

## ADVANCE PRAISE FOR *RETHINK THE BINS*

“This well-researched guide clears up the many myths and mysteries of what happens to the nearly 8 pounds of trash we Americans create daily. The book answers the question, does recycling make a difference? Yes, but you must have the checklists here because they guide you toward actions that really do help the environment. Should be required reading in schools to help future generations embrace a circular economy.”

—James Dillehay, author of *Start a Creative Recycling Side Hustle*

“If you’re looking for a resource that demystifies what actually happens to the things we throw away, *Rethink the Bins* is for you! It’s an easily digestible and interactive read. Goldstein’s compelling writing style inspires hopefulness and action amid the often confusing task of reducing household waste.”

—Moji Igun, Founder of Blue Daisi Consulting

“Finally, a book on waste reduction for realists! Julia demystifies compost and recycling, and her worksheets make this guide personal for you and your area.”

—Summer Hanson, Co-owner of Eco Collective

“At a time when we’re dumping mountains of food in landfills and filling the oceans with plastic trash, it’s clear we need to change how we handle the problem of waste. *Rethink the Bins* is a great place to start: a clear, practical, and informative guide to the ways our waste systems work—and don’t work. It’s a valuable resource for anyone hoping to learn how to leave less trash behind.”

—Susan Freinkel, author of *Plastic: A Toxic Love Story*

# PRAISE FOR MATERIAL VALUE

“Meticulous editing and a succinct style.... Exemplary for its balanced and reasonable viewpoint, the text deserves to be classified as a reference tool for countless professionals.”

—*Publishers Weekly*, BookLife Prize

“An engrossing, comprehensive overview of sustainable manufacturing and recycling and the challenges to expanding their adoption.”

—*Kirkus Reviews*

“This book is an antidote to a world too dominated by extreme opinions: it is a detailed, balanced and fascinating account of how we can make the modern material world more sustainable.”

—Mark Miodownik, author of *Stuff Matters* and *Liquid*

“A comprehensive, comprehensible guide to the impact of everyday materials like plastics and metals. If you want to take informed actions to support a better world, read this book.”

—Anne Janzer, author of *Subscription Marketing*  
and *Writing to Be Understood*

“The clear explanations of the benefits and costs of so many types of modern materials, along with their current disposal methods, are valuable to anyone interested in moving our society toward a zero-waste future.”

—Jill Lightner, author of *Scraps, Peels, and Stems: Recipes and Tips for Rethinking Food Waste at Home*

“In this compelling and informative book, you will learn about everything from chemicals and plastics to manufacturing and recycling, as well as what you can do as both a consumer and citizen to make for a more sustainable material world, all explained in a simple, clear, engaging style.”

—David Biello, author of *The Unnatural World*

# RETHINK THE BINS

Your Guide to Smart Recycling  
and Less Household Waste

JULIA L F GOLDSTEIN, PhD



Bebo Press

## **Rethink the Bins: Your Guide to Smart Recycling and Less Household Waste**

Copyright © 2020 by Julia L F Goldstein, PhD  
First edition, Bebo Press, Redmond, WA

All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the publisher, except for brief quotations embodied in critical reviews and certain other noncommercial uses permitted by copyright law. For permission requests, contact Bebo Press at [info@bebo-press.com](mailto:info@bebo-press.com).

The paperback edition of this book is printed on demand, eliminating the negative environmental impact of printing large quantities of books that might go unsold and contribute to waste. Organizations seeking discounts for bulk orders should contact the publisher.

Cover design: Michelle Fairbanks  
Typesetting: Sue Balcer  
Interior graphics: Sirajum Munir Galib  
Editing: Ariel Hansen  
Indexing: Judi Gibbs  
Proofreading: Abbey Espinoza

ISBN: 978-0-9995956-4-0 (paperback)  
ISBN: 978-0-9995956-5-7 (eBook)

Library of Congress Control Number (LCCN): 2020913332

# TABLE OF CONTENTS

|  |    |
|--|----|
| Introduction: The mystery of the missing cup | 1  |
| How to get the most from this book           | 3  |
| Glossary                                     | 4  |
| <i>Chapter 1: Where the Waste Goes</i>       | 7  |
| Key takeaways                                | 21 |
| <i>Chapter 2: Understanding Recycling</i>    | 23 |
| Sorting and processing different materials   | 25 |
| Alternative recycling programs               | 33 |
| Key takeaways                                | 37 |
| <i>Chapter 3: Understanding Compost</i>      | 39 |
| The value of compost                         | 39 |
| Backyard vs. industrial composting           | 40 |
| Composting biodegradable plastics            | 42 |
| Key takeaways                                | 44 |
| <i>Chapter 4: Waste Streams</i>              | 45 |
| Food waste                                   | 47 |
| Yard trimmings                               | 49 |
| Paper and paper products                     | 50 |
| Metals                                       | 53 |
| Plastics                                     | 55 |
| Glass  | 58 |
| E-waste                                      | 60 |
| Hazardous waste                              | 64 |
| Mixed materials                              | 66 |

