



How can we advance sustainability?

A green arrow pointing downwards from the word "advance" to the word "sustainability?".

2024 Environmental
Sustainability Report

Reporting on our 2023 fiscal year



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Reporting disclosure

A key principle of our work is transparency. This report, published annually, includes our strategy, progress against our goals, and key challenges and trends we see in this work. We also publish our environmental data, which is included in the separate [Environmental Data Fact Sheet](#). Deloitte & Touche LLP performed a review relating to specified information within Section 1 of the [Environmental Data Fact Sheet](#).

Read about how we report in Appendix A.



Cover captured by:
Finnian Power
Regional CE Program Manager,
Ireland

5M

metric tons of carbon removal contracted in FY23

18.5K

metric tons of waste diverted from landfills and incinerators

61M

cubic meters of water replenishment projects contracted by end of FY23

\$761M

allocated towards climate technologies through our Climate Innovation Fund (CIF)¹

Overview

Reviewing our 2023 progress and learnings

Our employees are at the core of our sustainability journey. Their passion and commitment catalyzes progress in every part of our business and their communities around the world.

Images taken by employees are featured throughout the 2024 Environmental Sustainability Report.

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Captured by:
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Foreword

Accelerating innovation and partnership for people and the planet



Brad Smith
Vice Chair and President



Melanie Nakagawa
Chief Sustainability Officer

Four years ago, Microsoft committed that by 2030 we would become carbon negative, water positive, zero waste, and protect more land than we use. Since that announcement, we have seen major changes both in the technology sector and in our understanding of what it will take to meet our climate goals. New technologies, including generative AI, hold promise for new innovations that can help address the climate crisis. At the same time, the infrastructure and electricity needed for these technologies create new challenges for meeting sustainability commitments across the tech sector. As we take stock as a company in 2024, we remain resolute in our commitment to meet our climate goals and to empower others with the technology needed to build a more sustainable future.

“There is no issue today that connects everyone on the planet more than the issues around climate change.”

At the end of last year, the world met in Dubai at COP28 to assess global sustainability progress. The results were sobering. The world is not on track to meet critical climate goals, and we see many of the world’s challenges reflected in our own situation. During the past four years, we have overcome multiple bottlenecks and have accelerated progress in meaningful ways. As we report here, we are on track in several areas. But not in every area. We therefore are mobilizing to accelerate progress in areas where we’re not yet on track.

In four areas we are on track, and in each of these we see progress that has the potential to have global impact beyond our own sustainability work. These are:

- Reducing our direct operational emissions (Scope 1 and 2).
- Accelerating carbon removal.
- Designing for circularity to minimize waste and reusing cloud hardware.
- Improving biodiversity and protecting more land than we use.

At the same time, there are two areas where we’re not yet on track, and in each of these we are intensively engaged in work to identify and pursue additional breakthroughs. These are:

- Reducing our Scope 3, or indirect, emissions.
- Reducing water use and replenishing more water than we consume in our datacenter operations.

Even amid the challenges, we remain optimistic. We’re encouraged by ongoing progress across our campuses and datacenters, and throughout our value chain. Even more, we’re inspired by the scores of executives and employees across Microsoft who are rolling up their sleeves and identifying new and innovative steps that are helping us to close critical gaps. We all recognize the same thing: there is no issue today that connects everyone on the planet more than the issues around climate change. We all need to succeed together.

Carbon negative

Our carbon negative commitment includes three primary areas: reducing carbon emissions, increasing use of carbon-free electricity, and carbon removal. We made meaningful progress on carbon-free electricity and carbon removal in FY23. Microsoft has taken a first-mover approach to supporting **carbon-free electricity** infrastructure, making long-term investments to bring more carbon-free electricity onto the grids where we operate.

Foreword continued

In 2023, we increased our contracted portfolio of renewable energy assets to more than 19.8 gigawatts (GW), including projects in 21 countries. In FY23, we also contracted 5,015,019 metric tons of **carbon removal** to be retired over the next 15 years. We are continuing to build a portfolio of projects, balanced across low, medium, and high durability solutions.

Carbon reduction continues to be an area of focus, especially as we work to address Scope 3 emissions. In 2023, we saw our Scope 1 and 2 emissions decrease by 6.3% from our 2020 baseline. This area remains on track to meet our goals. But our indirect emissions (Scope 3) increased by 30.9%. In aggregate, across all Scopes 1–3, Microsoft’s emissions are up 29.1% from the 2020 baseline.

The rise in our Scope 3 emissions primarily comes from the construction of more datacenters and the associated embodied carbon in building materials, as well as hardware components such as semiconductors, servers, and racks. Our challenges are in part unique to our position as a leading cloud supplier that is expanding its datacenters. But even more, we reflect the challenges the world must overcome to develop and use greener concrete, steel, fuels, and chips. These are the biggest drivers of our Scope 3 challenges.

We have launched a company-wide initiative to identify and develop the added measures we’ll need to reduce our Scope 3 emissions.

Leaders in every area of the company have stepped up to sponsor and drive this work. This led to the development of more than 80 discrete and significant measures that will help us reduce these emissions—including a new requirement for select scale, high-volume suppliers to use 100% carbon-free electricity for Microsoft delivered goods and services by 2030. As a whole, this work builds on our multi-prong strategy, this year focusing on the following:

- 1 **Improving measurement** by harnessing the power of digital technology to garner better insight and action.
- 2 **Increasing efficiency** by applying datacenter innovations that improve efficiency as quickly as possible.
- 3 **Forging partnerships** to accelerate technology breakthroughs through our investments and AI capabilities, including for greener steel, concrete, and fuels.
- 4 **Building markets** by using our purchasing power to accelerate market demand for these types of breakthroughs.
- 5 **Advocating for public policy** changes that will accelerate climate advances.



Water positive

We take a holistic approach to becoming water positive, which includes **water access**, replenishment, innovation, reduction, and policy. In 2023, we achieved our water access target by providing more than 1.5 million people with access to clean water and sanitation solutions. We contracted **water replenishment** projects estimated to provide more than 25 million m³ in volumetric water benefit over the lifetime of these projects—enough water to fill about 10,000 Olympic sized swimming pools. Finally, we continue to drive **innovation in water**, through first-of-their kind replenishment projects like FIDO, which leverages AI-enabled acoustic analysis to reduce water loss from leakage.

Looking ahead, as our datacenter business continues to grow, so does the need to minimize our water consumption and replenish more than we consume in these operations. In FY23 our progress on water accelerated, and we know we need to implement an even stronger plan to accelerate it further. We therefore are investing in our water positive commitment in four ways:

- 1 We are taking action to **reduce the intensity with which we withdraw resources** by continuing to design and innovate in order to minimize water use and achieve our intensity target.

- 2 Our new **datacenters are designed and optimized to support AI workloads** and will consume zero water for cooling. This initiative aims to further reduce our global reliance on freshwater resources as AI compute demands increase.
- 3 We are **partnering to advance water policy**. In 2023, we joined the Coalition for Water Recycling. Over the coming year we will finalize a position and strategy for water policy.
- 4 We are developing innovative scalable replenishment projects in high water stress locations where we operate datacenters. We recently announced Water United, a new initiative to unite public and private sectors in reducing water loss from leakage across the Colorado River Basin.

Zero waste

Our journey to zero waste includes reducing waste at our campuses and datacenters, advancing circular cloud hardware and packaging, and improving device and packaging circularity. In FY23, we achieved a reuse and recycle rate of 89.4% for servers and components across all cloud hardware, a target that is increasingly important as needs for cloud services continue to grow. In 2023, we also diverted more than 18,537 metric tons of waste from landfills or incinerators across our owned datacenters and campuses, and we reduced single-use plastics in our Microsoft product packaging to 2.7%.

Foreword continued

From expanding our Circular Centers to piloting programs that give a second life to used fiber optic cables through partnerships with local technical schools, we are working to keep materials in use longer and approach our work at every stage with circularity in mind. We are accelerating our work to reuse and recycle cloud hardware wherever possible, and launched two new Circular Centers in Quincy, Washington and Chicago, Illinois in 2023.

Protecting ecosystems

We have committed to protect more land than we use by 2025, while preserving and restoring ecosystems in the areas where we live and work. As of FY23, we exceeded our land protection target by more than 40%. At this point, 15,849 acres of land have been legally designated as permanently protected compared to our goal of 11,000 acres.

We are incorporating green business practices that support the surrounding ecosystems near our campuses and datacenters. This includes regenerative design solutions around our datacenters that enhance local biodiversity, improved stormwater management, and contributing to climate resilience. We are also piloting AI-driven Microsoft technology to provide insights into the overall health of the ecosystem and inform future actions.

**Customer and global sustainability**

In last year's [Environmental Sustainability Report](#), we announced that we were expanding our ambition to help advance sustainability for our customers and the world. In 2023, we continued this work to empower our customers and partners on their own sustainability journey by creating the technology needed to better manage resources and optimize systems. On a global scale, we focused on accelerating innovation, research, and policy, not only for ourselves but also to support a more sustainable world for all.

The shift from pledges to progress requires action, transparency, and accountability. Microsoft Cloud for Sustainability is helping customers unify data and garner richer insights into the sustainability of their business. In 2023, we expanded Microsoft Sustainability Manager to include Scopes 1, 2, and all 15 categories of Scope 3 carbon emissions to help track progress and inform action across an organization's operations and value chains.

As the world experiences worsening impacts of climate change, we are also helping to put planetary data into the hands of researchers, governments, companies, and individuals through the Planetary Computer. We are providing open access to petabytes of environmental monitoring data to help empower people with actionable information to protect their communities.

Microsoft's sustainability progress requires global engagement. We are investing in innovative solutions, advancing research, and advocating for policies that we believe can drive progress at scale. A hallmark of this effort has been our Climate Innovation Fund (CIF)—our \$1 billion commitment set in 2020 to advance innovation beyond Microsoft's four walls. To date the CIF has allocated \$761 million toward innovative climate technologies¹ including commercial direct air capture technologies, sustainable aviation fuel (SAF), industrial decarbonization, and more.

Our science, research, and AI for Good teams are also working to accelerate solutions and develop climate resilience with AI. In November 2023, we published a [whitepaper](#) and [playbook](#) that expands on the incredible potential of AI for sustainability. Through our AI for Good team, we are collaborating with the United Nations to research the use of AI to advance the Early Warning for All Initiative, with a goal of better understanding the populations that may be at risk of extreme weather events and other threats.

“The shift from pledges to progress requires action, transparency, and accountability.”

Last year, Microsoft CEO Satya Nadella called climate change “the defining issue of our generation.” To meet this generational challenge, we are putting sustainability at the center of our work. With each emerging technology, with each new opportunity, we ask ourselves an important question: how can we advance sustainability?

As we strive to answer that question, we are developing new approaches, experimenting with new partnerships, and learning as we go. We are optimistic about the role technology can continue to play in accelerating climate progress, and we look forward to working with others on this critical journey for all of us.

Brad Smith
Vice Chair and President

Melanie Nakagawa
Chief Sustainability Officer

2023 highlights

Carbon

Total renewable electricity use in FY23

23.6 million MWh

This would be enough to power Paris with renewable electricity for about two years.



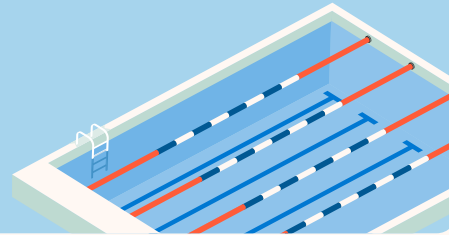
- ✓ 19.8 gigawatts (GW) of renewable energy assets were contracted, including projects in 21 countries around the world.
- ✓ We contracted 5,015,019 metric tons of carbon removal in FY23, and continue to build a portfolio of projects, balanced across low, medium, and high durability solutions.

Water

Total contracted water replenishment since 2020

61.7 million m³

This is enough water to fill over 24,000 Olympic sized swimming pools.



- ✓ We met our water access target by providing more than 1.5 million people with access to clean water and sanitation solutions.
- ✓ Our new datacenters are designed and optimized to support AI workloads and will consume zero water for cooling.

Waste

Total amount of solid waste diverted from landfills and incinerators FY23

18,537 metric tons

This is equivalent to the weight of over 45 commercial passenger jets.



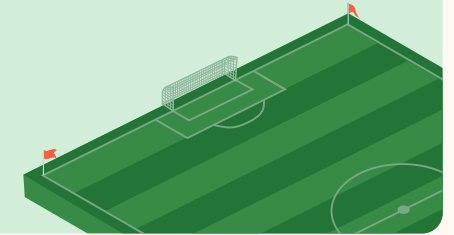
- ✓ 18,537 metric tons of solid waste were diverted from landfills and incinerators across our owned datacenters and campuses.
- ✓ Our reuse and recycle rates of servers and components across all cloud hardware reached 89.4% in FY23.
- ✓ We reduced single-use plastics in our Microsoft product packaging to 2.7% in FY23.

Ecosystems

Total amount of land protected in FY23

15,849 acres

This is equivalent to over 9,000 soccer pitches.



- ✓ 15,849 acres were designated as permanently protected. We exceeded our land protection target of 11,000 by more than 40%.
- ✓ Through the Microsoft Datacenter Community Environmental Sustainability program we are responding to local needs in the communities that host Microsoft datacenters and where our employees live and work.

How we work

Our sustainability journey starts with getting our own house in order. In 2020, we set bold targets to be a carbon-negative, water-positive, zero-waste company that protects ecosystems by 2030. We are committed to sharing our progress, challenges, and learnings through our annual Environmental Sustainability Report to help accelerate global progress toward net zero.

We recognize that our actions alone will not solve the climate crisis. As a global technology provider, we also believe we have a role to play in supporting the thousands of customers and partners who put their trust in Microsoft. We think about Microsoft's role in sustainability through three spheres of influence: Microsoft sustainability, customer sustainability, and global sustainability.



Microsoft sustainability: Taking care of our own environmental footprint

Our sustainability work starts with taking accountability for our operational footprint. This means taking accountability for our operational footprint across our campuses, datacenters, devices, software, and value chain. We look at our operations across the entire life cycle of assets and products, from design to building, usage, and end of life. We are committed to sharing our learnings, accelerating markets, scaling solutions across our value chain, and being transparent about our progress.



Customer sustainability: Delivering digital technology for net zero

Microsoft is committed to providing innovative digital technology to help build a more sustainable world. From managing environmental footprints with Microsoft Cloud for Sustainability to accelerating innovation for new climate technologies, we're working to empower our customers and partners across industries. We are advancing greener software and reducing carbon intensity to improve device sustainability, and helping organizations measure and manage the health of the planet's natural ecosystems with the Microsoft Planetary Computer.



Global sustainability: Enabling a more sustainable world

Microsoft's actions alone cannot solve the climate crisis. As a global technology leader, we are also committed to helping build the enabling societal conditions that will support a net zero economy. We're focused on accelerating the availability of new climate technologies, strengthening our climate policy agenda, helping to develop a more reliable and interoperable carbon accounting system, advocating for skilling programs to expand the green workforce, and working to help enable a just energy transition.

Microsoft sustainability

How are we addressing our environmental footprint?

Our sustainability work starts with taking accountability for our operational footprint. In 2020, we made a bold set of commitments: to be a carbon negative, water positive, zero waste company that protects ecosystems—all by 2030.

We are committed to sharing our learnings, accelerating markets, scaling solutions across our value chain, and being transparent about our progress.

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Captured by:
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Getting to carbon negative

Carbon

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Our approach

Our commitment to becoming carbon negative requires unprecedented innovation and partnership. Over the last four years since setting our sustainability targets, thousands of companies have also joined the call to reach a net zero future and are taking steps, big and small, to help make that future a reality. This year, technologies like AI brought renewed promise of the role innovation can play in accelerating progress. From improving measurement to increasing datacenter efficiency and improving energy transmission, technology can be a powerful accelerant for the pace and scale the world needs to achieve net zero.

Amid this optimism, we face the realities of the complexity of the challenge. Addressing Scope 1, 2, and 3 emissions requires partnership and systemic action. We need to decarbonize supply chains and take action to build the carbon-free electricity infrastructure needed by Microsoft, our suppliers, our partners, and the world.

In FY23 our emissions increased by 29.1% across Scope 1, 2, and 3 from our 2020 baseline, as we continue to invest in the infrastructure needed to advance new technologies.

Since 2020, our Scope 1 and 2 emissions have decreased by 6%. This result is driven by our ongoing work to advance clean energy procurement, green tariff programs, and use of unbundled renewable energy certificates.

Scope 3 accounts for over 96% of our total emissions, which includes emissions from our supply chain, the life cycle of our hardware and devices, and other indirect sources. Our Scope 3 emissions continue to be our most significant decarbonization challenge. Progress will take deep collaboration across industries.

Microsoft has taken a first-mover approach, making long-term investments to bring more carbon-free electricity onto the grids where we operate, and we continue to advocate for the expansion of clean energy solutions around the world.



Our approach continued

Our journey to carbon negative

We are committed to being carbon negative by 2030 and by 2050 to remove from the atmosphere an equivalent amount of all the carbon dioxide our company has emitted either directly or by our electricity consumption since we were founded in 1975.

Working to help decarbonize the industrial sector



At Microsoft, we are also partnering to address carbon-intensive industries such as building materials, chemical products, and fossil fuels for aviation, shipping, and trucking.

Our targets

Reducing direct emissions

We will reduce our Scope 1 and 2 emissions to near zero by increasing energy efficiency, decarbonization of our operations, and reaching 100% renewable energy by 2025.

Reducing value chain emissions

By 2030, we will reduce our Scope 3 emissions by more than half from a 2020 baseline.

Replacing with 100/100/0 carbon-free energy

By 2030, 100% of our electricity consumption will be matched by zero carbon energy purchases 100% of the time.

Removing the rest of our emissions

By 2030, Microsoft will remove more carbon than it emits. By 2050, we will remove an amount of carbon equivalent to all our historical operational emissions.

Our progress

✓ Scope 1 and 2 emissions

Our Scope 1 and 2 emissions decreased by 6% from the 2020 base year. This result is driven by our ongoing work to advance clean energy procurement, green tariff programs, and use of unbundled renewable energy certificates.

✓ Scope 3 emissions

Our value chain or Scope 3 emissions increased by 30.9% from our 2020 baseline. Microsoft continues to work to scale corporate clean energy purchases across our supply chain and invest to help decarbonize hard-to-abate industries, including steel, concrete, and other building materials used in our datacenters.

✓ 19.8 GW of carbon-free energy

In 2023, we increased our contracted portfolio of renewable energy assets to over 19.8 gigawatts (GW), including projects in 21 countries around the world.

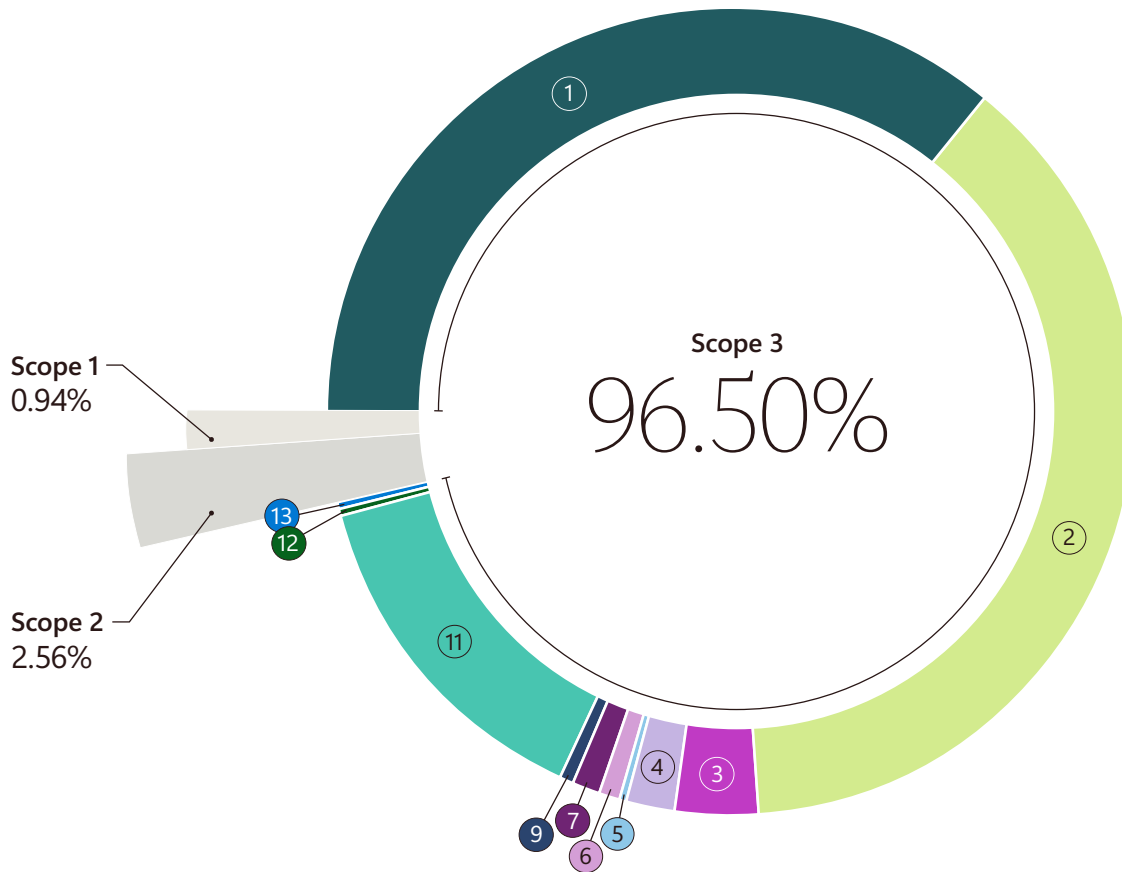
✓ 5M metric tons of carbon removal

We contracted 5,015,019 metric tons of carbon removal in FY23. We are continuing to build a portfolio of projects, balanced across low, medium, and high durability solutions.

Our approach continued

Carbon Table 1—Breaking down our FY23 Scope 3 emissions by source

Microsoft’s Scope 3 emissions continue to account for more than 96% of our total emissions, with the vast majority of these emissions coming from two categories upstream, Purchased Goods and Services (Category 1) and Capital Goods (Category 2), and one downstream, Use of Sold Products (Category 11).



Scope 3 Categories

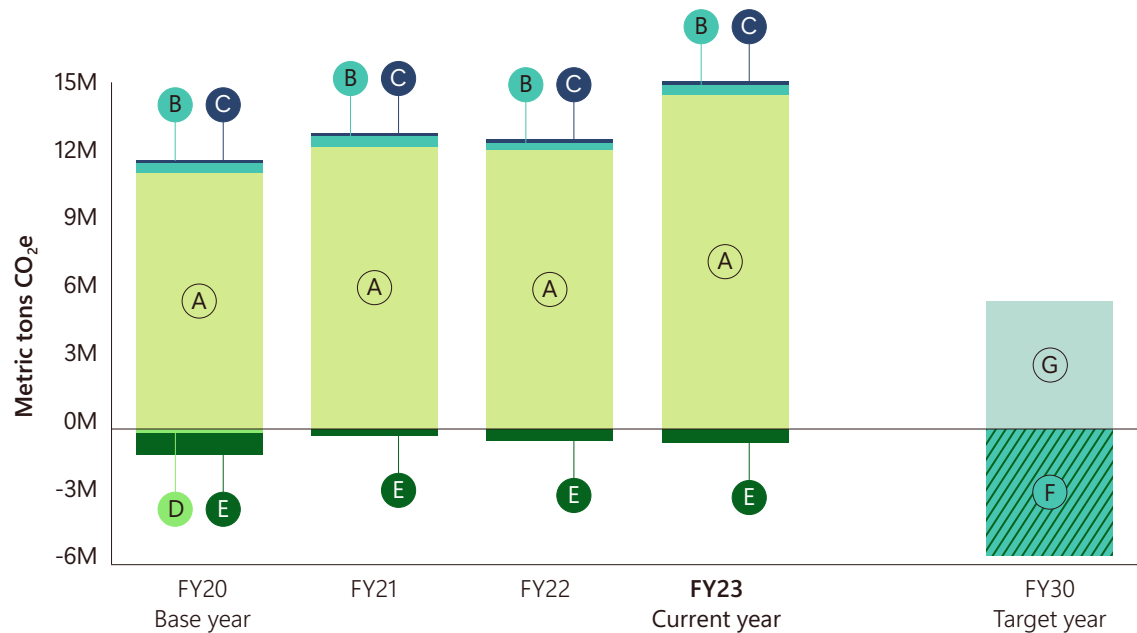
1	Purchased Goods & Services	36.23%
2	Capital Goods	38.24%
3	Fuel-and Energy-Related Activities (Market-Based)	3.39%
4	Upstream Transportation	1.99%
5	Waste	0.05%
6	Business Travel	0.81%
7	Employee Commuting	1.22%
9	Downstream Transportation	0.45%
11	Use of Sold Products	14.05%
12	End of Life of Sold Products	0.03%
13	Downstream Leased Assets	0.05%

Scope 2 and 3 emissions included in this chart are market-based. Scope 3 emissions are management criteria values.

Our approach continued

Carbon Table 2—Tracking progress toward carbon negative by 2030

Microsoft’s overall emissions increased by 29.1% in FY23, in relation to our base year. Additionally, we retired 605,354 metrics tons of carbon removal as part of achieving our annual target to be carbon neutral.



Find out more in our [Data Fact Sheet](#)



Key definitions

Carbon-free electricity (CFE)

Microsoft refers to the broader suite of technologies compatible with a fully decarbonized electricity system as CFE. CFE technologies include solar, geothermal, sustainable biomass, hydropower, nuclear, carbon capture utilization and storage, and others with zero direct emissions.

Renewable energy

Electricity technologies including wind, solar, geothermal, sustainable biomass, and sustainable hydropower.²

Scopes 1, 2, and 3

Indirect emissions from all other activities up and down the value chain such as upstream and downstream transportation, materials, and end-of-life impacts, as well as all suppliers’ direct Scope 1 and 2 emissions.

Scope 3 represents over 96% of Microsoft’s annual emissions in FY23. Our Scope 3 emissions result primarily from the operations of our tens of thousands of suppliers (upstream) and the use of our products across millions of our customers (downstream).

Tackling Scope 3 means decarbonizing industrial processes such as steel, concrete, and other building material production for use in our campus and datacenter construction, as well as jet fuel for business travel and logistics.

Scope 1	Scope 2	Scope 3
<p>Direct emissions created by a company's activities</p>	<p>Indirect emissions from the consumption of the electricity or heat we use</p>	<p>Indirect emissions from all other activities in which we're engaged</p>

Since setting our targets in 2020, data has played an increasingly important role in our journey by allowing us to better measure and manage our resource consumption.

Improving the measurement and efficiency of our operations

Reducing the carbon intensity of our operations is the first pillar of our approach to carbon negative. From the construction of our datacenters and campuses to our daily operations, efficiency is built into our design and use. Since setting our targets in 2020, data has played an increasingly important role in our journey by allowing us to better measure and manage our resource consumption. At Microsoft, we strengthened our supply chain methodologies in 2023 to drive progress in major sectors like building materials, sustainable aviation fuel, and hardware.

Datacenter efficiency

Measuring efficiency

Power usage effectiveness (PUE) is a ratio that describes how efficiently a datacenter uses energy. The lower the number, the better the score. We design and build Microsoft datacenters as close to a PUE of 1.0 as possible. This year our datacenters delivered a design rating of 1.12 PUE and, with each new generation, we will strive to be even more efficient.

Transitioning servers to a low-power state

We continue to seek opportunities to reduce server energy consumption. Using low-power server states, we observed a reduction in energy usage of up to 25% on unallocated servers, with a corresponding reduction in Scope 2 emissions. This year, we expanded our deployment of this technique from a few thousand servers in 2022 to around one million by the end of 2023. This initiative reduces energy usage by thousands of megawatt-hours per month across our global datacenters. A similar initiative targets servers that are awaiting maintenance, reducing energy usage by hundreds of megawatt-hours per month.



◀ We support carbon-free electricity infrastructure through procurement and investment.

