

A photograph of several wind turbines silhouetted against a sunset sky. The sun is low on the horizon, creating a warm orange and yellow glow. The turbines are arranged in a line, receding into the distance. The sky transitions from a deep blue at the top to a bright orange near the horizon.

# Environment

Fast Forward  
2021 Sustainability Report

## Innovation, collaboration and tenacity are necessary as we drive improvements in our energy, emissions, water and waste performance throughout our operations.

Transformative technology innovations — breakthroughs in autonomous driving, big data processing, artificial intelligence and more — are possible only through significant improvements in memory and storage solutions. Increasing the capacity and performance of these components can unlock new possibilities for people and the planet.

But these product improvements also require new manufacturing equipment, materials and processing technologies, which can intensify our operational footprint. We are continually working to align our production with objectives for both product and environmental performance while also managing sometimes significant trade-offs.

This balance begins in the early stages of planning and process development, when we strive to identify opportunities to reduce the effect of our operations on the environment and in the communities where we're located. This analysis requires a blend of global strategy and local adaptation, which we do through these activities:

- Assessing opportunities to align processes with our strategic objectives in early-stage technology development
- Engaging our robust network of site-based environmental, health and safety (EHS) professionals throughout our global operations
- Exploring and implementing opportunities to build manufacturing, infrastructure and office space that conserves resources and ensures worker safety
- Implementing and maintaining certified ISO 14001:2015 and ISO 45001:2018 EHS management systems at all manufacturing locations
- Enhancing critical practices in our manufacturing to align with industry trends, often exceeding local legal requirements

- Assessing and reviewing our performance through corporate and third-party audits
- Adopting strategic corporate environmental sustainability and safety targets, which are implemented throughout our global manufacturing network

We continue to strengthen our upfront integration of EHS considerations into our process design, facility design

and construction. This integration includes evaluating environmental sustainability improvements, such as energy, water and waste efficiency; Leadership in Energy & Environmental Design (LEED) criteria; and other opportunities to improve our performance over time.



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**Our products improve the world by giving billions of people the power to access and store information. We believe these products should be made sustainably. That's why we set aggressive goals for emissions reduction, renewable energy, water use and waste reduction to achieve over the next 10 years.”**

**Buddy Nicoson**  
Senior Vice President of  
Global Front-End Operations

## Our Manufacturing Process

**As one of the world's largest semiconductor companies, Micron understands that our manufacturing operations affect the environment, so we take a proactive approach to environmental stewardship.**

We build memory chips (or die) at our front-end facilities, known as fabs, in Singapore, Taiwan, Japan and the United States. Using state-of-the-art processes, we add and subtract specialized materials to silicon wafers to create our memory and storage solutions. This process takes place at the nanoscale in a cleanroom environment. Each wafer goes through numerous manufacturing steps, where chemicals and materials are precisely applied to develop the functionality of each chip. Airborne particles, temperature and humidity are tightly controlled to ensure quality as the wafer passes hundreds of times through up to 10 process areas, each with a unique set of tools.

From the moment a new wafer enters the fab until all steps are finished, the process can take months. Once complete, a wafer is divided into its constituent die, which are then assembled at our assembly and test facilities into numerous customized formats that enable many technologies. These processes require energy to run specialized equipment and maintain the cleanroom environment, use water to ensure the cleanliness and quality of the wafer, and involve potentially hazardous chemicals.

Our application of Moore's law has driven higher bit density with each successive product generation while requiring fewer resources and producing fewer emissions per unit of production. No other industry is as efficient as semiconductor manufacturing in this regard. For instance, energy consumed per bit produced is improved by as much

as 25% per year, and the cumulative effect over the decades has been enormous. That said, innovation opportunities abound to enhance environmental sustainability in semiconductor manufacturing.