|                                     |     |
|-------------------------------------|-----|
| Textiles                            | 68  |
| The worksheets                      | 69  |
| Key takeaways                       | 70  |
| <i>Chapter 5: Track Your Waste</i>  | 81  |
| Measure it                          | 81  |
| Control it                          | 84  |
| My experience                       | 86  |
| Do our efforts make a difference?   | 90  |
| Epilogue: May 2020                  | 97  |
| Acknowledgments                     | 99  |
| About the Author                    | 101 |
| Resources                           | 103 |
| My data tracking results            | 103 |
| Useful books, reports, and websites | 105 |
| Notes                               | 109 |
| Index                               | 113 |

*LIST OF ILLUSTRATIONS*

|   |     |
|---|-----|
| Annual household waste generation       | 8   |
| Plastic recycling rate                  | 9   |
| Where the waste goes                    | 12  |
| Circular and linear economy models      | 14  |
| Greenhouse gas emissions from landfills | 15  |
| Strategies to reduce GHG emissions      | 18  |
| Curbside recycling options              | 23  |
| Recycling of PET water bottles          | 30  |
| E-waste regulation timeline             | 61  |
| My household waste tracking data        | 104 |

*LIST OF WORKSHEETS*

|   |    |
|---|----|
| Ideas for reducing food waste                       | 71 |
| Destinations for paper and paperboard waste         | 72 |
| Destinations for metal waste                        | 73 |
| Destinations for plastic waste                      | 74 |
| Destinations for glass waste                        | 75 |
| Destinations for electronic waste (e-waste)         | 76 |
| Handling of hazardous waste                         | 77 |
| Destinations for multilayer and miscellaneous waste | 78 |
| Destinations for textile waste                      | 79 |
| Tracking waste by volume                            | 92 |
| Tracking waste by weight                            | 93 |
| Tracking waste by counting                          | 94 |
| Tracking waste by counting (blank)                  | 95 |
| SMART goals for reducing waste                      | 96 |



My reusable plastic cup with  
a Zentangle design



## INTRODUCTION

# THE MYSTERY OF THE MISSING CUP



I stepped away from the table for only a minute or two. When I returned, my laptop was still there, but my favorite reusable coffee cup had disappeared. I couldn't find it anywhere! How could I describe its unusual design to ask whether anyone had seen it? Then I remembered: I had written a blog post about this exact cup in a story touting the benefits of reusable plastic cups.

I pulled up my website on my phone and scrolled down the blog page to find the post, which included a photo of the cup. I spotted an employee (let's call her Jane) and held up my phone: "Have you seen this cup?"

She thought about it for a moment. "Yes. I threw it away."

It was an honest mistake. Jane was just trying to keep the area tidy, and my cup was empty. These reusable plastic cups from Starbucks are the exact shape and size of the paper cups, with an identical Starbucks logo on one side. The plain white reusable ones are hard to distinguish from the disposable variety.

But mine wasn't plain. It sported a design inspired from the practice of Zentangle, a meditative artistic expression that creates elaborate patterns in black and white. But apparently the design wasn't enough to convince Jane to leave the cup on the desk where I was working.

Jane and I walked over to the three bins in the kitchen area of this shared workspace and began searching. Success! Well, sort of. It wasn't in the trash. The cup was buried in the compost bin amongst discarded

coffee grounds and banana peels. The lid ended up in the recycling bin, which was filled with a mix of items that did not look recyclable: plastic forks, wrappers from energy bars, you name it.

After a trip through my dishwasher, my cup and lid were good to go.

But this story illustrates a problem that I see frequently. The presence of multiple discard bins confuses people. The different bins are designed to improve recycling and composting rates, but the lack of consistent labels makes everything harder than it needs to be. I see trash in compost bins and food waste in trash cans. Foil or plastic food wrappers don't belong with the compost or the recycling. If composting is available, apple cores shouldn't go in the trash. Recycling bins are often filled with a mix of recyclable containers and stuff that doesn't belong. My lid certainly did not, though lids from single-use coffee cups might be recyclable, depending on where you live. It is hard to know what to toss where, especially as best practices keep changing.

There are a lot of mixed messages out there.

*Recycle everything you can!*

*Recycling does no good.*

*Don't throw that in the garbage; it's recyclable.*

*You can't recycle that; throw it in the trash!*

*Avoid plastic in any form.*

*Buy compostable plastic!*

*Always compost food waste.*

*Never put meat or fish in the compost.*

*Don't toss that there!*

No wonder so many of us are confused about recycling and composting. Sometimes we feel like giving up trying to figure it out. We're worried that no matter what we do, it will be wrong.

