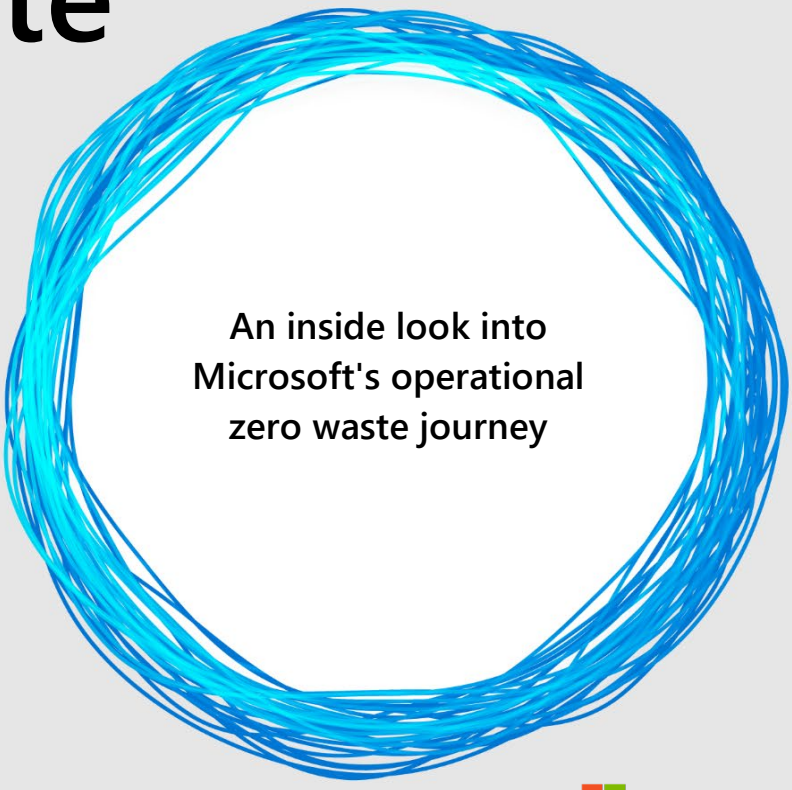
Achieving Operational Zero Waste



Microsoft

In partnership with WSP

Contents

Foreword 3
Executive summary 4
Introduction 5
- The big picture: drowning in waste 6
- Challenges of waste management 7
- Growing momentum for a zero waste approach 7

The business case for zero waste 9
- Sustainability leadership 9
- Risk mitigation 9
- Cost savings 9
- Operational efficiency 10

Developing our waste strategy 11
- The strategic planning process 11
  - Benchmark where we are at today 11
  - Define our goals 11
  - Identify top initiatives 12
- Third-party zero waste certification 12

Best practices at Microsoft 14
- Minimize disposables 14
- Establish central collection points 15
- Develop site-specific materials management procedures and training 16
- Choose facility and waste management vendors for waste diversion performance 17
- Perform occasional waste audits 18
- Target packaging waste 19
- Hire dedicated staff for materials management 20
- Manage change through communications and engagement 21

Measuring and reporting 23
- Using technology to manage waste 23
- Reporting to internal and external stakeholders 25

Looking ahead 26

Foreword

Not that long ago, most people didn't think much about waste. It was out of sight, out of mind. As long as the garbage bins were emptied, what happened with the waste afterwards just didn't seem to matter much. This isn't true anymore. The world has come to realize that what happens with waste does indeed matter—and so too have our employees, who are increasingly conscious of the waste associated with our business.

At Microsoft, we have a longstanding commitment to sustainability and recently increased our ambitions. Waste minimization is increasingly taking center stage as we build new facilities and redesign our existing facilities to minimize their environmental impact. From ensuring that nearly all food waste was diverted at our headquarters in Redmond in 2012 to achieving zero waste certification for our entire Redmond campus in 2016, we have made steady progress on our zero waste journey. Since then we expanded our focus to our other major office campuses, and we are also addressing the waste impact of our growing datacenter operations, achieving our first two zero waste certified datacenters in June 2020. This progress provided the necessary learning and is the foundation for Microsoft's commitment to be zero waste for our direct operations, products, and packaging by 2030.

There has been a huge learning curve for us. One of the biggest things we have realized is that it doesn't need to be an all-or-nothing proposition. Even facilities with minimal access to recycling services can make significant progress in minimizing waste. Eliminating single-use plastics is a great first step—one of the hardest, but with huge impact. We've also learned that successful waste management has to happen at multiple levels. There are executive policies that set and reinforce the strategy for the company. There are line managers who interpret those policies and implement them at a site level. And then there is what happens "on the ground," through the efforts of employees in multiple roles and through the relationships that facility managers build with waste haulers.

With this paper, we aim to share insights from our zero waste journey to date based on our collective experience across our global datacenter and facilities teams. Our hope is that by sharing these experiences, we will help those chartered with defining and executing on waste strategies in other organizations on their path to zero waste.

Danielle Decatur
Cloud Operations + Innovation
Environmental Sustainability

Katie Ross
Real Estate & Security
Environmental Sustainability

Executive summary

Landfills at capacity. Borders shut to recycling imports. Plastics polluting the oceans and killing marine life. Microplastics in drinking water. Carbon emissions from waste contributing to climate change. There is no doubt of the waste crisis facing our planet. And in response, there is growing momentum among individuals, businesses, and municipalities to drastically reduce the waste they generate by transitioning to a zero waste approach that prioritizes reducing, reusing, and recycling materials.

