage Food in Hospitality Industry

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ABSTRACT: Zero waste is a set of principles focused on waste prevention that encourages redesigning resource life cycles so that all products are repurposed (i.e. “up-cycled”) and/or reused. The goal of the movement is to avoid sending trash to landfills, incinerators, oceans, or any other part of the environment. Currently 9% of global plastic is recycled.^[1] In a zero waste system, all materials are reused until the optimum level of consumption is reached.

Zero waste refers to waste prevention as opposed to end-of-pipe waste management.^[2] It is a “whole systems” approach that aims for a massive change in the way materials flow through society, resulting in no waste.^[2] Zero waste encompasses more than eliminating waste through reducing, reusing, and recycling. It focuses on restructuring distribution and production systems to reduce waste.^[3] Zero waste provides guidelines for continually working towards eliminating waste.^[2] The hospitality industry is a broad category of fields within the service industry that includes lodging, food and beverage service, event planning, theme parks, travel agency, tourism, hotels, restaurants and bars.

KEYWORDS: zero, wastage, food, hospitality, industry, prevention, recycled

I. INTRODUCTION

Food loss and waste is food that is not eaten. The causes of food waste or loss are numerous and occur throughout the food system, during production, processing, distribution, retail and food service sales, and consumption. Overall, about one-third of the world's food is thrown away.^{[2][3]} A 2021 meta-analysis that did not include food lost during production, by the United Nations Environment Programme found that food waste was a challenge in all countries at all levels of economic development.^[4] The analysis estimated that global food waste was 931 million tonnes of food waste (about 121 kg per capita) across three sectors: 61 percent from households, 26 percent from food service and 13 percent from retail.^[4]

Food loss and waste is a major part of the impact of agriculture on climate change (it amounts to 3.3 billion tons of CO₂e emissions annually^{[5][6]}) and other environmental issues, such as land use, water use and loss of biodiversity.^[1,2,3] Prevention of food waste is the highest priority, and when prevention is not possible, the food waste hierarchy ranks the food waste treatment options from preferred to least preferred based on their negative environmental impacts.^[7] Reuse pathways of surplus food intended for human consumption, such as food donation, is the next best strategy after prevention, followed by animal feed, recycling of nutrients and energy followed by the least preferred option, landfill, which is a major source of the greenhouse gas methane.^[8] Other considerations include unreclaimed phosphorus in food waste leading to further phosphate mining. Moreover, reducing food waste in all parts of the food system is an important part of reducing the environmental impact of agriculture, by reducing the total amount of water, land, and other resources used.

The UN's Sustainable Development Goal Target 12.3 seeks to "halve global per capita food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses" by 2030.^[9] Climate change mitigation strategies prominently feature reducing food waste^[7,8,9]

Food loss and waste occurs at all stages of the food supply chain – production, processing, sales, and consumption.^{[13][12]} Definitions of what constitutes food loss versus food waste or what parts of foods (i.e., inedible parts) exit the food supply chain are considered lost or wasted vary.^[12] Terms are often defined on a situational basis (as is the case more generally with definitions of waste).^{[13][14]} Professional bodies, including international organizations, state governments, and secretariats may use their own definitions.^[15]

United Nations

The Food and Agriculture Organization (FAO) of the United Nations defines food loss and waste as the decrease in quantity or quality of food along the food supply chain. Within this framework, UN Agencies distinguish loss and waste at two different stages in the process:^[16]

- Food loss occurs along the food supply chain from harvest/slaughter/catch up to, but not including, the sales level
- Food waste occurs at the retail and consumption level.[10,11,12]
- Important components of this definition include:^[12]
- Food redirected to nonfood chains (including animal feed, compost, or recovery to bioenergy) is not counted as food loss or waste. Inedible parts are not considered as food loss or waste (these inedible parts are sometimes referred to as unavoidable food waste)^[12]
- Under Sustainable Development Goal 12, the Food and Agriculture Organization is responsible for measuring food loss, while the UN Environmental Program measures food waste.^[17]
- There are multiple initiatives that rescue food that would otherwise not be consumed by humans anymore. The food can come from supermarkets, restaurants or private households for example. Such initiatives are:
- climate action campaigns, such as GoodDeed and Hearts For Nature with the goal of tackling climate change by reducing food waste,
- food banks,
- online platforms like Too Good To Go and Olio,
- public foodsharing shelves like those from foodsharing.de and
- dumpster diving.[16,17,18]