## **HOW TO GET THE MOST FROM THIS BOOK**

When I run smarter recycling workshops or talk to people about recycling, I find that almost everyone wants answers. People want to know what to do with specific items when they are at home or away. And, secondly, they want to know if their actions make a difference. To that second concern I say, yes, they do. You are only one person, but if you change your behavior and encourage those around you to change theirs, your influence is greater than you think.

This is an interactive workbook, filled not only with information about the various items and materials that make up the municipal waste stream, but with worksheets for you to complete, so you can track, control, and reduce your household waste. The options for access to the worksheets depend on the edition you are reading.

### *Print edition:*

1. Write directly in the book or
2. Follow the URLs to download fillable PDF forms.

### *Kindle edition:*

Follow the URLs to download fillable PDF forms.

### *PDF edition:*

1. Type directly into the PDF or
2. Follow the live links if you need additional copies of any form.

The first three chapters will tell you what happens to your household waste after you toss it into a bin. Feel free to read the chapters in detail or skip to the end of each chapter where I summarize the key takeaways.

Chapter 1 provides background on the state of recycling and composting in the US. I recognize that the US is not the only country that can benefit from a better understanding of how to handle household waste. But it is beyond the scope of this book to cover systems in Canada, Europe, or elsewhere in the world. If you are not in the US, I encourage you to research what systems are used where you live.

If you want to better understand what happens at recycling and composting facilities, read Chapters 2 and 3, respectively. Those chapters cover sorting and processing and should help you understand the intention behind existing policies.

If you want to know how to handle a specific category of material, such as paper, glass, or clothing, you may go directly to Chapter 4 where I group items into ten categories. Each category features an associated worksheet to mark which items apply to you and note what action they require.

Chapter 5 proposes three ways to track your monthly waste stream and suggests methods you can use to reduce the amount of waste you generate. It contains multiple worksheets to direct your tracking and guide you to discovering strategies that will work for you.

If you would like to see an example of how this works in practice, I tracked my family's waste for a month. I share the results, along with a list of useful resources, in the Resources section beginning on page 103.

## **GLOSSARY**

Before diving in, it will be helpful to clarify a few terms. I'm listing these alphabetically rather than in order of importance.

**Curbside:** Americans living in single-family homes in many urban or suburban communities are familiar with the colored bins on wheels that waste-hauling companies provide for sorting household waste. Residents bring these bins to the curb for pickup. Residents of multi-family dwellings often have large dumpsters instead single-household bins. If that's your situation, everywhere I mention curbside recycling, think of whatever collection container is available near your building.

**Garbage:** Any household waste that doesn't get recycled or composted is garbage. Even waste that should be recyclable often ends up as garbage.

**Landfill:** This is both a noun (a location where garbage gets sent to get buried forever) and a verb (the act of sending garbage to a landfill).

**Recyclables:** Recyclables are household waste that can be processed into new materials. As you'll see when you keep reading, just because something is recyclable doesn't mean that it will actually get recycled.

**Trash:** I use this term interchangeably with garbage. A garbage bin and a trash bin are, therefore, both the same. Whatever goes in there usually ends up in a landfill.

**Waste:** This term, which is short for municipal solid waste, comprises all types of household waste. It includes everything that gets landfilled, recycled, or composted.



When you're done reading this book and completing the worksheets, you should come away with an understanding of how to better manage your waste at home and away. I hope that you will feel more confident that the items you toss into recycling and compost bins are actually being recycled or composted.

You and the members of your household can create less trash and send fewer items to a landfill while ensuring that only items without a better destination go into the trash bin. If you are inspired to replicate this on a larger scale, you can request a policy change at your workplace, your favorite coffee shop, or in your community.

The global public health situation changed dramatically from the time I finished writing this book to when it was ready for publication. As a result, some of the suggestions in this book are not practical. Pick and choose those that make sense for you and your community, and consider the rest as inspiration.

I encourage you to send me a note at <https://juliagoldsteinauthor.com/contact> to share your feedback and results. I will be happy to feature your story in my blog to inspire more people to better control and manage waste. Here's to a less wasteful future and recycling that works!

# WHERE THE WASTE GOES



This book explains best practices and general guidelines for smarter recycling and waste reduction. I'm sorry to say, however, that this book alone will not give you all the answers about what to toss where. Rules and policies vary from city to city, even within one metropolitan area. Homeowners and apartment dwellers in the same community may need to take different actions. When you move, you will probably be faced with learning a new system even if the same company picks up your trash and recycling.

The examples throughout this book, primarily from the Seattle area where I live but also for other cities around the US, may or may not apply to you. Stay tuned, though, as I will explain how to look up current guidelines for your community.