To take advantage of these opportunities to innovate, we are investing approximately US\$1 billion over the next five to seven years to adopt and co-develop leading-edge technologies that further drive down our consumption of resources and generation of byproducts. We are committed to identifying and enabling these opportunities in partnership with governments, academia, utility providers and members of the broad manufacturing value chain. Micron is working with our process and equipment solution providers to

drive energy, material use and reaction efficiency and to develop additional abatement techniques for unreacted gases and chemicals. We are also working with equipment manufacturers to promote advanced technologies that can reduce total water use and enable us to reuse and recycle more water. In addition, we are finding ways to repurpose our waste to contribute to a circular economy.

We will continue to dedicate significant resources in each of these areas, demonstrating our commitment to enhancing energy efficiency, reducing greenhouse gas (GHG) emissions and improving waste and water recycling infrastructure at our global facilities.



Micron - Taichung City, Taiwan

**Our task is to innovate boldly, not only to improve our products but also to accelerate sustainability.**

## Goals & Aspirations

**The semiconductor industry faces great challenges to reducing its operational footprint. But these are challenges that Micron engineers and innovators are uniquely positioned to solve.**

Understanding how our operations affect the environment and wanting to be responsible stewards, we aspire to align our emissions with the target established by the Paris Agreement to limit planetary warming to well below

2 degrees Celsius and with the United Nations Sustainable Development Goal 13 on Climate Action.

To be accountable for our performance, Micron has set ambitious sustainability goals for the short and long terms. These aspirations will dramatically improve the environmental impact of our global operations while staying true to our vision of enriching the world *for all* through technology innovation. As a first step, we have set time-bound emissions, energy, water and waste targets for calendar years (CY) 2025 and 2030. And, as we mentioned above, Micron plans to spend approximately \$1 billion over the next five to seven years on our environmental programs to support these goals.

A variety of innovative approaches will help us meet these goals. For example, we are using artificial intelligence, machine learning and the internet of things (IoT) to increase

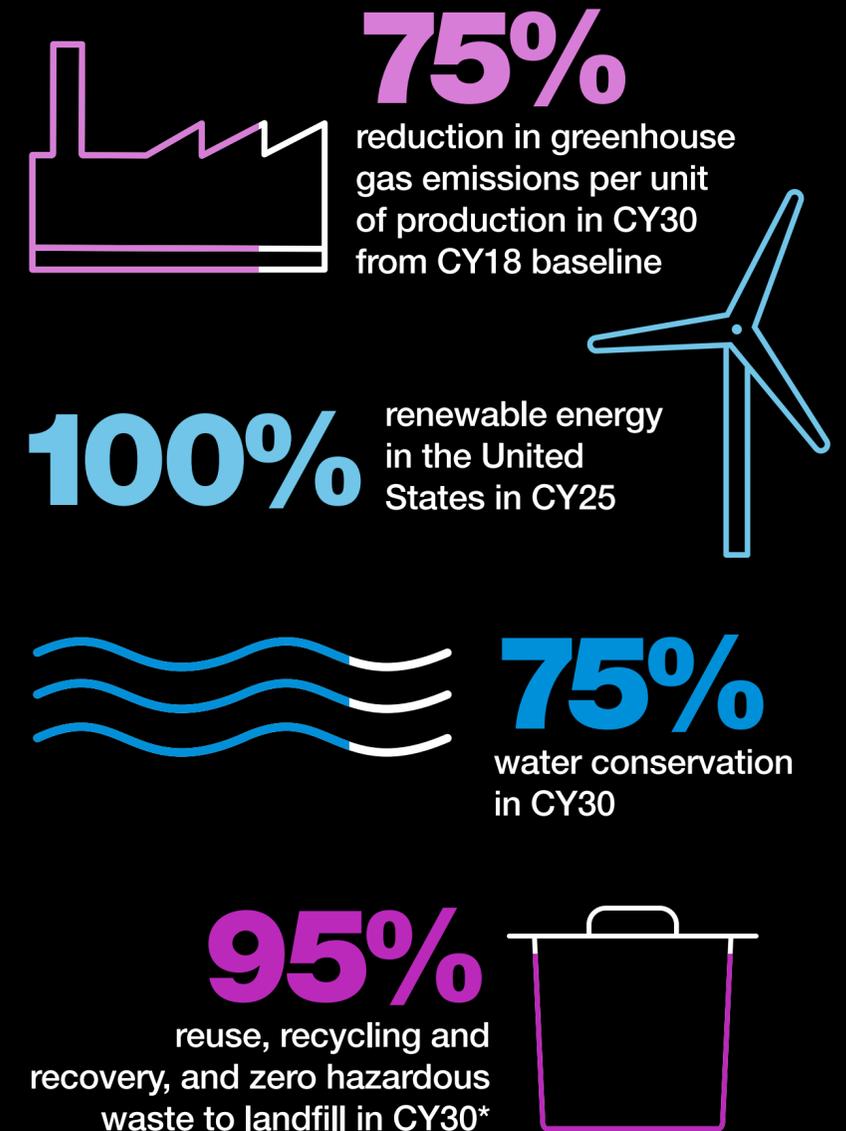
efficiency in our fabs. We are designing for sustainability, following LEED criteria in the construction of new facilities. Over the next five years, operational sustainability will be integrated into every technology development process, and goals and solutions will be developed to drive us to benchmark performance.