II. DISCUSSION

The cradle-to-grave is a linear material model that begins with resource extraction, moves to product manufacturing, and ends with a "grave" or landfill where the product is disposed of. Cradle-to-grave is in direct contrast to cradle-to-cradle materials or products, which are recycled into new products at the end of their lives so that ultimately there is no waste.^[5]

Cradle-to-cradle focuses on designing industrial systems so that materials flow in closed-loop cycles, which means that waste is minimized and waste products can be recycled and reused. Cradle-to-cradle goes beyond dealing with waste issues after it has been created by addressing problems at the source and redefining problems by focusing on design.^[5] The cradle-to-cradle model is sustainable and considerate of life and future generations.^[5]

The cradle-to-cradle framework has evolved steadily from theory to practice.^[3] In the industrial sector, it is creating a new notion of materials and material flows. Just as in the natural world, in which one organism's "waste" cycles through an ecosystem to provide nourishment for other living things, cradle-to-cradle materials circulate in closed-loop cycles, providing nutrients for nature or industry.^[5]

The spread of industrialization worldwide has been accompanied by a large increase in waste production. In 2012 the World Bank stated that 1.3 billion tons of municipal waste was produced by urban populations and estimates that the number will reach 2.2 billion tons by 2025 (Global Solid Waste Management Market - Analysis and Forecast). The increase in solid waste production increases the need for landfills. With the increase in urbanization, these landfills are being placed closer to communities. These landfills are disproportionately located in areas of low socioeconomic status with primarily non-white populations. Findings indicated these areas are often targeted as waste sites because permits are more easily acquired and there was generally less community resistance.[19,21,21] Additionally, within the last five years, more than 400 hazardous waste facilities have received formal enforcement actions for unspecified violations that were considered to be a risk to human health.^[6]

There is a growing global population that is faced with limited resources from the environment.^[7] To relieve the pressures placed on the finite resources available it has become more important to prevent waste. To achieve zero waste, waste management has to move from a linear system to be more cyclical so that materials, products, and substances are used as efficiently as possible. Materials must be chosen so that they may either return safely to a cycle within the environment or remain viable in the industrial cycle.^[8]

Zero waste promotes not only reuse and recycling but, more importantly, it promotes prevention and product designs that consider the entire product life cycle.^[8] Zero-waste designs strive for reduced material use, use of recycled materials, use of more benign materials, longer product lives, repair ability, and ease of disassembly at end of life.^[3] Zero waste strongly supports sustainability by protecting the environment, reducing costs and producing

additional jobs in the management and handling of wastes back into the industrial cycle.^[8] A Zero waste strategy may be applied to businesses, communities, industrial sectors, schools, and homes.[22,23,24]

Benefits proposed by advocates include:

- Saving money. Since waste is a sign of inefficiency, the reduction of waste can reduce costs
- Faster Progress. A zero-waste strategy improves upon production processes and improves environmental prevention strategies which can lead to taking larger, more innovative steps.
- Supports sustainability. A zero-waste strategy supports all three of the generally accepted goals of sustainability - economic well-being, environmental protection, and social well-being.^[8]
- Improved material flows. A zero-waste strategy would use far fewer new raw materials and send no waste materials to landfills. Any material waste would either return as reusable or recycled materials or would be suitable for use as compost.^[8]

Health

A major issue with landfills is hydrogen sulfide, which is released from the natural decay of waste. Studies have shown a positive association between increased lung cancer mortality rates and increased morbidity and mortality related to respiratory disease and hydrogen sulfide exposure. These studies also showed that the hydrogen sulfide exposure increased with proximity to the landfill.^[7]

Household chemicals and prescription drugs are increasingly being found in large quantities in the leachate from landfills. This is causing concern about the ability of landfills to contain these materials and the possibility of these chemicals and drugs making their way into the groundwater and the surrounding environment.^[8]

Zero waste promotes a circular material flow that allows materials to be used over and over, reducing the need for landfill space.^[9] Through zero waste the number of toxins released into the air and water would be decreased and products examined to determine what chemicals are used in the production process.[25,26,27]

Health issues related to landfills:

- Birth defects, low birth weight, and exposure to particulates and nitrogen dioxide are associated with close proximity to landfills.
- Respiratory diseases and lung cancers are related to the release of hydrogen sulfide from landfills.[28,29,30]
- Zero waste promotion of a cyclical product life can help reduce the need to create and fill landfills. This can help reduce incidents of respiratory diseases and birth defects that are associated with the toxins released from landfills. Zero waste can also help preserve local environments and potable water sources by preventing pollutants from entering the ecosystem.