Improving resource utilization

Datacenter resources are traditionally designed and built to accommodate peak power demands, often resulting in underutilization and the necessity to construct new datacenters. Microsoft is focused on improving datacenter efficiency by minimizing peak power consumption, effectively harnessing unused power, and maximizing server density within existing datacenters. This is achieved through power harvesting driven by service level agreements (SLAs), intelligent power-aware workload allocation, and utilizing the inherent redundancy in Microsoft internal services to tap into datacenter capacity that is conventionally reserved for use only during power grid or infrastructure failures.

In 2023, these initiatives have directly contributed to a roughly 7% reduction in datacenter power infrastructure and the associated embodied carbon.

Microsoft is also increasing server utilization by oversubscribing central processing unit (CPU) cores of internal workloads that have low CPU utilization. The direct impact in 2023 was an approximately 1.5% reduction in datacenter hardware needs for the Microsoft Azure platform—an improvement of three times over 2022 with a proportional reduction in associated embodied carbon.

Improving the measurement and efficiency of our operations continued

Building operations and construction

Infrastructure decarbonization

Our sustainability standards for new construction continue to expand to meet our climate goals. New campus projects require the procurement of high-efficiency refrigeration systems, all-electric kitchens and mechanical systems, and non-fossil-fuel-powered backup power systems. Combustion is no longer permitted for daily use in any new office construction project in our standard. We have also expanded our requirements to reduce embodied carbon in interior materials.

76.5%

In FY23, 76.5% of our total emissions originated from our suppliers. We believe Microsoft also has a role to play in bringing the global supply chain with us on our journey to net zero.

Innovations in low-carbon concrete

To minimize our carbon impact in constructing datacenters, we build our datacenters to meet LEED Gold certification, with 37 datacenters already meeting this goal globally.³ LEED buildings also use less water, utilize renewable energy and fewer resources, create less waste, and preserve land and habitat. One example of innovation in this area is a series of pilots completed this year using a net-negative embodied carbon limestone alternative to traditional concrete. Derived from algae cultivation in concert with other alternative cementitious materials, the combination yielded a concrete mix that met our performance requirements and achieved an estimated 65% embodied carbon reduction from conventional concrete of a similar strength.

Fleet electrification

On Microsoft campuses around the world, we are making progress toward electrifying our fleet and eliminating dependence on fuel burning vehicles.

To establish the infrastructure needed to support our goal of operating a 100% electric fleet by 2030, we're constructing an Electric Vehicle Fleet Facility that will house, charge, and maintain our electric commute fleet of the future at our Redmond headquarters. The project is currently in the design phase and is pursuing LEED Platinum certification.

Additionally, an underground garage is set to be completed in FY24 as part of our Redmond campus modernization project and will include 130 EV charging stations with 176 additional EV charging stations planned for future phases.

As we continue to electrify our global fleet by 2030, these projects will help us test and implement our EV infrastructure and apply it to more campuses across the globe.

Improve measurements across our supply chain

While we know that the majority of our emissions are from Scope 3, over 96% in 2023, we also needed greater precision on the drivers contributing to these emissions. What we found is that these emissions have three primary, interrelated drivers:

- 1 Electricity use** in both upstream embodied in what we purchase, and downstream from the usage of our products.
- 2 Key material procurement** including semiconductors, steel, cement, aluminum, and plastics.
- 3 Fuel use** from direct travel, commuting, logistics, and embodied in what we purchase.⁴

Achieving net zero is not something we can do alone. As 76.5% of our total emissions originate from our suppliers, we have a role to play in bringing the global supply chain with us on our journey to net zero.

By leaning into education and investing in meaningful tools for carbon reduction, we can move these efforts up the supply chain tier.



- ▲ We are working to scale carbon accounting methodologies to drive progress across our supply chain.

Improving the measurement and efficiency of our operations continued

Partnering with our suppliers

Access to granular emissions data from our supply chain is essential to identifying where our largest Scope 3 reduction opportunities exist and how these can be actioned.

To understand the full extent of our Scope 3 carbon footprint, we piloted a new feature in Microsoft Sustainability Manager called the environmental, social, and governance (ESG) value chain solution. In 2023, Microsoft Procurement acted as customer zero, as we used our own technology and utilized the ESG value chain solution as its disclosure platform to successfully collect emissions from top in-scope suppliers. Additionally, due to the flexibility the ESG value chain solution offers, the Procurement Sustainability team was able to customize the platform to collect more advanced, granular emissions data from suppliers. In the future, the ESG value chain solution will enable customers to customize and collect detailed emissions data directly from suppliers.

Advancing procurement of carbon-free electricity

When we identified a near-term need to support suppliers in decarbonizing their electricity consumption, especially our smaller- to medium-sized suppliers who traditionally lack the expertise and resources to navigate this process on their own, we partnered with climate solutions expert 3Degrees to launch Supplier REach, a renewable electricity portal.

The portal assists with Microsoft supplier evaluation and procurement of high-quality carbon-free electricity options based on factors such as their geography and energy load.



Reducing emissions in Cloud Logistics

In 2023, the Cloud Logistics team implemented a three-pillar strategy for emissions reduction:

- 1 Apply industry-leading data models, based on the Global Logistics Emissions Council (GLEC) Framework, to obtain detailed emissions data for each shipment. This “digital twin” of our operations data earned us a finalist spot in Gartner’s 2024 “Power of the Profession” award.
- 2 Utilize data to optimize our supply chain, identifying efficiency gains that helped us avoid over 90,000 mtCO₂e emissions. These savings were achieved by shifting cargo to more carbon-efficient transportation modes, consolidation, and network design.
- 3 Drive transformational solutions in trucking, shipping, and aviation. In partnership with our largest transportation service providers, we have enabled them to source low-carbon or carbon-free logistics services. This led to the successful deployment of electric vehicles and sustainable fuels.

To further our goal of sustainable transportation, we joined collaborations like the Sustainable Aviation Buyers Alliance (SABA) and we have launched a new initiative with cargo-owning peers and suppliers that plans to build the first electric interstate trucking corridor in the United States.

Measuring semiconductor emissions

Driving targeted Scope 3 emission reductions requires more precise measurement.

For semiconductors, this means measuring emissions drivers down to the square centimeter of silicon—a unit of measure required for life cycle assessment (LCA)-based methodologies—and applying product-specific emissions factors. We modeled this for all high-impact components installed and sold by Microsoft.

This advancement, which reflects Microsoft’s application of leading-edge research findings from imec’s Sustainable Semiconductor Technologies and Systems (SSTS) program, enables us to quantify which specific products, manufacturers, geographic locations, and production stages are driving emissions. This specificity deepens our supplier engagement efforts and focuses our policy and advocacy discussions.

90K

By using data to optimize our logistics supply chain, 90,000 mtCO₂e emissions were avoided.

Improving the measurement and efficiency of our operations continued

LinkedIn

Our teams at LinkedIn have developed Healthy & Sustainable Building Materials specifications to guide our Workplace Design and Build team. We have also provided input to and utilized the Embodied Carbon in Construction Calculator (EC3) for identification and evaluation of the carbon intensity of workplace construction materials alternatives. We have piloted a variety of initiatives, including electrified kitchens in four sites, battery back-up and solar installation in one site, and installation of fault detection diagnosis (FDD) in one site. We also conducted a battery versus generator carbon life cycle study.

Expanding campus initiatives

At our LinkedIn campus in Omaha, Nebraska, we have been accessing direct renewable energy through our parking canopy solar installation since July 2022. In FY23, this solar installation project provided approximately 17% of the building's total electricity, including helping to power the all-electric kitchen.

Reducing carbon through our food programs

At LinkedIn, we are committed to reducing the carbon footprint of our food program and have implemented various initiatives to achieve that goal.



One of the key strategies employed to reduce Scope 3 emissions of suppliers' purchased goods in FY23 was to increase local purchasing of agricultural products to, or above, 20% of total purchasing spend, while partnering with regional producers focused on climate-smart agricultural practices and regenerative farming.

Mitigating carbon impacts of travel

We have also implemented an employee-facing travel solution called Tripkicks which supports our corporate sustainability initiatives. In partnership with BCD and Advito, Tripkicks allows employees to better understand their carbon impact before they travel. As employees plan their trips, they are able to see accurate and ISO-Certified carbon dioxide figures, powered by Advito's GATE4 carbon emissions methodology, for each flight option, identifying the most sustainable options.

Reducing the impact of our supply chain

Building transparency

Collaboration across Microsoft has led us to adapt an effective approach to shift from spend-to-process-based methodologies for measuring embodied carbon impact of construction materials. This methodology is based on a framework using today's best available third-party verified data via Building Transparency's EC3 tool. This new methodology aims to appropriately incorporate actual global warming potential of the materials we buy, where data is available, with existing spend-based methodologies, as we work to improve our Scope 3 measurement and emissions.



Greenhouse Gas Protocol

In 2023, we submitted responses to four Greenhouse Gas Protocol (GHGP) surveys that kicked off GHGP's comprehensive review of its corporate carbon accounting guidance. Microsoft's survey responses articulated a vision for more accurate, consistent, impact-relevant carbon accounting. We also published a [white paper](#) laying out Microsoft's approach, challenges, and innovations with respect to carbon accounting.

Cognitive visual learning

To improve data quality and reduce manual entry errors, we have been developing a cognitive visual learning (CVL) tool in partnership with the Microsoft Finance team. The CVL AI tool will be capable of automatically reading utility invoices (such as PDFs, Excel files, or image files) in any language and extracting the required data. Ultimately, this innovative tool will streamline reporting on our utility consumption and replace a time-consuming third-party application that is subject to manual error.

Building markets and driving progress

The ability of Microsoft and the technology sector to meet net zero targets is dependent on our collective ability to procure carbon-free electricity and decarbonize our supply chains. Microsoft continues to build and scale carbon-free electricity through our procurement of renewable energy and investing to bring more carbon-free electricity onto the grids where we operate. As one of the largest corporate purchasers of renewable energy, we continue to seek ways to diversify and scale-up supply of impactful renewable energy and mechanisms enabling access for all.

6.6 MW

We are partnering with Clearloop to help decarbonize the grid in the Mississippi Delta region, enabling a 6.6-megawatt project.

Building markets

Accelerating carbon-free electricity circularity

Microsoft's unique position as one of the world's largest corporate renewable energy purchasers provides the opportunity and responsibility to help facilitate a circular economy in the renewable energy sector. Our leadership is enabling and supporting the market due to the scale of our procurement, laying the foundations for renewable energy infrastructure reuse and recycling, concurrently addressing environmental, community, and supply chain challenges. In advancing a circular economy for all, we follow three principles:

- 1 Requiring recycling of renewable energy infrastructure.
- 2 Requiring recycled materials in renewable energy infrastructure manufacturing.
- 3 Using our voice on circular economy for renewable energy public policy.



Sustainability
Champion:

John Tien

At Microsoft, I play a role in achieving our sustainability goals by working with suppliers to implement best practices and technology solutions in the sourcing of memory semiconductors. The positive impact of these efforts on Microsoft, our customers, and the planet inspires me to believe that we all have the power to make a difference, both in our personal and professional lives.

Procuring carbon-free electricity

Incorporating environmental justice principles into our carbon-free electricity procurement, we partnered with EKOenergy's Climate Fund to enable the installation of solar-powered refrigeration for a Kenyan fishing village, offering ice and clean water at 20% lower prices for 2,000 households and addressing food security and economic hardship by reducing fish harvest loss.

We have begun embedding community funds in global power purchase agreements (PPAs)—for example, a 366-MW renewable energy deal in Ireland with European developer Statkraft includes such a fund to support local community needs.

We also partnered with Clearloop to expand equitable access to clean energy and help decarbonize the grid in the Mississippi Delta region, enabling a 6.6-megawatt project in Mississippi through an upfront payment for long-term renewable energy credits. Microsoft helped get the project online and provided support for Clearloop's model.



Building markets and driving progress continued

Advancing carbon dioxide removal (CDR)

At Microsoft, we continue to support the development of carbon removal. In FY23 we accelerated procurement of various pathways, building on our long-term agreement framework. We worked through the details in each of those agreements to make sure we are building this first generation of large-scale carbon dioxide removal projects to be as impactful as possible.

These multi-year agreements draw on our renewable energy procurement experience and are structured to help projects obtain external financing. Our carbon removal contracts reflect general industry risks along with the specifics of individual projects to ensure we are buying additional, durable, measurable, and net negative carbon credits.

As we fill our balanced portfolio of greater than 5 million metric tons a year starting in 2030, we are also buying novel solutions, for example enhanced rock weathering, to test what else will be ready for scale by 2030.

5M

In FY23, we procured 5.015 million metric tons of carbon removal in support of our carbon neutral and negative targets.

Progressing towards 2030

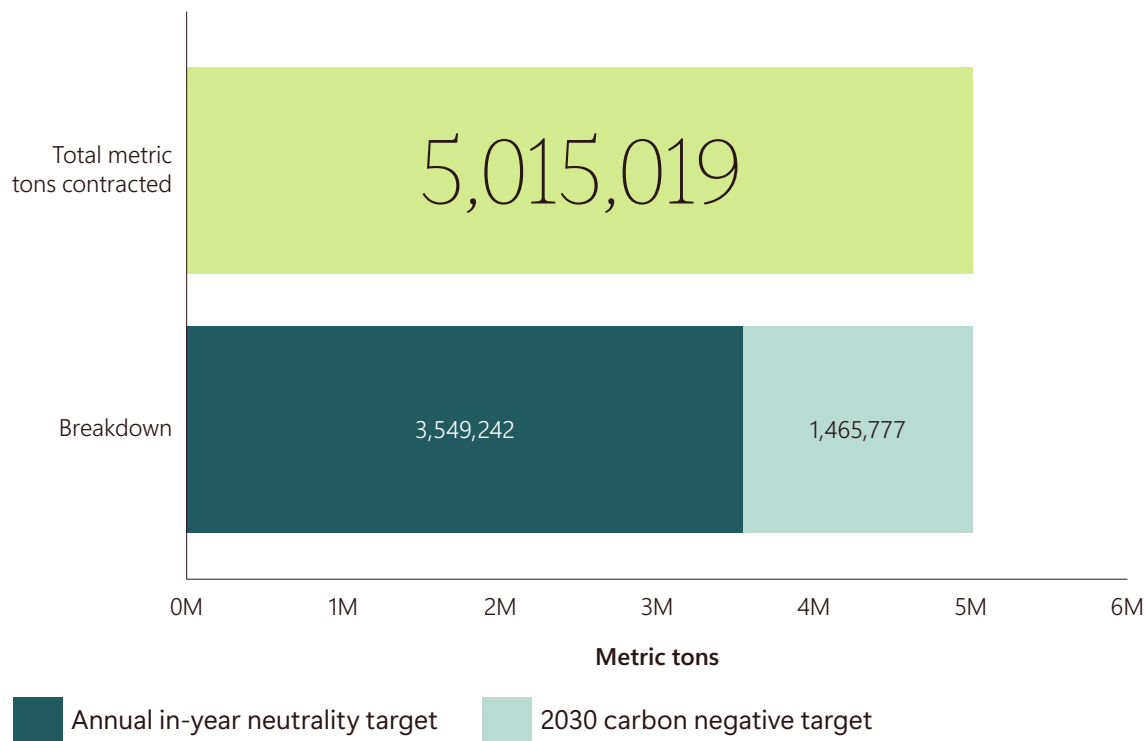
In FY23, we contracted 5,015,019 metric tons of carbon removal to be retired over the next 15 years. Many of these projects entail multi-year commitments to carbon removal. Altogether we expect our contracts signed as of December 2023 to provide 875,000 metric tons toward our 2030 goal of greater than 5 million metric tons. Projects signed in 2023 include the following.

Reforestation in the Amazon: In November 2023, we signed a long-term offtake with Mombak for carbon removal from reforestation in the Brazilian Amazon. We believe Mombak’s best-in-class project design and work to bolster a crucial carbon sink and biome represent an extraordinary win for the climate and local communities.



Carbon Table 3—Tracking progress toward carbon negative by 2030

In FY23, we procured 5.015 million metric tons of carbon removals. Carbon removal contracted each year includes credits retired in the same year and to be retired in future years, in support of our annual in-year carbon neutrality and 2030 carbon negative targets.



Find out more in our Data Fact Sheet



Building markets and driving progress continued

Landmark BECCS in Europe: Our recent agreement with Orsted shows the near-term potential of bioenergy with carbon capture and storage (BECCS). This project will add carbon capture to an existing heat and power plant and then store the carbon dioxide geologically to provide significant carbon removals and anchor the high durability category this decade.

Securing the sustainability of biomass for the Orsted project and future biomass-based pathways was a major focus and drove us to support [Carbon Direct's cross-sector work on this topic](#) alongside Frontier Climate. We believe that the time for responsibly scaling BECCS is here and look forward to the coming wave of project developments.



^ We support carbon-free electricity infrastructure through procurement and investment.

Scaling up carbon removal

Heirloom direct air capture: Heirloom's next direct air capture (DAC) projects will prove their potential to scale towards the megatons per year that society needs this decade to stay on track for the goals of the Paris Agreement. Heirloom's technology of making and breaking limestone to take carbon dioxide out of air is simplicity itself.

Enhanced rock weathering: Our deals this year with UNDO and Lithos explore the novel carbon removal pathways that will reduce outstanding market uncertainties, and which could feasibly scale in the next several years. In addition to the science of enhanced rock weathering (ERW), we note that innovative business models will be important to expand projects with such front-loaded costs.

19.8 GW

We increased our contracted portfolio of renewable energy assets to over 19.8 gigawatts.

Supporting global progress

Meeting our carbon negative goals is tightly linked with global decarbonization. Supporting carbon-free electricity infrastructure through procurement and investment is critical to making this happen. It's a challenge that is bigger than any one company, but Microsoft has taken a first-mover approach, making long-term investments to bring more carbon-free electricity onto the grids where we operate. We continue to seek ways to diversify and scale-up supply of impactful renewable energy and mechanisms enabling access for all.

Partnering to scale clean energy

Microsoft partnership goals are threefold: achieve our own operational needs, accelerate the development of technologies that will help our customers and partners, and rapidly increase the scale of the global sustainability market.

In 2023, Microsoft increased its contracted portfolio of renewable energy assets to over 19.8 gigawatts (GW) across 21 countries. We signed new PPAs around the world, including with AES in [Brazil](#), Constellation Energy in [Virginia](#), Powerex in [Washington](#), Contact Energy in [New Zealand](#), and Lightsource bp in [Poland](#).

Microsoft is the first large commercial entity to use [Powerex's wholesale 24x7 Clean Load Service](#) for its new datacenter in Washington state. Under this agreement, Powerex will match Microsoft's hourly datacenter demand with direct deliveries of carbon-free hydro, solar, and wind power on a 24-hour, year-round basis—supplying reliable electricity to our datacenter while also supporting our 100/100/0 goal.

During the hours that Microsoft's contracted renewable resources produce more electricity than the datacenter can use, Powerex will take the surplus renewable power, allowing hydro generation to be reduced and water to be conserved for later use. This will enable clean deliveries back to this datacenter in later hours, when Microsoft's contracted renewable resources produce less electricity than the datacenter needs.

Microsoft and [Helion](#) announced an [agreement](#) to provide Microsoft with electricity from its first fusion power plant. The plant is expected to be online by 2028 and will target power generation of 50 MW or greater, dramatically shortening the projected timeline for commercially viable fusion energy. The planned operational date for this first-of-its-kind facility is significantly sooner than typical projections for deployment of commercial fusion power.

Building markets and driving progress continued**The Cajujina wind project**

Microsoft's first power purchase agreement in Brazil (154 MW) is sourced from the Cajujina Wind Complex, developed by AES Brasil, and will be operated by an all-female operations and maintenance (O&M) team. AES Brasil is the first company in the country to have a wind farm operated and maintained locally by a team composed entirely of women.

**Deerfoot solar project**

The Deerfoot solar project in Canada (37 MW) is majority-owned (51%) by local First Nations, Chiniki and Goodstoney. This project is expected to generate economic returns for the Indigenous communities and contribute to the lasting prosperity of the Nations for future generations.

The Skyward Community Solar project

In Oregon, we signed on as the major commercial partner on the Skyward Community Solar project, a solar farm in the Greater Portland area that generates nearly 3.6 million kilowatt-hours of clean energy each year. Clean electricity from the project is fed into the electric grid, replacing fossil fuels and reducing carbon emissions from our workplace operations.

**Investing in sustainable aviation fuel**

In 2023, Microsoft entered a 10-year contract with World Energy for sustainable aviation fuel (SAF) certificates, aiming to replace 43.7 million gallons of fossil jet fuel, and jointly funded a large-scale global SAF purchase with International Airlines Group (IAG). Additionally, Microsoft joined the Roundtable on Sustainable Biomaterials (RSB), contributing to RSB's sustainability framework and participating in programs supporting SAF development. Together with RSB and Alaska Airlines, Microsoft launched SAF-now.org, an educational resource designed to empower key decision makers with information on topics most relevant to choosing SAF.

Advocating for clean energy infrastructure

In August 2023, Microsoft hosted and participated in the Asia-Pacific Economic Cooperation (APEC) roundtable on GHG accounting standards on August 4 and the APEC Energy Ministers Meeting on August 15.

Microsoft has a direct interest in an expanded and clean electric grid; with over 60 Azure regions operating now or coming soon, and more than 300 datacenters globally. Over half of these regions are in APEC economies.

43.7M

Microsoft entered a 10-year contract with World Energy for sustainable aviation fuel (SAF) certificates, aiming to replace 43.7 million gallons of fossil jet fuel.

Learnings and what's next

Growing the supply for clean energy will require policy advocacy

Microsoft decarbonization policy advocacy is expected to contribute to reducing our upstream emissions in two ways:

- 1 Helping to create more direct corporate renewable procurement options in markets that are currently difficult to access, as in much of Asia-Pacific, thus increasing opportunities for reducing operational emissions in the near term.
- 2 Contributing to the enactment of policies that decarbonize the grids on which our suppliers operate.

These efforts can help to reduce the amount of baseline emissions to be addressed through renewable procurement.

Partnership and investment remains critical for Scope 3 emissions reduction

Collaboration remains critical to success, for Microsoft and our suppliers. While many of our suppliers are willing and want to reduce their footprints, they may still face considerable barriers like access to capital or market knowledge.

As we work to achieve our own operational needs, we are also working to accelerate the development of solutions that will help our customers and partners, and rapidly increase the scale of global sustainability markets.

Scaling markets for lower-carbon materials requires investment

While lower-carbon building construction materials are on the market today, they do not exist at the volume, in the geographies, nor at the scale needed to decarbonize the sector. We continue to pursue key mitigations to embodied carbon risk through extensive collaboration across Microsoft datacenters.

Our actions are focused on accelerating the uptake of low-embodied carbon solutions and driving innovation through new building materials with the potential to drastically reduce embodied carbon from those materials. Building on our experience with other industrial sectors, we will use forward contracting mechanisms to spur the market supply of lower-carbon materials.

Measurement plays an important role in Scope 3 reduction

Driving Scope 3 reductions requires developing better data visibility and more accurate and actionable methodologies than are generally available today. With improved life cycle assessment (LCA) methodologies and detailed analysis of specific products, manufacturers, geographic locations, and emissions life cycle stages, we are better able to understand the complexity of our supply chain and which tangible levers we can pull both with our suppliers and through policy.

Additionally, we are exploring how technology, like AI and blockchain, can further increase accountability and traceability for our Scope 3 carbon emissions.

Sharing our learnings to support global construction efforts

With our Redmond campus modernization project still in progress, we are continuing to catalog emissions, carbon, water, and energy use data. This data will inform future construction and modernization efforts at Microsoft campuses globally.

We will continue to share our learnings in hope that it inspires greater sustainability in construction—as well as transparency in reporting—from other organizations large and small in the future.

Getting to water positive

Water

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Our approach

Today, one in four people live in countries facing high water stress, a number that is expected to increase to one in three by 2050. We believe Microsoft has an important role to play in protecting freshwater resources in the areas where we operate and around the world. We recognize that water reduction alone is not enough to address growing global water challenges—reduction, replenishment, access, innovation, and policy all play important roles in our water positive journey.

In 2023, we continued to drive progress by focusing on accelerating solutions to water challenges through innovation and partnerships. In 2023, we nearly doubled our water replenishment portfolio, and met our 2030 water access target to provide 1.5 million people with access to clean water and sanitation services. Our internal water fee continues to play a critical role in funding replenishment and access projects while providing an incentive to our business groups to reduce water use.

Amid this progress, we also believe Microsoft has a responsibility to support our customers and the world in addressing the water crisis. Investments made across Microsoft operations are made with a view to accelerating global progress. Our investments in innovation will help establish new approaches to reducing water consumption, and investments in replenishment will help scale solutions and drive greater impact in the basins where we operate.



1.5M



In FY23, we met our water access target by providing more than 1.5 million people with access to clean water and sanitation solutions.

Our approach continued**Committing to improving water use efficiency**

As our datacenter business continues to grow, and we balance the need for power and water, Microsoft remains committed to reducing the intensity with which we withdraw resources, focusing on being as efficient as possible. Our datacenter strategy puts us on track to achieve a 40% water intensity reduction target by 2030. We will continue to design and innovate to minimize water use and help break the relationship between AI growth and resource consumption.

Five pillars of water positive

Reducing our water footprint across our direct operations

Replenishing more water than we consume across our operations

Increasing access to water and sanitation services

Scaling water solutions through **innovation and digitization**

Advocating for effective and innovative water policy

Keep community needs and impact at the forefront

In 2023, we became more intentional about integrating environmental justice into our replenishment program.

We aim to align our project investments with the needs and desires of the local communities and consider how we can support marginalized communities while avoiding potential unintended consequences of projects that could cause harm to those communities. In 2023 we refreshed our criteria to ensure we keep environmental justice at the forefront of our replenishment investments and project assessment. We will continue to evolve our approach to meet the needs of the communities where we work.

- 1 Projects should not pose any potential health impacts on local communities.
- 2 Community members should be involved in the decision-making process for projects that directly affect their communities.
- 3 A process to address community concerns should exist for projects that directly affect those communities.
- 4 Projects should consider the cultural and historical significance of the area and ensure that there are no impacts on cultural resources.



- ^ We prioritize water replenishment projects that fit a basin's unique needs.

By partnering with credible organizations that have an in-depth understanding of local community needs, we have the best likelihood of ensuring that we keep community impact at the forefront.

Our approach continued

Our journey to water positive

As we work to be water positive, we continue to scale our efforts to reduce water use across our operations, while increasing procurement from alternative sources and investing in innovative replenishment and access projects.

Our targets

Replenishing more water than we use by 2030

We will replenish more water than we consume across our global operations, with a focus on water-stressed regions where we work.

Increasing access to water

We will provide 1.5 million people with access to clean water and sanitation services by 2030.

Reducing our water intensity

We will make progress against our target to improve water use efficiency by 40% across our global, owned datacenter operations by 2030, from a 2022 baseline.

Our progress

✓ 25.4 million m³ of water replenishment volume

In FY23, we contracted for replenishment projects that are estimated to provide more than 25 million m³ in volumetric water benefit over the lifetime of these projects. Since the inception of this program, projects contracted are estimated to provide more than 61 million m³ in volumetric water benefit.

✓ Over 1.5 million people with water access

In FY23, we met our water access target by providing more than 1.5 million people with access to clean water and sanitation solutions in Brazil, Chile, India, Indonesia, and Mexico.

✓ Improving water efficiency

As of January 2024, we are on track to meet our 40% target. We remain focused on reducing the water intensity of our operations and will continue to report on our progress in future sustainability reporting.

25.4M

In FY23, we contracted for replenishment projects that are estimated to provide more than 25.4 million m³ in volumetric water benefit.



Reduction

We take a holistic approach to water reduction across our campuses and datacenters to drive efficiency and reuse. Innovation is a thread that runs throughout our work toward our water positive commitment, like piloting innovative approaches to reduce our water use intensity, and project investments we make.

50%
Improvements as part of our Redmond campus modernization project are estimated to yield over 50% reduction in water use for new facilities.

Advancing best practices

In an ongoing effort to embed best practices into our methods, we have developed and implemented our Sustainability Standards for new construction projects, including requirements that reflect each of Microsoft’s climate commitment targets. For water, project design teams now create a water budget and water reuse plan early in the design phase. The following updates are the latest in an ongoing effort to improve our construction standards and efficiency.

A water budget quantifies and maps all water end uses and sources, potable and non-potable. This allows teams to target only non-potable sources for non-potable end-use and increase the use of recycled water and greywater.