A global, cross-functional team was convened to develop our sustainability aspirations and has allowed us to share insights across geographies so that we can make progress in several areas at once. In addition, we have formed specialized teams focused on heat transfer fluids, fluorinated gases, energy efficiency and renewables, water and waste, and other areas to support our goals.

Pillar	Goal	Aspiration	Actions	CY20 Performance
<b>Emissions</b>	75% reduction in GHG emissions per unit of production in CY30 from CY18 baseline	40% reduction in absolute GHGs from CY18	Reducing direct emissions through efficient abatement of process GHGs and a transition to low global-warming-potential heat transfer fluid  Reducing indirect emissions through design of energy-efficient facilities, smart-controlled systems, and a transition to renewable electricity where available	36% reduction in GHG emissions per unit of production vs. CY18
<b>Energy</b>	100% renewable energy in the United States in CY25	100% renewable energy globally where available	Finalizing contracts for new U.S. renewable energy development and engaging with governments to increase the availability of renewable energy to support our global manufacturing	Initiated negotiations for new renewable energy development and procurement in the U.S.
<b>Water</b>	75% water conservation through reuse, recycling and restoration in CY30	100% water conservation through reuse, recycling and restoration	Targeting conservation through enhancing our water reuse and recycle infrastructure, as well as engaging in water restoration projects	50% water conservation through reuse, recycling and restoration
<b>Waste</b>	95% reuse, recycling and recovery, and zero hazardous waste to landfill in CY30* <small>*Subject to vendor availability</small>	Zero waste to landfill through reduction, reuse, recycling and recovery	Focusing on reuse, recycling and recovery through enhanced waste recovery systems, improved waste stream segregation, and engagement of alternate waste disposal vendors	84% reuse, recycle and recovery (including energy recovery)

Note: Micron's environmental performance is measured by calendar year. Environmental goals are targeted for the end of the referenced calendar year.

### Our Environmental Goals



\*Subject to vendor availability

## Greenhouse Gas Emissions & Energy

**While Micron’s low-power devices support sustainability and climate change initiatives in customer operations and products, our manufacturing process remains an energy- and emissions-intensive one.**

Micron is tackling the challenge of energy and emissions reduction head-on, with aspirations established early in 2020 to reduce our absolute GHG emissions by 40% and achieve 100% renewable energy where available worldwide. We are updating these aspirations with two new time-bound corporate targets:

- Reduce GHG emissions 75% per unit of production in 2030 (compared to a 2018 baseline)
- Achieve 100% renewable energy in the U.S. by the end of 2025

We also maintain our multiyear goal to achieve at least 10% energy savings (measured in kilowatt-hours saved compared to 2016 baseline energy use) by 2022. To achieve these goals, we are focusing first on areas where our potential is greatest, including our energy use and process gas emissions.