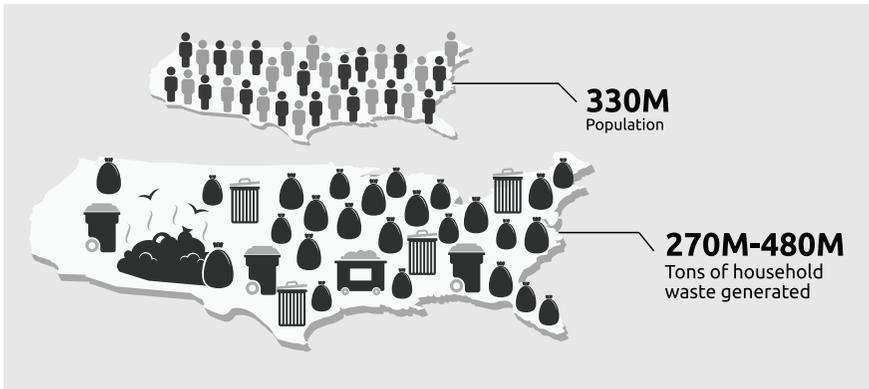
US households are impressively wasteful. We generate an average of somewhere between 4.5 and 8 pounds of household waste per person per day. It's helpful to dig into national data to grasp the scope of household waste generation. But if you prefer to skip the data and just learn what happens to our stuff once the trucks haul it away, go to page 12.



**The national picture.** According to the US Environmental Protection Agency (EPA), Americans generated 268 million tons of municipal solid waste in 2017, the most recent year for which comprehensive data are available.<sup>1</sup> This equates to 4.5 pounds per person per day.

Per-person waste generation rates have been fairly constant in recent years, suggesting a total of 270 million tons generated nationwide in 2019 based on population growth.

These numbers, while large, are probably underestimating total waste generation. My calculations, based on the EPA data as well as information from Waste Management, Inc. and Republic Services, suggest that the total may be as high as 8 pounds per person per day. This is close to Edward Humes's estimate of 7.1 pounds in his book *Garbology*, published in 2012.<sup>2</sup>



### Annual household waste generation

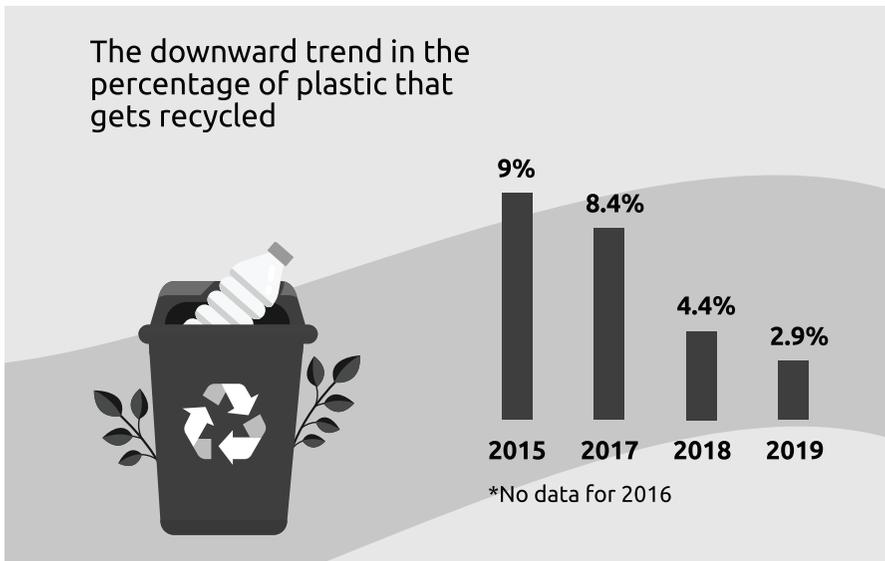
Millions of tons compared to the population of the US in millions. Based on 2019 estimates.

According to EPA data, paper and paper products comprise the largest proportion of waste (25% in 2017) and boast the largest recycling rate. Of 67 million tons of paper and paper products generated in 2017, 44 million tons (65%) were recycled.

How much is 67 million tons of paper? I weighed and measured a stack of magazines and did some calculations. A similar stack, if it weighed 67 million tons, would be around 240,000 miles high, equal to the distance between Earth and the moon!

The average US resident's contribution to that immense stack of paper is considerable. Assuming a population of 330 million people, we each accumulate a 38-foot-tall stack every year, or nearly five floor-to-ceiling stacks of paper. Whether landfilled or recycled, that's a lot of paper. No wonder we have a hard time decluttering! Fortunately, there are ways to reduce the amount of paper that comes into your home. It takes effort, but it is possible. I share some ideas in Chapters 4 and 5.

While paper waste has decreased since 2000 because of electronic documents, plastics represent a growing percentage of waste. Recycling rates for plastics are dismal, around 9% in 2015 and dropping. The Plastic Pollution Coalition estimated a plastics recycling rate of only 4.4% in 2018 and a prediction of 2.9% for 2019 because of the China effect (see page 10 on China's policy change).<sup>3</sup>



**After you learn what to do, the rules keep changing.** Though they may seem arbitrary, there are good reasons for these differing and

ever-changing rules, and it is important to modify your habits to keep up.