The new Sustainability Standards also require teams to develop a water reuse plan which outlines strategies to reduce, capture, and reuse water on the construction site, for example, capturing stormwater from sediment ponds to be used later for dust control and vehicle washing.

Reducing water use at our campuses

As part of our Redmond campus modernization project, we’ve implemented new infrastructure to significantly improve water use and reuse. These improvements are estimated to yield over 50% reduction in water use for the new facilities compared to pre-modernization.

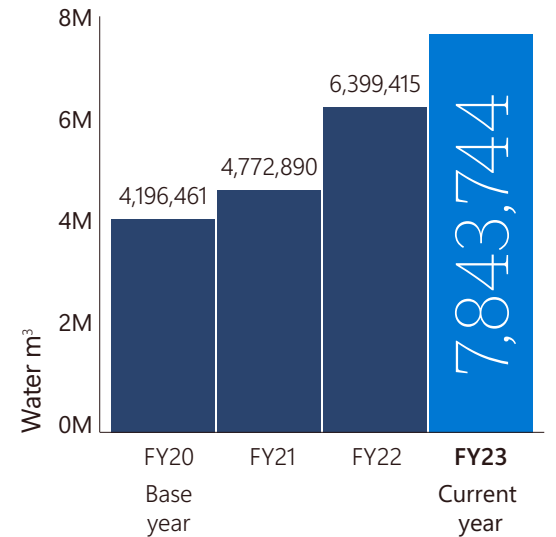
- ✓ Indoors, we estimate a reduction in water use of over 7 million gallons annually, through implementing efficient features and constructing cisterns for rainwater capture.
- ✓ Outdoors, we estimate a reduction in irrigation water of over 30 million gallons annually, through planting native and adaptive vegetation as well as installing efficient irrigation systems.
- ✓ We estimate that our Thermal Energy Center will help save over 10 million gallons of water per year. The Thermal Energy Center at our Redmond Campus uses several unconventional approaches to heat rejection, including geothermal heat exchange, heat recovery chillers, and water softening in its cooling towers.

While these water reduction strategies implemented through the Redmond campus modernization projects are impactful, they also represent important proofs-of-concept and testing grounds, helping us apply learnings and techniques to other campuses globally.

Water Table 1—Measuring our annual water consumption informs our replenishment targets

In FY23, our water consumption increased in alignment with our business growth. This data from our operations informs the amount of water we need to replenish. See p28 for more information.

Total water consumption



Find out more in our Data Fact Sheet [↗](#)

Reduction continued**Maximizing cooling efficiency in existing datacenters**

In 2022, all owned datacenters that use water for cooling underwent an audit to ensure operational values aligned with design expectations. Observed deviations were reviewed and corrected, which resulted in lower water and maximized water usage efficiency.

Datacenter water withdrawal and discharge are closely tracked and used to monitor our water consumption. Additionally, we are developing advanced prediction models that anticipate water consumption based on real-time weather data. Comparing anticipated and actual consumption values helps quickly identify operational inefficiencies and provides the ability for advanced troubleshooting.

Our new datacenters are designed and optimized to support AI workloads and will consume zero water for cooling. This initiative aims to further reduce our global reliance on freshwater resources as AI compute demands increase.

Innovations at datacenters

In 2023, we expanded our usage of alternative water sources, such as reclaimed and recycled water, in Texas, Washington, California, and Singapore, further reducing our dependence on freshwater supply. We are harvesting rainwater to partially offset cooling and humidification needs at our Netherlands and Ireland datacenters, and to offset humidification at our Sweden datacenters. Rainwater harvesting is also part of the design for new datacenters in Canada, England, Finland, Italy, South Africa, and Austria.

Our new datacenters are designed and optimized to support AI workloads and will consume zero water for cooling.



^ We are reducing our reliance on freshwater sources for our existing datacenters.

Replenishment

In FY23, we grew our water replenishment program significantly, adding rigor to our approach while nearly doubling the size of our portfolio. As of July 2023, we invested more than \$16 million in 49 replenishment projects around the world, for more than 61 million m³ of potential volumetric water benefits (the equivalent volume of 24,000 Olympic size swimming pools) over the lifetime of the projects.

Once we sign a contract for a replenishment project, it takes 1 to 3 years for that project to become operational. As such, we are contracting for projects today that will come online within a few years.

61M m³

Our replenishment projects are contracted to deliver more than 61 million m³ of volumetric benefit over their lifetime.

One of the challenges with water replenishment is the lack of protocols and standards available to support companies in evaluating projects and measuring impact. Given this, we defined four core principles to guide our strategy:

- ✔ Prioritize investment in areas with high water stress and high operational water consumption.** By 2030, we expect to replenish more water than we consume across our entire direct operations globally and replenish all of that water in approximately 40 priority high water stress locations where we operate.
- ✔ Invest in locally relevant projects that offer co-benefits.** We prioritize water replenishment projects that fit a basin's unique needs while also offering social and environmental co-benefits.
- ✔ Keep community needs and impact at the forefront.** We are intentionally integrating environmental justice into our replenishment investments, considering how we can support marginalized communities while avoiding potential unintended harmful consequences.
- ✔ Focus on innovation with an aim to build project supply and scale.** We're increasingly looking for opportunities to support new project implementers that bring creative and innovative approaches—such as through new technologies or funding models—that will help the market scale quickly to meet demand.

In November 2023, we published a [white paper](#) that shares some of our learnings as we developed our global corporate water replenishment program. We also shared [for the first time an overview of all replenishment projects](#) we have funded to date.

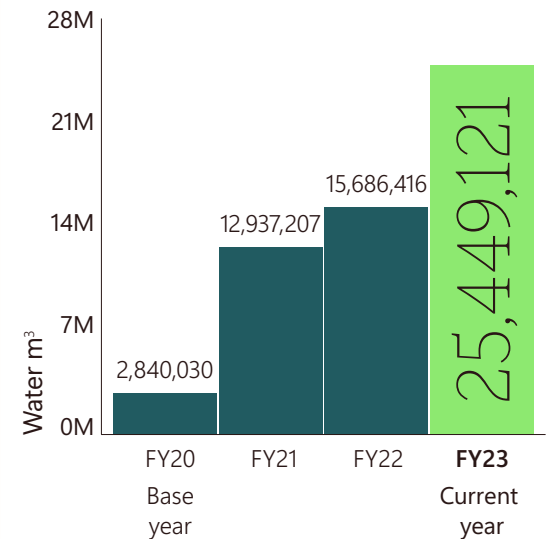
Our hope is that, in combination with existing guidance documents and resources, this will help others navigate the complexities of replenishment and even inspire action and investment by other parties in innovative new replenishment approaches.

We're increasingly looking for opportunities to support new project implementers that bring creative and innovative approaches—such as through new technologies or funding models—that will help the market scale quickly to meet demand.

Water Table 2—Replenishing more water than we consume

Since year one, we have contracted 49 replenishment programs in water-stressed basins, which are expected to deliver more than 61 million m³ of replenishment volume over their lifetime.

Total contracted volume water replenishment



Find out more in our [Data Fact Sheet](#)



Replenishment continued**AI** Accelerating progress with AI

In support of our water replenishment target, we've partnered with FIDO Tech to reduce water loss from leaks through three projects in the aging water distribution networks of London (England), Querétaro (Mexico), and Phoenix, Arizona (United States). The projects use FIDO's AI-enabled acoustic leak analysis to identify and track leaks over a distance of 350 km within the networks. Once leaks are identified, the local water utilities will conduct repairs. Over a 10-year period, FIDO plans to track volumetric benefits alongside other complementary benefits, including greenhouse gas reductions.

Another project will support the use of AI and site-specific data to improve irrigation management on 385 hectares per year of private irrigated family farms in the Maipo Basin near Santiago, Chile. In partnership with Kilimo, the system can provide tailored irrigation schedules for a variety of high-value crops, helping farmers to decrease groundwater pumping and diversion of surface water.

Partnerships**Restoring the Lake Xochimilco ecosystem**

Conservation International is working to restore the Lake Xochimilco ecosystem—home of the endangered axolotl and the last natural remnant of the Valley of Mexico lagoon system—which has been severely modified by urbanization, resulting in water pollution and endangering biodiversity. Using a site-specific model designed to protect this ecosystem through various conservation measures, such as restoration of the traditional chinampa wetland agricultural technique, planting of native species, and employing biofilters to improve water quality, the project is expanding its reach through support from Microsoft to incorporate more local farmers and a larger wetland restoration area.

**Partnerships****Improving water resilience in the lower Colorado River**

Bonneville Environmental Foundation (BEF), in partnership with Microsoft and others, is engaged in the Lower Colorado River Resilience project to conserve water in Lake Mead and support water resilience in Arizona and the lower Colorado River Basin. The project brings together water leasing, habitat restoration, environmental flows, and private and public sector investment to increase water resilience in the lower Colorado River.

**Partnerships****Addressing water loss and improving resilience**

With support from Microsoft, **Bonneville Environmental Foundation** is working to improve water resiliency in the Dallas-Fort Worth area, Texas. A partnership between BEF's Business for Water Stewardship, Sensor Industries, Pacific Institute, and local housing authorities will install 600 leak detection sensors for toilets in multi-family, low-income housing developments. The sensors have a 10-year lifetime and will allow for real-time monitoring of leaks, enabling prompt response from maintenance to minimize water loss.



Access

Today, one in four people lack access to safely managed drinking water and more than half of the global population does not have access to safe sanitation. Our water positive goal is about more than only reducing and replenishing, it is also about helping to provide people around the world with access to safe water and sanitation services.

\$3M

We have invested more than \$3 million to improve water access in Brazil, India, Indonesia, Mexico, and Chile.

Increasing access to water and sanitation

As of 2023, having invested more than \$3 million to support communities in Brazil, India, Indonesia, Mexico, and Chile, we have reached our target to provide more than 1.5 million people with access to water or sanitation services. A majority of our work to date has been implemented by [Water.org](#), an organization that helps people without safe access to water and sanitation get access to affordable financing, which enables them to install household taps and toilets and to collect, store, and purify rainwater and water from municipal sources.

While we are proud of the progress we have made, we recognize it is not enough, and we remain committed to continuing to support marginalized communities that have limited access to water and sanitation services. In partnership with WaterEquity to create a water and climate resilience investment strategy, we are turning our attention to vulnerable populations who are susceptible to increased climate shocks. This is WaterEquity's first strategy to focus exclusively on investing in municipal-level climate-resilient water and sanitation infrastructure for low-income populations, supporting people in countries in South and Southeast Asia, sub-Saharan Africa, and Latin America. This work represents our third water-related investment advanced through Microsoft's \$1 billion Climate Innovation Fund.

Enhancing and sustaining the availability of safe drinking water

WaterAid is partnering with Microsoft to ensure the sustainable availability of groundwater while adapting to climate change in the Deccan region of India. This project will harvest rainwater and enhance the availability of groundwater in water-starved regions through artificial groundwater recharge. Envisioned as a three-year program that follows up on previous work in Karnataka that demonstrated significant volumetric benefits, **WaterAid** will scale this project into the Hyderabad district of Telangana state and expand its work in Raichur and Gulbarga districts of North Karnataka. In Hyderabad, this project will cover 25 residential welfare associations and create profound impact at the district level.



We met our target to provide more than 1.5 million people with access to water and sanitation services.



Helping to expand access to safe drinking water in Indonesia's rainforest communities.

In partnership with [Water.org](#) we are also working to expand access to safe drinking water in Indonesia's rainforest communities. Many lack running water at home and spend time each day carrying heavy buckets of water from the nearest water source. Sapdiah is among those who live in Indonesia's rainforests and was able to overcome this challenge by securing a microloan for a water tank and filter through a local financial partner of [Water.org](#).

Access continued

Water Table 3—Delivering on our water positive target by enabling access to water and sanitation services, and through water replenishment projects



A Mexico

Water.org in Mexico focused on the Metropolitan Area of Mexico City, disbursing microloans that will benefit more than 1,500 people.

1,500

people in Mexico provided with water access



B Chile

Through our collaboration with Agua Segura, close to 4,000 people benefited from improved access to drinking water for the community of Cerrillo in the municipality of Curacaví, and more than 1,000 students gained access to safe drinking water at schools in the communities of Quilicura and Colina.

4,954

people in Chile provided with water access



C Brazil

In Brazil, Water.org disbursed more than 15,000 WaterCredit loans that will benefit more than 60,000 people.

62,986

people in Brazil provided with water access



D India

Through our collaboration with Water.org, more than 900,000 people have been reached in the states of Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu, Telangana, and others.

923,760

people in India provided with water access

49
Total number of water replenishment projects to date



E Indonesia

Water.org reached over 500,000 people throughout Indonesia, primarily in the regions of East, West and Central Java.

517,713

people in Indonesia provided with water access

1,510,913

Total number of people reached to date

Innovation

With the publication in 2023 of our [water replenishment white paper](#), we are sharing our learnings and best practices to help others embarking on replenishment. This paper shares our learnings as we developed our global corporate water replenishment program. This is not meant to be a single “source of truth” to guide corporate replenishment decisions, but we hope that in combination with other existing guidance documents and resources it will help leaders in this space better understand the complexities involved. We still have a lot to learn, and we hope this encourages others to share their own insights as well. We look forward to publishing updates as we continue to evolve our strategy and grow our project portfolio.

\$45M

Through our Climate Innovation Fund, we have invested \$45 million in scaling water solutions.

Improving water data and insights

In recognition of the need for future water projections to be based on the latest available data, Microsoft became one of the inaugural World Resources Institute (WRI) Aqueduct Pro Sponsors, providing support for the build out of the most recent WRI Aqueduct tool. [Aqueduct 4.0](#), which is free to the public and available online, helps companies, organizations, and investors understand risks, with new projections on water stress, demand, and supply. The tool uses the latest CMIP6 climate forcings from the [IPCC Climate Change 2022: Impacts, Adaptation and Vulnerability report](#).

Along with other organizations engaged in water replenishment, we are helping to fund the development of Volumetric Water Benefit Accounting (VWBA) 2.0, which will establish methodologies for quantifying the volumetric water benefits of water stewardship activities and help achieve the scale needed to address global water challenges.

VWBA 2.0 will refine the existing guidance related to project selection and volumetric water benefit quantification; provide principles to guide companies in making credible volumetric water benefit quantification claims; provide guidance for collecting, tracking, and reporting information to substantiate claims; and refine some quantification methodologies.

We are also co-funding the development of a guidance document for water access and sanitation projects, modeled after the VWBA guidance for replenishment projects, to create more guidelines around water access and sanitation project typologies, quantifying benefits.

Microsoft is also sponsoring [HydroSHEDS v2](#), the next generation of the hydrographic data framework HydroSHEDS. The global standard for mapping basins, rivers, and lakes, HydroSHEDS has enabled advances in global and regional freshwater and biodiversity work and is the basis for many management and decision-making applications, including water risk assessment tools such as WRI’s Aqueduct and WWF’s Risk Filter Suite.

HydroSHEDS v2 refines global river network and catchment delineations using TanDEM-X elevation data. The new version includes latitudes above 60°N and below 60°S for full global coverage.



◀ HydroSHEDS hydrographic data framework is enabling advances in freshwater and biodiversity management.

Scaling water solutions

Our focus on innovation doesn’t stop with addressing Microsoft’s water goals related to our direct operations. A significant focus of this pillar is to help our customers and the world more broadly in responding to the global water crisis. Our Climate Innovation Fund has invested \$45 million in scaling innovative water solutions, including \$25 million in WaterEquity’s water and climate resilience strategy in FY23. This strategy focuses exclusively on investing in municipal-level climate-resilient water and sanitation infrastructure.

Furthermore, we remain committed to driving data digitalization for water. In FY23, [we introduced critical new water data capabilities in Microsoft Cloud for Sustainability](#). The Microsoft Cloud for Sustainability water data model provides the framework required for storing and linking water quality and quantity measurement data and water sustainability reference data.

Policy

Advocating effective and innovative water policy

As water challenges continue to intensify, we need to go beyond reduction, replenishment, and access, and consider opportunities to improve management of this essential resource. In the United States and in many other countries around the world, less than 1% of water used is recycled today; in contrast, some countries, like Israel, recycle roughly 90% of their wastewater. Water reuse and recycling has the potential to lessen demand for water in water-stressed regions, while also helping minimize the discharge of contaminated water into sensitive areas.



We continue to look for opportunities to advocate for meaningful policy. Some of our advocacy projects include the following:

Improving water reuse and recycling

At Microsoft, we are working to improve water stewardship and to be good partners with local municipal water resource managers in the communities where we operate.

This is why Microsoft is working to increase the procurement of recycled or reclaimed non-potable water in our datacenters and other facilities. We recently signed on as a founding member of the WaterReuse Association's Coalition for Water Recycling, a group of companies looking to support the adoption and expansion of water reuse across the United States. The Coalition will work to advance policy solutions and build partnerships between recycled water utilities, regulatory agencies, and industry. Companies that join this coalition will have a unique role to play in helping to advocate for more reuse and recycling across the United States.



Increasing water security

Microsoft is supporting The Nature Conservancy working with the Jicarilla Apache Nation, and the New Mexico Interstate Stream Commission (NMISC), in implementing a first-of-its-kind water sharing agreement that allows the NMISC to lease up to 20,000 acre-feet of water per year from the Nation to benefit threatened, endangered, and sensitive fish species and increase water security for New Mexico. This agreement demonstrates how Tribal Nations and state governments can work together on a sovereign-to-sovereign basis, with support from conservation organizations, to find collaborative solutions that benefit multiple interests and their surrounding community.

Supporting more sustainable water governance

Water Europe is a multistakeholder organization representing the whole water value-chain focused on achieving a Water-Smart Society⁵. As members, we continue to support research, analysis, and advocacy on water in the European Commission.



Learnings and what's next

Innovation will continue to play a powerful role

As a global community, we need to scale investment in water to help all of us meet our corporate goals, to help the world protect freshwater resources, and to help ensure that everyone, including those most vulnerable, have access to water and sanitation services.

As we identify innovative approaches that work, we look forward to scaling these within Microsoft and sharing them outside of our four walls to increase supply for replenishment projects and further reduce pressure on the shared water resources we depend on.

We plan to continue to identify and invest in technology adoption opportunities for emerging water technologies through our Climate Innovation Fund and through our replenishment and access investments.

Water reuse remains a big opportunity globally

The global average for water reuse is roughly 10%.⁶ In the United States, less than 1% of water is reused, and there are very few utilities globally that offer reclaimed water to industrial users.⁷ This means that most of the water we all use every day is potable water that is disposed of and polluted after it is used.

At Microsoft, we tackle reuse within our datacenters and campuses: maximizing reuse of each drop of water that we withdraw, procuring reclaimed, non-potable water from utilities and from alternative sources, including rainwater, air-to-water generation, and other innovative approaches where available.

In 2023 we joined the Coalition for Water Recycling to continue advocating to help increase water reuse across the United States.

Partnering to create a water positive future

We believe that the collective power of multiple organizations funding innovation, driving action, and advocating for public policy will be critical to addressing the global water crisis. Collective action is a thread that we see across each of Microsoft's five pillars for water positive.

Given the collective approach required to solve shared water challenges, we plan to continue building on partnerships like the Water Resilience Coalition (WRC) that bring companies together to pool funding and invest in solutions in locations with extreme water stress. We will also continue to co-invest in water replenishment projects around the world. A complete list of replenishment projects we have funded as of July 2023 can be found in our replenishment [white paper](#).

Improving measurement

Understanding the value and impact of water-related projects requires better monitoring. Developing enhanced guidelines and establishing standards for measuring project outcomes will help everyone account for impacts in a consistent and reliable manner.

In support of this, we're helping fund the next iteration of the VWBA 2.0 and the development of standardized accounting methods for the co-benefits of water access, sanitation, and hygiene (WASH) projects (WASH Benefit Accounting). We are also supporting the CEO Water Mandate in building out the Water Action Hub 5.0, a platform that connects stakeholders to a range of water stewardship tools. Microsoft is also participating in the Water Resilience Coalition's Net Positive Water Impact (NPWI) working group, which plans to release its Operational Guidance paper in early 2024.

Investing to accelerate progress

Project supply is particularly low in high water stress basins where many companies have operations. In some regions, few to no pre-designed projects ready for investment and implementation are available. We are tackling this by building supply and working to scale projects, like FIDO, so they are available to others.

Building a more ready supply will require:

- 1 More project implementers, brokers, and corporate investors.
- 2 Broader awareness among professionals at utilities, governments, consulting firms, and NGOs.
- 3 Innovative financing.

Getting to zero waste

Waste

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Our approach

Every year, people consume 100 billion metric tons of materials, and only 7.2% of those materials are cycled back into the economy after use, according to the [2023 Circularity Gap Report](#). Retooling existing linear take-make-waste systems and infrastructure is required to meet the critical need to accelerate progress in how we design and use products to effectively reduce material consumption.

We recognize the urgent need to reduce waste and carbon emissions associated with the life cycle of materials by prioritizing reduction and reuse as much as possible. As a company that manufactures devices, builds campuses and datacenters, and uses manufactured goods in our operations, we have committed to responsibly design and source materials, and are taking an increasingly circular approach to reach our target of zero waste by 2030.

This strategy, grounded in the prioritization of reduction and reuse, enables us to extend the life of the materials we use, and reduce waste and carbon emissions as a result. This effort begins upstream by reducing the quantity of materials wherever possible, keeps products in use longer through reuse and repair, and recovers materials downstream to our recycling and composting programs.

Image captured by John Tien, Director of Commodity Sourcing, United States



Our approach continued

Our journey to zero waste

As we work to achieve zero waste, we are taking an increasingly circular approach to materials management to reduce waste and carbon emissions.

2.7%

We reduced single-use plastics in our Microsoft product packaging to 2.7% in FY23.

Our targets

Driving to zero waste building and operations

We will achieve 90% diversion of operational waste at owned datacenters and campuses, and 75% diversion for all construction and demolition projects, by 2030.

Increasing reuse and recycling of servers and components

By 2025, 90% of servers and components for all cloud hardware will be reused and recycled with support from our Circular Centers.

Eliminating single-use plastic

By 2025, we plan to eliminate single-use plastics in all Microsoft primary product packaging.

Making fully recyclable products and packaging

We plan to design Surface devices, Xbox products and accessories, and all Microsoft product packaging to be 100% recyclable in OECD countries by 2030.

Innovating cloud packaging

By 2025, all cloud packaging⁸ is planned to have a minimum of 50% recycled content; eliminate single-use plastics; will be 100% reusable, recyclable or compostable; and packaging weight will be reduced by a minimum of 10% from a December 2020 baseline.

Our progress

✓ 18,537 metric tons of operational waste diverted

In FY23, we diverted 18,537 metric tons of solid waste from landfills and incinerators across our owned datacenters and campuses.

✓ 89.4% reuse and recycling

Our reuse and recycle rates of servers and components across all cloud hardware reached 89.4% in FY23.

✓ Reduction in single-use plastics to 2.7%

On our way to eliminate single-use plastics in Microsoft product packaging by 2025, we reduced plastics across Microsoft’s product packaging portfolio for another year, achieving 2.7% in FY23.

Devices

Recycled materials

The post-consumer recycled content used in our devices packaging currently stands at 53.8%.

Repairability

We expanded our portfolio of repairable Surface products in 2023.

Device recyclability

To be reported in future years.

✓ Increasing circularity of cloud packaging

In FY23, we increased circularity in our rack packaging, which makes up most of our packaging waste by mass. We’re pioneering an innovative reusable rack packaging system that drives progress across all four packaging targets. As we scale our reuse system, we are partnering with our logistics service providers to implement a global recycling program across our worldwide locations.

Reducing waste at our campuses and datacenters

Getting to zero waste at our campuses and datacenters requires ambitious efforts to design for circularity; reducing as much waste as we can, as well as reusing and repairing products to extend their useful life. We're thinking through everything—from durable serviceware to air filters—with circularity in mind and prioritizing the prevention of waste from the start as we approach the construction, furnishing, renovation, and demolition of the buildings in our datacenter and campus portfolio.

Campuses

Reducing construction and demolition waste

In FY23, we've achieved over 90% construction and demolition waste diversion rate on the Redmond campus modernization project. This accounts for over 11,000 tons of waste diverted from the landfill thanks to thorough and detailed planning that started early in concept design and continued throughout construction.

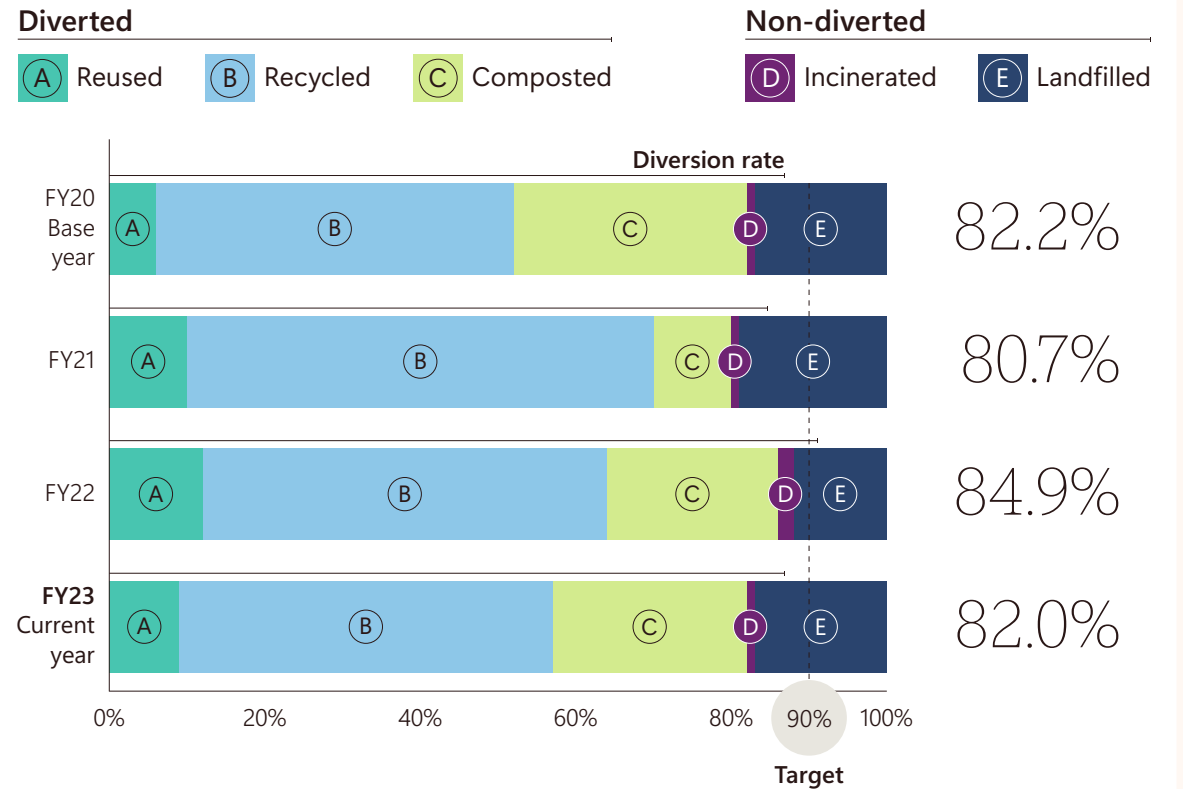
Reducing operational waste in our workplaces

As we continue to pursue Zero Waste certification on campuses worldwide, we have focused on the reduction of single-use materials and operational waste through the widespread deployment of reusable serviceware at several campuses, including Hyderabad and Bengaluru, India; Silicon Valley, California; Dublin, Ireland; and Thames Valley Park, England. We have also deployed beverage dispensers to replace single-use cartons, cans, and bottles. Additionally, we're engaging employees with novel, effective messaging around participation to further reduce single-use materials.

Our Redmond campus has been Zero Waste certified for seven consecutive years. In FY23, we initiated a reuse pilot on our Redmond campus where employee devices and peripherals used on campus turned in for recycling were refurbished and reused, reducing operational waste, extending the internal life cycle of devices and peripherals previously destined for recycle. The pilot was a success, with over 18,000 items redeployed internally, diverting 33,000 pounds of e-waste. We're evaluating the results for pilot expansion in future years.

Waste Table 1—Diverting operational waste from landfills and incinerators

In FY23 we diverted more than 18,500 metric tons of waste from being landfilled or incinerated across our owned datacenters and campuses.