Our approach to GHG management begins with collecting, analyzing and reporting data specific to these emissions. We report on GHG emissions through CDP, the primary international organization standardizing environmental data reporting on GHG emissions and other environmental criteria for companies, cities, states and regions. In 2020, we received a score of B on CDP’s climate list and a B on its water security list, both improvements from prior years’ scores.

The semiconductor industry is also working to reduce emissions of fluorinated GHGs (F-GHG), a potent source of emissions that result from manufacturing processes. Despite years of research into alternatives for F-GHGs, few suitable substitutes exist for broad use. Micron is continuously evaluating possibilities that are more efficient or have lower potential for global warming. When no other options are available, we also reduce F-GHGs through point-of-use abatement at the tool level, where more than 90% of gases are destroyed.

In terms of energy savings, we have saved a cumulative 7% compared to our 2016 baseline through projects implemented in 2020. We are also taking the first steps toward our renewable energy goal. In 2020, we began negotiations to develop and procure new renewable energy in the United States. In addition, we are installing solar panels at facilities in Malaysia and Singapore and will explore further opportunities for on-site solar as local regulations allow.

Micron is a member of the Renewable Energy Buyers Alliance (REBA), a membership association for large-scale energy buyers, developers, service providers and nongovernmental organizations. In early 2021, we joined our REBA partners in releasing a [policy statement](#) calling on the U.S. government to enact national policy solutions that will accelerate the transition to a zero-carbon power system by decarbonizing

the grid and increasing federal funding for clean energy technology research, development and demonstration.

Achieving our GHG and energy goals requires incorporating sustainability into our buildings from the ground up. We consider sustainable building attributes — such as LEED criteria, the world’s top rating system for green buildings — as part of new building design. Many of our newest buildings have achieved LEED Gold status, and we design and build all new construction to meet or exceed that standard. To improve the energy and emissions associated with existing buildings, we are creating roadmaps to reductions over the coming years. Because both new fab construction projects and upgrades take years to design and implement, our plans take a long-term view.

In the near term, we are implementing AI tools, smart control systems and predictive maintenance to improve production efficiency and automation. We have integrated 470,000 facility sensors into IoT platforms and control centers. And we use a real-time performance monitoring platform with video analytics, high-speed cameras, graphic units and deep learning to conduct automated root-cause and corrective-action analyses. This platform, which enables us to quickly resolve equipment downtime and process deviations, has led to an 18% improvement in labor productivity, 50% reduction in product downgrade, 22% improvement in time to new product ramp and significant savings in energy consumption.



Note: Micron’s environmental performance is measured by calendar year. Environmental goals are targeted for the end of the referenced calendar year.

### Progress Toward Greenhouse Gas Emissions & Energy Goals

**36%** reduction in GHG emissions from CY18

#### Energy Consumption

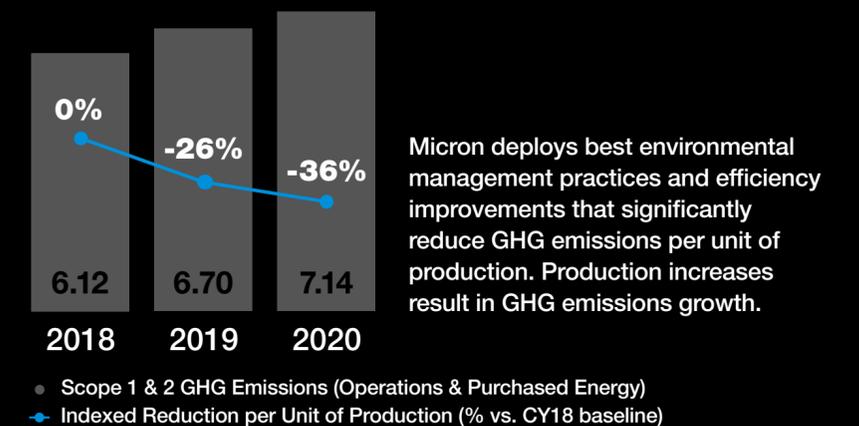


● Purchased Electricity ● Purchased Steam and Cooling ● Fuel

Energy consumption in millions of megawatt hours (M MWh)