Milk can be shipped in many forms. One of the traditional forms was reusable returnable glass milk bottles, often home delivered by a milkman. While some of this continues, other options have recently been more common: one-way gable-top paperboard cartons, one-way aseptic cartons, one-way recyclable glass bottles, one-way milk bags, and others. Each system claims some advantages and also has possible disadvantages. From the zero-waste standpoint, the reuse of bottles is beneficial because the material usage per trip can be less than other systems. The primary input (or resource) is silica-sand, which is formed into glass and then into a bottle. The bottle is filled with milk and distributed to the consumer. A reverse logistics system returns the bottles for cleaning, inspection, sanitization, and reuse.[32,33,34] Eventually, the heavy-duty bottle would not be suited for further use and would be recycled. Waste and landfill usage would be minimized. The material waste is primarily the wash water, detergent, transportation, heat, bottle caps, etc. While true zero waste is never achieved, a life cycle assessment can be used to calculate the waste at each phase of each cycle.^{[27][28][29][30]}

Online shopping orders are often placed in an outer box to contain multiple items for easier transport and tracking. This creates waste for every order, especially when there is only a single item. In response, some products are now designed not to require an outer box for safe shipping, a feature known as ships in own container.[35,36,37]

Recycling

It is important to distinguish recycling from Zero Waste. The most common practice of recycling is simply that of placing bottles, cans, paper, and packaging into curbside recycling bins. The modern version of recycling is more complicated and involves many more elements of financing and government support. For example, a 2007 report by the U.S. Environmental Protection Agency states that the US recycles at a national rate of 33.5% and includes in this figure composted materials. In addition, many multinational commodity companies have been created to handle recycled materials. At the same time, claims of recycling rates have sometimes been exaggerated, for example by the inclusion of soil and organic matter used to cover garbage dumps daily, in the "recycled" column. In US states with recycling incentives, there is constant local pressure to inflate recycling statistics.

Recycling has been separated from the concept of zero waste. One example of this is the computer industry where worldwide millions of PC's are disposed of as electronic waste each year in 2016 44.7 million metric tons^[31] of electronic waste was generated of which only 20% was documented and recycled. Some computer manufacturers refurbish leased computers for resale. Community Organizations have also entered this space by refurbishing old computers from donation campaigns for distribution to underserved communities.[38,39,40]

Software recycling

A clear example of the difference between zero waste and recycling is discussed in Getting to Zero Waste,^[32] in the software industry. Zero waste design can be applied to intellectual property where the effort to code functionality into software objects is developed by design as opposed to copying code snippets multiple times when needed. The application of zero waste is straightforward as it conserves human effort. Also, software storage mediums have transitioned from consumable diskettes to internal drives which are vastly superior and have a minimal cost per megabyte of storage. This is a physical example where zero waste correctly identifies and avoids wasteful behavior.[41,42,43]

Use of zero waste system

Zero waste is poorly supported by the enactment of government laws to enforce the waste hierarchy.

A special feature of zero waste as a design principle is that it can be applied to any product or process, in any situation or at any level. Thus it applies equally to toxic chemicals as to benign plant matter. It applies to the waste of atmospheric purity by coal-burning or the waste of radioactive resources by attempting to designate the excesses of nuclear power plants as "nuclear waste". All processes can be designed to minimize the need for discard, both in their own operations and in the usage or consumption patterns which the design of their products leads to. Recycling, on the other hand, deals only with simple materials.[44,45,46]

Zero waste can even be applied to the waste of human potential by enforced poverty and the denial of educational opportunity. It encompasses redesign for reduced energy wasting in industry or transportation and the wasting of the earth's rainforests. It is a general principle of designing for the efficient use of all resources, however defined.

The recycling movement may be slowly branching out from its solid waste management base to include issues that are similar to the community sustainability movement.