At Microsoft, waste is one of our four environmental priorities (alongside carbon, water, and ecosystems), and we are focused on achieving zero waste by 2030 across our direct operations. This focus reflects our belief that we have a responsibility to minimize our impact on the environment, but there is also a strong business case for our zero waste commitments. Adopting a zero waste approach lets us share our learnings with our customers to help them use technology and develop policies for their own waste journeys, mitigate reputational risk, reduce costs, and increase operational efficiency. We increasingly hear from our customers, partners, investors, and employees that they want us to do more to address our environmental footprint.

Our transition to zero waste started gradually and has accelerated—we assessed opportunities for impact and set new goals along the way. An important part of our strategy, zero waste certification highlights our commitment to our employees, customers, investors, community, and environment. Measuring and reporting on our progress plays a vital role in ensuring our accountability and transparency.

Although we have made great progress on our zero waste journey thus far, we know there is still work to do as we expand our zero waste achievement across our direct business operations by 2030.

Zero waste best practices at Microsoft
Minimize disposables
Establish central collection points
Develop site-specific materials management procedures and training
Choose facility and waste management vendors for waste diversion performance
Perform occasional waste audits
Target packaging waste
Hire dedicated staff for materials management
Manage change through communications and engagement

Introduction

Microsoft's focus on waste reduction initiatives began in 2008, when our facilities division (responsible for our offices, labs, and retail spaces) implemented single-stream recycling and composting across our Puget Sound offices and dining services. By 2016, we had earned zero waste certification for our corporate headquarters in Redmond, Washington, a 520-acre site with more than 125 buildings and more than 44,000 employees. This achievement was a significant milestone on our path to building sustainable campuses and datacenters. It reflects the growing and increasingly visible challenge that waste represents globally and the opportunity that we as a corporation have to contribute to a solution while protecting our business from the associated risks and costs of waste.

We are now focusing on preventing waste creation by reducing as much waste we generate as possible and then reusing or recycling across categories including solid waste, recycling, compost, electronic and electrical equipment (e-waste), construction and demolition, and hazardous waste.

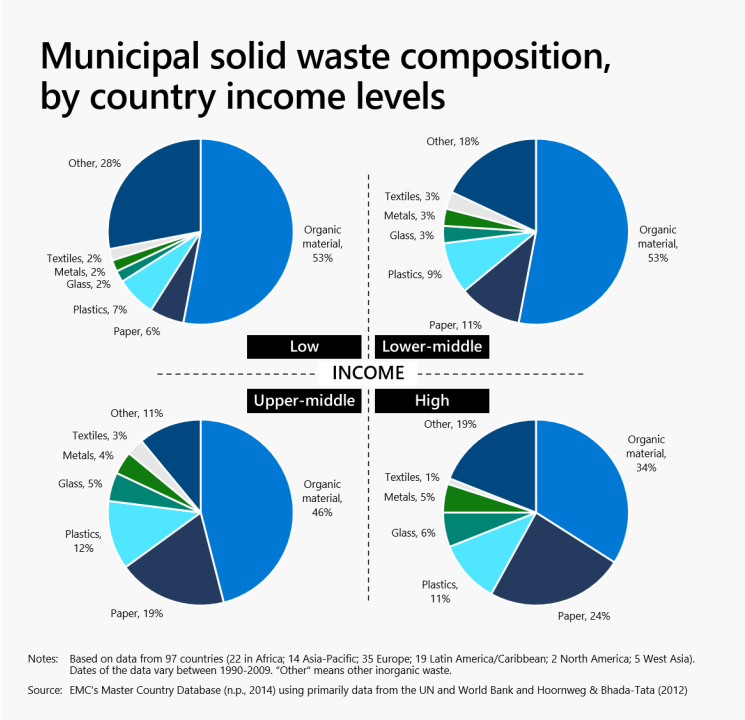
> *"By 2030, we will divert at least 90 percent of the solid waste headed to landfills and incineration from our campuses and datacenters, manufacture 100 percent recyclable Surface devices, use 100 percent recyclable packaging (in Organization for Economic Cooperation and Development, OECD, countries), and achieve, at a minimum, 75 percent diversion of construction and demolition waste for all projects."*
>
> —Brad Smith, President and Chief Legal Officer, August 2020 blog post

We have committed to achieving zero waste for Microsoft's campuses and owned datacenters by 2030. All offices, campuses, and owned datacenters have set a minimum construction and demolition diversion target of at least 75 percent. We currently remarket and recycle 99.9% of all decommissioned datacenter hardware through IT Asset Disposition (ITAD) partners. To further optimize management of e-waste at our datacenters, we plan to repurpose and reuse servers and related hardware through Microsoft Circular Centers, which will be located first on our new major datacenter campuses or regions, and eventually added to existing ones. We expect Microsoft Circular Centers to increase the reuse of our servers and components by up to 90 percent by 2025.

In this paper we describe the business case and strategy for making the shift to zero waste operations in Microsoft campuses and datacenters while also sharing some of our learnings in the work done to date. Please note that this document is intended to share Microsoft's experience on our journey to achieving zero waste operations in an effort to help other businesses do the same. It is not intended to be a comprehensive guide.