Local policies are based on:

- Available recycling and composting facilities
- Available methods to process waste
- Laws at the state, county, or city level
- Cost of waste collection and processing

All the above policies continue to evolve. One big change that happened in 2018 was China's decision to stop buying trash and recyclables from North America and Europe, an abrupt reversal of nearly twenty years of standard practice. Since 2000, waste processors in the US had been sending increasing quantities of waste overseas (13 million tons in 2017), primarily to China, and getting paid well for it.

Overseas shipping of waste started with paper and metal but began to expand to a wider variety of mixed recyclables. As the US diverted more and more of its waste to China, contamination rates continued to climb—nonrecyclable items were increasingly mixed in with the recyclables. US processors could no longer make money by trying to recycle this highly contaminated mix, but they could still sell it for a profit.

At some point, waste importers in China must have evaluated the ever-decreasing value of the materials they were receiving, and made the same calculation the US processors had. The model was no longer economically sustainable on their end, and they put on the brakes.

Once China implemented this disruptive change, other countries in Asia soon followed its lead. As a result of these actions, the economics of waste processing suddenly shifted. Market prices dropped from around \$90 per ton in early 2017 to \$25 per ton by late 2019.<sup>4</sup>

In reaction, during 2018 and 2019, 54 communities in the US stopped curbside recycling completely, while others reduced the list of materials they would accept or increased collection fees. As of early 2020, many companies in waste management are still scrambling to adjust. Financial reports from the largest waste management companies show significant decreases in recycling revenue over that timeframe.

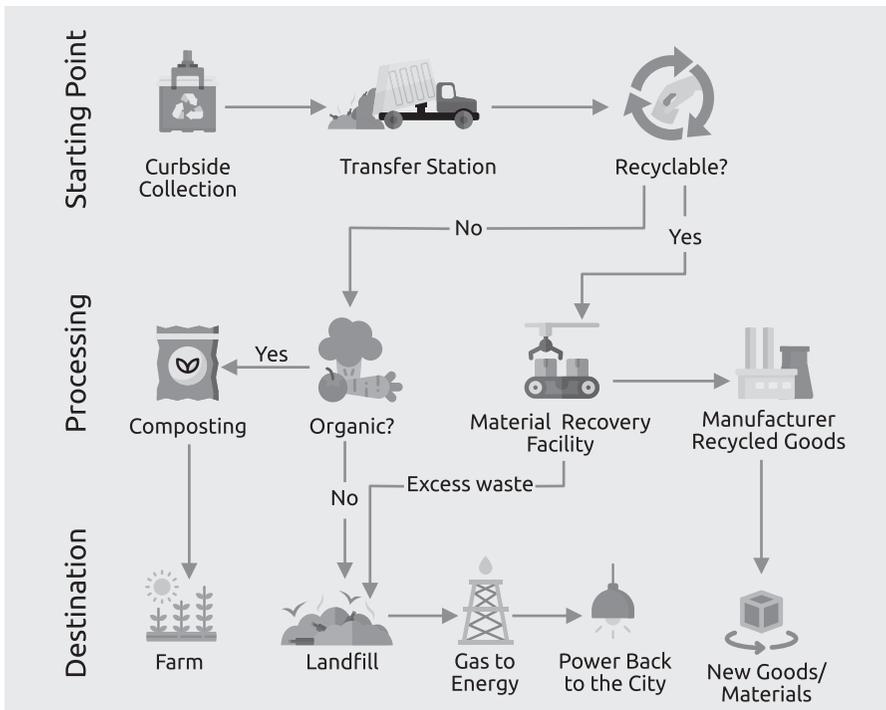
In the long run, China's refusal to buy low-value waste offers an opportunity for the US and other countries to step up domestic processing. Some of the largest companies, such as Waste Management, Inc. and Republic Services, have already been doing just that. Such actions can improve recycling rates and create new sources of recycled materials, as well as saving energy by not shipping waste overseas. Domestic processing also allows us to avoid burdening other countries with our trash.

The largest waste processing companies earn enough revenue from curbside collection that they can afford to absorb a significant reduction in recycling revenue in the short term. Smaller facilities don't always have that luxury. With processing costs around \$80 per ton, businesses that don't make money from hauling waste—only from sorting or processing it—are struggling to stay afloat.

The burden of improving the system belongs to the waste management industry and to local governments. But as consumers, we can take steps to reduce the amount of waste we produce and properly handle our remaining waste. We can ask our cities to provide greater options for recycling. We can also ask our local waste management companies to provide clearer instructions and change their policies so that less material ends up in landfills. And we can ask the companies that make products we enjoy and depend on to use less packaging.