Find out more in our Data Fact Sheet



Reducing waste at our campuses and datacenters continued

In Silicon Valley, Dublin, Reading, and Herzliya (Israel), campuses performed waste characterizations to determine how materials are sorted and find intervention opportunities to prevent waste contamination. In China, our campuses are actively working with third-party waste auditors to codify terms and definitions around waste that are easily translated and understood by colleagues across the world. Finally, across Microsoft campuses we are working to better define reduction and reuse calculations in preparation for more campuses to pursue Zero Waste certification.

AI Accelerating progress with AI

As part of a three-year pilot program (FY22–FY25), we are rolling out an AI-powered food waste prevention technology across several major locations including Bengaluru and Hyderabad, India; Shanghai, Beijing, and Suzhou, China; Charlotte, North Carolina; Silicon Valley, California; Dublin, Ireland; and Reading, England. Using scales and scanning devices, the system tracks, learns, and classifies both back-of-house prep waste and front-of-house plate waste. The dining staff uses the data collected each month to calculate and monitor diversion rates to inform future purchases across campuses, bringing Microsoft one step closer to zero waste.

LinkedIn waste reduction

At our Dublin campus, LinkedIn has piloted a bin-free kitchens program with a dedicated fermentation room, where trim waste and fruit and vegetable pulps are dehydrated and repurposed. The removal of the bins has resulted in an average reduction of food waste by 55% per serving since its introduction.

Additionally, LinkedIn creates in-house made products and is cultivating strategic partnerships with vendor partners to facilitate plastic packaging reduction programs across all facets of vendor supply chains.

- ✓ At our Dublin campus and globally, 100% of our micro-kitchens are free of plastic bottles, and each site with onsite full-service kitchens uses reusable plateware.
- ✓ Use of house-made oat milk and almond milk collectively diverted an average of 15.5 pounds of plastic and 75 pounds of cardboard from entering the landfill each month.
- ✓ LinkedIn is partnering with suppliers to implement reusable cooking oil containers (eliminating 1,854 pounds of packaging from landfills and oceans), bulk coffee (eliminating 420 pounds of packaging), and bulk milk (eliminating over 50 pounds of single-use milk packaging).



Sustainability
Champion:

Emilia Zamora

As a member of the Circular Cloud Supply Chain team, I have the opportunity to be at the forefront of circular supply chain design and deployment. By supporting decommissioned material channel development and operations, our team has the responsibility to find the optimal path for every part. I feel lucky to be on a team that works every day to support our datacenters and minimize electronic waste.

Datacenters

Our goal by the year 2030 is for 75% construction and demolition waste diversion for all projects, and 90% diversion for core and shell projects over 75,000 square feet. On the operational side, our goal is to divert 90% of operational waste by 2030 for our owned datacenters.

Reducing construction and demolition waste

Microsoft and our suppliers continue to look for innovative solutions within the construction processes to reduce waste across the building materials' entire life cycle and supply chain. In FY23, we piloted construction circularity principles onsite and gathered key learnings to apply to future projects. We continue to enhance our real-time database allowing for more robust data analysis. Moving forward, construction circularity, upstream design considerations, take-back programs, and repurposing of excess materials are all sustainability practices we continue to pursue at datacenter construction projects.



Reducing waste at our campuses and datacenters continued**Reducing waste in our datacenter operations**

Wooden pallets are a crucial component of Microsoft's datacenter supply chain. We have been actively working across our datacenters worldwide to establish programs that promote wooden pallet reuse and recycling. By conducting research to understand local market opportunities and establishing relationships with local haulers, we have been able to significantly increase wooden pallet diversion. In FY23, Microsoft increased the quantity of wooden pallets diverted from landfills and incinerators by nearly 79% compared to FY22.

Air filtration is critical for datacenter operations because it helps maintain a clean environment for sensitive electronic equipment, reducing the risk of contamination and potential equipment failure.

We have been assessing whether durable air filters—with an anticipated lifespan of up to 15 years—can replace the disposable air filters that we currently use at our datacenters without compromising key performance metrics.

In 2023, we successfully launched a pilot to test a durable air filter product in a real-world datacenter environment. Over the next few years, we will evaluate ongoing performance and maintenance requirements for this innovative product.

Additionally, our Boydton, Virginia and Cheyenne, Wyoming datacenters completed a pilot with local technical schools to give a second life to over 200 used fiber optic cables. By partnering with local schools, we're enabling cable reuse while also providing an educational opportunity for community members. We are looking into scaling this initiative globally to build on the success of the pilot and serve more communities where we operate.

75%

Our goal by the year 2030 is for 75% construction and demolition waste diversion for all projects.



◀ We continue to work to reduce waste across the life cycle and supply chain of our datacenters.

Community environmental engagement

At our Amsterdam datacenters, we hosted a month-long series of interactive workshops to bring a hands-on approach to learning about waste. Workshop topics include the principles of zero waste; the history of plastics; an introduction to the United Nations Sustainable Development Goals; waste and carbon emissions; procurement practices and waste impacts; and an overview of Microsoft's zero waste initiatives. All workshops included an opportunity for self-reflection and tips for integrating sustainable practices into daily life.

Additionally, in our Singapore and Busan, South Korea datacenters, we began using small-scale onsite biodigesters to convert used coffee grounds into compost, which is then used in the site landscaping. The program provides an opportunity for datacenter personnel to learn about composting and Microsoft's zero waste commitments.

By partnering with local schools, we're enabling cable reuse while also providing an educational opportunity for community members. We are looking into scaling this initiative globally to build on the success of the pilot and serve more communities where we operate.

Advancing circular cloud hardware and packaging

A critical part of achieving our zero waste goal is managing cloud hardware and packaging across our datacenters. This year, we continued to optimize circularity within our datacenter operations by scaling our [Circular Centers](#), and implemented a novel technological innovation that embeds sustainability guidance within our material assets. This solution has further accelerated our efforts to reuse and recycle cloud hardware wherever possible.



Our Circular Center program will support our target to reuse or recycle 90% of datacenter decommissioned cloud computing hardware assets by 2025.

Improving reuse and recycling in cloud hardware

Our reuse and recycling rates for servers and components across all cloud hardware reached 89% in FY23. This progress was in large part due to working directly with recyclers to understand recycling efficiency on Microsoft-specific equipment. Through this partnership, we were able to determine that Microsoft servers were on average 86% recyclable, as compared to the industry average of 67% that was previously assumed.

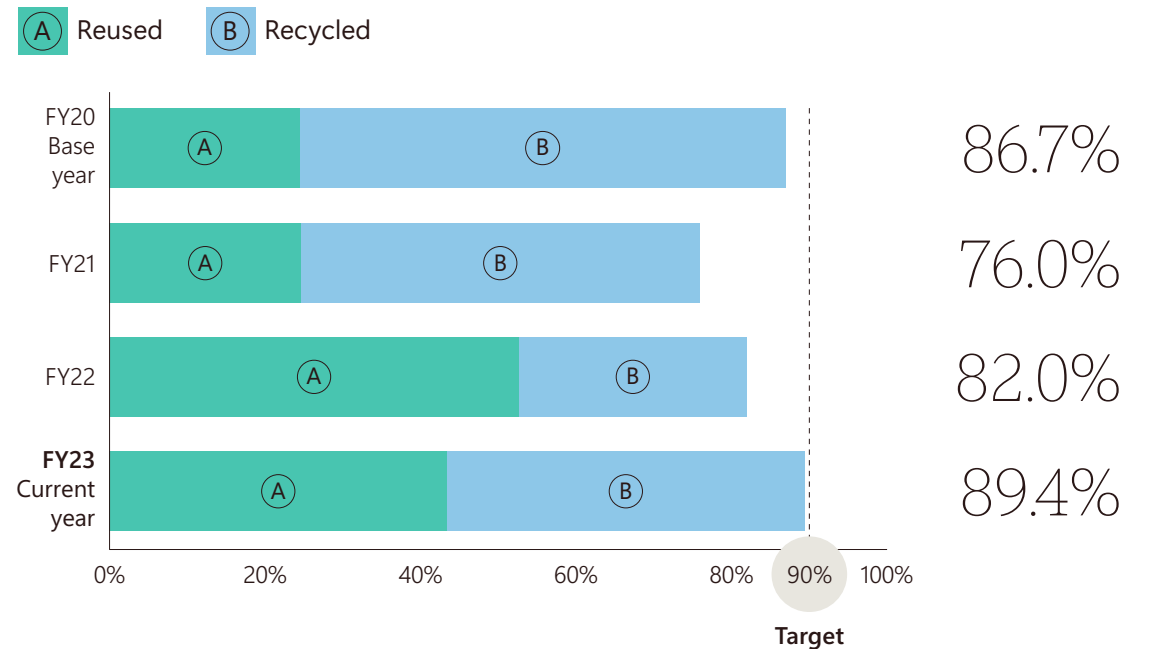
Four Circular Centers were launched in FY22 in Amsterdam, Dublin, Boydton, and Singapore, with an additional two in Quincy, Washington and Chicago, Illinois in 2023. As the program continues to expand, we plan to launch two new Circular Centers in FY25 in England and Australia, and expand our Circular Centers in Amsterdam and Dublin.

Additionally, we are designing a growing portion of our own hardware needs and we make sustainability considerations a key part of the entire design process—including energy efficiency, repairability, upgradability, and durability.

We continue to implement ecodesign principles and requirements outlining the sustainability guidelines that hardware engineers and suppliers should follow when designing hardware for the Microsoft Cloud, including Design for Serviceability specifications and requirements for recycled content as well as material recyclability.

Waste Table 2—Improving reuse and recycling of servers and components for all cloud hardware

In FY23 Microsoft increased reuse and recycling of servers and components to 89.4%.



Find out more in our [Data Fact Sheet](#)



Advancing circular cloud hardware and packaging continued

To support our efforts to reuse and recycle cloud hardware, we developed the patent-pending Intelligent Disposition and Routing System (IDARS), which establishes and executes a zero waste plan for our cloud hardware assets. IDARS is an end-to-end system that identifies the most sustainable disposition path for every part at any point in its life cycle across the supply chain.

Paired with Microsoft Dynamics 365 Supply Chain Management and Microsoft Power Platform, IDARS utilizes the bill of materials of assets, inventory, and demand to optimize the sustainable path, and provides Circular Center technicians with precise instructions on how to steward the asset onto its next phase. This technology, along with our close collaboration with both upstream and downstream partners, offers a model for the technology industry.

Increasing circularity of cloud packaging

In addition to reducing waste in cloud hardware, Microsoft has the responsibility to address the environmental impact of packaging used to transport cloud hardware to, from, or between Microsoft datacenters. We also have an opportunity to utilize reusable systems to deliver sustainability results and cost savings. To support Microsoft's public sustainability targets, our cloud supply chain has begun the sustainable transformation of our cloud packaging landscape.

Understanding our packaging landscape

Supporting Microsoft datacenters are over 150 different original equipment manufacturers (OEMs), as well as a variety of products, services, and suppliers who support our cloud business. Multiple types of packaging are associated with those products and services, which fall into two primary categories: IT hardware assets that are integrated into a rack and packaged together; and IT hardware assets that arrive at our datacenters packaged individually, or in groups, that are not yet integrated into a rack.

In FY23, Microsoft studied its heterogeneous supply chain to identify the largest producers of packaging waste. We found that rack packaging contributes most of our waste by mass, while other parts arriving at our datacenters comprised the remaining mass. Given that Microsoft controls the design and application of rack packaging, and that rack packaging is the majority waste contributor by mass, one of our main transformation focuses of FY23, and continuing into FY24, will be rack packaging transformation.

Reducing, reusing, and recycling rack packaging

We are pioneering two transformative programs to address rack packaging waste: Sustainable Rack Packaging transformation and Rack Packaging Recycling.

The innovative Sustainable Rack Packaging system is designed to be made predominantly from recycled materials, completely devoid of single-use plastics, and fully repairable to prolong its lifespan. The deployment of this system is estimated to enable us to reduce over 100,000 metric tons of waste from the landfill. This kind of groundbreaking packaging intervention is crucial for the cloud supply chain to meet Microsoft's zero waste targets.

But we're not just looking to the future. We're delivering results now through our Rack Packaging Recycling program. By partnering with our logistics service providers, we've implemented a global recycling and responsible disposal program across our worldwide locations. This program is designed to mitigate the impacts of existing packaging well ahead of the full deployment of the Sustainable Rack Packaging solution. In this first year of deployment, the Rack Packaging Recycling program is forecasted to divert over 2,500 metric tons of waste from landfill.

Transforming the long tail of supplier packaging.

In many cases, parts other than racks arriving at our datacenters have packaging that is supplier designed and applied, preventing any unilateral capabilities for Microsoft to transform the packaging of the products that we receive. Therefore, collaboration within industry is necessary to drive sustainable packaging transformation. In FY23 and continuing into FY24 and beyond, Microsoft will closely collaborate with our suppliers to transform packaging reaching our datacenters.



▲ We are pioneering two transformative programs to address rack packaging waste.

Improving device and packaging circularity

Over the past year, we have continued our work to reduce the environmental impacts of Microsoft devices and packaging by increasing circularity and reducing carbon intensity across the entire product life cycle.

53.8%

The post-consumer recycled content used in our devices packaging currently stands at 53.8%.

Reducing waste in packaging design

As part of Microsoft's commitment to zero waste, we are working to maximize the circularity of our product packaging. This is accomplished first by increasing our use of post-consumer recycled content in the packaging materials, and second by designing packages that are recyclable in existing collection systems. The post-consumer recycled content used in our devices packaging currently stands at 53.8%, while the calculated or theoretical recyclability of our product packaging stands at 94%, portfolio average. Our designers and engineers work relentlessly to increase use of recycled materials and recyclability of packaging to support the circulation of packaging materials, while delivering solutions that protect the product.

A key pillar of our zero waste packaging strategy is the use of renewable and recyclable materials, and the elimination of single-use plastics used in packaging by the end of calendar year 2025. We made strong headway against this goal in FY23. The portfolio average of single-use plastic by weight was reduced from 3.3% to 2.7%. We introduced several single-use plastic-free highly recyclable retail packages. These include the line of Microsoft Adaptive Accessories and Surface Thunderbolt™ 4 Dock. The transition to sustainable wraps and bags continued with the expansion of bamboo bags across our line of Surface commercial devices.



▲ Packaging continues to evolve to improve recyclability. Image shows packaging evolution from left to right from 2005 to 2024.

FY23 was a year focused on the development of new packaging technologies that are currently deployed in new and existing products. These technologies include:

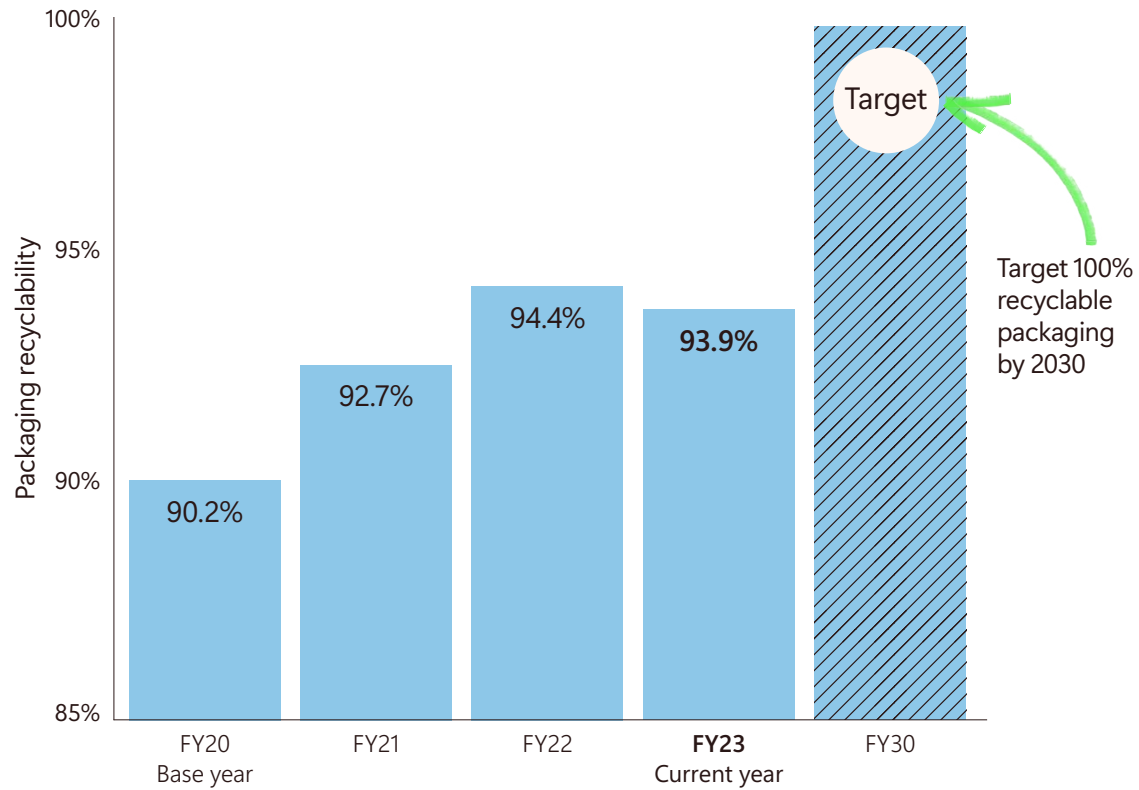
- 1 Fiber-based cushioning solutions to replace plastic foam.
- 2 Coatings to replace film laminations.
- 3 Paper-based security labels to replace plastic shrink wrap.

We take a data-driven, science-based approach to this work and the tracking of our progress. The packaging recyclability and single-use plastics percentages were included in our third-party assurance.

Improving device and packaging circularity continued

Waste Table 3—Designing our product packaging for circularity

In FY23, we achieved a rate of 93.9% recyclability across all Microsoft product packaging.

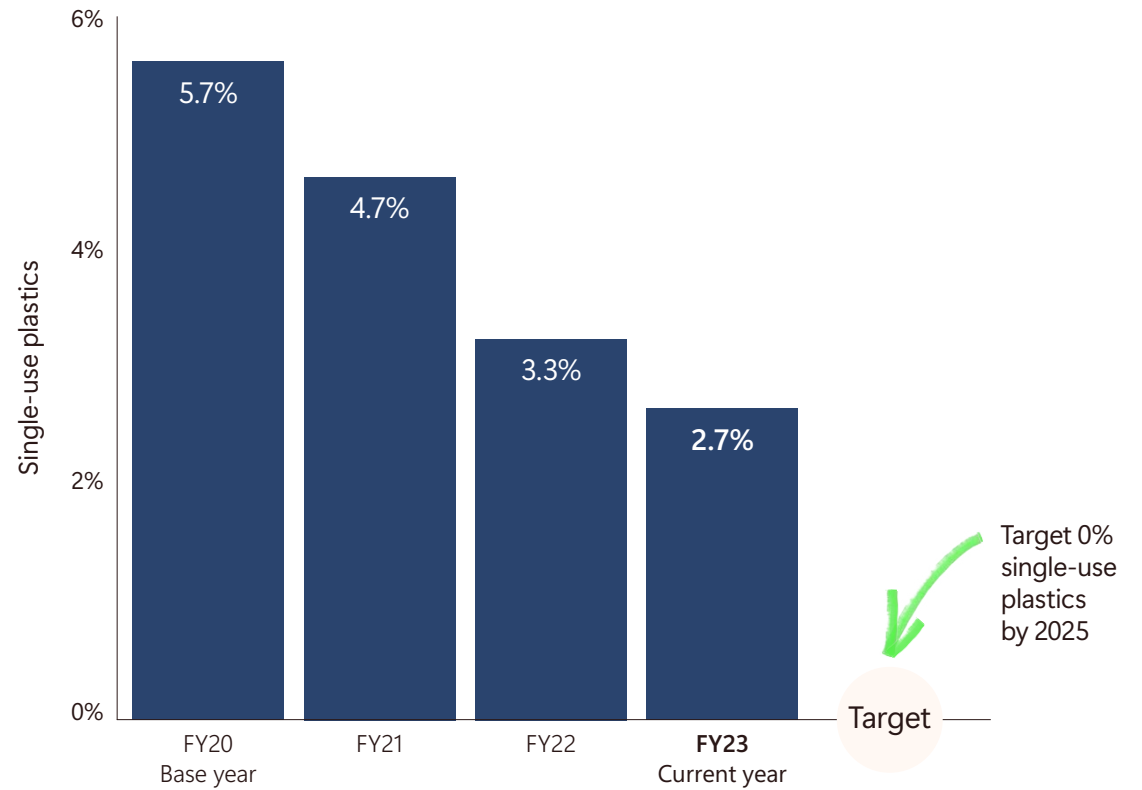


Find out more in our Data Fact Sheet



Waste Table 4—Reducing single-use plastics

In FY23 we decreased single-use plastics to 2.7% across all Microsoft product packaging.



Find out more in our Data Fact Sheet



Improving device and packaging circularity continued**Designing for repairability**

Designing our products for repairability reduces waste by enabling servicing of the component or sub-assembly needing repair. To reduce the overall waste impact of Surface products, we collaborate across the disciplines of engineering, design, and business to ensure that our strategies to reduce waste are circular, timely, and globally relevant.

In 2023, we filled out our new Surface device portfolio of repairable products with the launches of Surface Go 4, Surface Laptop Studio 2, and Surface Laptop Go 3. With the addition of these products, all our latest model devices include spare parts such as displays, motherboards, keyboards, and batteries.

We also increased access to services for commercial customers by growing our authorized service provider network by more than 50%, and increasing availability of spare parts for independent repair services and end users via the [Microsoft Store](#) online.

In addition to an expanded repair network, warranty support for our commercial customers enables in-region Same Unit Repair in select countries. This option provides our customers with choices, and it reduces waste.⁹

By making our devices more repairable, it is possible to extend their life.

▶ [Watch the video here: Surface Go 4](#)

Designing with more recycled content

We continue to pursue innovative design with the inclusion of recycled content such as aluminum, rare earth magnets, plastics, and gold and tin solder paste in key components of our products. Our Surface Thunderbolt™ 4 Dock and power supply unit enclosures (excluding the power cable) use 20% ocean-bound plastic and feature lighter materials than our previous docks.

Expanding takeback programs

In September 2023, we expanded our device Microsoft Store Trade-In Program to Canada for consumers. In addition, we also launched a new trade-in program for our commercial customers in the United States. Consumers and companies can trade in their end-of-life devices, extending the life of their devices through refurbishment where feasible, and where not feasible, providing environmentally sound management practices following Microsoft's end-of-life requirements ([H09117](#)) publicly available on our website.

20%

Our Surface Thunderbolt™ 4 Dock and power supply unit enclosures use 20% ocean-bound plastic.

In addition to expanding takeback programs, we are also expanding the scope of the products under our recycling program. Business customers can now return Surface Hub 2S computer cartridges for recycling in many countries globally, allowing customers to upgrade their existing Surface Hub 2S to the next generation computing platform.¹⁰

To improve discoverability and access to these programs, Windows 11 now allows OEMs to [include recycle and trade-in links](#) in the Settings app. Microsoft and other device manufacturers have included these links on their PCs. Approximately 150,000 customers interact with these links each month, based on Windows optional diagnostic data.



▲ We are expanding the scope of the products under our recycling program.

Learnings and what's next

Build circularity into everything

Microsoft will continue to implement our roadmaps across the company to further enable key activities that are expected to result in zero waste outcomes centering circularity. We will continue to scale our programs (including Circular Centers), design for circularity in buildings and hardware, and eliminate single-use plastics from packaging for Microsoft products and IT asset packaging in our datacenters.

In addition to further advancing circularity within our operations, we also see opportunities for broader industry to drive waste prevention activities, develop critical circular economy markets, scale enabling technology, and innovate circular materials.

Prevention is first

Prevention is critical to reduce waste, and initiatives to reduce and reuse materials should be prioritized to minimize consumption and reduce carbon emissions. Identification of prevention opportunities, such as redesigning products or prioritizing local reuse within a targeted geography, can contribute to a company's diversion rate while effectively moving the needle forward on circularity.



Market development is needed to help close the material recovery gap

Designing products for material recirculating is essential to accelerating circularity, but to achieve the intended impacts of design efforts, mature recovery markets need to be in place to safely collect and prepare materials for recirculation. Infrastructure, technology, policy, and financing are key drivers to extending the useful life of materials, and further market development is needed to close the gap on recovery.



Technology can scale circularity, collaboratively

Increased data visibility is generating key insights on the degree of circularity within products and solutions. To further accelerate the application of these insights, innovative technology, such as product tracking or "digital passports", can be utilized to support mass scaling of a collaborative and transparent circular system that generates engagement and increased transparency between producers and consumers.

Prioritize circular materials

Plastics and hard-to-recycle materials, such as fabrics or glues, can inhibit the recovery of a product and its components. By reducing hard-to-recycle materials and prioritizing more readily recoverable material choices such as metals and cardboard, designers can accelerate progress toward circularity by utilizing materials that can cycle through more systems.

Reuse and recycling go hand in hand

Microsoft continues to establish a foundation for reuse across the company. While the scaling of reuse efforts will continue to be prioritized, it is also important to improve recycling. Both are critical to accelerating circularity, and we must build on global progress to ensure that technology and infrastructure are available to improve both reuse and recycling.

Protecting our ecosystems

Ecosystems

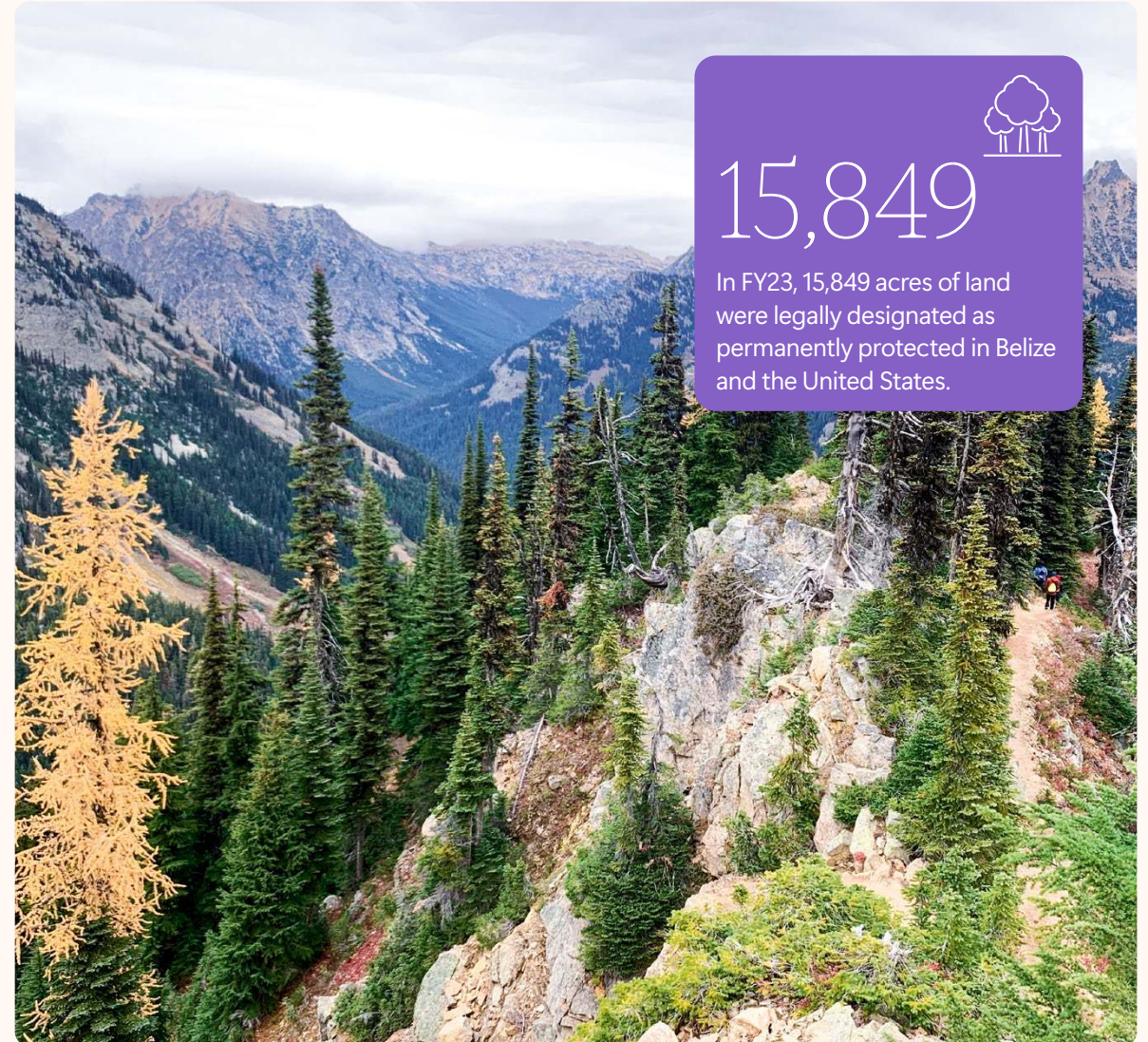
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Our approach

In 2020, we committed to protecting more land than we use by 2025. As of FY23, 15,849 acres of land have been legally designated as permanently protected. We have exceeded our land protection target of 11,000 by more than 40%.