The big picture: drowning in waste

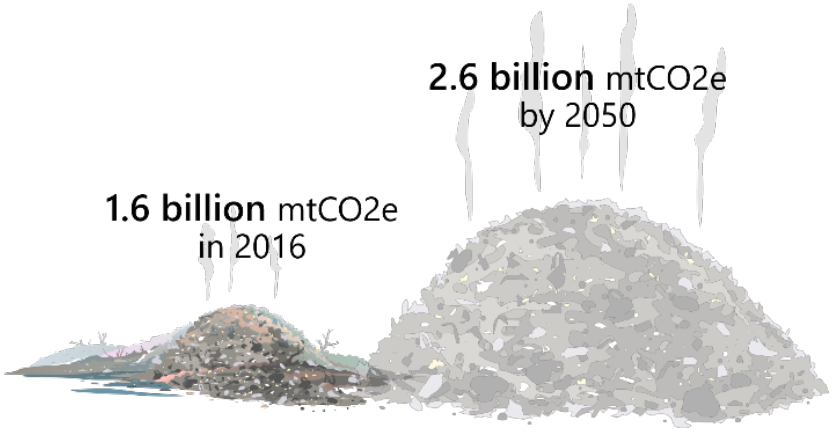
Every year, more than 11 billion tons of waste are produced worldwide according to the United Nations Environment Programme (UNEP). Waste includes everything from organic materials such as food and garden waste to paper and cardboard, glass, metal, wood, textiles, waste from e-waste[1], and, of course, plastic. There is some notable variation in waste composition and generation based on country income levels and most waste streams are managed based on local needs, conditions, options, and requirements.



Source: UNEP, Global Waste Management Outlook, 2015

Waste is also a contributor to climate change. According to the World Bank, in 2016 solid waste management and disposal produced an estimated 1.6 billion metric tons of carbon dioxide equivalent (mtCO2e), or 5 percent of total global greenhouse gas (GHG) emissions. These emissions are primarily from open dumping and disposal in landfills without landfill gas capture systems (landfilled materials produce methane, a greenhouse gas that is 84 times more potent than carbon dioxide when looking out 20 years). Furthermore, the World

Forecast growth in GHG emissions from solid waste management and disposal

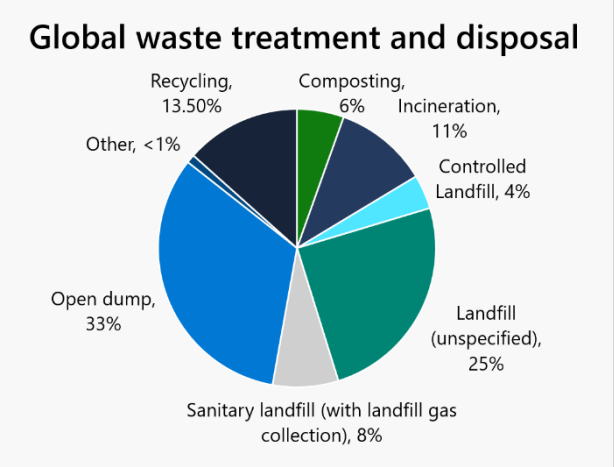


Source for data: World Bank, What a Waste, 2018

[1] Given the complexity and global implications of e-waste management, it is outside the scope of this paper, which focuses on the operational waste streams.

Bank predicts that figure to increase to 2.6 billion tons by 2050 unless major changes are made to how we manage waste.

Challenges of waste management



Source: World Bank, What a Waste, 2018

Part of the waste problem is poor waste management. The World Bank conservatively estimates that at least a third of waste is not managed in an environmentally safe way, landing in open dumps. This partially explains why only 20–30 percent of plastic waste found in the ocean comes from marine sources such as fishing gear—the rest has been washed or blown out to sea from land. Single-use plastic, in particular, has become a significant waste issue due to its substantial increase in usage over the last few decades and limited global collection and recycling infrastructure for this material. Despite the fact that organic materials represent 34–53 percent of all waste, the World Bank reports that only 5.5 percent of waste is composted. And only 13.5 percent of solid waste globally is recycled.

However, the bigger issue is the sheer volume of waste produced. Roughly half of all plastic produced is used to manufacture single-use items. And we are running out of space to store this trash. In the United States, total landfill capacity is predicted to decrease by 15 percent in the next five years, and by 2021, only 8 to 15 years of capacity will remain (depending on the region).

Growing momentum for a zero waste approach

What's the answer? As waste issues grow, cities, businesses, and individuals around the world are adopting a zero waste approach in a bid to dramatically reduce, if not eliminate, the waste that they create. "Zero waste" is about minimizing waste generation by restructuring production and distribution systems and reducing waste headed for landfills by reusing materials, selecting materials with reuse in mind, and recycling where possible.

Zero waste is closely aligned with the principles of a circular economy. In contrast to today's linear model of production, consumption, and end-of-life disposal, the goals of a circular economy are "designing out waste and pollution, keeping products and materials in use, and

regenerating natural systems." It is reflective of the way the natural world works, where there is no "waste" per se; everything is part of an ongoing closed-loop cycle of use, decomposition, and regeneration.

The process of transitioning to zero waste can be daunting but is achievable one step at a time. In our experience, there is great value in taking an incremental approach, in introducing changes gradually and focusing on the areas of greatest impact first. For example, simply minimizing use of single-use materials by introducing reusable alternatives will be beneficial, by disrupting the linear model of consumption and disposal that modern society is built on.

The business case for zero waste

Growing interest from investors and customers coupled with increasing governmental regulations on waste disposal make establishing a zero waste strategy good business sense.

> *"Investing in circular economy measures can not only mitigate risk but can open up new markets and improve brand reputation."*
> —Niall Smith, Senior Environmental Analyst at Verisk Maplecroft

For Microsoft, the business case for our zero waste commitments can be summarized in four desired outcomes: sustainability leadership, risk mitigation, cost savings, and operational efficiency.

Sustainability leadership

Microsoft's ambition is to become the world's leading technology platform and provider of environmental solutions. In 2020, we made ambitious commitments and outlined detailed plans to be carbon negative, zero waste, water positive, and account for our land footprint by 2030. From achieving carbon neutrality in 2012 to our new commitments, we have long been committed to minimizing our environmental impact and helping our customers address theirs.