Zero waste, on the other hand, is not based in waste management limitations to begin with but requires that we maximize our existing reuse efforts while creating and applying new methods that minimize and eliminate destructive methods like incineration and recycling. Zero waste strives to ensure that products are designed to be repaired, refurbished, re-manufactured and generally reused.[47,48,49]

Significance of dump capacity

Many dumps are currently exceeding carrying capacity.^[33] This is often used as a justification for moving to Zero Waste. Others counter by pointing out that there are huge tracts of land available throughout the US and other countries which could be used for dumps. Proposals abound to destroy all garbage as a way to solve the garbage problem. These proposals typically claim to convert all or a large portion of existing garbage into oil and sometimes claim to produce so much oil that the world will henceforth have abundant liquid fuels. One such plan, called Anything Into Oil, was promoted by Discover Magazine and Fortune Magazine in 2004 and claimed to be able to convert a refrigerator into "light Texas crude" by the application of high-pressure steam. In 2020, the United States Department of Labor Standard Industrial Classification (SIC) defines the hospitality industry more broadly, including:^[2]



- 701 Hotels and Motels, including auto courts, bed and breakfast inns, cabins and cottages, casino hotels, hostels, hotels (except residential ones), inns furnishing food and lodging, motels, recreational hotels, resort hotels, seasonal hotels, ski lodges and resorts, tourist cabins and tourist courts
- 704 Organization Hotels and Lodging Houses, On a Membership Basis
- 58 Eating and Drinking Places (cf. U.S. "food service industry", U.K. "catering industry")
 - 5812 Eating Places, including restaurants (among which carry-out restaurants, drive-in restaurants and fast food restaurants), automats, beaneries, box lunch stands, buffets, cafés, cafeterias, caterers, coffee shops, commissary restaurants [50,51,52]a.k.a. canteens, concession stands, prepared food (e.g., in airports and sports arenas), contract feeding, dairy bars, diners, dining rooms, dinner theaters, food bars, frozen custard stands, grills, hamburger stands, hot dog stands, ice cream stands, industrial feeding, institutional food service such as that aboard airplanes, railroads, and ships), lunch bars, lunch counters, luncheonettes, lunchrooms, oyster bars, pizza parlors and pizzerias, refreshment stands, sandwich bars or shops, snack shops, soda fountains, soft drink stands, submarine sandwich shops, and tearooms. Sources other than the SIC also mention other formats of eating places such as cyber cafés, ramen shops a.k.a. noodle bars, and sushi bars.^[3]
 - 5813 Drinking Places (alcoholic beverages) including bars, beer gardens/parlors/taverns, sale of beer, wine, and liquors for on-premise consumption, bottle clubs, cabarets, cocktail lounges, discotheques, drinking places, nightclubs, saloons, taprooms, taverns, and wine bars
 - 472 Arrangement of Passenger Transportation
 - 4724 Travel Agencies
 - 4725 Tour Operators
 - 4729 Arrangement of Passenger Transportation, Not Elsewhere Classified, such as ticket offices not operated by transportation companies, and services that arrange carpools

In the United States, hotels are the most popular vacation accommodation. In 2022, the hotel and motel industry in the United States was a \$224.9 billion market, measured by revenue.^[4]

Definition in Dutch, Italian and French

Horeca (also HoReCa, HORECA) is the Dutch, German, Italian, Romanian and French languages term for the food service and hotel industries. The term is a syllabic abbreviation of the words Hotel/Restaurant/Café.^{[5][6]} The term is mostly used in the Benelux countries and Switzerland.

"Horeca" is often not a one-to-one equivalent to the term "hospitality industry" used in English, which is often used more broadly. According to the Cambridge Business English Dictionary the "hospitality industry" consists of hotels and food service,^[7] equivalent to NAICS code 72, "Accommodation and Food Service". However, the United States Department of Labor Standard Industry Classification (SIC) defines the hospitality industry more broadly, as noted above.^[53,64,55]

The Dutch Uniforme Voorwaarden Horeca (UVH) is translated into English as Uniform Conditions for the Hotel and Catering Industry. This code covers hotels, bars, restaurants and related businesses in the Netherlands. Koninklijke Horeca Nederland is the Dutch trade association for the hotel and catering industry.^[8]