AI gives new hope and opportunity for ecosystem and biodiversity management at a scale previously not possible. Researchers and practitioners are using AI to enable more reliable biodiversity monitoring and assessments, and to transform conservation decision making with the analysis of real-time data and early warnings of ecological tipping points.

Image captured by Darlene Campos, Director of Sustainability Strategy, United States



Our approach continued

Our targets

Taking responsibility for our land footprint

We will take responsibility for the ecosystem impacts of our direct operations by protecting more land than we use by 2025.



Image captured by Martin Tatar, Business Ops & Program Manager, Czech Republic

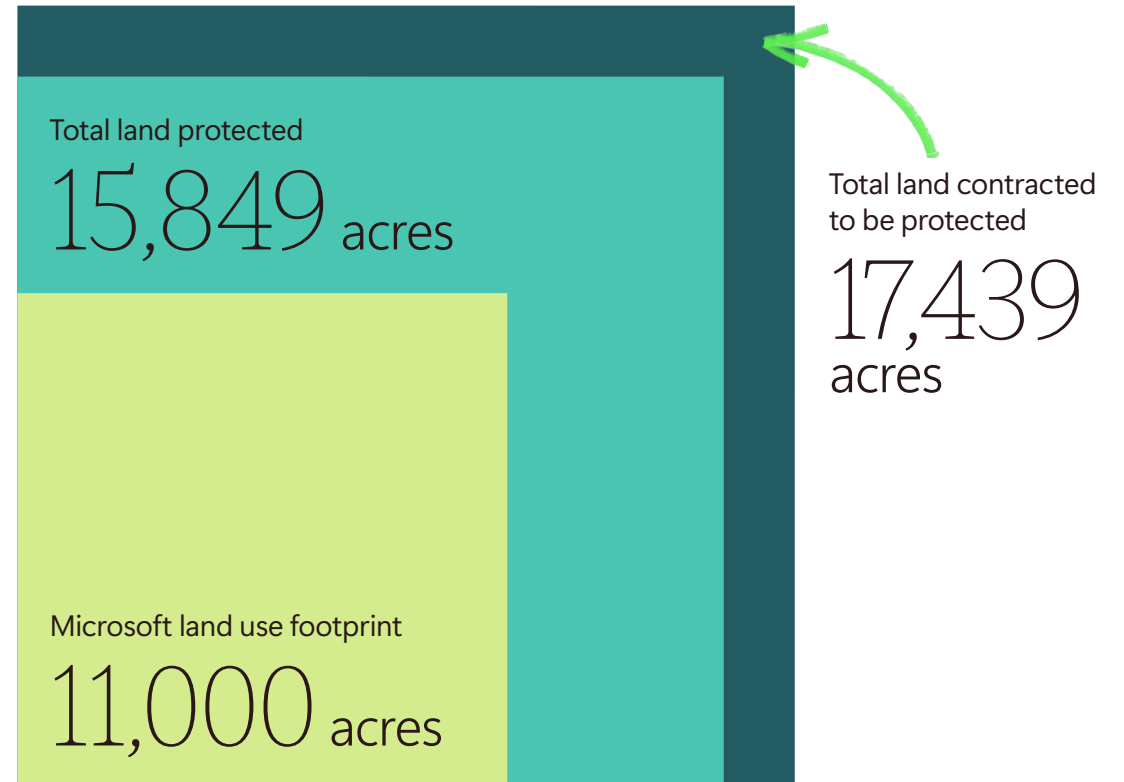
Our progress

✓ **15,849 acres permanently protected**

We have exceeded our land protection target of 11,000 by more than 40%.

Ecosystems Chart 1—Meeting our target of protecting more land than we use by 2025

As of FY23, Microsoft has contracted to protect 17,439 acres of land, and 15,849 acres were designated as permanently protected.



Improving biodiversity at our campuses

In FY23, we updated our Sustainability Standards for new construction to include ecosystem protection for both flora and fauna. Namely, for projects that include landscaping, a local expert will be consulted to avoid invasive species and ensure plantings are native to the area. And to protect local wildlife, projects that alter or update an existing facade will be designed to meet LEED Bird Collision Deterrence pilot credits.

1.3M

Open space occupies over 1.3 million square feet of the Redmond campus modernization project site area.

Designing more sustainable workplaces

Improvements made to our headquarters as part of the Redmond campus modernization project include protections for local ecosystems such as green roofs, open space restoration, and heat island reduction.

- The Redmond campus modernization project includes 31,000 square feet of green roofs. These vegetation-filled canopies provide habitats for pollinators and wildlife, while reducing rainwater runoff and creating pleasant scenery for employees on campus.
- The project is designed with a network of underground-only parking, restoring over 30% of the site area to open space, or nearly 1 million square feet. In lieu of parking, we've instead planted native and adaptive vegetation in restored soil in this area.
- Open space occupies over 1.3 million square feet of the Redmond campus modernization project's site area. In combination with the green roofs, this space helps mitigate water runoff as well as the heat island effect where large clusters of concrete and urban structures absorb and retain more heat compared to natural landscapes.



- ▲ Our Redmond campus modernization project includes protections for local ecosystems.

Together, these design choices contribute to better human, plant, and animal health, decreased pollution, and less required energy for cooling buildings on campus—creating a more enjoyable workplace in greater harmony with the landscape it occupies.

Biomimicry within our operations



Kaitlin Chuzi

Director of Biomimicry and Advanced Ecosystems

As the Director of Biomimicry and Advanced Ecosystems within the Microsoft Datacenter Systems Technology team, Kaitlin Chuzi brings 3.8 billion years of best practices in nature to the design table to champion an aspirational vision: creating technology that is indistinguishable from nature. A strong advocate for data-driven decision making, her vision is supported by practical, measurable strategies. Kaitlin's methodology—crucial in her efforts to support Microsoft's progress towards a net zero and nature-positive future—is to equip teams with a framework and tools to assess the impact of their designs on the natural environment and identify strategies to enhance the surrounding ecosystem and community.

Within the datacenter team, Kaitlin integrates biomimetic principles in construction and operations. She leads projects that demonstrate how technology can not only coexist with but enhance local ecosystems and communities. For Kaitlin, the nature of innovation is recognizing that we are part of nature and have the choice and ability to build products and technologies that have a positive, lasting impact.

Improving biodiversity at our campuses continued**Creating homes for pollinators on Microsoft campuses**

It's hard to overstate the importance of bees to our ecosystem. It's estimated that one third of our food supply depends on insect pollination, most of which is done by bees.¹¹ Yet, for reasons that range from habitat loss to invasive plants, pesticides, and climate change, bee populations globally have been declining over the last decade. By taking hundreds of thousands of bees under our wing, we're spreading awareness about the essential role pollinators play in maintaining biodiversity and working to create solutions to sustain them.

The benefits of urban beehives

When working to restore urban ecosystems, honeybees can be a great choice for nurturing healthy flora and promoting greater biodiversity. Honeybees have a wide flying radius and great pollinating abilities, all while being naturally docile and uninterested in humans. By increasing the pollinator population of the environment, we create a thriving campus that supports biodiversity.

**AI Accelerating progress with AI**

Protecting ecosystems and bees with AI



Belgian start-up, [BeeOdiversity](#), has developed what it calls BeeOimpact, a system that is using [machine learning to extrapolate bee-gathered data](#) over large areas. BeeOimpact uses machine learning in Azure Data Factory to identify areas where pesticides may be in high concentrations and assesses the impact of an activity on local biodiversity.

Once the data is analyzed, BeeOdiversity scientists make recommendations to clients and stakeholders to reduce pesticide use and improve the overall environment. "In that way we are working on factors like biodiversity and pollution," says cofounder Bach Kim Nguyen. "And in the end, we save the bees."

Protecting salmon

Our Redmond campus modernization project is the first Microsoft location in our portfolio to be certified Salmon Safe. This peer-reviewed certification in the US Pacific Northwest ensures our water reuse practices protect local watersheds and prevent harm to salmon. We've achieved this by constructing two rain gardens on campus and procuring metal landscape and building components that exclude zinc and copper, which can lead to toxic rainwater runoff for some aquatic species.



Increasing biodiversity at our datacenters

A primary consideration for our datacenter construction and use is biodiversity. Before any new development begins, we conduct thorough ecological assessments to understand the local flora and fauna. This helps to ensure we are aware of, and can take steps to protect, any endangered or native species in the proposed area. This process also results in benchmarks for ecosystem performance that help identify enhancements to improve the impact of our datacenters.

This effort doesn't stop at identification; we have developed design playbooks for our internal teams and are actively piloting solutions that support and enhance local biodiversity around our datacenters.

75%

Modeled results suggest efforts to restore and enhance ecosystems can recreate 75% of the function of the untouched ecosystem.

Wherever possible, we incorporate green building practices that not only reduce our carbon footprint but also support local ecosystems. Features such as green roofs and walls, native landscaping, and sustainable water management systems are integrated into our design concepts. These not only help to minimize our impact on local habitats but also may provide new ones.

Our approach to land development for datacenters is not just about building sustainably, but about coexisting harmoniously with the natural world, ensuring that as we grow, we also give back. Using the tools of biomimicry, we are assessing the impact of our datacenters and identifying opportunities to enhance the ecosystems around us. And, as we learn from our pilots, we are exploring how our designs for biodiversity can be implemented across our footprint.

Modeled results suggest that ecosystem performance can be restored to as much as 75%, as evidenced by where we are able to successfully recreate 75% of the function of the untouched ecosystem.

Our North Holland datacenter, located near Middenmeer, Netherlands, stands as an example to this commitment. In collaboration with the Hollands Kroon municipality, we embarked on an ambitious project to restore and enhance the ecosystem around the datacenter. Initiated in early 2022, the aim of Phase 1 was not only to integrate the datacenter visually with the municipality

but also to create a resilient ecosystem that supports biodiversity, manages stormwater, and prevents erosion.

The next phase will focus on soil remediation, preparing the ground for the introduction of diverse plant species aimed at attracting a broader range of birds and insects. The goal is to create a year-round thriving environment, emphasizing the importance of a diverse mix of trees and shrubs for wildlife.

AI Accelerating progress with AI

Overcoming biodiversity bottlenecks

As we expand our footprint to meet the demand for cloud services, we are implementing regenerative design solutions around our datacenters that enhance local biodiversity, improve stormwater management, and contribute to climate resilience. As part of this initiative, we are piloting AI-driven Microsoft technology to monitor and measure the impact of our solutions. This is a powerful example of how technology can be nature positive as well.

In late 2023, we deployed our first on-campus Microsoft Premonition device to pilot ecological monitoring. Premonition is a biological weather station that lures, monitors, and samples invertebrate species to easily track ecosystem services, biodiversity, and disease transmission.

This approach will allow Microsoft to measure the biodiversity impact of ecological enhancement efforts over time and validate that the ecological enhancements we deploy on our datacenter campuses have a positive impact on the local environment.

This innovative tool captures and analyzes a segment of the insect population, providing insights into the overall health of the ecosystem. As we learn valuable lessons through this pilot, we are exploring how these strategies can be incorporated across our footprint. This initiative underscores our unwavering commitment not only to the communities we operate in but also to the planet.



^ We are incorporating green building practices that support local ecosystems.

Protecting more land than we use

We've continued to make progress on our goal to protect more land than we use in partnership with the **National Fish and Wildlife Foundation (NFWF)** and **The Nature Conservancy (TNC)**. In addition to the 12,270 acres protected in Belize, we added 3,579 acres of land protected in the United States.

We are also working on recounting the amount of land that Microsoft directly operates on. We recount periodically to ensure that our protected lands continue to balance with land used.

3,579

In 2023, 3,579 additional acres of land were permanently protected in the United States.

Conservation projects in the United States

Buffalo Horn Ranch, Colorado

Preventing development and conserving vital sagebrush, riparian, and forestland habitat, as well as a migration corridor and pathway for two of Colorado's largest migratory ungulate herds, a conservation easement on Buffalo Horn Ranch north of Meeker, Colorado will permanently protect approximately 14,000 acres of critical winter and transition range for elk and mule deer.

Kootenai National Forest, Montana

Linking migration corridors for mule deer and elk, creating landscape continuity, and stitching together landscape-scale conservation efforts within the Kootenai National Forest in Montana, this project will protect 35,653 acres of habitat under permanent conservation easement. This easement is on track to close by mid-year 2024.



Land protection efforts in the United States help conserve vital migration corridors for deer, elk, and other animals.

Fort Union Ranch, New Mexico

Protecting 7,000 acres of native grasslands in northeast New Mexico, this conservation easement will improve habitat and enhance movement and migration for pronghorn and other wildlife dependent upon these grasslands. This area of Fort Union Ranch includes both winter and summer ranges for the pronghorn.

East Humboldt Range, Nevada

Conserving habitat along a critical migratory corridor for the largest population of mule deer in Nevada, as well as bighorn sheep, mountain goat, and several species of conservation priority including the greater sage-grouse, this project will permanently protect more than 12,000 acres of private rangeland along the base of the East Humboldt mountains in northern Nevada through a conservation easement.

Protecting more land than we use continued

Partnering to protect vital ecosystems



Protecting the Belize Maya Forest

In 2021 Microsoft made a contribution to help the Belize Maya Forest Trust in their quest to protect 236,000 acres in this biodiversity hotspot. This land was placed under declaration of trust by the Belizean government, putting 9% of Belize's land under permanent protection. The designation of land protection is just the first important step for the long-term conservation and management of Belize Maya Forest Project (BMF). The Belize Maya Forest Trust was established as a local nonprofit, trustee, and steward to create a globally recognized, locally relevant model of healthy, biodiverse forest protected for and by all Belizeans and to be a global benchmark for effective and lasting conservation.

Ranger program

To help legally enforce forest protection, the ranger force has increased to 12 local rangers patrolling the BMF. All the patrols are now being recorded using the open-source Spatial Monitoring and Reporting Tool (SMART) used by parks globally. A significant portion of the rangers' time, apart from anti-poaching patrols and maintenance, is dedicated to fire management training and fire suppression.



Regenerative agriculture

One reason for the acquisition of BMF was to halt the continued expansion of large-scale mechanized agriculture in the region. As such, part of the agreement between The Nature Conservancy and the Government of Belize is for additional investment in regenerative agriculture in the buffer zones neighboring BMF. Model and demonstration projects in partnership with the major stakeholders in the farming community, including the University of Belize's Central Farm campus and the Valley of Peace High School, will greatly assist to promote regenerative practices in the communities surrounding BMF.

The team and partners to date have planted approximately 1,500 native *Inga edulis* plants as part of an alley cropping system in which rows of *Inga* provide added biomass and nitrogen for soil health and integrity alongside the production of corn or other crops, as well as the establishment of two acres of cover crops that can be used as green manure or to produce seeds for sale to other farmers in the area.



Datacenter community environmental sustainability

The Microsoft Datacenter Community Environmental Sustainability program responds to local needs in the communities that host Microsoft datacenters and where our employees live and work. We are actively working to protect the environmental health of these communities. We support science-informed nature-based solution projects, designed for human well-being, social equity, and environmental benefits. Through partnerships with local leaders and organizations, we aim to identify priority environmental issues, build local partnerships, and actively participate in supporting sustainable solutions to protect and restore our communities' natural environments.

We support two main types of projects: Ecological restoration and urban forestry.

Over the past five years, we have funded 112 sustainability projects in partnership with these global communities, totaling \$6.7 million.

In 2023, we funded 22 new projects in 21 locations around the world, leading to over 20,000 urban trees supported and 30,000 square meters of area improved for human and ecological use.



Ecological restoration

Loudoun Wildlife Ecological Restoration

Loudoun Wildlife Conservancy's JK Black Oak Wildlife Sanctuary, near Microsoft datacenters in northeast Virginia, faces ecological challenges due to invasive species and excessive deer pressure. Microsoft is funding a project to restore the degraded habitat and biodiversity. Goals for this project include creating deer exclusion zones for understory recovery and removing invasive plants, which will benefit 541 plant and animal species.

The project fosters community engagement through volunteer involvement, nature walks, and digital outreach. After the funding period, the conservancy plans to continue its impact, applying lessons learned to enhance biodiversity, ensuring the long-term ecological and community benefits of the JK Black Oak Wildlife Sanctuary.

Cyberjaya Lake Gardens Ecological Restoration

The community-based Ecological Enhancement of Cyberjaya Lake Gardens project in Malaysia, is implemented with the support of the Sepang Municipal Council, SER, and Microsoft. The project aims to restore the 15-acre main lake, enhance biodiversity and water quality, and connect the local community to this important piece of nature.

This project is a holistic initiative aimed at improving the biodiversity of the area and water quality of the lake. The project's cornerstone is the use of nature-based solutions, such as wetlands for water filtration, biofilters for stormwater treatment, and habitat creation for biodiversity improvement. Moreover, it actively involves the local community including education institutions through citizen science initiatives.

Datacenter community environmental sustainability continued

Urban forestry

Tree Equity and Shade for Students in Phoenix

The Arizona Sustainability Alliance, in partnership with the City of Phoenix, American Forests, and Microsoft, is combating extreme heat in Phoenix by advancing Tree Equity in low-income communities. With 80 trees planted so far at local schools near the Microsoft datacenter campus, [this initiative](#) is helping to address the city's record-breaking high heat days by focusing on areas lacking trees, often affecting marginalized communities. The project enhances school environments by providing shade to decrease temperatures, improve air quality, and foster mental well-being. The schools' staff, students, and families actively participate, ensuring communities voices are heard. The Arizona Sustainability Alliance employs a five-year monitoring plan, collaborating with schools and providing ongoing teacher education, ensuring the project's long-term impact even beyond the funding period.



Trees for Schools and Urban Food Forests

In collaboration with Microsoft, Project Roots, and the Cartwright School District, Trees Matter is launching an initiative in West Phoenix. Targeting Title I schools and nearby communities, the project combines Trees for Schools and Urban Food Forests programs. Working with Cartwright's STEM and food service experts, the initiative educates students and residents about local food systems and tree cultivation, focusing on tree identification, harvesting, and processing, and community members are encouraged to explore nearby food sources. Microsoft volunteers will participate in tree planting events at Cartwright schools, promoting environmental awareness. This initiative aims to empower marginalized communities, inspire environmental consciousness, and foster sustainable local food systems in West Phoenix.



Cool Streets

In partnership with Blacktown City Council, Microsoft is leading a [local initiative in Sydney and Melbourne](#) to combat urban heat and reduce carbon emissions by planting 400 street trees in sun-exposed areas. Urban areas globally are warming 29% faster than rural ones, making trees crucial for cooling neighborhoods and absorbing carbon dioxide. The Hebersham project engages the community, allowing residents to contribute to the tree planting design, considering factors like appearance and environmental impact. Over 80 Microsoft employees and local citizens planted 45 large canopy trees, along with shrubs and understory plants, in Heber Park at Hebersham. The initiative promotes community collaboration, enhancing public spaces' livability while addressing climate change. Microsoft's volunteer hours are matched, and donations go to reforestation nonprofit One Tree Planted.



Jarama Riverbed Revitalization

Fundacion FDI, with support from Microsoft and One Tree Planted, planted 2,000 trees along Madrid's Jarama riverbed from January to May 2023. [This initiative](#) aims to restore a five-hectare area near our San Sebastian de Los Reyes datacenter community, improving water quality, sequestering 547 tons of carbon over 50 years, and enhancing biodiversity. The project creates a green space for the community and benefits at-risk species. Fundacion FDI prioritizes inclusivity, involving people with disabilities as volunteers and paid employees. Future plans include an environmental education center in collaboration with local schools. This collaborative effort tackles environmental issues while fostering community engagement and education.



Learnings and what's next

Datacenters that support local ecosystems

Microsoft's vision of a sustainable future is one where technology and nature coexist and thrive, and that includes designing datacenters to serve both functional and environmental goals. This sets the stage for sustainable development and community engagement.

In our commitment to our environmental stewardship, we have completed concept designs for five additional datacenter campuses across four regions. This will help to ensure we create a regenerative framework that is globally applicable and locally configurable.

Supporting biodiversity with AI

Preventing and reversing biodiversity loss requires early detection and a deep understanding of the factors driving change. AI can help us better monitor and track biodiversity at a scale not previously possible. Access to real-time data and insights can inform better conservation decisions at critical moments. We will continue exploring how machine learning, geospatial, bioacoustics, and computer vision data can be used to support conservation of global ecosystems.



Image captured by Haley Alesi, Senior Sustainability Manager, United States

Progress through partnership



Ellen MacArthur Foundation

Microsoft is a Network Partner of the Ellen MacArthur Foundation, which is focused on developing and promoting the idea of a circular economy. We are elevating opportunities for Microsoft employees to learn and engage on topics of the circular economy through community platforms, workshops, events, courses, and collaborative projects.

➔ [Learn more about the Ellen MacArthur Foundation](#)



The Carbon Call

Microsoft was a founding member of The Carbon Call, a ClimateWorks Foundation-hosted initiative, that mobilized action to improve the interoperability of digital GHG accounting infrastructure. The Carbon Call developed solution blueprints for better discovery, understanding, and sharing of GHG data, key to tracking our progress to a net zero carbon economy.

Wide adoption of these solution blueprints will facilitate data exchange across supply chains and increase transparency and accurate interpretation of corporate carbon disclosures. ClimateWorks Foundation will advance these solution blueprints with standard-setters and regulators through their global intelligence advocacy efforts, in collaboration with xBRL International.

➔ [Learn more about The Carbon Call and the ClimateWorks Foundation](#)



Student Energy

Student Energy is a global youth-led organization with ~50,000 members (college and young professionals) in 120 countries. Student Energy provides clean energy educational resources and training, convenes the largest student clean energy summit, and has launched a program supporting student leadership of clean energy projects. LinkedIn has partnered with it for six years. The LinkedIn ad grant enables it to expand its membership, promote its summits, and raise the visibility of its online resources.

➔ [Learn more about Student Energy](#)



Greenlining

Greenlining is based in Northern California and works with local organizations to bring economic opportunity to communities of color. Its programs include a Greenlining the Block initiative, an academy for leaders, and policy advocacy. LinkedIn's grants have enabled it to expand its online reach and visibility and raise awareness for climate equity and justice.

➔ [Learn more about Greenlining](#)

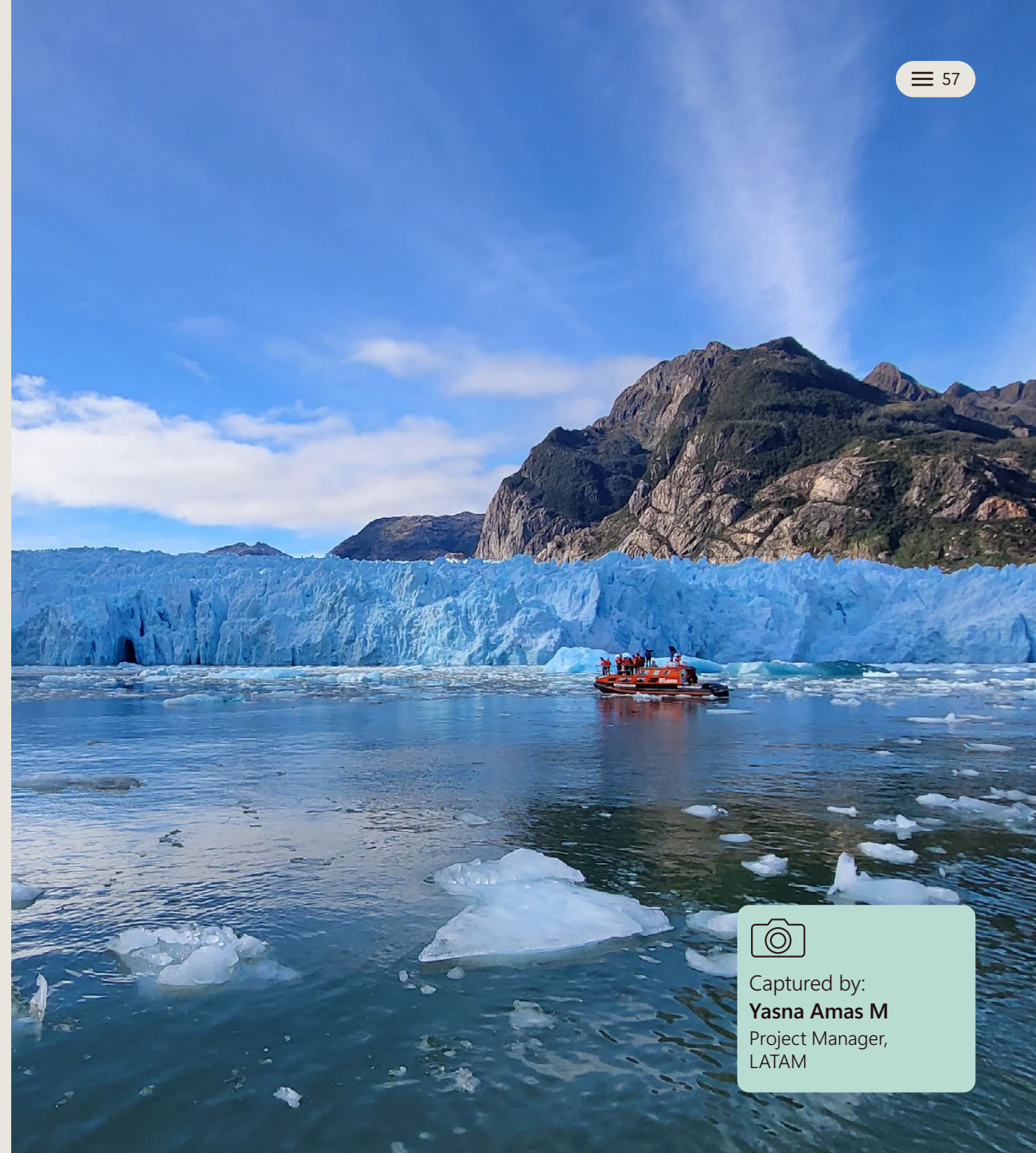


Customer sustainability

How are we advancing technology for net zero?

Microsoft is committed to helping to provide the digital technology needed to build a more sustainable world and supporting our customers on their own sustainability journeys. From creating tools to better measure and manage environmental data through Microsoft Cloud for Sustainability, to reducing the carbon intensity of our devices and building the Planetary Computer, we understand that not one person or company can solve the climate crisis and technology can play a powerful role in accelerating progress.

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Captured by:
Yasna Amas M
Project Manager,
LATAM

Our approach continued

Customer sustainability



Our targets

Empowering customers and partners

We are working to help our customers, partners, and suppliers around the world to reduce their carbon footprints, understand water-related risks, and make environmental decisions through our learnings and with the power of data, AI, and digital technology.

Building a Planetary Computer

We are aggregating environmental data from around the world and putting it to work through computing and machine learning in a Planetary Computer.

Our progress

✓ Measuring and managing sustainability data

Microsoft Cloud for Sustainability helps customers to track and to manage sustainability data at scale. In 2023, we expanded Microsoft Sustainability Manager to include Scopes 1, 2, and all 15 categories of Scope 3 carbon emissions across organizations' operations and value chains.

✓ Empowering communities with planetary data

We are providing open access to petabytes of environmental monitoring data in consistent, analysis-ready formats to help empower communities with actionable information.

We are working to create devices that are built with integrity and with reduced waste and carbon impact across their life cycles.