We've been encouraged to see the increasing number of commitments companies, organizations, and governments are making. To meaningfully address climate issues it will take all of us doing more. That's why we are committed to putting data and technology to work, transparency, sharing our learnings, and learning from others.

Risk mitigation

Customers and investors are increasingly prioritizing the environment in their purchasing and investment decisions. This is both a global and local issue, particularly in areas where landfills are reaching capacity. The shift to a zero waste model reflects our commitment to take responsibility for our direct waste footprint and minimize our local impact.

Cost savings

As landfills reach capacity and governments introduce new regulatory requirements around solid waste, the costs for managing waste will only increase. As Niall Smith with Verisk Maplecroft predicts, "With the world's attention firmly fixed on the problem of waste, we expect governments to act, with businesses footing the bill." At Microsoft, the cost savings from

reduced landfill tonnage when we moved to single-stream recycling and composting on our Redmond, Washington, campus in 2008 were sufficient to add a full-time waste manager position on the campus. There can also be significant cost savings associated with minimizing single-use disposable products, as well as additional revenue streams from commodity reuse and recycling. The TRUE Zero Waste certification scheme reports that the first 100 TRUE-certified projects together realized up to $6.5 million in annual cost savings while diverting more than 445,000 tons of waste from landfill.

Operational efficiency

Microsoft has sites in more than 100 countries around the world. Each site is subject to different local regulations surrounding waste and ensuring compliance with these various regulations is labor intensive and inefficient. Moving towards a consistent waste stewardship strategy helps minimize our exposure to waste regulations while ensuring better operational efficiency locally and globally.

Developing our waste strategy

At Microsoft, we developed our campus and datacenter zero waste strategy with the aim of putting us on the best path to reach our desired outcomes of sustainability leadership, risk mitigation, cost savings, and operational efficiency. Third-party certification plays an important role by giving credibility to our approach.

The strategic planning process

Microsoft's progression towards zero waste has been gradual and has accelerated as we have set new goals and explored new processes. For our datacenter and facilities work, we have largely followed a very simple process: (1) benchmark where we are at today, (2) define our goals, and (3) define our top initiatives.

Benchmark where we are at today

Before developing our datacenter and facilities waste strategy, we needed to know our starting point:

- **Just how much waste, and what types, are we generating?** To find this out, we performed waste audits. That is, we literally sorted through our trash to record what kinds of waste we had in what volumes, who was responsible for it, and where it went. We have found that for Microsoft general facilities, the biggest areas of waste are general office waste and cafeteria waste, whereas for Microsoft datacenters the most significant waste stream is e-waste. For more guidance on waste audits, please see the Perform occasional waste audits section.
- **What's being done across the business?** When our datacenter team set their zero waste target, they worked closely with our facilities team (responsible for our offices and labs) to take advantage of the experiences and best practices that the team had already gained when achieving zero waste certification for our Redmond campus. This helped reduce the churn and streamline the overall process.

Define our goals

As described in The business case for zero waste section, for Microsoft, the primary drivers for going zero waste are the opportunity for sustainability leadership, mitigating reputational risk, cost savings, and operational efficiency. These drivers are the foundation for our goals. We use benchmarking to identify gaps and establish our path going forward. For example, our cloud services business is growing exponentially, and with that growth comes a corresponding growth in the number of datacenters that we build and operate to support those services. Our goal to

achieve zero waste for Microsoft's campuses and owned datacenters by 2030 addresses the area of greatest impact for our business—for leadership, reputational, and cost benefits.

Identify top initiatives

Given our drivers for going zero waste, it makes sense for us to think about what works at scale, so that we can have the greatest impact possible over the long term while gaining visibility for our efforts. The Best practices at Microsoft section covers many of the initiatives that have helped make our zero waste programs successful. Despite our broad focus, we have found pilot testing useful in getting an initiative rolling. For example, we experimented with different tactics at our datacenter in Dublin before extending those tactics to other parts of our business, resulting in zero waste certification not only in Dublin but in our Boydton, Virginia datacenter as well.

Third-party zero waste certification

Should third-party zero waste certification be part of a corporate zero waste strategy? For Microsoft, it was important to receive independent third-party certification to validate and verify our achievement of zero waste. We opted for the TRUE Zero Waste certification for our Redmond headquarters, whereas we selected the UL Zero Waste to Landfill standard as the best fit for our datacenter facilities. During our decision-making process, we looked for frameworks that would work for the global scale and type of facility we wanted to certify, are technically credible and transparent in their calculation methodologies, and can be integrated reasonably into our operational practices. For our datacenters, the global applicability and documentation approach (which focuses on tracked materials hauling data) of the UL standard was the best fit. For other facilities, a more prescriptive standard like TRUE that lays out specific techniques for achieving high diversion rates may be a better fit.

		
Certification	TRUE Zero Waste	UL ECVP 2799 Zero Waste to Landfill
International applicability	Yes	Yes
Diversion tactic: Source reduction (prevention)	Yes	Yes
Diversion tactic: Reuse	Yes	Yes
Diversion tactic: Recycling	Yes	Yes
Diversion tactic: Composting	Yes	Yes
Diversion tactic: Anaerobic digestion	Yes, with productive use of byproducts	Yes, with energy recovery
Diversion tactic: Biofuel	Yes, if can justify per "productive use" criteria	No
Diversion tactic: Waste-to-energy	No	Yes, up to 10% after diverting 90% through other means
Diversion tactic: Alternative daily cover (ADC)	No	No
Required performance	90% diversion	90% diversion

Best practices at Microsoft

The following sections provide highlights of what we have found works well when we have introduced zero waste programs at Microsoft's datacenters and facilities. These eight programs represent the programs where we felt that we could have the fastest and biggest impact from an operational waste perspective and that would also be most helpful to share with other businesses looking to learn from our experiences.