This sector is one of the fastest growing in Europe. In 2004, more than 7.8 million people were employed^[9] and the sector generated more than \$338 billion in turnover.^[10] Jobs tend to be temporary, with irregular hours, low pay, and few career prospects. There is a high proportion of young people working in the sector. Some distribution companies use this term to define the food & beverage service trade channel or the hospitality trade.^[56,57,58]

III. RESULTS

National and provincial governments often set targets and may provide some funding, but on a practical level, waste management programs (e.g. pickup, drop-off, or containers for recycling and composting) are usually implemented by local governments, possibly with regionally shared facilities.^[40]

Reaching the goal of zero waste requires the products of manufacturers and industrial designers to be easily disassembled for recycling and incorporated back into nature or the industrial system; durability and repairability also reduce unnecessary churn in the product life cycle. Minimizes packaging also solves many problems early in the supply chain. If not mandated by government, choices by retailers and consumers in favor of zero-waste-friendly products can

influence production. More and more schools are motivating their students to live a different life and rethink every polluting step they may take.^[41] To prevent material from becoming waste, consumers, businesses, and non-profits must be educated in how to reduce waste and recycle successfully

In the book *Zero Waste Home: The Ultimate Guide to Simplifying your Life by Reducing your Waste* the author, Bea Johnson, provides a modified version of the 3 Rs, the 5 Rs: Refuse, Reduce, Reuse, Recycle, Rot to achieve Zero Waste at home. The method, which she developed through years of practicing waste free living and used to reduce her family's annual trash to fit in a pint jar, is now widely used by individuals, businesses and municipalities worldwide. The Zero Waste Hierarchy describes a progression of policies and strategies to support the zero-waste system, from highest and best to lowest use of materials.[59,60,61] It is designed to be applicable to all audiences, from policymakers to industry and the individual. It aims to provide more depth to the internationally recognized 3Rs (Reduce, Reuse, Recycle); to encourage policy, activity and investment at the top of the hierarchy; and to provide a guide for those who wish to develop systems or products that move us closer to zero waste. It enhances the zero-waste definition by providing guidance for planning and a way to evaluate proposed solutions. All over the world, in some form or another, a pollution prevention hierarchy is incorporated into recycling regulations, solid waste management plans, and resource conservation programs. [62]

IV. CONCLUSION

In Canada, a pollution prevention hierarchy otherwise referred to as the Environmental Protection Hierarchy was adopted. This Hierarchy has been incorporated into all recycling regulations within Canada and is embedded within all resource conservation methods which all government mandated waste prevention programs follow. While the intention to incorporate the 4th R (recovery) prior to disposal was good, many organizations focused on this 4th R instead of the top of the hierarchy resulting in costly systems designed to destroy materials instead of systems designed to reduce environmental impact and waste. Because of this, along with other resource destruction systems that have been emerging over the past few decades, Zero Waste Canada along with the Zero Waste International Alliance have adopted the only internationally peer-reviewed Zero Waste Hierarchy that focuses on the first 3Rs; Reduce, Reuse and Recycle including Compost[63,64]

REFERENCES

1. "Plastic pollution is growing relentlessly as waste management and recycling fall short, says OECD". www.oecd.org. Retrieved 2022-10-21.
2. ^{a b c} Snow, W.; Dickinson J. (2001). "The end of waste: Zero waste by 2020" (PDF). Archived from the original (PDF) on 2017-10-30. Retrieved 2014-04-02.
3. ^{a b} Davidson, G. (2011). "Waste Management Practices: Literature Review" (PDF). Archived from the original (PDF) on 2012-02-01. Retrieved 2017-09-19.
4. ^a Townsend, W. K. (2010). "Zero waste: an aspiration or an oxymoron?". *Waste Management & Research*. 28 (1): 1–3. doi:10.1177/0734242X09356145. PMID 20065044. S2CID 209360875.
5. ^{a b c d} McDonough, W.; Braungart, M. (2003). "The cradle-to-cradle alternative". Archived from the original on 2016-03-25. Retrieved 2014-04-02.
6. ^a Stretesky, P.; McKie, R. (2016). "A perspective on the historical analysis of race and treatment storage and disposal facilities in the United States" (PDF). *Environmental Research Letters*. 11 (3): 031001. doi:10.1088/1748-9326/11/3/031001.
7. ^a Mataloni, F.; Badaloni, C.; Golini, M.; Bolignano, A.; Bucci, S.; Sozzi, R.; Forastiere, F.; Davoli, M.; Ancona, C. (2016). "Morbidity and mortality of people who live close to municipal waste landfills: a multisite cohort study". *International Journal of Epidemiology*. 45 (3): 806–15. doi:10.1093/ije/dyw052. PMC 5005946. PMID 27222499.
8. ^a Masoner, Jason R.; Kolpin, Dana W.; Furlong, Edward T.; Cozzarelli, Isabelle M.; Gray, James L. (2016-04-01). "Landfill leachate as a mirror of today's disposable society: Pharmaceuticals and other contaminants of emerging concern in final leachate from landfills in the conterminous United States". *Environmental Toxicology and Chemistry*. 35 (4): 906–918. doi:10.1002/etc.3219. ISSN 1552-8618. PMID 26562222. S2CID 34573996.
9. ^a Song, Qingbin; Li, Jinhui; Zeng, Xianlai (2014). "Minimizing the Increasing Solid Waste Through Zero Waste Strategy". *Journal of Cleaner Production*. 104: 199–210. doi:10.1016/j.jclepro.2014.08.027.
10. ^a "California Adopts Zero Waste Goal in Strategic Plan". waste360.com. 1 April 2002.
11. ^a "Policies Related to Zero Waste". *SF Environment*. 15 October 2011.