Microsoft Cloud for Sustainability

Throughout our Microsoft sustainability journey, one of the most important things we've learned is that we need better data. As we've worked to address this challenge, it has led us to advance our reporting and management tools to garner richer insights and inform our actions. In keeping with our commitment to empower others on their own sustainability journeys, we are sharing our learnings and technology to help customers more efficiently advance their progress with data.

Microsoft Cloud for Sustainability helps organizations to track and manage data at scale and to unify ESG data so they can record, report, and holistically understand the sustainability impact of their organization and value chain. With a solid foundation for managing ESG data across their business units and value chains, organizations can be more prepared to gain the insights needed to make data-informed decisions that can help to transform their business.

Monitoring and managing environmental sustainability performance

In 2023, we expanded Microsoft Sustainability Manager, enabling calculation and data management of Scopes 1, 2, and all 15 categories of Scope 3 carbon emissions across organizations' operations and value chains. These new capabilities also give customers the ability to gain full visibility into their environmental impact to address reporting needs. In addition, a new ESG value chain solution in Sustainability Manager enables customers to use surveys and customized workflows to collect from their value chain partners the detailed data about sustainability activities needed for reporting, science-based target setting, and reduction strategies.

Additionally, the Microsoft Cloud for Sustainability data model was expanded in preview to support water data. The model makes water data available for use cases such as water sustainability disclosures and regulatory water quality reporting.



Sustainability Champion:

Matt Hellman

I am a Sustainability Global Black Belt (GBB) at Microsoft, where I work with customers to achieve their sustainability targets by adopting best practices and technology solutions. I am also a co-leader for the Sustainability Connected Community (SCC), a global network of employees at Microsoft who are passionate about learning, inspiring others, and activating sustainability in their lives and careers. Climate change is the most urgent challenge we face, and we all have a role to play in shaping our future. It is the intersection of making a positive difference for the planet and driving value for our customers and partners that motivates and empowers me every day.

Analyzing and reporting ESG performance

As the world shifts from voluntary to regulatory environmental sustainability reporting, tools that can help capture and analyze data at scale will become increasingly important.

In 2023, we introduced Project ESG Lake (Preview), enabling organizations to centralize and standardize data in a comprehensive ESG data estate. This solution offers an expansive ESG data model that organizations can use to transform data from across business units and supply chains into a standard schema ready for advanced analytics and reporting.

To help our customers track the required actions and document evidence for emerging ESG reporting and compliance initiatives, we rolled out the first of several planned new reporting templates in Microsoft Purview Compliance Manager.

For regulations coming from the European Union's Corporate Sustainability Reporting Directive (CSRD), we released the CSRD template (Preview). This new template will help organizations to explore and plan for the data required for CSRD and will enable data governance workflows to collect data for disclosures, internally review disclosure data, and generate a draft report for reviewed disclosure data.

Microsoft Cloud for Sustainability continued

Empowering organizations with guidance and training

In support of our goal of building a community of shared learning and action, in 2023 we:

- ✓ Published new LinkedIn Learning modules to share learnings on how sustainability affects organizations and how to minimize environmental impacts.
- ✓ Made technical guidance available within the [Azure Well-Architected Framework](#), focused on workload optimization strategies to help organizations build more sustainable IT.
- ✓ Released new [Well-Architected for Industry guidance](#) to help organizations build Microsoft Cloud for Sustainability workloads using proven best practices and scalable principles for cloud adoption and governance.

Other tools created to empower customers on their sustainability journey include the [Emissions Impact Dashboard](#) and Environmental Credit Service.

Emissions Impact Dashboard is a tool to improve transparency into the carbon emissions generated by the use of Azure or Microsoft 365 cloud services. Using third-party validated methodology, the application factors in Microsoft's Scope 1, 2, and 3 (direct and indirect) emissions as well as the efficiency of a customer's on-premises environment.¹²

[Environmental Credit Service \(Preview\)](#) is a managed service under Microsoft Cloud for Sustainability that provides a [common infrastructure](#) to track environmental credit provenance from creation through retirement. This service helps decrease time to market and increase the quality and quantity of credits—ultimately giving credit purchasers more confidence and fueling marketplace momentum.

Turning data into insights with AI

Access to more reliable data intelligence enables organizations to make more targeted decisions about their sustainability strategies. To help customers perform advanced analytics and generate even more detailed, actionable data insights, we have built AI into many of our sustainability products and solutions. New features in Microsoft Cloud for Sustainability such as Intelligent Insights, released to preview in 2023, help organizations find outliers, trends, and correlations between their activity data and calculated emissions through an integrated and interactive AI model. These insights can inform more impactful decisions for companies and the planet.

Accelerating progress

Companies around the world have begun implementing Microsoft Cloud for Sustainability tools to improve sustainability and business growth.

OSTP Group, a Nordic-based manufacturer of welded stainless steel tubular products and custom equipment for pressure corrosion applications, prioritizes sustainability and has an ambitious target to be carbon neutral at its sites by 2025. Using Microsoft technologies, including Microsoft Cloud for Sustainability, OSTP built a digital platform to gather and report carbon dioxide emissions data in real-time. Cloud for Sustainability helps OSTP measure emissions accurately and in near-real-time and unify data intelligence providing a more comprehensive view of the impact of its operations and value chain.



Automation, transparency, and centralized visibility enable everyone from executives to frontline business workers to access the data they need while spending less time on data collection. AI capabilities in Microsoft Cloud for Sustainability will aid faster decision making and help the organization optimize its roadmap.

Devices

Sustainability is a core part of our product promise—we work to create devices that are built with integrity and with reduced waste and carbon impact across their life cycles.

We are committed to reducing the carbon intensity of our devices and we've made significant investments in designing for a smaller manufacturing footprint by reducing waste, moving to more efficient manufacturing processes, and increasing the use of recycled and repurposed materials.

Designing and building for circularity

We have embedded ecodesign principles, as outlined in the ISO/TR 14062 standard, into our internal product development process, positioning sustainability and circularity as foundational elements of innovation.

- 1 Starting at a new product's inception, defined roles and clear sustainability targets are set to guide decision making throughout development.
- 2 During the initial design stages, screening life cycle assessments (LCAs) are used to gauge potential carbon reductions of various design concepts and to assess circularity.
- 3 Upon the product launch, detailed LCAs measure the tangible achievements in carbon reduction and circularity, offering valuable insights for future design improvements.

We publish the carbon footprint of each device, along with other sustainability metrics, in our [Eco-profiles](#). Rigorous third-party ecolabels and standards provide validation of our products' environmental attributes and achievements.

Extending the life of our devices

Designing for circularity conserves resources, minimizes waste, and extends the lifespan of our devices.

Our devices are designed to be easier to service and maintain so that customers have more flexibility and opportunities to extend their use. As we design products that are easier to service with more replacement components and expanded device servicing options, we also continue to grow our service network to offer servicing alternatives closer to our customers. This encourages consumers to choose servicing over replacement by removing perceived barriers and inconvenience, and by reducing cost.

The newest generation of Surface Laptop, Surface Pro, and Surface Laptop Go lines are the most repairable devices in their product lines to date; and for customers interested in self-service, we now offer spare parts on the Microsoft Store.¹³

Reducing the impact of product usage

Our newest laptops and tablets are ENERGY STAR® Certified and registered EPEAT® Gold in more than 30 countries. We continue to focus on increasing the energy efficiency of our devices to reduce direct emissions.

Our latest products are ENERGY STAR® Certified, consuming less than the recommended energy limit set by the latest ENERGY STAR® computer specification. For example, our Surface Laptop Go 3 uses 52% less energy and our Surface Laptop Studio 2 uses 65% less energy than the ENERGY STAR® limit.

Surface Emissions Estimator

Since its inception, the emphasis for the Surface Emissions Estimator has been to facilitate ease of use and accessibility for all Surface customers. This goal was further heightened in September 2023, with the tool accessible on a standalone webpage, and integration into Microsoft Intune and the Surface Management portal, thereby expanding its reach to millions of new customers. This progress helped to establish a new benchmark for other device manufacturers. We continue to work to embed CoPilot in Windows 11 chat functionality into the Surface Emissions Estimator, aiming to demystify data interpretation for customers, eliminating the need for extensive knowledge in life cycle assessment or sustainability in order to understand an individual's emissions impact.

▲ The Surface Thunderbolt™ 4 Dock uses 20% ocean-bound plastic.

Devices continued

Xbox

Xbox is the first gaming console to offer carbon-aware game downloads and updates as part of Shutdown (energy saving) mode. We have made significant strides in enhancing the energy efficiency of these devices while simultaneously adopting innovative approaches to product design aimed at reducing waste and increasing recyclability within our Xbox controller lineup.

Recognizing that a substantial portion of emissions in the Xbox value chain stems from console usage, our primary focus over the past year has been to transition the majority of our players to Shutdown mode. This Shutdown energy saving mode offers up to 20 times reduction in power consumption compared to the higher power Sleep mode. Importantly, players still maintain the ability to download updates for all their software while in energy saving mode.

We have also revamped the update process, positioning the Xbox as the world's first gaming console with carbon awareness. This innovative feature means that when a console is plugged in, connected to the internet, and has access to regional carbon intensity data, Xbox will intelligently schedule game, app, and OS updates during times when renewable energy is at its highest in the local energy grid. This scheduling not only ensures convenient updates but also strives to minimize carbon emissions by aligning updates with periods when a higher proportion of electricity on the grid is derived from lower-carbon sources.

New in 2023, Xbox also added the Active Hours feature. Those that select the Sleep power option can now adjust their console's active hours. Xbox will boot quickly and be available for remote wake during the user's selected active hours. When the active hours are done for the day, Xbox will fully shut down and will draw 0.5 W versus 10–15 W while active.

This year at Gamescom 2023, the world's biggest event for computer and video games and Europe's biggest business platform for the games industry, Phil Spencer, on behalf of Xbox, was honored to be presented with the Green Game Studio of the Year award in recognition of the industry advancements we have made.

Case study

Supporting game creators and developers

The launch of the [Xbox Developer Sustainability Toolkit](#) in March 2023 marked the start of empowering game creators and developers with the knowledge and resources they need to enhance the environmental impact of their games. This toolkit introduces a range of analytical and visual systems, measurement tools, and valuable resources that empower creators to make well-informed decisions regarding their games' energy consumption to lower gamers' energy bills and lower carbon emissions. By utilizing the toolkit, game developers gain access to precision engineering insights that enable them to pinpoint and reduce energy usage during moments when players don't require maximum power, all while safeguarding the overall gaming experience from any adverse effects. We've already seen great success with games like Halo Infinite, Fortnite, Call of Duty: Warzone 2, and more.

Following the initial collaboration with Xbox, and as a result of these changes, Epic estimates around 200 MWh per day of savings across the total player base of Fortnite, or 73 GWh per year, which is the equivalent to 14 wind turbines running for a year.¹⁴ Just as importantly, Epic has helped to reduce the energy bills of its players on Xbox and other platforms.

Case studies from our collaboration with some of these studios can be read on [Xbox Game Devs Docs](#) today. Xbox continues to partner with the UN-facilitated Playing for the Planet alliance to promote sustainable game design. We continue to add more to our innovative Sustainability Toolkit and are collaborating with even more studios into 2024.



200 MWh per day

of savings across Fortnite's total player base, or 73 GWh per year, which is the equivalent to 14 wind turbines running for a year.¹⁴

Devices continued

Improving design and efficiency with AI

Our life cycle assessments (LCAs) help to build sustainability into our devices with the goal of facilitating product and supply chain decision making at a larger scale.

Partnership between Microsoft software engineering teams and Makersite—an AI and data company specializing in digital twins—has transformed our LCA process by shifting from directional modeling to a supply-chain-focused environmental impact accounting approach. Makersite's AI gives us the capability to automate the analysis of electronic product bill of material (BOM) data and material composition data—modeling each part, component, and sub-assembly down to the chemical composition. Manual effort is significantly reduced compared to a typical LCA process, while granularity and representativeness is improved.

Improving efficiency

Last year, we announced that a limited run of enhanced Xbox Series X|S consoles containing power supply energy monitoring began providing us with anonymized insights into console power consumption. Over the course of 2023, we have been able to use this telemetry to build all-new data models and reports showing the dynamic power consumption of individual titles across the Xbox platform. By doing so, we have been able to work with gaming development studios 343 Industries, Mojang, Infinity Ward at Activision, Epic, and others to support our publishing partners in their own pursuit of improving their energy footprint.

Microsoft continues to align with the Global Logistics Emissions Council framework. This globally recognized and verifiable calculation method is applied across all shipments in the global supply chain network to calculate carbon emissions. Shipment-level emissions data empowers everyone across the supply chain organization through data, reporting, simulation, and the ability to drive decisions to reduce Microsoft's emissions.

We continue to focus on increasing the energy efficiency of our devices to reduce direct emissions.

Advancing measurement and accountability

In FY23, we focused on improving data relevance and precision. First, to better reflect our supply chain and the impacts associated with the manufacturing of our products, we shifted from a spend-based approach to using product-specific carbon footprints to account for the emissions of our devices. In addition, we have enhanced our LCA approach, moving away from a generic model based on secondary data to a more detailed model including more supplier data. Second, although our customer use phase methodology is already informed by real-world optional diagnostics, a detailed analysis revealed some areas of improvement, such as shifting from monthly to daily data.

Microsoft has used optional diagnostic data from Windows devices to estimate power consumption since 2020, and each year we have worked to improve the quality of the methodology. Requiring numbers to be re-baselined each year is necessary to pursue increasingly better data. Initially, we took a simple approach of gathering Windows optional diagnostic data, averaging daily energy consumption for all sampled devices over a month, and extrapolating to the entire group. We then worked to refine the data; by grouping devices by characteristics significant to energy consumption before extrapolation, we were able to focus only on devices that were being actively used.

Microsoft Devices is working with the Carbon Trust and other leading tech companies, such as Amazon, Meta, Samsung, and Sky, to develop an industry-first specification for measuring, accounting for, and decarbonizing the carbon emissions associated with connected devices while being used by customers.

Microsoft and Xbox, as part of Playing for the Planet, have also worked with the Carbon Trust to develop a report which aims to provide clarity on the complexity of emissions related to video gaming, and how they can be addressed going forward. As a next step, Xbox is currently working with Playing for the Planet and the Carbon Trust to build a carbon calculator for video game businesses, to support the industry in reducing its carbon footprint.



^ We continue to explore how AI can help improve the design and efficiency of our devices.

Devices continued

Manufacturing and sourcing for sustainability

In the past year we have made significant steps in improving the sustainability impact of our manufacturing and sourcing practices. Some examples include:

- Increasing the amount of renewable energy used in our manufacturing supply chain. In FY23, 59 suppliers transitioned to using renewable energy in manufacturing facilities for Microsoft with six transitioning to 100%. These efforts contributed to 105,000 mtCO₂e, avoiding emissions roughly equivalent to 21,000 homes' annual average energy usage.
- Increasing the number of our suppliers responding to the CDP climate change questionnaire from 98.3% in 2022 to 99.4% in 2023. This enables Microsoft Devices to have greater visibility into supplier progress towards a sustainable future by partnering with suppliers to identify areas of improvement, set targets, implement best practices, and track progress.
- Improving the integrity of the decarbonization data shared by our suppliers by conducting internal audits and independent third-party external audits, including onsite supplier assessments for suppliers who transitioned to using renewable energy in FY23.

- Quantifying the decarbonization impact from our suppliers transitioning to renewable energy, through improvements to our LCAs. By shifting away from using generic industry models to supplier-specific primary data, the decarbonization efforts from our suppliers' transition to renewable energy are being reflected in our products. For example, increased use of documented renewable energy in the supply chain resulted in a reduction of approximately 13 kg CO₂ equivalent in the carbon footprint of each Surface Laptop Studio 2 as compared to the previous generation Surface Laptop Studio.¹⁵



Decarbonizing our device supply chain

Meeting our decarbonization goal and achieving carbon negativity by 2030 requires focus on three key areas in our device supply chain: measurement and visibility, optimization control, and instilling technology and operational enhancements to drive emissions reduction and lead the industry.

Measurement and visibility

The financial budget is mirrored and translated into a carbon emissions budget for logistics. This enables precise emissions target setting for monthly/quarterly reporting actuals against targets, driving transparency across the business and enabling decision making and recalibration to the annual target and control annual results. Microsoft Devices logistics emissions resulted in a 10% reduction in emissions. Of that reduction, 5% is tied to reduction initiatives throughout our logistics network.

Optimization control

Containers for Xbox are loose loaded rather than palletized, saving over 400 containers' worth of emissions, or 280 mtCO₂e. Use of reusable, lightweight pallets from factories to destinations resulted in a savings of 950 mtCO₂e.

Technology and operational enhancements

Electric vehicles and alternate fuel emissions remain a focus of outbound shipments and final mile deliveries. Approximately 25% of all online consumer deliveries were made with an electric or carbon neutral option. Our devices supply chain drove initiatives and solar installation across the distribution network, resulting in three net zero distribution facilities, with a reduction of over 1,000 mtCO₂e annually.

25%

Approximately 25% of all online consumer deliveries were made with an electric or carbon neutral option.

Green software

Microsoft remains committed to adopting green software engineering principles in every step of building, deploying, and managing software applications, making them carbon efficient. Carbon efficient software can be described as energy efficient (uses less energy to perform a given workload), hardware efficient (uses less hardware to do the same workload), and carbon-aware (does more when the available electricity is cleaner and does less when the available electricity is dirtier).

The following sections detail what Microsoft is doing to increase the carbon efficiency of our software, and to advance green software practices with customers and partners and across the globe.

[Energy Recommendations](#) make it easier for customers to make choices about their energy settings.

Windows energy recommendations

With Windows running on more than a billion computers around the world, small software and configuration changes in the operating system can result in significant reductions in energy consumption for our customers. With the introduction of Energy Recommendations in Windows 11 in February 2023, we continued the work we started in 2022 to make Windows carbon aware, with a focus on empowering customers to reduce energy consumption and carbon emissions, and improve battery life.

Energy Recommendations make it easier for customers to make choices about their energy settings. This collection of settings can have an outsized impact on power consumption. In the first four months this functionality was available (February to June 2023), approximately 11 million customers adopted one or more recommendations.

Developing standards, tools, and best practices

Microsoft continues to be a steering member of the [Green Software Foundation](#) (GSF). With members on the steering committee, various working groups, and developers on [Open Source projects](#), Microsoft remains committed to building a trusted ecosystem of people, standards, tooling, and best practices for creating and building green software.

Some of our accomplishments together include:

- The Software Carbon Intensity (SCI) Specification, an easy-to-implement industry standard created by the Green Software Foundation to help organizations understand and prioritize their approach to reducing carbon emissions. It is in the final stages of ISO's review to become an ISO standard, which is the first step in becoming an internationally recognized standard.



- ▲ We seek to build a trusted ecosystem of people, standards, tooling, and best practices.

- The Impact Engine Framework, a new project designed to help technologists to model, measure, simulate, and monitor the environmental impacts of software without having to code using a plug-in infrastructure. The Azure model was one of the first to be created and showcased at the 2023 Decarb Software event.

- Releasing a white paper, in a partnership with UBS and WattTime through the Green Software Foundation, outlining our contributions to the open-source [Carbon-Aware software development kit \(SDK\)](#). The Carbon-Aware SDK tool lets developers use a web API and command line interface to assist in building carbon-aware software, enabling any organization to become carbon-aware by modifying computation to take advantage of the lowest-carbon sources of energy possible.

Additionally, Microsoft Learn offers training on the [Principles of Sustainable Software Engineering](#) for developers to build green software skills through hands-on learning. The training helps developers to understand a core set of competencies needed to define, build, and run green software applications.

Green software continued

Empowering change with cloud computing and AI

Vestas is using a combination of simulation, modeling, and machine learning in its business, from minimizing the wake effect affecting windmill turbines within wind farms to designing the turbines themselves.

Microsoft and Vestas co-developed an improved solution for the existing Vestas Turbine Simulator (VTS) to run large-scale simulations for wind turbines to help determine optimal placement in wind farms and material design for location. The solution uses Green Software Foundation's Carbon-Aware SDK to efficiently move workloads between regions. Vestas has deployed this solution to help it lower carbon emissions based on renewable production capacity, and to optimize cost by utilizing spot instances availability in the regions.

Microsoft is also collaborating with weather intelligence leader **Tomorrow.io** to introduce an innovative cloud-based solution to bridge the weather risk gap with swift, efficient, affordable, and reliable solutions. This pioneering solution harnesses Tomorrow.io's extensive global coverage, which includes near real-time data from a novel weather radar satellite constellation, and incorporates it with a machine learning and AI-powered, high-resolution global weather model hosted on the Azure High-Performance Computing platform.

“The time for climate adaptation is now. It is encouraging that Microsoft is leading by example to prioritize getting the most advanced technology in the hands of those who need it most and making access a priority above all else. We're excited to bring this weather intelligence to Africa”.

Shimon Elkabetz,
CEO and Co-founder at Tomorrow.io

The primary objective is to provide governments in the Global South with the opportunity to empower existing meteorological agencies, enabling weather intelligence, early warning systems, and climate information to citizens and organizations.

Helping customers and partners optimize Azure workload

Microsoft developed new technical guidance and best practices to help customers and partners adopt and operate on Azure sustainably as part of the [Cloud Adoption Framework](#). This covers guidance across the cloud adoption journey, from strategy and planning to optimized landing zones, sustainable cloud operations, and governance setup.

We're working across Microsoft to [help customers and partners plan their path forward](#), improve sustainability, and create new business value while reducing their operational footprint. This includes:

- Sustainability guidance within the [Azure Well-Architected Framework](#), designed to help optimize Azure workloads for greener IT, as well as a new [Azure Well-Architected Framework sustainability self-assessment](#).
- The newly launched Cloud Adoption Framework – Sustainability Guidance.
- Sustainable software engineering practices in [Azure Kubernetes Service](#), which includes design and configuration checklists, recommended design, and configuration options.
- Educational sessions, hackathons, and value-based delivery workshops run by our Customer Success Unit for customers interested in optimizing their Azure environments and applications.

Azure AI and Wildlife Protection Solutions

Wildlife Protection Solutions (WPS) uses remote cameras to gather image data about the status of the species it protects, but the number of images that must be analyzed before action can be taken is overwhelming. To overcome this challenge, WPS uses MegaDetector, an AI model developed by Microsoft AI for Earth, running on Microsoft Azure Virtual Machines to accelerate the processing of camera trap images. MegaDetector improves threat detection accuracy and processes images faster than other AI models tried, in some cases by up to 50%. The processing power of Azure AI infrastructure makes a critical difference and offers performance gains.

Arts and culture

Ahluwalia Circulate and Symphony Unlocked

Innovations in AI are a critical component to accelerating circularity in the fashion industry. This year, we brought together two existing Microsoft partners, EON and Ahluwalia, to extend access to data traceability at the product level and enable customers to feel a deeper sense of connection with the garments they're wearing.

"Building a circular economy depends on data," explains Natasha Franck, Founder and CEO at EON.

"We need visibility of products at every stage of their life cycle—how they're made, where they're made, and how they're recycled. That's a huge challenge in the fashion industry, where clothing brands have notoriously complex supply chains."

Ahluwalia's Autumn/Winter 23 collection, *Symphony Unlocked*, features Digital IDs powered by EON's Product Cloud platform, built on Microsoft Azure. To reveal a unique story and soundtrack behind each piece, customers scan a QR code on their garment with a smartphone. Ahluwalia endeavors to encourage people to cherish and nurture their garments by providing digital access to the stories behind each product. With this transparency, enabled by technology, they can also discover each item's unique production process and the creative inspiration.



▲ Ahluwalia aims to provide transparency at every stage, from creation to closet.



▶ Watch the video here: [Ahluwalia Symphony Unlocked – Microsoft Unlocked](#)

"The way our community connects with our brand and our clothes is important to us. Technology is helping us to ensure the story behind our clothes is heard and seen."

Priya Ahluwalia,
Creative Director and Founder of Ahluwalia

Ahluwalia collaborated with Microsoft in 2021 for the award-winning *Circulate Program*, creating an entirely new AI platform that would allow customers to upcycle and recycle their preloved clothes. Circulate has since become an integral part of Ahluwalia's operations. The incorporation of Digital IDs powered by EON into their new clothing line represents the next step in the evolution of Ahluwalia's business model.

The partnership between EON and Ahluwalia provides a glimpse into the high-tech future of fashion that cloud technology, powered by Microsoft Azure, can help accelerate.

Upcycling fashion with STEAM

Microsoft partnered with Junk Kouture, a worldwide creative platform set on inspiring young people aged 13 to 18 to create upcycled fashion that brings attention to the issues facing society at large. The partnership's goal is to help a new generation of talented, eco-conscious designers use their passion to create a better, healthier world. Microsoft tools allow them to make the most of their creative spark and truly bring their most ambitious pieces to life. In partnering with Microsoft, Junk Kouture hopes to use STEAM (science, technology, engineering, art, and mathematics) to help bring even more young, forward-looking creators to the table.

Planetary Computer

The impacts of climate change are often unevenly distributed, with a greater burden falling on those living in poor and marginalized communities, particularly in the Global South. While individuals in these groups are usually not the largest contributors to climate change, they have been disproportionately affected by extreme climate events including droughts, floods, storms, and heatwaves, which contribute to other problems like food insecurity and exacerbate existing challenges like poverty.

To avoid the worst effects of climate change, governments, organizations, companies, and citizen scientists in these communities deserve equal access to open, interoperable, reliable, and timely climate data.

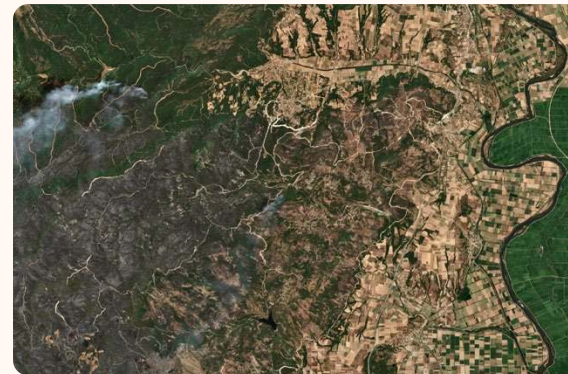
Within the Microsoft Planetary Computer, we provide open access to petabytes of environmental monitoring data in consistent, analysis-ready formats. This data has the power to unlock adaptation and resilience research, planning, and projects in communities globally, ensuring that all people have access to the actionable information they need to protect and preserve their communities and surrounding environment.

With over 120 data sources and over 50 petabytes of data, the Planetary Computer maintains one of the largest collections of open data about our planet. In 2023, we continued to grow the Planetary Computer data catalog, adding nine new datasets that provide insights into land, ocean, and atmospheric changes over time. Each month the Planetary Computer data catalog is accessed billions of times by researchers, scientists, students, and organizations to measure, monitor, model, and ultimately manage Earth's natural systems.

Storing, indexing, and distributing data at this scale has required that the Planetary Computer be built from the ground up with cloud optimization and interoperability in mind. As a result, Microsoft has become one of the largest supporters of the SpatioTemporal Asset Catalog (STAC) specification, an open community standard for increasing access to earth observation and earth science data in the cloud.

Partnering on the Planetary Computer

Maps depicting the intactness of global biodiversity have become a critical tool for spatial planning and management, monitoring the extent of biodiversity across Earth, and identifying critical remaining intact habitat. Yet these maps are often years out of date by the time they are available to scientists and policymakers. To address this gap, Impact Observatory and Vizzuality used the Microsoft Planetary Computer to create 100-meter gridded maps of terrestrial Biodiversity Intactness for the entire planet. In 2023, we released these maps through the Planetary Computer data catalog, where they can now be used by conservation stakeholders globally.



^ The Planetary Computer maintains one of the largest collections of open data about our planet.

Esri and Synthetiaic

In July 2023, the Planetary Computer joined Microsoft's Azure Space product group, which will enable Microsoft's partners and customers to use the Planetary Computer in new ways. Today, Azure Space is building upon the existing catalog of the Planetary Computer to drive a path to new capabilities and partnerships that will empower users with some of the largest Earth observation datasets at their fingertips—petabytes worth of possibilities for understanding our planet. In keeping with Microsoft's partner-first approach, Esri and Synthetiaic will provide essential capabilities that integrate with the Planetary Computer. By combining the power of data analysis in Synthetiaic's RAIC with the data visualization of Esri's ArcGIS, customers will be able to glean insights from data within the Planetary Computer at vast speed and scale.