Some people insist that recycling is broken. I believe that throwing up our hands and saying that there's nothing we can do is not helpful. My advice instead is to educate ourselves and those around us and to promote practices that improve real recycling rates and reduce waste generation.

**When waste is collected at the curbside, where does it go?** The diagram below shows the options for various types of waste. The exact sequence can vary because not all services are available in all communities, but this will give you a basic idea of the possible steps.



**Where the waste goes**

Possible paths from curbside collection to disposal or reuse.

Curbside collection typically includes three types of collection bins: garbage, recycling, and yard waste/organics. In this context, “organic”

simply means plant- or animal-based waste. Think eggshells and orange peels, rather than inorganic materials like metals and plastics.

Some cities tell residents to separate out different types of recyclables for curbside collection, but single-stream recycling has become the norm (more on that in Chapter 2). Putting all types of recyclable materials into one bin simplifies collection. Contamination rates, though, are much higher with single-stream recycling than with multi-stream.

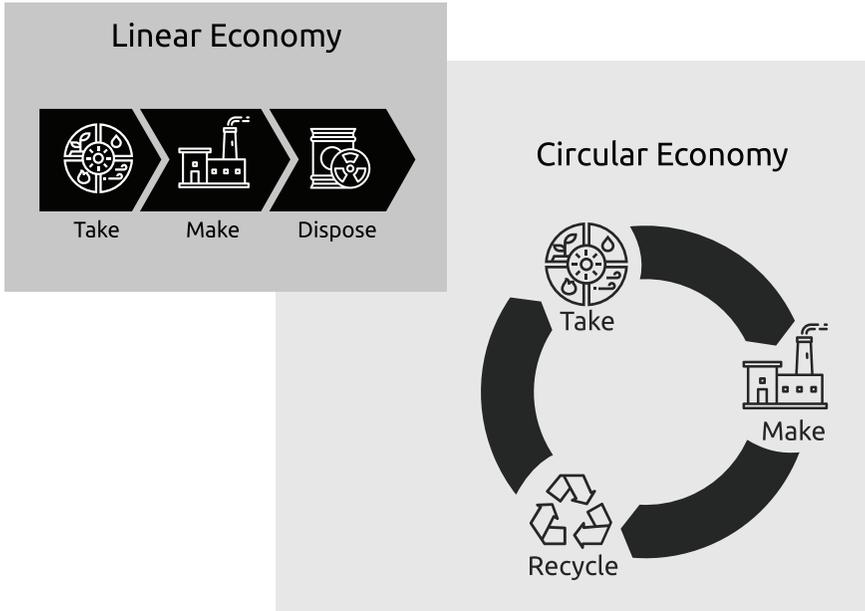
Waste deposited into a recycling bin heads to a material recovery facility (or MRF, pronounced “murf”) for sorting. MRFs usually send paper, plastic, metal, and glass to separate processing plants that grind or shred them and process them into recycled materials. Material that is successfully recycled goes into producing goods with recycled content, while contaminated or otherwise nonrecyclable material heads to the landfill. Chapter 2 describes more about what happens at MRFs and processing plants.



**In an ideal world, all waste would either be recycled into new goods and materials, turned into compost, or burned to generate electricity.** Such a process is the heart of the circular economy, an economic model where almost nothing becomes waste. The circular economy stands in contrast to our existing, mostly linear, economy. The linear economy depends on products being created, used, and disposed of. It drives production of new materials and new goods and assumes that all economic growth is desirable.

In the circular economy, everything is part of either an organic cycle, where compostable materials return to the soil, or part of an inorganic cycle, where materials like plastics, glass, and metals are recovered to make new products. If you want to learn more about the

circular economy, the Ellen MacArthur Foundation (see page 107 in the Resources section) has been instrumental in promoting the concept.



### Circular and linear economy models

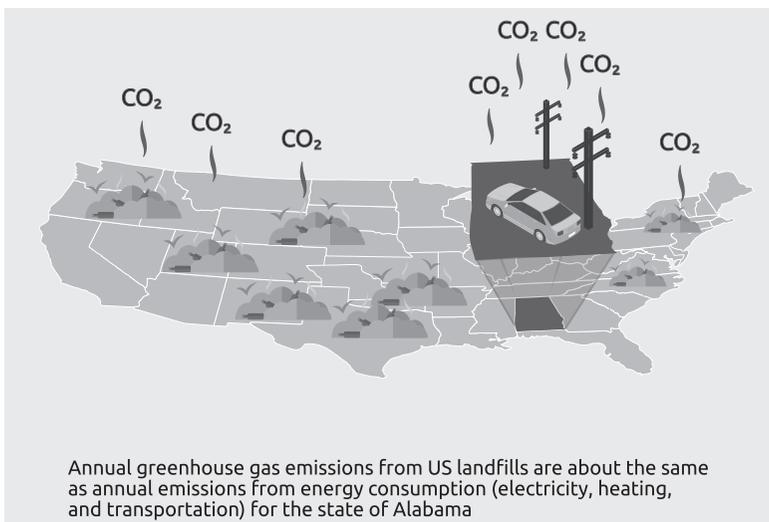
Moving to a completely circular economy is an ambitious goal. In reality, much of our waste heads to landfills where it takes up space and provides no real value. Are landfills reaching capacity? While hundreds of landfills around the country have closed, remaining capacity is enough to last hundreds of years. The issue is the location of landfills and the distance that garbage must travel to reach them. For example, no municipal landfills remain open near New York City. Trash there goes to landfills out of state, more than 100 miles away. Trash from Seattle travels even further, to a landfill in northeastern Oregon. At least it is transported by train rather than by truck, reducing the impact of emissions from the 260-mile trip.