Minimize disposables

A fundamental part of any zero waste program is to reduce waste. At Microsoft, we found that there is a big opportunity to minimize single-use plastics, such as disposable bottles, containers, dishware, and cutlery for food and drink. Addressing disposables was one of the first initiatives we tackled, both for our general business facilities and within our datacenters. Our top tips include:

- **Transition to durables wherever possible.** Durables are items that are suitable for reuse over the long term, such as hard-wearing cups, plates, and cutlery. One approach that we used to kick off zero waste initiatives was to give our employees their own reusable cup as a gift—this helped get their buy-in from the outset when disposable cups disappeared from the coffee room. It also helps keep the kitchens tidy, since employees feel ownership over their mugs and don't want to lose them in the sink or dishwasher.
- **Opt for compostable or easily recyclable materials when durables are not an option.** For our facilities with no kitchens for cleaning durables or when we are providing refreshments to site visitors at a scale that we can't accommodate with our supply of durables, we have moved to using compostable materials (where there are commercial composting facilities available) or easily recycled materials (such as aluminum cans or cardboard).
- **Identify the available waste diversion opportunities for the geographic area.** For example, given the geographic spread of our facilities, we found that some areas did not have commercial composting services. It was important that we identified this before committing to a composting strategy (in some cases, where composting was not available, we chose to pursue onsite composting).
- **Install filtered water dispensers.** Since our employees can refill their own reusable water bottles with filtered water, we don't need to provide plastic single-use water bottles, which can be difficult to recycle and a major source of waste.

MICROSOFT EXAMPLE

Minimizing disposables
We are saving more than US$100 per employee per year by moving from disposable cups to durables at one of our datacenters.

In general, we have found that although there will be some costs associated with the move to durables (such as to purchase and replace durables as required, higher costs for purchasing

items made from compostable or recyclable materials, and costs for water filtration), these costs are more than offset by savings from not purchasing disposable items.

Establish central collection points

It is pretty common for people to have a waste bin next to their desk. When it comes to separating waste into different streams to improve diversion (such as composting or recycling), however, a best practice is to move to central collection points. In our experience, this helps reinforce messaging about how to properly dispose of waste and decreases how many bins (and therefore plastic bin liners) are required. We've also found that it saves our janitorial staff a significant amount of time, since they don't have to collect materials from hundreds of deskside bins. Here are our top tips:

- **Aim to have one collection point per 10 to 20 workstations, or within 20 steps of each workstation, in office areas.** What has worked best for us is to place central collection points in areas that our employees tend to congregate, such as by a coffee station, and along normal walking routes within office spaces that are easily visible. The key to getting our employees to accept the change has been to make it as easy as possible for them to use the central bins. Whenever we move to a central collection point, we closely monitor usage for the first few weeks to ensure we have enough bins for peak periods of use.
- **Put bins for different types of waste side by side.** At a minimum, we have bins for dry mixed recycling and general waste side by side. We have found that most people don't want to make extra trips or go farther to find the specific bins they need, and so providing the bins together generally improves our waste segregation.
- **Use consistent visual cues (such as colors) and intuitive, universal signs to make it easy for people to choose the right bin.** People make split-second decisions about where to put their waste, and if it isn't immediately clear which bin to use, we've found that they are likely to default to the nearest bin—which leads to contamination of recyclables or recyclable material being put in the general garbage. We've learned the importance of consistent, clear signage to help regular users form habits and intuitive instructions to help visitors understand how the system works.
- **Color code bin liners to make it easy for custodial staff to sort waste when they take it to storage areas.** For example, in one of our datacenters and in our Puget Sound office facilities, we use black bin liners for general garbage destined for the landfill and clear bin liners for recycling. We've also found that it is worth checking with the waste hauler, as they

MICROSOFT EXAMPLE

Central collection points
Side-by-side central collection bins at one of our datacenters.

may already have a preferred color-coding scheme, and aligning with it helps with material handling, sorting, and disposal.

Develop site-specific materials management procedures and training

We prepare site-specific written documentation on our waste management procedures—this helps us ensure that our sites meet our specific zero waste targets (including criteria for zero waste certification), helps new personnel understand the role that they can play in reducing and managing waste, and provides the foundation for training. Since there are regional variances in what recycling services are available and how waste haulers operate, we've found it particularly important that our documentation and training are site specific. We've found these elements were critical to developing effective datacenter and facilities documentation and training:

- **Provide a comprehensive overview of the new waste strategy that takes into account all audiences.** Although existing custodial personnel generally have a decent understanding of waste management practices, we've found that many of our employees simply don't think about what happens to waste once it lands in the bin. Some elements that we cover in our site-specific documentation include:
    - An overview of the different types of solid waste produced onsite.
    - Descriptions (with images) of the equipment that will be used to collect and manage waste.
    - Step-by-step instructions for segregating, storing, and transporting waste.
    - Roles and responsibilities for all aspects of waste management.
- **Tailor training to each audience—from general employees, to custodial staff, to external contractors.** We try to make our training as targeted as possible, so that everyone gets the information they need without having to wade through information not relevant to their role. For example, for general employees we include tips on how to avoid creating waste in the first place, how to properly sort waste, and the impact of improper sorting. For custodial staff, we include procedures for properly transporting and storing collected materials, plus what to do when there are issues with equipment or how employees are sorting their waste. For all audiences, we include an overview of why waste management matters—with executive endorsement wherever possible—and the different roles that people can play in achieving zero waste.
- **Make training materials highly visual.** We've found that using lots of images can help people absorb the information quickly and connect it with what they see around them, whether on the office floor or in back-of-house areas, such as loading docks and custodial closets.
- **Review and update procedures, documentation, and training each year.** We like to use the annual update process as an opportunity to identify and troubleshoot any issues with our procedures or where they are not being followed properly.