Chesapeake Conservancy

In a regional effort to protect 30% of the Chesapeake Bay watershed by 2030, the Chesapeake Conservancy is collaborating with Microsoft to develop an AI system that maps ground-mounted solar arrays using up-to-date satellite data, enabling them to regularly track one of the most rapid drivers of land use change in the Chesapeake Bay watershed. Going forward, the Chesapeake Conservancy will work with Microsoft and our partners to produce their 1-meter land use data more frequently and accurately, keeping an active pulse on the entire Chesapeake Bay watershed.

Progress through partnership



Carbon Trust

The Carbon Trust has created a secretariat titled Decarbonizing the Use Phase of Connected Devices (DUCD) with representatives from several leading technology companies including Microsoft. The secretariat is focused on developing a standard for measuring the carbon emissions of connected devices and using various carbon removal instruments to decarbonize those emissions.

➤ [Learn more about the Carbon Trust](#)



Green Software Foundation

Microsoft continues to support sustainability through its efforts with the Green Software Foundation, of which it is a founding member. With participation on the steering committee, Community, Open Source, and Standards Working Groups, and Open Source green software projects, Microsoft is committed to helping developers become Green Software Practitioners.

The foundation is advancing carbon-aware computing, industry standards to improve how we measure software, building knowledge and tools on green software principles and patterns, fostering climate advocacy, and accelerating innovation to nurture a workforce fit to build climate-conscious solutions that reduce the environmental impacts of software.

➤ [Learn more about our partnership](#)



Sustainable Packaging Coalition

With over 600 member organizations, the Sustainable Packaging Coalition (SPC) is the leading voice on sustainable packaging. For many years, Microsoft has been a key partner of the SPC, working with like-minded member organizations to use the power of industry to advance sustainable packaging through education, collaboration, and action. Through these key pillars, Microsoft's partnership with SPC has helped create a more informed marketplace focused on developing a circular economy.

➤ [Learn more about the Sustainable Packaging Coalition](#)



Circular Electronics Partnerships

The Circular Electronics Partnership (CEP) unites its six influential partners, industry leaders, and the wider stakeholder network behind a vision for a circular electronics industry by 2030. CEP drives collective action to resolve the barriers that companies face in their transition to circular electronics.

➤ [Learn more about CEP](#)

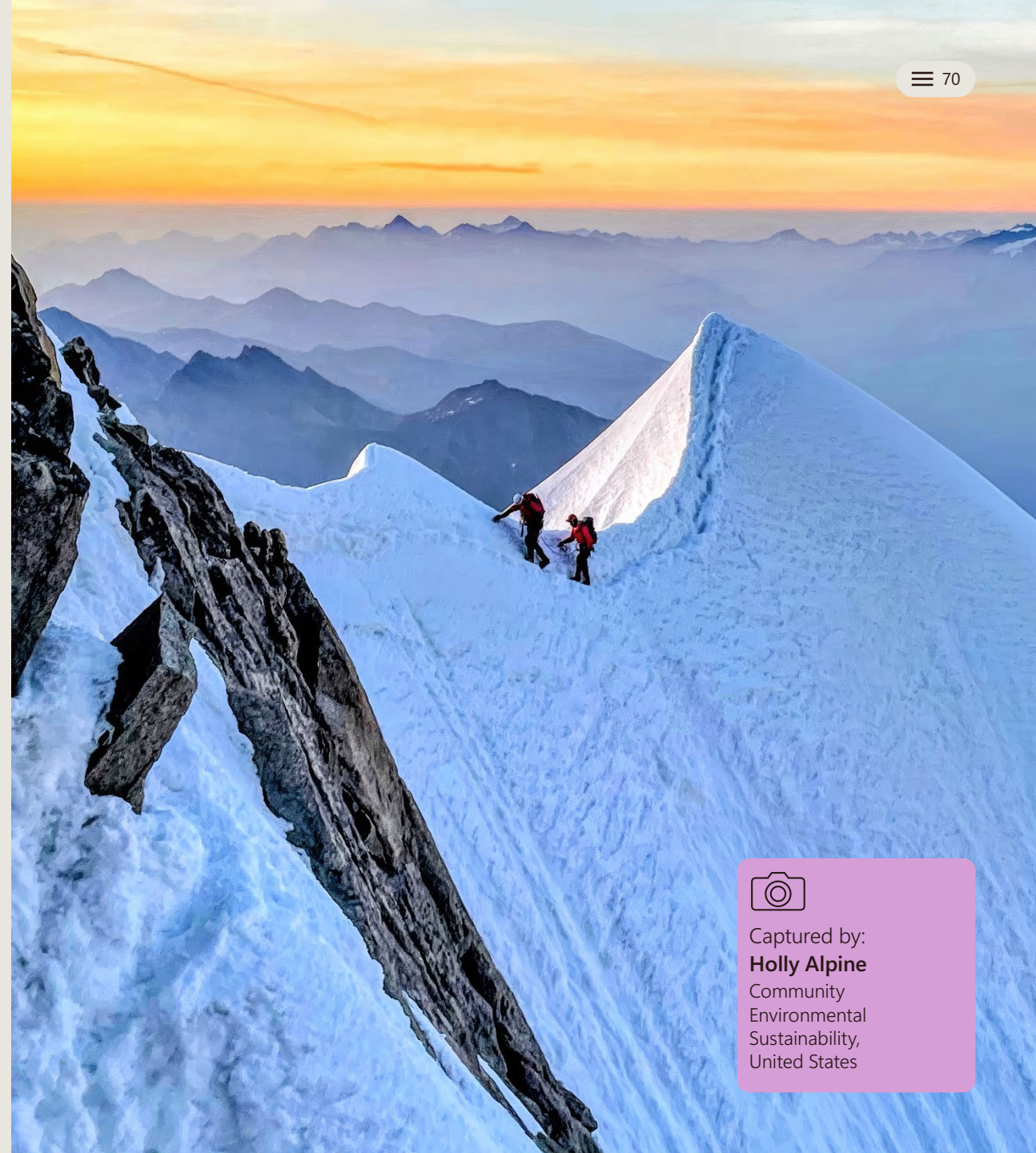


Global sustainability

How are we enabling a more sustainable world?

Microsoft's actions alone will not solve the climate crisis. As a global technology leader, we also commit to help societal conditions that will cultivate a net zero economy. We're focused on accelerating the availability of new climate technologies, strengthening our climate policy agenda, helping to develop a more reliable and interoperable carbon accounting system, advocating for skilling programs to expand the green workforce, and working to enable a just energy transition.

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Captured by:
Holly Alpine
Community
Environmental
Sustainability,
United States

Our approach continued

Global sustainability

We are committed to helping build the enabling societal conditions that will support a net zero economy for Microsoft, our customers, and the world.



Our targets

Using our voice on climate-related public policy

We aim to support new public policy initiatives to accelerate carbon reporting, reduction, and removal; the transition to clean energy; water access and stress reduction; and the ability to measure, manage, and protect ecosystems.

Investing in climate innovation

We have created a \$1 billion Climate Innovation Fund to accelerate the global development of carbon reduction and removal technologies, as well as related climate solutions to reduce water and waste.

Driving collective action

We will continue partnering with others to drive deeper engagement to help the world reach net zero, focused on rigorous and consistent carbon accounting and innovation, water access and stress reduction, and the circular economy.

Empowering our global workforce

We recognize that our employees are the most important asset and resource in advancing innovation in sustainability and are creating opportunities for them to contribute to our efforts.

Our progress

✓ Advancing progress through advocacy

In 2023, Microsoft expanded our global policy engagement to drive consistent and interoperable sustainability reporting, support certifiable long-lasting carbon removal projects, expand carbon-free electricity, advance circular economy solutions, and align AI with sustainability outcomes.

✓ \$761 million allocated towards climate technologies¹

Through the Microsoft Climate Innovation Fund (CIF), we have allocated \$761 million towards climate technologies that reflect our vision for the sustainability markets of the future.¹

✓ Partnering to accelerate progress with AI

The ability of AI to measure, predict, and optimize complex systems as well as accelerate the development of sustainability solutions can help the world overcome key challenges. We are working with a wide range of partners to help unlock the full potential of AI for accelerating progress towards net zero.

✓ Tools to help close the green skills gap

Microsoft and LinkedIn are taking action to empower the workforce with the green skills needed to drive climate progress. We are sharing our research, learnings, and tools to empower and build the workforce we need.

\$761M

Since launching our \$1 billion Climate Innovation Fund (CIF), we have allocated \$761 million towards climate technologies.¹

Investing in innovation

Since launching the Microsoft Climate Innovation Fund (CIF) in January 2020 as part of our corporate sustainability commitments, we have allocated \$761 million towards climate technologies that reflect our vision for the sustainability markets of the future.¹ Our investment priorities have evolved to focus on specific sectors. We remain committed to optimizing climate impact in underfunded markets, with alignment to climate equity and our core business.

We are advancing innovation beyond Microsoft's four walls through CIF, with an emphasis on expanding access to capital for innovators working to address the climate challenge, build new markets, and use AI to accelerate solution development and scale adoption. We continue to invest across energy systems, industrial supply chains, and natural systems, and prioritize direct equity and debt investments to finance solutions with the potential for mainstream adoption by 2030.

As a corporate climate investor, we are differentiated by our ability to mobilize our core business resources in support of our investees, in addition to providing catalytic capital.

With over 55 investments in CIF's portfolio, we have fostered relationships with our relevant business groups and designed opportunities to integrate with our climate intelligence and technology solutions. As an end customer, we are also able to offer novel contracting structures that align with the needs of our portfolio companies, such as multi-year or forward procurement contracts and pilot projects.

Our investments create impact beyond financial investment by sending a demand signal to nascent markets, advocating with industry and government agencies on shared policies and market building standards, and catalyzing additional capital resources.

We continue to lead on first-of-a-kind climate finance solutions and build bridges to bankable, scaled climate technologies that we and the world need to create a more sustainable and prosperous future for all.

In 2023, we brought together our portfolio in Redmond, Washington, to connect our ecosystem of innovators and collaborate on reaching scale and our shared impact goals. It was a powerful reminder of the value of convening entrepreneurs and stakeholders working across multiple sectors to catalyze partnerships, share diverse perspectives, and be reminded that we are in this together.



◀ Through the CIF, Microsoft is investing to build a high-quality carbon removal market.

Investing in carbon reduction and removal solutions

Addressing our own environmental footprint

Through CIF, we made investments in companies positioned to directly affect our Scope 2 and 3 emissions. These investments include:

H2 Green Steel, a near-zero emissions steel producer in Sweden, aims to build the world's first large-scale green steel plant with 95% reduction in carbon dioxide emissions compared to traditional steel-making. Powered by renewable electricity, the plant will generate enough green hydrogen to bring 5 million tons of green steel to the market by 2030.

FlexiDAO, a carbon-free energy analytics platform in which CIF invested in 2022, is helping Microsoft source, track, and certify energy towards our 100/100/0 carbon-free energy commitment. The advanced and detailed management of a clean energy portfolio requires digital solutions to accelerate market adoption, which we're partnering with FlexiDAO to develop and deploy across 37% of our global Scope 2 carbon-free energy portfolio.

Heirloom Technologies, a direct air capture company, currently operating America's first and only commercial direct air capture facility, has built on our investment in 2021 to provide Microsoft with up to 315,000 tons of permanent carbon removal delivery over a multi-year period.

Investing in innovation continued

Building the high-quality carbon removal market

Unlocking the supply of high-quality carbon removal credits is a core priority for CIF's broader investments. Within that area, we advanced the nature-based solutions opportunities with new investments in digital monitoring, verification, and reporting (MRV) and ecosystem restoration. These include the following:

Yard Stick Public Benefit Corporation (PBC)

provides in-ground measurement of soil carbon. This is a crucial digital MRV service to the carbon markets, accelerating project developers' time to market and helping to ensure customers are purchasing high-quality credits.

Vibrant Planet PBC uses complex data fusion and AI to map forests at fine scale to support its customers in monitoring current conditions and devising adaptive management strategies to mitigate wildfire and climate risk, improve climate adaptation, and enhance ecosystem services.

Innovative portfolio collaborations

To meet climate needs, both innovation and collaboration will play important roles. In 2023, partnerships between CIF portfolio companies, such as the following, helped to amplify the climate impact of their technologies.

In 2023, CarbonCure Technologies and Heirloom Technologies teamed up to demonstrate the power of direct air capture paired with permanent carbon dioxide storage in concrete to achieve carbon removal. Heirloom Technologies captured carbon dioxide from the atmosphere using their direct air capture technology in Brisbane, California, while CarbonCure's reclaimed water technology injected the captured carbon dioxide into the process wastewater at a Central Concrete batch plant in San Jose, California.

Climeworks anchors the direct air capture technology in Louisiana's Project Cypress with Ohio-based nonprofit Battelle and Heirloom Technologies. This project was one of two initial selections by the United States Department of Energy as one of two under the advanced tier of the regional DAC Hubs program. If awarded, the project will receive federal funding and is set to scale up to 1 million metric tons of annual carbon removal capacity.



Sustainability
Champion:

Haley Alesi

As an outdoor enthusiast, I have seen the direct effects of climate change already and share a sense of urgency to protect our planet. At Microsoft, I have the privilege of developing tools and systems that empower Microsoft's suppliers to operate more sustainably, using the large stage and voice that Microsoft has to extend positive and sustainable impacts globally.

Investing in water

We expanded our focus on water innovation in 2023 with our work in building a new strategy led by WaterEquity, a nonprofit investment manager focused on expanding access to clean water and sanitation across the globe. This strategy, "Water and Climate Resilience," helps to improve and expand water infrastructure in the Global South and will work to unlock access to clean water for an estimated 10 million or more people.¹⁶



Investing in innovation continued

AI This is a feature powered by AI

Investing in AI

The Climate Innovation Fund has made several investments in 2023 in innovative uses of AI to address some of climate's biggest questions. AI excels at combining disparate datasets with varying spatial and temporal characteristics, enabling the data to relate so that it can be reasoned against—and this is exactly the type of technological capability needed to provide more timely answers to the pressing questions being posed by a changing climate.

CIF is focused on areas where we believe AI can make a material difference, including novel material development, climate intelligence and risk forecasting, digital MRV, and environmental monitoring. In addition to Vibrant Planet PBC, mentioned previously, in which we shared how we are building the high-quality carbon removal market, examples in our portfolio include the following:

Mitiga Solutions provides climate risk intelligence that combines science, AI, and high-performing computing to help customers analyze, report, and act on their business exposure to climate risk through their self-serve platform EarthScan™ and risk models. Mitiga's mission is to make the world more resilient by providing climate intelligence on any asset, anywhere in seconds.

LineVision uses AI and computational fluid dynamics to integrate local weather data with near real-time ground sensor measurements to provide a reliable hourly rating of the current-carrying capacity of transmission lines. This dynamic line rating allows transmission owners to unlock additional carrying capacity from their existing infrastructure compared to traditional static line ratings and bring additional renewable energy onto the grid.

Equity as a core principle

Climate equity is a core principle of our investment strategy. We recognize the disproportionate impact of climate change on communities around the world and work to ensure we are investing in leaders and companies that meet people where they are with the solutions they need.

We know that to reach global climate goals, we need to invest in a clean energy transition on virtually every continent and with every community. These communities have a right to thrive, which means increasing energy access and bringing healthier, more affordable solutions to the market. We are investing in clean energy growth and infrastructure that directly serves low-to-medium income households. Investments include the following:

KOKO Networks, a clean technology company that operates a bioethanol cooking fuel utility in Kenya, is helping to switch households from charcoal to clean and safe fuel. KOKO reached its one millionth customer this year and is expanding to Rwanda and other East African countries.¹⁶

▼ KOKO Networks



CrossBoundary Energy Access, a project financing facility for solar mini grids, has funded its first batch of mini grids in Nigeria with development partner ENGIE. Around 28,000 people will have first-time electricity access, including productive energy loads for grain milling and other income generating activities.¹⁶

EverEnviro, a Green Growth Equity Fund portfolio company and one of India's leading producers of renewable natural gas, is supporting farmers to sustainably clear their fields in a faster manner, helping grow crops on time with better yields. It has created a network of Village Level Entrepreneurs to harvest, collect, and transport agri residue to its renewable natural gas plants, creating rural employment in the residue supply chain. Through its operations, EverEnviro is ensuring better waste management in both urban and rural areas by using multiple feedstock in its processing and providing access to alternate clean fuel.

Solstice, a CIF portfolio alum, is collaborating with our energy procurement team and ENGIE North America on the development of two community solar projects in Illinois that will serve historically excluded communities and help reduce participating residents' electric supply costs by up to 60%.¹⁷

We consider every CIF investment through the lens of climate equity and social co-benefits. This will continue to be a focus as we invest our capital.

1M

KOKO Networks is helping households switch from charcoal to clean and safe fuel. KOKO reached its one millionth customer this year.

Investing in innovation continued

First-of-a-kind financing

Many of the first-of-a-kind (FOAK) commercial projects in our portfolio have been funded with an objective to create a bridge to bankability and economic sustainability alongside technical outcomes at scale. We are learning that structuring these investments requires balancing flexibility and creativity, while also ensuring we set our investees up to demonstrate the performance track record required to raise institutional finance.

We appreciate that FOAK risk involves not only technology risk, but also development risk. This requires teams that want to build FOAK projects to be sure they have the right skills, talent, and culture to execute projects successfully, as the competencies needed for project development are very different from those needed for technology development in the initial stages of the company.

55

We are advancing innovation beyond Microsoft's four walls through CIF, with a portfolio of over 55 investments to help address the climate challenge.

Impact measurement and reporting

At the launch of the Climate Innovation Fund, we partnered with Rhodium Group to develop a bespoke approach to forecasting environmental impact outcomes to optimize for climate impact across CIF's diverse priority sectors and financing mechanisms. We have learned the challenge and necessity of adequately quantifying the catalytic impact of our capital. With a portfolio of 55 investments, we can now internally benchmark impact per dollar invested, which allows us to further filter for the highest impact for our portfolio. CIF is supporting the GHG emissions accounting ecosystem through an investment in Novata, whose digital platform was designed by and for the private equity market and radically simplifies the process of collecting, analyzing, and reporting on ESG and sustainability data.

Skilling for green jobs

The clean energy transition will require a new generation of skills and talent to fill the economic opportunity potential and green jobs. Our portfolio companies, such as the following, are training the workforce that can build the green economy of the future.

BlocPower has been working since 2021 to ensure that green jobs include underrepresented community members. In partnership with the New York City Mayor's Office of Criminal Justice, BlocPower's Civilian Climate Corps program has trained over 1,700 members in skills such as HVAC and electrical, largely in communities hardest hit by gun violence.¹⁶

Eavor's technology solution and target geographic locations offer a valuable chance for those who work in conventional fossil fuel companies to join a climate-focused organization and apply their industry best practices to facilitate a transition towards cleaner, sustainable energy sources. The geothermal industry has immense promise as a catalyst for economic growth in the United States, particularly benefiting rural communities. The alignment presents a unique opportunity to transfer technical knowledge and skillsets required in the oil and gas sectors directly, while also providing direct benefits to the communities that have been affected by fossil fuel production and use.

New Sun Road actively supports skilling and encourages community contribution. It has partnered with Microsoft to establish solar-powered community centers in rural Guatemala that provide broadband, digital skills, devices, educational experiences, and mentorship to women and youths in rural and high-migration areas. The company often partners with local organizations to design, install, and operate renewable energy systems, as well as train local technicians and entrepreneurs to manage and maintain microgrids and provide customer support, creating jobs and building expertise in the local economy.



Accelerate sustainability solutions with AI

Microsoft is investing in AI-based solutions in areas where progress on our global sustainability goals is bottlenecked. As the world enters a new era of AI, there is both an opportunity and an urgent need to focus the abilities of AI on accelerating sustainability.

In November 2023, we published a [white paper and playbook](#) that expands on the incredible potential of AI to accelerate sustainability solutions and introduces our five-point playbook for creating the needed enabling conditions to unlock the transformative potential of AI for sustainability.



“Given the urgency of the planetary crisis, society needs to push harder on the AI accelerator while establishing guardrails that steer the world safely, securely, and equitably toward net zero emissions, climate resilience, and a nature-positive future.”

Accelerating AI with Sustainability: A Playbook

AI’s three game-changing abilities

On the journey to net zero, the world has faced many bottlenecks to progress. AI has three unique abilities that can help society overcome key bottlenecks to this progress. These include the ability to:



Measure, predict, and optimize complex systems



Accelerate the development of sustainability solutions



Empower the sustainability workforce

AI This is a feature powered by AI

Unlocking the transformative potential of AI for sustainability

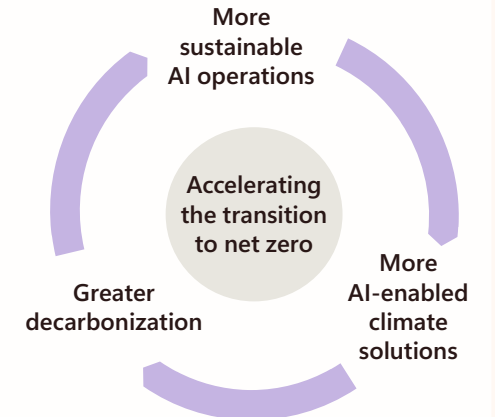
While AI has the potential to accelerate the world’s sustainability transformation, its success is not guaranteed. Establishing the right enabling conditions is critical and the right enabling conditions can help initiate a self-sustaining cycle, akin to a flywheel, in which AI can generate sustainability solutions that expedite decarbonization.

Microsoft has outlined a five-point playbook for establishing the enabling conditions needed to use AI ethically and responsibly to accelerate the global sustainability transition.

Five-point playbook...

- Invest in AI** to accelerate sustainability solutions
- Develop digital and data infrastructure** for the inclusive use of AI for sustainability
- Minimize resource use** in AI operations
- Advance AI policy principles and governance** for sustainability
- Build workforce capacity** to use AI for sustainability

...to unlock the flywheel for accelerating sustainability



Accelerate sustainability solutions with AI continued

Partnering to accelerate progress with AI

The ability of AI to measure, predict, and optimize complex systems as well as accelerate the development of sustainability solutions can help the world overcome some of the key challenges we face on the transition to net zero. Microsoft is working with a wide range of partners, such as the following, to help unlock the full potential of AI for accelerating progress towards net zero.

Transforming the world's approach to measuring emissions

The Global Carbon Budget project, in collaboration with Tsinghua University, aims to develop the world's first near real-time global carbon budget assessment framework driven by AI and data science techniques. In 2023, the team outperformed the state-of-the-art model in reconstructing ocean historical observations and predicting ocean carbon sink data in a near real-time context. The next frontier is broadening the project's scope to encompass more comprehensive facets of the global carbon budget.

Accelerating the development of better batteries

BatteryML is an open-source tool that aims to streamline and unify the approaches to predicting and analyzing battery performance. In 2023, BatteryML harmonized the fragmented and diverse landscape of battery data by introducing a unified data format. This made it possible for various models and features to be cohesively applied across multiple datasets, simplifying the experimentation process and amplifying the efficacy of analyzing factors that dictate lithium-ion battery performance. BatteryML's versatile model repository underscores the synergy of machine learning and battery science. Future directions involve broadening its model repository, incorporating real-time data analytics, and fostering collaborations with the wider research community.

Reducing embedded emissions in concrete

The University of Washington aims to offset the use of classic concrete with biomaterials. The concrete industry is estimated to account for 8% of global greenhouse gas emissions, with 80% of that impact attributable to cement, a component of concrete. To propose concrete formulations that meet desired quality criteria, machine learning is used to evaluate the large number of candidate materials. We are currently performing experiments to demonstrate the utility of machine learning in accelerating discovery and demonstrating that bio-cements can meet strength requirements for various applications.



Sustainability
Champion:

Bichlien Nguyen

Bichlien is a principal researcher at Microsoft Research AI4Science and has a PhD in chemistry. She is working to help accelerate the development of sustainable technologies. Most recently, she has been working on the application of AI for the discovery and design of more sustainable molecules and materials.

Enabling more efficient carbon capture and storage

Carbon capture and storage involves capturing carbon dioxide from industrial emissions and storing it in subsurface structures. To optimize the amount of carbon dioxide that can be safely stored, we have collaborated with Schlumberger and [Northern Lights](#) to build an optimization workflow based on global numerical optimization. This workflow relies on an AI simulator to find the optimal location of the carbon dioxide injection wells. The AI-based carbon dioxide flow simulations and genetic-based optimization on a test case resulted in providing superior well placement, \$50 million higher net value, faster total workflow time, and lower compute costs under all conditions tested.



AI can be used to evaluate large numbers of candidate materials to aid in the discovery of more sustainable concrete and other materials.

Accelerate sustainability solutions with AI continued

Developing climate resilience with AI

As highlighted by the IPCC, the world is already experiencing the impacts of climate change. AI can be used to help better understand risks and inform the response to disasters when they strike.

✔ Improving early warnings

Microsoft is collaborating with the United Nations to research the use of AI to advance the Early Warning for All Initiative, with a goal of better understanding the populations that may be more at risk of extreme weather events and other threats, often due to climate change.

✔ Mapping population and risk

Knowing where people live and anticipating migration patterns is essential for policy decision making, from ensuring food security to evacuation planning and improving population health. Population growth and migration in places like the Sahel region of North Africa are difficult to characterize due to a lack of recent census counts or local population maps. AI can help us to produce population estimates where there are geographic or temporal gaps. Microsoft AI for Good Lab, Planet Labs PBC, and the Institute for Health Metrics and Evaluation are working on research to estimate population at highly granular levels using satellite imagery to better understand the impact of local threats on health and assess strategies to mitigate risk.

✔ Helping guide disaster response

Microsoft AI for Good Lab is researching the use of new AI models and methods in supporting first responders during the immediate aftermath of natural disasters. This year, in partnership with Planet Labs PBC and its temporal and spatial resolution data, we provided research on rapid damage assessments to first responders tasked with helping people after the flood in Derna, Libya, the wildfires in Maui, and the earthquakes in Turkey and Afghanistan. This research has proven invaluable to emergency response organizations in determining how to deploy and allocate limited resources to save lives and provide essential services to people affected by natural disasters.

Supporting a nature positive world

Achieving a nature positive world is essential for human well-being, a healthy planet, and economic prosperity for all. However, as highlighted in the [Kunming-Montreal Global Biodiversity Framework](#),

...despite ongoing efforts, biodiversity is deteriorating worldwide at rates unprecedented in human history.

Microsoft is working with partners from around the world to help better understand, halt, and ultimately reverse the loss of nature.

Helping to conserve the Amazon

The Amazon rainforest, one of the Earth's most vital ecosystems, faces a dire threat as approximately 18% of it has already been lost and an additional 17% has suffered degradation. Deforestation in the Amazon, driven by farming and illegal mining, poses severe consequences for climate stability and biodiversity. To combat this crisis, technology, particularly AI, is being harnessed to predict and prevent deforestation. At Microsoft, our AI for Good Lab has been at the forefront of this research, collaborating with Colombian organizations and utilizing innovative methods through Project Guacamaya.

Project Guacamaya employs AI to understand the interconnectedness between forestation and biodiversity in the Amazon. It uses high-resolution satellite imagery from Planet Labs PBC to detect deforestation and signs of impending deforestation, such as detecting unauthorized roads. Additionally, camera traps in the rainforest capture wildlife movements, and AI algorithms help classify animals with remarkable accuracy. Sound analysis using bioacoustics further distinguishes between bird and non-avian wildlife. These technologies can provide valuable insights into ecological changes and early warnings.

Better understanding global biodiversity

The world currently lacks the consistent, frequent, high spatial-resolution observations of biodiversity that are needed to deliver a nature positive world. For example, it's been estimated that less than 1% of the planet has been sampled at a resolution of 1 km.¹⁸ Microsoft has helped to develop a vision for a global biodiversity observing system as a global network of interconnected national and regional networks to assess biodiversity trends worldwide. This global system would provide the insights and data needed to realize the world's biodiversity goals, including those outlined in the Kunming-Montreal Global Biodiversity Framework (KM-GBF).