But the main problem with landfills isn't capacity or location. There are more pressing concerns, such as the economic value of the items discarded into landfills. If diverted properly, the items now being discarded can produce new raw materials or energy worth billions of dollars per year. Many discarded items, such as clothing, furniture, and electronics, are still usable. Some are high enough quality to be worth selling as secondhand goods, while others can be repaired or refurbished and sold.

Landfills also pollute air and water. Although plastic liners in landfills contain much of the liquid that collects from wet garbage and rainwater, the liners can leak, releasing contaminants into the ground. Studies of drinking water near landfills have shown the presence of toxic chemicals.<sup>5</sup>

Another problem is the emission of methane and other greenhouse gases (GHG) into the atmosphere from landfills.

In 2017, landfills in the US emitted 108 million metric tons of CO<sub>2</sub> equivalent.<sup>6</sup> To put this number into perspective, it's about the same as annual CO<sub>2</sub> emissions from energy consumption (electricity, heating, and transportation) for the entire state of Alabama.



There are two ways to reduce GHG emissions from landfills:

1. Send less material to landfill. This goal can be achieved by reducing the amount of waste generated, increasing recycling and composting rates, and burning waste for energy.
2. Capture methane from landfills and convert it to energy.

**Reduce waste generation.** Of the ways to send less waste to landfill, reducing how much we create in the first place is the best option. Given the challenge of convincing businesses and individuals to control consumption, however, that strategy alone will not be enough.

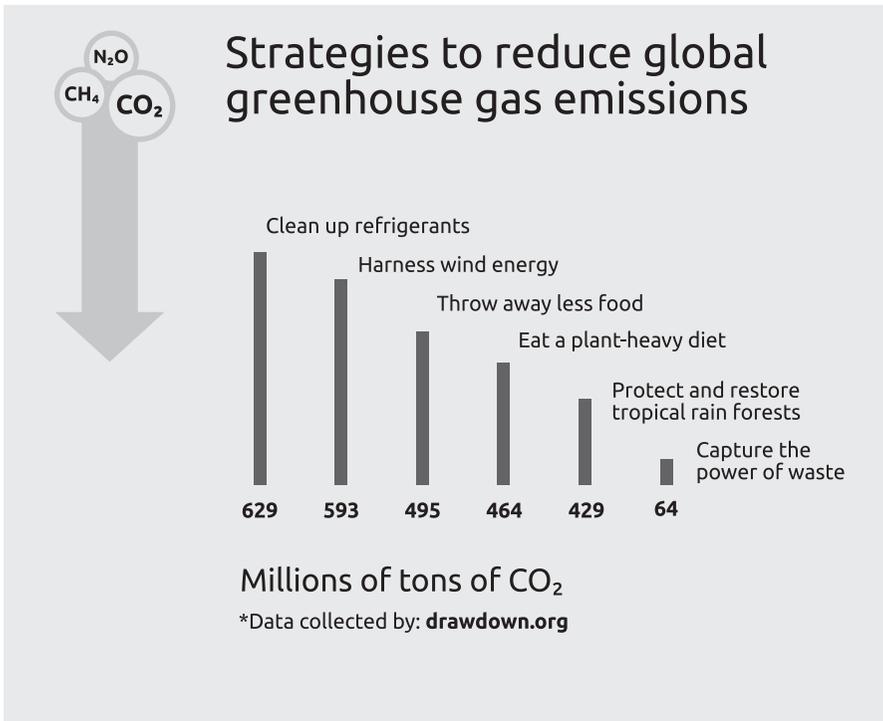
Diverting organics, especially food waste, to composting facilities, represents a huge opportunity for reducing the associated GHG emissions. More than 200 landfills in the US are located within a mile of composting facilities.<sup>7</sup> But few composting facilities accept food waste. As a result, neither do most curbside collection systems. On the bright side, the availability of composting for yard trimmings has increased substantially during the 21st century. Yard trimmings are now much more likely to head to composting facilities than to landfills.