Detailed energy consumption & savings figures can be found in [Performance at a Glance](#)

#### Total Greenhouse Gas Emissions Trend



Micron deploys best environmental management practices and efficiency improvements that significantly reduce GHG emissions per unit of production. Production increases result in GHG emissions growth.

● Scope 1 & 2 GHG Emissions (Operations & Purchased Energy)  
 ◆ Indexed Reduction per Unit of Production (% vs. CY18 baseline)

Emissions for calendar year in million metric ton CO<sub>2</sub> equivalents

## Water

### Water is an essential resource in the manufacture of semiconductors.

Each wafer used to make our products goes through a series of cleaning steps, which depend on ultrapure water to ensure manufacturing process quality. As semiconductor technologies have become more complex, demand for water has grown. Therefore, reducing the amount of water we use and properly treating the water we do use are among Micron's top environmental priorities.

Micron proactively manages water consumption by identifying opportunities to increase water efficiency and reduce raw water demand, supporting the U.N. Sustainable Development Goal 6, which focuses on clean water and sanitation. Our manufacturing sites generate ultrapure water from a combination of recycled water from our operations and local, untreated water resources. Wastewater from our operations that is not recycled or otherwise reused on-site is treated to comply with local standards and then discharged.

We are working toward an aspirational goal of reusing, recycling or restoring 100% of the water used in our operations, with an interim goal of 75% by the end of 2030. Actions such as enhancing reuse and recycling infrastructure and managing water efficiency, especially at existing facilities, will drive us toward this goal. Increasingly, we are incorporating water saving measures during the design stage of new buildings and industrial processes.

Sustainable management of our water footprint begins with understanding where we obtain water. Globally, the primary source for water at manufacturing locations is the municipal supply, underscoring the importance of partnering with local water authorities. We consider these relationships within their local context, seeking to understand the implications of different geographies, climates, watersheds and infrastructure. We then use the information we

have gathered to determine the best approach to water management at each site.

A water risk assessment using the World Resources Institute's Aqueduct tool has helped us better understand local water conditions. Recent updates to Aqueduct note that only 1% of Micron's total water withdrawals come from areas of high water stress — specifically our facility in Xi'an, China. Still, many of our locations face potential water stress, and we recognize the importance of being a good partner in managing local water resources. Our fabs in Taiwan, for example, have been designed to enable the highest water recycling rates in the Micron network. A wastewater reclamation system installed at our wafer fab in Taoyuan in 2019 reduces our annual municipal water consumption by over 450,000 cubic meters. As the location weathers a historic drought, we are working closely with local authorities and carefully managing our water use.

While our approach to water stewardship reflects a local, adaptive approach, our commitment to ensuring that industrial wastewater discharges meet all environmental legal requirements is global. Each Micron site has invested in significant water treatment infrastructure so that any wastewater leaving the site meets or exceeds applicable water quality standards. Wastewater treatment methods may vary by site but include membrane filtration, ion-resin adsorption, precipitation, bio-oxidation and neutralization. We routinely sample wastewater discharges for compliance with environmental standards. In CY20, we discharged 42.4 million cubic meters of treated wastewater, with 85% of that discharge sent to publicly operated treatment works. The sites also have staff responsible for the ongoing operation and routine maintenance of wastewater systems to safeguard proper performance over time.