MICROSOFT EXAMPLE

Materials management documentation

An example of information that should be in a materials management plan as a visual reference for waste collection infrastructure.

Choose facility and waste management vendors for waste diversion performance

When it comes to the effectiveness of a zero waste program, we've found that the choice of vendor(s) to run the facilities and pick up and process our waste can make a real difference. We find it worth spending extra time during the request for proposal (RFP) process to find vendors with the expertise and interest to help design and optimize our waste collection programs. Here are our top tips to select vendors that will be engaged partners:

- **Make achievement of zero waste part of facility management performance standards in vendor contracts.** We aim to incentivize vendors at the outcome level, not process

level—for example, requiring corrective action whenever diversion rates fall below a certain level.

- **Include waste diversion targets and reporting criteria in RFPs and contracts.** We have found this particularly important to support zero waste certification. We try to engage new haulers at the end of existing contracts, to avoid early termination fees. We have found that in some cases, there are additional fees to meet our reporting requirements, particularly for haulers that do not already provide reporting services.
- **Choose vendors that can demonstrate high diversion outcomes at other service locations.** In our experience, vendors with a track record of prioritizing (and documenting) diversion are more likely to bring that same focus to our business.
- **Avoid haulers that have financial incentives to send materials to landfill or incineration.** In practice, we have found that this means it is often better to have different vendors for different services (for example, one for general waste and another for recycling).

MICROSOFT EXAMPLE

Waste management vendors
In Amsterdam, our waste hauler is highly engaged in the circular economy model and is committed to finding recycling opportunities, even going so far as to create a subsidiary that will manufacture new products out of materials that its haulers collect.

Perform occasional waste audits

Although we had a pretty good overall idea of what types of waste we were generating at our datacenters and facilities and how well diversion efforts were working, it wasn't until we actually dug into the waste at a specific site that our knowledge moved beyond the theoretical. A waste audit isn't a pass/fail test—it is just how we have gained a good understanding of our waste streams. Waste audits are about physically sorting and weighing the materials being collected in waste, recycling, and composting bins. We've found that performing occasional waste audits can help us answer questions like, what are our main waste streams, how much waste do we generate, who is responsible for it, and where does it go? How effective is our signage at guiding people to separate their waste properly (that is, is there a lot of contamination, such as cardboard in general waste bins)? Are we generating a lot of waste from single-use products that we could easily avoid? Here are our top tips:

- **Work with an independent auditor if possible.** Although some haulers may provide auditing services, we prefer to get an independent review to help ensure that business interests do not influence the results. (For example, if a waste hauler manages both general waste and recycling, it may have a financial incentive to maintain general waste levels.)

- **Choose an auditor with experience that aligns with the motivation(s) for the audit.** In some cases, we will be searching for ways to improve our diversion rate. In others we want to quantify exactly how much of a specific type of waste we are generating and build a business case for sourcing alternative materials or implementing a new recycling program. And in others we just need to audit our waste regularly to meet certification criteria or for regulatory compliance. By choosing an auditor based on the drivers for the audit—and providing the auditor with clear direction from the start—we help ensure that we get the outcome we're looking for.
- **Coordinate with custodial and logistics teams before and during the audit.** We have found that by arranging ahead of time for these teams to temporarily set aside materials for sorting and weighing instead of putting them directly into the normal storage and disposal containers, the audit process is smoother and more efficient.

MICROSOFT EXAMPLE

Waste audits
An independent waste audit that we conducted at one of our datacenters led to recommendations for improvements and new recycling opportunities, identified existing issues (such as construction waste incorrectly being placed in general garbage compactors), and provided weight data to support zero-waste certification documentation going forward.

Target packaging waste

Packaging (in particular, plastic film such as from air cushions and overwraps) can be a large portion of a company's waste, and we think it makes a great target for a waste reduction initiative. We have found that engaging our sourcing managers—who have the relationships with our suppliers—is key to reducing the packaging waste that enters our company's waste streams. Here are our top tips:

- **Work with suppliers to eliminate problem materials and reduce the types of materials used in packaging.** We start by identifying any packaging materials that cannot be recycled (such as Styrofoam and pink foam) and replace them, wherever possible, with materials that are easily recycled (such as cardboard). We've found an added benefit of switching to packaging that uses fewer materials is that this also simplifies the sorting process. When multiple materials are used for packaging, we try to find options that are easy to separate for recycling.
- **Look into recycling options for plastic film.** Plastic film, when segregated from other waste streams, can often be used by specialist manufacturers to create composite decking,

MICROSOFT EXAMPLE

Packaging waste
We have worked with our suppliers to change packaging for some of the materials that we procure. For example, for our dining services on our Redmond, WA, campus, we have requested that no plastic rings are used with canned beverages, and we changed suppliers for almond milk to one that doesn't include plastic straws.

benches, pallets, crates, pipes, and other useful products. We often need to contract a specific hauler for recycling plastic films, as not all will manage this material. In some cases, we have also had to invest in baling equipment and set aside dedicated space to house the equipment and store the bales until they can be picked up.