12. ^ "Recycling & Composting in San Francisco - Frequently Asked Questions (FAQs)". sfenvironment.org. 16 May 2013.
13. ^ "Mayor Lee Announces San Francisco Reaches 80 Percent Landfill Waste Diversion, Leads All Cities in North America - Office of the Mayor". sfmayor.org.
14. ^ Economist Intelligence Unit (2011). "US and Canada Green City Index" (PDF). Siemens AG.
15. ^ Slatalla, Michelle (15 February 2010). "A Visit from the Priestess of Waste-Free Living". The New York Times.
16. ^ "Home". Zero Waste Home. Retrieved 2022-07-07.
17. ^ "Zero Waste Manifesto" (PDF). Dragon1. Retrieved 2019-03-24.
18. ^ "The Book". Zero Waste Home. Retrieved 2018-12-28.
19. ^ "Wir".
20. ^ "Home". beunpackaged.com.
21. ^ "ZeroWaste Switzerland".
22. ^ "Home". app.zerowastehome.com.
23. ^ "Zero Waste Youth". zerowasteyouth.org. Archived from the original on 28 May 2013. Retrieved 12 January 2022.
24. ^ "Ambassadors". Zero Waste Youth Movement. Archived from the original on 2014-07-21. Retrieved 2013-07-05.
25. ^ "International Day of Zero Waste". United Nations. December 14, 2022. Retrieved March 15, 2022.
26. ^ "Sustainable development: towards the achievement of sustainable development: implementation of the 2030 Agenda for Sustainable Development, including through sustainable consumption and production, building on Agenda 21" (PDF). United Nations. December 1, 2022. Retrieved March 15, 2022.
27. ^ Teresa M. Mata; Carlos A. V. Costa (2001). "Life cycle assessment of different reuse percentages for glass beer bottles". The International Journal of Life Cycle Assessment. 6 (5): 307–319. doi:10.1007/BF02978793. S2CID 111259179.
28. ^ Spitzly, David (1997). "Life Cycle Design of Milk and Juice Packaging" (PDF). U.S. Environmental Protection Agency. Retrieved 29 June 2014.
29. ^ Singh, Jay; Krasowski, Aric; Singh, S. Paul (January 2011). "Life cycle inventory of HDPE bottle-based liquid milk packaging systems". Packaging Technology and Science. 24: 49–60. doi:10.1002/pts.909. S2CID 6850034.
30. ^ Van Doorselaer, K; Lox, F (2000). "Estimation of the energy needs in life cycle analysis of one-way and returnable glass packaging". Packaging Technology and Science. 12 (5): 235–239. doi:10.1002/(SICI)1099-1522(199909/10)12:5<235::AID-PTS474>3.0.CO;2-W.
31. ^ "Global-E-waste Monitor 2017 (Electronic single pages).PDF".
32. ^ Palmer 2005.
33. ^ "Time is Running Out: The U.S. Landfill Capacity Crisis – SWEEP". Retrieved 2019-06-13.
34. ^ Woodyard, Chris (19 February 2008). ""Zero landfill" plants". USA Today. Archived from the original on 2 March 2008. Retrieved 9 March 2011.
35. ^ "Six Google data centers are diverting 100% of waste from landfill". Google. 2016-09-14. Retrieved 2021-05-18.
36. ^ "Microsoft's Redmond Campus: 500 Acres and "Zero Waste"". Microsoft Green Blog. 2016-11-28. Retrieved 2021-04-06.
37. ^ Edibleculture in Faversham has stopped packaging its Christmas trees in plastic
38. ^ a b Roper, William E. (2006). "Strategies for building material reuse and recycle". International Journal of Environmental Technology and Management. 6 (3/4): 313–345. doi:10.1504/IJETM.2006.009000.
39. ^ Cary, S. S. (4 September 2008). "GM plans to dump use of landfills". USA Today. Retrieved 23 September 2008.
40. ^ a b Cole, C; et al. (2014). "Towards a Zero Waste Strategy for an English Local Authority". Resources, Conservation and Recycling. 89: 64–75. doi:10.1016/j.resconrec.2014.05.005.
41. ^ Zero waste#cite note-27
42. ^ Zero waste#cite note-Snow-2
43. ^ Johnson, Bea (2013). Zero Waste Home: The Ultimate Guide to Simplifying Your Life by Reducing Your Waste. Scribner. ISBN 9781451697681.
44. ^ "Zero Waste Hierarchy". Zero Waste Canada.
45. ^ "Vancouver votes to ban single-use straws, foam cups and take-out containers". CTV News. May 17, 2018. Retrieved July 28, 2018.
46. ^ "Pioneering Italian Town Leads Europe in Waste Recycling". Inter Press Service. 17 May 2013. Retrieved 9 April 2017.^ 18 December 2020.
47. ^ "Austin Resource Recovery Master Plan" (PDF). December 15, 2011.