Producing more food with less impact to nature

[Project FarmVibes.AI](#) is an open-source geospatial multi-modal machine learning toolkit that includes workflows and example Jupyter notebooks. The toolkit demonstrates how to build rich heatmaps of nitrogen, phosphorus, potassium, and carbon using soil sample/sensor data along with remote sensing (satellite data). This workflow can help optimize fertilizer use. Another workflow identifies farms that are irrigated versus rainfed. Future work involves building AI models and workflows for water use, soil carbon estimates using causal modeling, and hyper local weather predictions.

Policy and advocacy

We believe that Microsoft and the broader private sector have an important role to play in advocating for effective and innovative sustainability policies. In 2020, we pledged to use our voice on public policy issues to help advance global decarbonization efforts to achieve zero waste, to be water positive, and to protect all ecosystems.

Over the past year, Microsoft expanded our global policy engagement to drive consistent and interoperable sustainability reporting, support certifiable long-lasting carbon removal projects, expand carbon-free electricity, advance circular economy solutions, and align AI with sustainability outcomes. We magnified our advocacy impact through strategic engagements at APEC and COP28, and through efforts to align our US trade associations with Microsoft's climate and energy policy priorities.

80

Microsoft and over 80 other Carbon Call members are working to improve the interoperability of corporate carbon reports.

Driving reporting and disclosure policies

We continued driving consistent, robust, and interoperable GHG reporting metrics, promoting comprehensive yet flexible corporate GHG disclosures and using new technologies to calculate and track emissions and climate impacts. In the United States, Microsoft was an early advocate for a first-in-the-nation GHG disclosure law in California and submitted comments in SEC and FAR proposals. In addition, we made efforts to align our US trade associations with Microsoft's disclosure principles.

In Europe, we are informing the implementation of Corporate Sustainability Reporting Directive (CSRD) legislation in European Union member states and continuing to engage with the Commission on the development of the European Sustainability Reporting Standards (ESRS).

We are engaging with governments in Australia, the United Kingdom, and Singapore to inform their ESG reporting rules and working with the ISSB in its efforts to create global ESG reporting standards.

Microsoft helped create open-source, technical specifications to improve the interoperability of corporate carbon reports. The Carbon Call will deliver these actionable solution blueprints to regulators and standard-setters and continue to advocate for its adoption, in partnership with Microsoft and over 80 other Carbon Call members.

Advancing carbon removal

We advanced government efforts to drive clear accounting and high-quality standards, prioritized highly durable solutions, and engaged local and affected communities.

In the United States, we supported and informed the Department of Energy efforts to create direct air capture hubs.

In the European Union, we advocated for strong carbon dioxide removal guidelines, high-quality standards, and clear definitions in the draft Carbon Removal Certification Framework, and we joined the Negative Emissions Platform trade association to amplify our voice.



▲ We are advocating for progress that supports sustainability and resilience in carbon-free generation, infrastructure, and supply chain.

We submitted comments to the United Nations Framework Convention on Climate Change (UNFCCC) to enable the incorporation of robust highly durable carbon dioxide removal in countries' climate plans under Article 6. In 2023, we also fulfilled our carbon dioxide removal commitment under the First Movers Coalition.

Advocating for carbon-free electricity policy

We doubled down on our efforts to advance electricity policy around the world, advocating for progress that supports sustainability and resilience in carbon-free generation, infrastructure, and supply chain.

In the United States, we supported legislative efforts to streamline permitting for clean energy and transmission projects, as well as conducted a review to drive alignment between our US trade associations and our electricity policy priorities.

In the European Union, we advocated for expanded access to clean energy and increased investments in grid infrastructure in the Electricity Market Design and the revision of Renewable Energy Directive III.

Policy and advocacy continued



Advanced nuclear and fusion energy

In December 2023, we published a [policy brief](#) that highlights the importance of carbon-free electricity, the role advanced nuclear and fusion energy may play in a decarbonized energy future, and the priorities that guide our policy advocacy. We focus on advanced nuclear and fusion energy technologies because of their potential and because these technologies are rapidly evolving and face a different set of regulatory considerations than other carbon-free technologies. Microsoft's policy advocacy priorities focus on advancing research, development, and demonstration projects; enabling safe deployment of technologies; and encouraging an efficient and effective regulatory process for new technologies to be deployed.

APEC Energy Ministers Meeting

Microsoft hosted and participated in the APEC roundtable on GHG accounting standards and a Ministerial roundtable on grid decarbonization as part of the 2023 APEC Energy Ministers Meeting in August. With over 250 government representatives from 20 of the 21 APEC member economies present, topics ranged from clean electricity procurement to electricity policy and carbon accounting. These meetings delivered near consensus on a new aspirational goal of approximately 70% carbon free and carbon neutral electricity for the APEC region by 2035, as well as a methane emissions reduction target.

Advocating for waste reduction

In the European Union, we informed and advocated for a robust and coherent Eco-design for Sustainable Products Regulation (ESPR), as well as new initiatives such as the European Green Claims Directive, the revision of the Waste of Electronics and Electronic Equipment Directive, and the European Right to Repair Directive.

Advancing progress with AI

Microsoft published [Accelerating Sustainability with AI: A Playbook](#). The playbook outlines policy principles to govern AI and align it with sustainability outcomes. We are engaging with the European Union institutions to inform the AI Act to build on existing and emerging sustainability policy

frameworks—such as the Sustainability Indicators for Data Centers coming from the Delegated Act for the Energy Efficiency Directive—to include AI and incentivize the use of AI to enable sustainability outcomes.

Microsoft partnered with the UNFCCC in its pavilion at COP28 in Dubai and is supporting the UNFCCC to help deliver development and implementation of new systems and tools required to put into operation the Enhanced Transparency Framework under the Paris Agreement. Using AI and data analytics, this collaboration aims to augment the capacity of UNFCCC with generative AI to increase transparency, accountability, and reporting on climate change commitments.

Learnings and what's next

1 ESG reporting rules are fast evolving in many countries around the world. Increasingly based on a threshold of business activity, the policy scope is broadening from GHG emissions reporting to other environmental, social, and governance areas and the data requested is becoming more market, sector, and activity specific. With more governments and regulators consulting on proposed local policy, there is increased urgency for consistent rules across geographies and digital solutions to help companies share data and report.

- 2** Achieving carbon-free grids in the time needed to meet climate targets will require strong policy support. Key areas of focus include: robust and diverse markets; data transparency and accuracy to inform economic and environmental efficiencies in markets and dispatch; grid enhancing technologies and expanded transmission capacity; and deployment of fast-emerging carbon-free solutions to augment existing clean resources and support a decarbonized grid.
- 3** The use of advanced digital technologies, including AI, can help expedite public policy implementation, remove impediments, and speed the transition to a decarbonized grid. AI can enable faster decision making for power grid resource and transmission planning, as well as speed permitting decisions and the grid interconnection process for critical clean energy assets. Moreover, AI could increasingly become the basis of data science-led approaches for operating the clean energy grid of the future. Utilities, balancing authorities, and their regulators will need policy means for including AI in power system management. In the year ahead, we will advocate and work with governments and partners to develop policy incentives, investments, and a conducive environment to use AI for sustainability outcomes.

Employee engagement

Employees play an invaluable role in our Microsoft sustainability journey. Over the past year, our volunteer Sustainability Connected Community (SCC) expanded our mission to “make sustainability part of everybody’s job” at Microsoft. Through panel discussions, employee-led initiatives, and new chapters, the SCC expanded opportunities to “think globally and act locally.”

1.5M

Employee eco-challenge actions resulted in 1.5 million pounds of carbon dioxide savings.

Fostering our employee community

In 2023, local chapters around the world hosted dozens of volunteer opportunities and represented the community at numerous sustainability events, universities, and startup accelerators. The SCC was hands-on with projects like tree plantings, supporting local food projects and trash cleanups; donating time and money to local nonprofits; and working hard to ensure that environmental justice was factored into the work we do every day.

The SCC has a strong presence in EMEA, with chapters representing the community at numerous sustainability events, universities, and startups in Portugal and France, as well as planting trees and growing local produce with involvement from LinkedIn employees and local leaders.

In APAC, over 800 employees participated in activities during Earth Month. There were more than 20 local events across more than 10 locations, including tree plantings, beach cleanups, electronic waste collection, and more. Eco Talks Asia, our speaker series, hosted sustainability leaders throughout the year for employee learning and inspiration.

SCC chapters in Arizona and North Carolina are also having a big impact through panel discussions, local campus initiatives, fundraising activities, and employee resource group partnerships.

Employee eco-challenge

During a month-long eco-challenge, employees completed nearly 93,000 actions to help build more sustainable day-to-day habits. Through these actions, and the nearly 10,000 reflections that were shared during the challenge, our employees worked to transform their individual behaviors to focus more on sustainable living. These actions included conducting household waste audits, completing additional sustainability trainings, installing low-flow showerheads, conserving electricity, and investigating water collection systems for their homes. Altogether, this resulted in over 1.5 million pounds of carbon dioxide savings, over 304,000 gallons of water saved, and nearly 2,700 pounds of waste composted and diverted from landfills.



Microsoft’s Rohit Shetty, Datacenter Technician Manager, India

Hackathon

Our 2023 Hack for Sustainability challenged over 700 participants to create innovative AI solutions for environmental challenges across our company and around the world. The scale and computational power enabled by AI and cloud computing is just beginning to identify solutions to help enrich biodiversity and protect ecosystems.

Participants submitted 142 projects that aimed to achieve broader societal transformation that supports environmental sustainability. The winning projects this year proposed solutions for reducing AI computing carbon intensity, easier carbon accounting with a new innovative methodology, and generative AI that helps to speed the transition to carbon-free energy.

Scaling impact through Green Skilling

To transform the global economy, the sustainability workforce must grow quickly. Globally, green hiring is outpacing overall hiring. Driven by new climate policies and commitments, we expect to see millions of new green jobs created globally. Despite this increase, talent remains tight with only one in eight workers globally having the green skills needed to drive the green transition. Today, 16% of men are part of the green talent pool, compared to only 10% of women.¹⁹

Microsoft and LinkedIn are taking action to empower the workforce with the green skills needed to drive climate progress. We are sharing our research, learnings, and tools to empower and build the workforce we need. With over one billion users active on LinkedIn, we have an opportunity to provide tools and resources to both help skill the workforce and address the gender gap.

Delivering insights

Sustainability is inextricably tied to the LinkedIn Learning team's vision of creating economic opportunities for every member of the global workforce. The global transition to a green economy requires people with critical green skills employed in all industries and occupations. LinkedIn's [Economic Graph](#) provides actionable insights about the demand and supply of talent with green skills. LinkedIn Learning also offers a growing catalog of sustainability skills courses to empower the workforce.

Drawing directly from the LinkedIn Economic Graph, the [2023 Green Skills Report](#) highlights global trends in the green economy. Given the scale of action needed to address the climate crisis, the report explores ways to help accelerate green skills development. The report also includes leading trends in energy production, transportation, and finance, and policy implications tied to labor market insights.

1 in 8

Today, only 1 in 8 workers have the green skills needed to support a green transition.

Building upon the report, LinkedIn's Economic Graph team developed deep dives that provide additional insights into leading trends. In September 2023, the team published a [report](#) looking at green skills across the German manufacturing sector, particularly around auto manufacturing, with Germany's Ifo Institute. An accompanying [research note](#) provides a more global view of the role green skills will play in accelerating the electric vehicle transition.

In 2023, LinkedIn also released [The Green Gender Gap Report](#) which highlights the growing gender gap in the green skill which highlights the growing gender gap in the green skills economy. Findings indicate that while women are entering the workforce at a greater rate, many are still missing out on the chance to be part of the climate solution. And as the urgency of the climate problem increases, our planet is missing out on the full contributions of a group that makes up nearly half of the global workforce. Microsoft and LinkedIn are working to advance new policies and programs that close the green skills gender gap—and that accelerate the proliferation of green skills throughout the entire global workforce.

Green Coaches Program

A grassroots initiative led by passionate members of our Go Green employee volunteer team mentored and upskilled over 200 professionals to help grow their careers in the green economy, expand their networks, and connect to opportunities through coaching conversations. LinkedIn employees also provided other employees and leaders of environmental nonprofit organizations with general coaching on how to optimize their individual and organizational LinkedIn profiles.

Global policy recommendations for green skilling

Our LinkedIn team met with climate and workforce government leaders during COP27 and COP28 to push for greater investment in green jobs and green skills development. This included sharing a list of global policy recommendations guided by the belief that green jobs, green skills, and the people who have them are critical to achieving global climate progress.

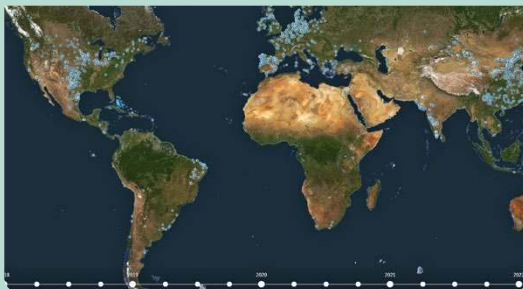
Progress through partnership



Planet Labs PBC

Microsoft AI for Good Lab collaborates with Planet to bring geospatial machine learning capabilities to vast datasets of high-resolution satellite imagery. The use cases are numerous, including deforestation monitoring of the Colombian Amazon, irrigation water management for agricultural lands in Northern Kenya, and measuring the global capacity for wind and solar energy production on a quarterly basis.

➤ [Learn more from Planet and explore Global Renewables Watch](#)



Instituto Humboldt and Instituto Sinchi

Microsoft has partnered with the Humboldt Institute and the Sinchi Institute of Colombia to use AI to monitor biodiversity in the Amazon rainforest. Using bioacoustics recordings, camera trap images of wildlife, and satellite imagery, Microsoft is building AI models that accelerate data analysis by 10 times. This technology is scalable to other Amazon regions, so the aspiration is for more governmental and non-governmental entities to take advantage of these AI technologies.

➤ [Learn more about our partnership](#)



Project Drawdown

LinkedIn has partnered with Project Drawdown for five years for their climate solutions subject matter expertise. Drawdown's team helped enrich LinkedIn's green taxonomy by spotlighting emerging green technologies, skills, occupations, and industries that can draw down carbon emissions. This information helps shape LinkedIn's green jobs collection and enables LinkedIn's Economic Graph green data insights for policymakers and business leaders. In 2023 LinkedIn launched a Sustainability Resource Hub that includes Drawdown's employee functional guides for going green and a LinkedIn Learning course for employees authored by the Drawdown team. LinkedIn has provided Drawdown with ad grants totaling over \$1 million over the past three years, which Drawdown has used to raise awareness and reach a large target audience for its online resources including its Climate 101 webinars and employee green functional guides.

➤ [Learn more about Project Drawdown](#)



CERES

CERES advances leadership among companies, investors, and capital markets influencers to drive climate solutions and policy advocacy. LinkedIn has participated for five years in the CERES-organized US LEAD program (Legislature Education and Advocacy Days) to meet with members and staff of the US Congress. In those policy meetings, LinkedIn has had the opportunity to provide lawmakers with insights on the greening of the economy and advocated for investment and policies supporting growth in clean energy, green jobs, and green workforce development.

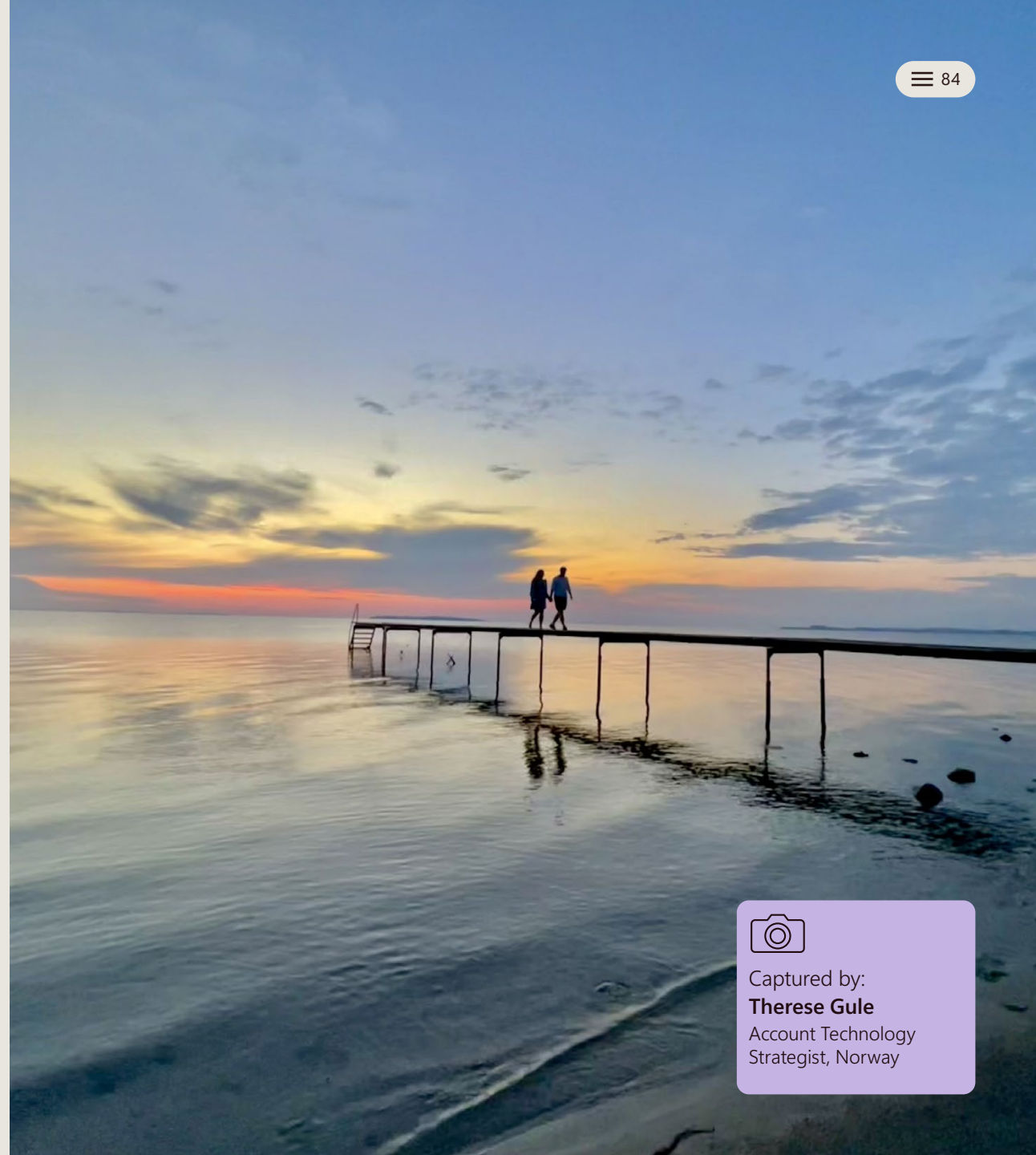
➤ [Learn more about CERES](#)



Appendix

How can we advance sustainability?

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#sustainabilitychampions	87



Captured by:
Therese Gule
Account Technology
Strategist, Norway

Appendix A

How we report

Reporting principles and external standards

Microsoft works to conduct business in ways that are principled, transparent, and accountable. We annually publish this Environmental Sustainability Report to provide information on our strategy, our performance and progress against our goals, and key challenges and trends we see in this work. We also publish our environmental data, which is included in the separate [Environmental Data Fact Sheet](#). We presented greenhouse gas emissions in accordance with the GHG Protocol and management's criteria and select environmental metrics that both reference the [Global Reporting Initiative \(GRI\) Standards](#) and are reported in accordance with management's criteria as of and for the fiscal year ended June 30, 2023 (FY23). Microsoft's environmental data reporting covers global wholly owned and partially owned subsidiaries over which Microsoft has management and operational control, including Microsoft owned and leased real estate facilities and datacenters. Environmental data reported is subject to Microsoft's recalculation and structural changes policy as described in our [Environmental Data Fact Sheet](#).

Our Reports Hub available at [Microsoft.com/transparency](https://microsoft.com/transparency) provides a consolidated, comprehensive view of our ESG reporting and data ranging from our carbon footprint to workforce demographics to political donations. This Environmental Sustainability Report is an important part of that overall set of disclosures. For this and other reports, we inform our disclosure strategies with careful consideration of commonly used global standards. We have [reported to CDP Climate Change](#) since 2004, and to [CDP Water Security](#) since 2011. On climate-related issues, we strive to align with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) and in FY22 we published our first [TCFD report](#).

Working together with stakeholders

We know that the decisions we make affect our employees, customers, partners, shareholders, suppliers, and communities, and we take their voices into account. Microsoft receives input from millions of people each year—from individual customers to policymakers and global human rights specialists. We bring outside perspectives into the company and inform our business decisions through a variety of feedback channels. We go beyond formal channels, proactively engaging with key stakeholders, advocacy groups, industry experts, corporate social responsibility (CSR) rating agencies, CSR-focused investors, and many others. We also share our learnings and practices, thereby generating industry dialogue, informing public debate, and advancing greater progress.

ESG materiality

Our ESG reporting describes the topics we consider to be the most important to stakeholders when evaluating environmental, social, and governance issues at Microsoft. Therefore, ESG materiality in our reporting does not directly correspond to the concept of materiality used in securities law. A listing of what we currently identify and categorize as our top ESG issues can be found on our [website](#). In 2020, Microsoft conducted a materiality assessment focused on environmental sustainability, which can be accessed in the [2020 Microsoft Sustainability Report](#).

Governance

The Environmental, Social, and Public Policy Committee of Microsoft's Board of Directors provides oversight and guidance on Microsoft's environmental sustainability strategy and efforts. During at least one meeting each year and on an as-needed basis, our Vice Chair and President and our Chief Sustainability Officer present to this committee on our overall sustainability agenda, including our climate-related work, and solicit high-level input on new and emerging initiatives. Additional information on Microsoft's corporate governance is available at microsoft.com/investor.

Forward-looking statements

This report includes estimates, projections, and other "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995, section 27A of the Securities Act of 1933, and section 21E of the Securities Exchange Act of 1934. These forward-looking statements generally are

identified by the words "believe," "project," "expect," "anticipate," "estimate," "intend," "strategy," "future," "target," "efforts," "goal," "commitment," "opportunity," "plan," "may," "should," "will," "would," "will be," "will continue," "will likely result," and similar expressions. Forward-looking statements are based on current expectations and assumptions that are subject to risks and uncertainties that may cause actual results to differ materially. We describe risks and uncertainties that could cause actual results and events to differ materially in our reports filed with the Securities and Exchange Commission. We undertake no obligation to update or revise publicly any forward-looking statements, whether because of new information, future events, or otherwise.

A number of our ESG goals may depend on the adoption of certain behaviors and activities by third parties, including our customers and partners. If those parties do not adopt certain behaviors or activities, or invest in certain evolving technologies, we may not be able to meet some goals. Additionally, we are engaged in certain projects, solutions, and technologies that, should they not perform as we expect, could negatively affect our ability to meet some ESG goals on time or at all. Finally, we make certain claims regarding our products and projects, including through our funding of certain projects, and the ability of those products, projects, and funding efforts to affect third parties' sustainability efforts; however, there can be no guarantee that our products, projects, or funding efforts will have the effects we anticipate or intend.

Appendix B

1. This value references CIF capital allocated through calendar year 2023.
2. This definition is consistent with RE100 technical criteria as of November 2023: [Dec 12 – RE100 technical criteria + appendices.pdf \(there100.org\)](#)
3. The Microsoft LEED Volume Program is based on LEED v4.0 and includes 83 prototype credits. These prototype credits share the same approach or strategy across multiple projects due to technical and managerial uniformity and have already been approved by U.S. Green Building Council (USGBC), thereby reducing duplicated efforts for project teams. Our architectural engineering (A/E) teams are also encouraged to review the complete LEED scorecard and apply for non-prototype credits that are most relevant to their specific project.
4. [Carbon Accounting at Microsoft](#)
5. A Water-Smart Society is defined as a society in which the value of water is recognized and realized to ensure water security, sustainability, and resilience; all available water sources are managed so that water scarcity and pollution are avoided; water and resource loops are largely closed to foster a circular economy and optimal resource efficiency; the water system is resilient against the impact of climate and demographic change; and all relevant stakeholders are engaged in guaranteeing sustainable water governance.
6. [ESSD - Country-level and gridded estimates of wastewater production, collection, treatment and reuse \(copernicus.org\)](#)
7. The Federal Energy Management program's wastewater map includes data on reclaimed water available in only six states across the US. [Reclaimed Wastewater Map | Department of Energy](#)
8. Our cloud packaging targets cover packaging for any cloud infrastructure product that is delivered to, collected from, or moved between Microsoft datacenters.
9. Based on estimated reductions in logistic carbon emissions and component waste reduction attributable to same unit repair from January 1 to December 31, 2023 across multiple regions.
10. [End-of-life management and recycling | Microsoft Legal](#)
11. [The Importance of Pollinators | USDA](#)
12. Customers and partners can access the Emissions Impact Dashboard data directly through the [Microsoft Cloud for Sustainability API \(preview\)](#). Accompanying the dashboard is this [white paper](#) describing what customers can do to reduce the environmental impact of their Microsoft 365 cloud usage.
13. Customer Replaceable Units (CRUs) are components available for purchase through your Surface Commercial Authorized Device Reseller. Components can be replaced onsite by a skilled technician following [Microsoft's Service Guide](#). Opening and/or repairing your device can present electric shock, fire, and personal injury risk and other hazards. Use caution if undertaking do-it-yourself repairs. Device damage caused during repair will not be covered under Microsoft's Hardware Warranty or protection plans. Availability of replaceable components and service options may vary by market and/or at initial product launch.
14. [Whitepaper: Reducing Fortnite's Power Consumption - Unreal Engine](#)
15. The overall manufacturing carbon footprint of a product is influenced by energy and other auxiliaries used in manufacturing processes, technology, as well as materials production. The manufacturing carbon footprint varies by product configuration (such as processor, storage, memory). This statement is solely referring to the reduction seen in global warming potential from energy use in manufacturing processes.
16. This information has been self-reported by the organization and has not been verified by Microsoft.
17. [ENGIE collaborates with Microsoft and Solstice to accelerate access to community solar for under-resourced communities in Illinois - ENGIE North America \(engie-na.com\)](#)
18. [Sampling biases shape our view of the natural world; Hughes et al., 2021](#)
19. [The Green Gender Gap: A special edition of LinkedIn's Global Green Skills Report 2023](#)



Captured by:
Finnian Power

Sustainability, to me, is about the responsible stewardship of our planet's resources to preserve them for present and future generations. I volunteer in a nature reserve as a nature and wildlife photographer. The purpose of the photos I take is to promote awareness of the natural biodiversity of our lands and the wildlife they support.



Captured by:
Therese Gule

I love the natural beauty of the world around me. I enjoy spending time in nature by hiking, skiing, and paddling. These activities bring calmness and inspiration to my life and help me to understand the importance of protecting the environment for future generations.



Captured by:
Yasna Amas M

As a nature lover, I care about the legacy we leave to future generations. Sustainability is the path to this legacy, as it balances economic, environmental, and social aspects. Through my personal actions and my role at Microsoft, I have the responsibility and the great opportunity to contribute to the achievement of our sustainability goals. We all have a role in this.



Captured by:
Martin Tatar

At Microsoft I work with our MVP community of technology experts to reflect our commitment to make a positive impact around the globe, including the environment. Outside of Microsoft, when I am in nature, I make a conscious decision to leave no trace, respecting the environment and helping to preserve it for future generations to enjoy.



Captured by:
Eoin Murphy

The most important part of sustainability for me is finding a balance with progress and protecting nature. National Parks are a great example of how to protect nature for future generations.



Sustainability champion:
Cameron Hughes

Cameron has been a trailblazer in helping colleagues and customers understand their own environmental footprint. He fosters climate discussion and encourages action in his community, highlighting that everyone has a role to play in creating a more sustainable world.



Sustainability champion:
Badarul Muneer

Badarul has led countrywide sustainability initiatives since 2022. Through these efforts, his team has helped to reduce single-use plastics, onboarded a local recycling company to collect logistics waste, and engaged with the building owners to record and track waste generation.

More about Microsoft's
#sustainabilitychampions

Our employees are at the core of our sustainability journey. Their passion and commitment catalyzes progress in every part of our business and their communities around the world.



Stay up to date on our progress

Learn more about our [sustainability journey](#) and sign up for news and updates [here](#).