- **Push for packaging and shipping methods that focus on reusable containers and take-back programs** (known as reverse logistics). We have found that making a supplier responsible for managing packaging waste gives them an immediate incentive to reduce that waste. It's important to understand what happens with packaging that is sent back—we prefer reusable containers as it gives us confidence that they won't just be sent to landfill or an incinerator. Although some suppliers do resist these kinds of programs if they don't already have them in place (as their costs increase), we want to encourage others to request them—the more businesses that push for reusable packaging and take-back programs, the sooner those programs will become standard.
- **Make packaging waste reduction targets part of overall performance assessments for sourcing managers.** By giving our sourcing managers incentives to reduce packaging waste, we have found that they are more motivated to make waste reduction a priority.

Hire dedicated staff for materials management

Across our sites and facilities, in most cases our building occupants—despite the best of intentions—don't manage to sort all waste materials correctly. This leads to contamination of recycling streams and lower waste diversion rates. Not only does this make our waste strategy less effective than it could be, but it also can put our waste targets and even zero waste certification at risk. By having dedicated staff who are responsible for sorting and managing our waste materials onsite, we have seen a significant boost in acceptable recycling collections and waste diversion rates. Here are our top tips:

- **Focus materials management staff on the areas of the business that generate the most waste (and/or the most different types of waste).** From our experience with datacenters, for example, this is primarily the loading dock area, but for our larger campuses we've also found value in sorting office waste and cafeteria waste.
- **Provide thorough training and management oversight.** This may seem obvious, but we've found it vital that materials management staff have clear and up-to-date training materials covering not only the most common waste items and proper waste separation procedures, but also the most common waste issues. We aim to update training materials whenever we make changes to haulers,

MICROSOFT EXAMPLE

Dedicated materials management staff

At our corporate headquarters in Redmond, WA, we have a team of dedicated materials management staff who sort through 30 tons of landfill waste every month, removing materials that can be recycled or composted. By providing this secondary sorting of waste materials, the team plays an important role in helping the campus maintain its zero-waste certification.

collection infrastructure, or segregation procedures.

- **Encourage materials management staff to identify patterns and recurring issues.** We use their observations to improve employee training and waste signage, to ultimately improve waste sorting at the point of collection.

Manage change through communications and engagement

We've found that when introducing a zero waste program, as with any process change in an organization, proactive change management—including clear communications and employee engagement—is key. Our goal is to share information in a timely way that will motivate and engage our employees so that they feel invested in the outcome of the zero waste initiative. Here are some of our best practices for developing a successful education campaign:

- **Get executives to sponsor the program.** In August 2020, Brad Smith, Microsoft's President and Chief Legal Officer, announced the company's ambitions to be zero waste by 2030. Additionally, our company executives talk about the importance of zero waste, for example at all-staff meetings, to raise the visibility and credibility of our message. Since our organization has multiple sites, we generally try to have the message delivered at a site-specific level in addition to the headquarters level, so it is highly relevant to our employees at that location.
- **Communicate early and often—and in multiple formats.** We have found that by sharing information about the program (including the goal and intent) well ahead of any major changes, we have been able to avoid confusion and help ensure a smooth rollout. We also use multiple communication methods (such as email, staff meetings, newsletters, and pantry television screens) to reinforce our messages and reach all audiences.
- **Consider using fun events to engage with employees.** Zero waste launch events have been a great way to get our employees excited about the change (of course, we work hard to reduce waste from these events as much as possible to reinforce a zero waste theme). These events also provide the perfect opportunity to distribute durable alternatives such as coffee cups or water bottles where this is part of our strategy. Encouraging employees to do their part by using durables at work and reducing waste at home can create buy-in to a collective effort and increase the opportunity for success.

- **Provide periodic progress reports.** Although we're conscious of not overwhelming our staff with too much information, we do find value in sharing site data periodically and updating them on the site's progress (and how it compares with other organizations in the area).
- **Celebrate successes and highlight good work by integrating zero waste into existing rewards and recognition programs.** We've found that these kinds of incentives are also great for motivating employees to contribute suggestions for further waste reduction tactics.
- **Designate a zero waste point-of-contact who can answer employee questions.** There is bound to be feedback or confusion when a new system is rolled out. Having someone on point to respond has helped our employees feel heard and helped prevent unintentional deviations from the new process. Our waste "champions" not only respond to questions and feedback but also proactively work with their colleagues in adopting the new systems.

MICROSOFT EXAMPLE

Communications and engagement
When we launched a zero-waste program at one of our datacenters, we hosted an event to introduce employees to the program, provide zero-waste tips, distribute new durable Microsoft bottles, and answer questions. We scheduled the event ahead of rolling out new centralized waste collection bins and waste signage, so that employees were informed about the larger goals behind these changes. We even provided ice cream—in cones, to help reduce waste generated by the event.