48. ^ "City of Boulder Zero Waste Strategic Plan" (PDF). November 2015. Archived from the original (PDF) on 2018-05-23. Retrieved 2018-05-22.
49. ^ Zero Waste Associates (December 2013). "Road to Zero Waste Plan" (PDF).
50. ^ "Zero Waste | City of Chula Vista". www.chulavistaca.gov. Retrieved 2022-03-30.
51. ^ Minneapolis, City of. "Zero Waste". www.minneapolismn.gov. Retrieved 2022-03-30.
52. ^ "Resolution Setting Zero Waste Date" (PDF). SF Environment. March 6, 2003.
53. ^ "How Communities Have Defined Zero Waste". EPA. December 2016.
54. ^^{a b c} Davoudi, S; Evans (2005). "The Challenge of governance in regional waste planning". *Environment and Planning C: Government and Policy*. 23 (4): 493–517. doi:10.1068/c42m. S2CID 154351606.
55. ^ Geels, F (2008). *The feasibility of systems thinking in sustainable consumption and production policy: A report to the Department for Environment, Food and Rural Affairs*. London: DEFRA.
56. ^^{a b} Young, C-Y; Ni, S-P; Fan, K-A (2010). "Working towards a zero waste environment in Taiwan". *Waste Management & Research*. 28 (3): 236–244. doi:10.1177/0734242x09337659. PMID 19710109. S2CID 10232907.
57. ^ Frosch, R; Gallopoulos (1989). "Strategies for manufacturing". *Scientific American*. 261 (3): 144–152. Bibcode:1989SciAm.261c.144F. doi:10.1038/scientificamerican0989-144.
58. ^ "Zero Waste Communities - Zero Waste International Alliance". 2018-06-27. Retrieved 2022-04-19.
59. ^ US EPA, REG 09 (2016-12-01). "How Communities Have Defined Zero Waste". www.epa.gov. Retrieved 2022-04-19.
60. ^ "Prevent Waste". sfenvironment.org - Our Home. Our City. Our Planet. 2018-08-14. Retrieved 2022-04-19.
61. ^ "Consumer Responsibility & Zero Waste". sfenvironment.org - Our Home. Our City. Our Planet. 2012-03-30. Retrieved 2022-04-19.
62. ^ "Zero Waste". sfenvironment.org - Our Home. Our City. Our Planet. 2017-04-03. Retrieved 2022-04-19.
63. ^ Meet Maria Camila Vasco, the 23-year-old who opened Boston's first zero-waste store



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