**Burn waste for energy.** Waste-to-energy (WTE) plants can convert both organic materials and plastics into energy. They serve as an alternative to landfills for mixed waste. Very few of these facilities operate in the US because of historic concerns about cost and release of toxins. Those are, for the most part, unfounded fears, as WTE plants burn the waste in a controlled manner that safely captures odors and toxic fumes. Industrial manufacturing poses a much greater threat to public health, but the public isn't clamoring to shut down manufacturers. If the costs to build WTE facilities can be justified, it could be a reasonable way to mitigate the waste problem.

WTE is much more popular in Europe, where landfill space is more limited. Manufacturing companies that boast zero waste to landfill tend to rely on WTE for a significant part of their strategy. That said, WTE should not be a justification to ignore the need to reduce waste generation and improve recycling practices.

**Capture methane from landfills.** Methane capture is something worth pursuing. The Landfill Methane Outreach Program (LMOP), run by the US EPA, tracks data from more than 2,600 landfills in all fifty states plus Puerto Rico and the US Virgin Islands. More than 1,200 landfills in the LMOP database operate landfill gas collection systems that convert methane into energy in the form of natural gas. The US government is looking to expand this program and has identified hundreds of sites where they can install methane capture technology. Methane capture does not collect 100% of the methane in landfills, but it still helps.

**Looking at global emissions.** Project Drawdown, a nonprofit organization that assesses methods of reducing GHG, evaluated the impact of various global changes on total CO<sub>2</sub> emissions. The organization considered strategies ranging from changing our diet to investing in renewable energy. Some of the results are surprising. The action responsible for the greatest reduction was proper handling of chemical refrigerants used in refrigerators and air conditioning units when these appliances are discarded.<sup>8</sup> The infographic on the next page shows the impact of the top five actions, along with capturing the power of waste.



From an energy perspective, increasing the use of wind power is much more effective than building more WTE plants, but that doesn't mean that WTE isn't a helpful strategy. Food waste is a significant part of the problem, and composting can help reduce it.

**The role of recycling.** Increasing rates of recycling, one of the strategies I highlight in this book, can reduce the amount of waste going to landfills. I don't propose that better recycling is the answer to the global problems of climate change, ocean plastics, and pollution. Recycling is far from a panacea, and there are other strategies that will make a greater difference.

But I do see smarter recycling as one step toward a less wasteful future. Ideally, society should move away from disposable packaging and the need to figure out where to toss it. The tide is turning, and

companies are seeing customer demand for solutions that use less packaging, which is great. Customers also want less frustrating packaging. We can all do without sealed blister packs that are hard to open or packaging with labels that contaminate recyclables.

I also endorse an attitude of thinking before buying, be that necessities or luxuries. The goal should be to buy less and consider each purchase more carefully. Will you use and enjoy the product? Or will it spoil before you can consume it, or take up storage space without serving its intended purpose?

One aspect of the circular economy is product design. Products that are designed to last longer or be repairable help reduce waste, as do those made with recycled or recyclable materials. Such products are often more expensive for the initial purchase, but the total cost of ownership must factor in the extra months or years of useful product life. A \$150 pair of shoes that lasts ten years is a much better value than a \$30 pair that falls apart after six months of wear.

But I'm a realist. I realize that asking everyone to restrict their purchasing and carefully consider the carbon footprint of everything they buy is a tall order.

Until society embraces a fully circular economy, recycling matters. Items that are recyclable should be recycled. Making an informed decision before tossing something into the trash or recycling bins will allow recycling to work better. If contamination rates at MRFs in the US held to 5% or lower, the economics of recycling could work. Clean streams of recyclables—metals, specific plastics, dry paper, or glass bottles—can be processed into new materials.

Unfortunately, curbside recycling programs in the US are hardly collecting clean streams. According to a 2020 report from The Recycling Partnership, the average contamination rate is 17%, meaning that for every 100 pounds collected, 17 pounds are stuff that doesn't belong.

And that's for the communities that report contamination rates. The two-thirds that don't could have rates that are much higher.<sup>9</sup>

**The cleaner the stream, the lower the cost to process it and the more potential applications exist for reuse.** Materials in clean streams carry the possibility of recycling into the same types of products or even upcycling, where they are recycled into higher-value durable products.

Any type of improvement in waste processing requires effort. It's easier to toss everything into the trash, like we used to do before curbside recycling existed and what communities without recycling services still do. When recycling is available, it's easy to toss everything that might be recyclable into the big blue recycling bin.

When you understand the reasons behind your city's recycling rules, you are more likely to think about whether that empty container in your hand will end up in a landfill. If I can convince more citizens of the importance of a certain level of sorting and cleaning, it will help build awareness as well as increasing the value of recycled material. And if I can inspire citizens to reduce the amount of waste of all types that they generate, that's even better.