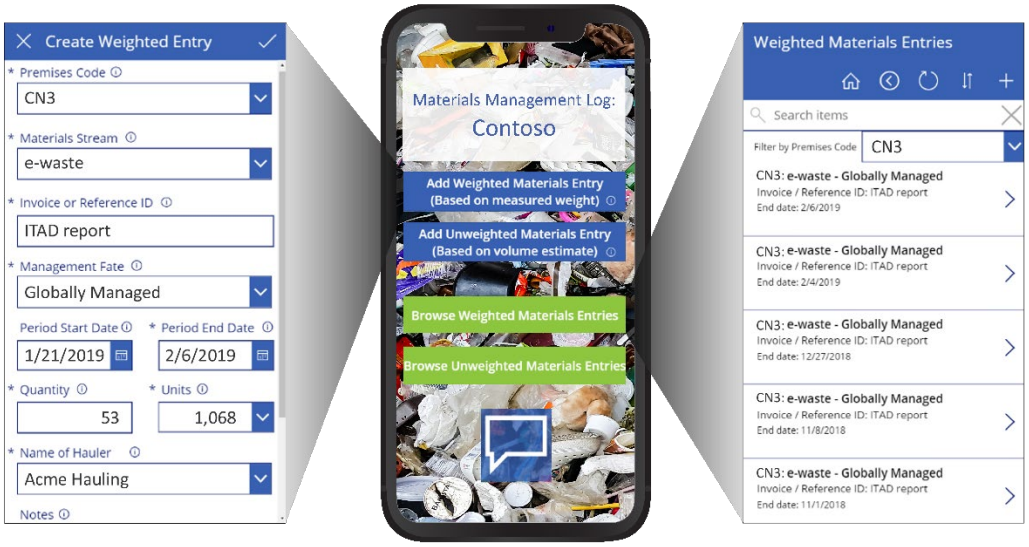
Measuring and reporting

As with virtually any corporate initiative, regularly measuring results can help ensure continued improvement and effective prioritization of investments. By reporting progress and achievements to executives, employees, investors, customers, and others, you can highlight challenges and opportunities, help shape perceptions, and share best practices that help accelerate outcomes globally. As an example, we recently announced the creation of an employee dashboard at our Headquarters to help employees understand our total waste generated and the impacts on an employee basis. Microsoft is deepening our investment to digitize waste data across the company, and here we share our approach to date.

Using technology to manage waste

We've found that keeping our tools to monitor our waste management processes and to share results simple and flexible allows us to evolve our processes more quickly and easily.

We have built a simple tool using Microsoft Power Apps that enables facilities managers to enter waste data directly from their phones. They can also use the app to capture real-time waste data that is not tracked by other systems.



Demo view of the Power App that our facility managers use to enter waste data from their phones.

We use a mixture of Microsoft Excel and third-party software tools for managing and analyzing data. We use the data streams we have and continually work to expand on data availability and accuracy, particularly with our waste haulers.

As processes, data accuracy, and data availability improve, we use Microsoft Power BI to aid executive decision making and to make common datasets available to a wider range of users.

Demo view of the Power BI dashboard that we use to track our waste diversion performance.

The primary data feeds we use for waste management at our datacenters and facilities include:

- **General waste haulers.** We work with haulers reponsible for collecting our daily waste streams—such as aluminum, glass, paper, plastic, general garbage, and compost—to ensure that materials quantities are tracked and reported back to us.
- **Specialty waste haulers.** We also track specialty materials that are collected by vendors other than the standard waste hauler. These can include materials that are reused or recycled, such as wooden pallets, or items that are recycled through vendor takeback programs, such as light bulbs. We've found that developing a process for capturing data about these materials is important to gain the full picture of a facility's waste and for calculating an accurate waste diversion rate.
- **E-waste recycling.** We have invested in developing sophisticated programs for collecting, accurately quantifying, and safely processing e-waste.

By tracking our waste in this way, we are starting to get a more concrete idea of the broader impact of our waste.

The key takeaway is to focus on expanding data availability and accuracy while using the tools users already have and know. For some organizations, this could mean making use of freely

available online tools, such as ENERGY STAR Portfolio Manager, which allows users to aggregate waste data from many different haulers in a free, online platform.

Reporting to internal and external stakeholders

Many large businesses publish a corporate social responsibility (CSR) report highlighting the organization's societal impact. In our 2020 Microsoft CSR Report, we identify waste as one of four environmental priorities (alongside carbon, water, and ecosystems), highlighting, for example, our efforts around reducing e-waste in landfills:

> Through our global recycling programs, we help reduce the environmental impact caused by electronic waste, as well as protecting the data of both Microsoft and our customers, by collecting and recycling used electronics. Microsoft extends the life of used electronic equipment by partnering with Microsoft Authorized Refurbishers to rebuild and reuse devices to help people, businesses, and communities around the world embrace sustainable technology.

Progress on our zero waste by 2030 commitment and waste data reporting is also included in Microsoft's 2020 Environmental Sustainability Report. We mention waste management and other sustainability achievements in various newsletters and reports (such as a datasheet on our approach to building sustainable campuses), on internal websites (for example, waste is featured as an environmental priority on our internal Sustainability Central employee website), and at employee events.

In addition to voluntary reporting of waste-related initiatives and accounting, many companies are increasingly exposed to governmental requirements for waste reporting, such as those in the European Union (EU) and currently being introduced in Singapore. Reporting requirements vary but can include data such as waste quantity, type, and downstream processing.

Looking ahead

Although we're still in the early stages of our zero waste journey, we're excited for the future of materials management at Microsoft with our recent commitment to zero waste by 2030.

We are working on achieving zero waste for Microsoft's owned datacenters by 2030. To achieve this goal, we are implementing the tactics described earlier to bring our existing owned datacenters to zero waste standards and gather the data needed for certification. Our new owned datacenters will perform to zero waste standards from the start of operations. As we achieve zero waste certification in line with our goals, we will identify new ways to prevent waste and improve diversion rates across locations.

For our Microsoft offices and labs, we are focused on reduction first on our path to zero waste. For example, in addition to our "durables first" approach in the global design standards for our kitchenettes and cafes, we are improving the efficiency of our food-ordering processes to reduce over-ordering and minimizing single-use plastics (everywhere from our visitor badges to our beverage program). Along with our committment to achieve zero waste certification for all Microsoft office campuses by 2030, we will continue our focus on improving our reduction and diversion programs in all offices around the world.

As we make progress on our operational zero waste initiatives, we will continue to share updates and the lessons we learn along the way. For more information on our corporate zero waste efforts and overall approach to environmental sustainability, please visit microsoft.com/en-us/corporate-responsibility/sustainability.