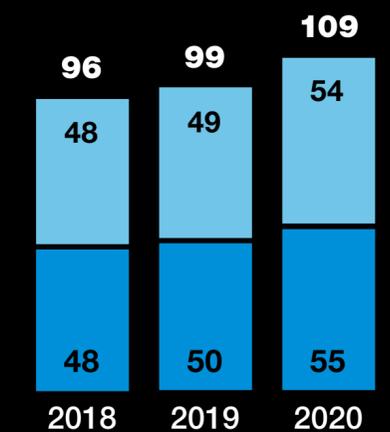
Note: Micron's environmental performance is measured by calendar year. Environmental goals are targeted for the end of the referenced calendar year.

### Progress Toward Water Stewardship Goal

**54** million m<sup>3</sup> **Water Reused, Recycled & Restored**



### Water Use & Recycle



● Withdrawal  
● Reuse, Recycle & Restoration

All data is calendar year

Water volume in millions of cubic meters (m<sup>3</sup>)



Boise, Idaho, U.S.

## Solving Shared Water Challenges Close to Home

One way Micron will achieve its water conservation goal is by getting involved in local water restoration projects in the communities where we operate. Boise State University's Intermountain Bird Observatory and Diane Moore Nature Center is just across the Boise River from the pumphouse for Micron's headquarters and primary technology development fab, providing a direct line of sight from one of Micron's water sources to our clean water goal.

By "adopting" this stretch of the river, Micron will support the restoration of a side channel that runs parallel to the river and improve the quality of 10.9 million cubic meters of water a year. If the main stem of a river is the highway, a side channel is the service road where the traffic flows at a slower pace. In the case of the Boise River, it is also where fish and wildlife can access food, shelter and rest. The side channel provides cleaner, cold water to target the higher dissolved oxygen needs of trout spawn and juveniles.

Micron is providing funding for the design and construction of the project, which will reopen the side channel that has been filled in over the years. This effort will offer an annual restoration benefit equal to 21% of Micron's 2020 global water withdrawals. Our support will also allow Boise State University, a longtime partner, to incorporate walking paths, signage and wildlife viewing areas along the river. These amenities will engage visitors and bolster community STEM education programs.

# Hazardous Substances & Waste

**The manufacturing processes that transform a wafer into hundreds of individual die use chemicals and materials such as acids, bases and solvents for depositing, patterning, selectively removing and cleaning. These processes also create a variety of waste materials.**

Micron maintains an active program to continually reduce hazardous chemicals in the manufacturing process and evaluate what we can do to mitigate any environmental impacts stemming from our use of those chemicals.

We also seek to reduce waste going into landfills and identify new recycling opportunities for any waste we produce — ultimately to meet our 2030 target of 95% waste reuse, recycling and recovery on the way to our aspirational goal to send zero waste to landfill.

This commitment starts with a rigorous chemical review process that ensures only approved chemicals reach our facilities. This review prevents banned or restricted chemicals from reaching our operations and facilitates the proper handling, recycling and disposal of chemicals throughout their lifecycle. It also allows us to track and understand our chemical-use profile so that we can implement chemical reduction and elimination initiatives. Over the past year, we have increased our focus on chemical reduction through process improvements, encouraging teams to design waste out of their processes. Chemicals

management also has critical intersections with workforce safety and with our products.

Beyond chemical screening, we perform due diligence on all new waste vendors to make sure their practices meet applicable legal requirements and safeguard the surrounding environment. If a waste facility passes this evaluation, Micron updates the assessment periodically to support the consistent and effective management of waste materials over time.

Given our dynamic industry, we keep abreast of any new risks or opportunities related to hazardous substances. We are committed to reducing chemical consumption and

waste production by identifying new segregation methods, collaborating with waste vendors on solutions, optimizing recipes to reduce chemical waste, and working with business partners on reuse and recycling technology. For example, facilities in many countries now divert treatment plant byproducts for use as alternative raw materials in other industries. We are also exploring technologies for treating and reusing it in other Micron applications.



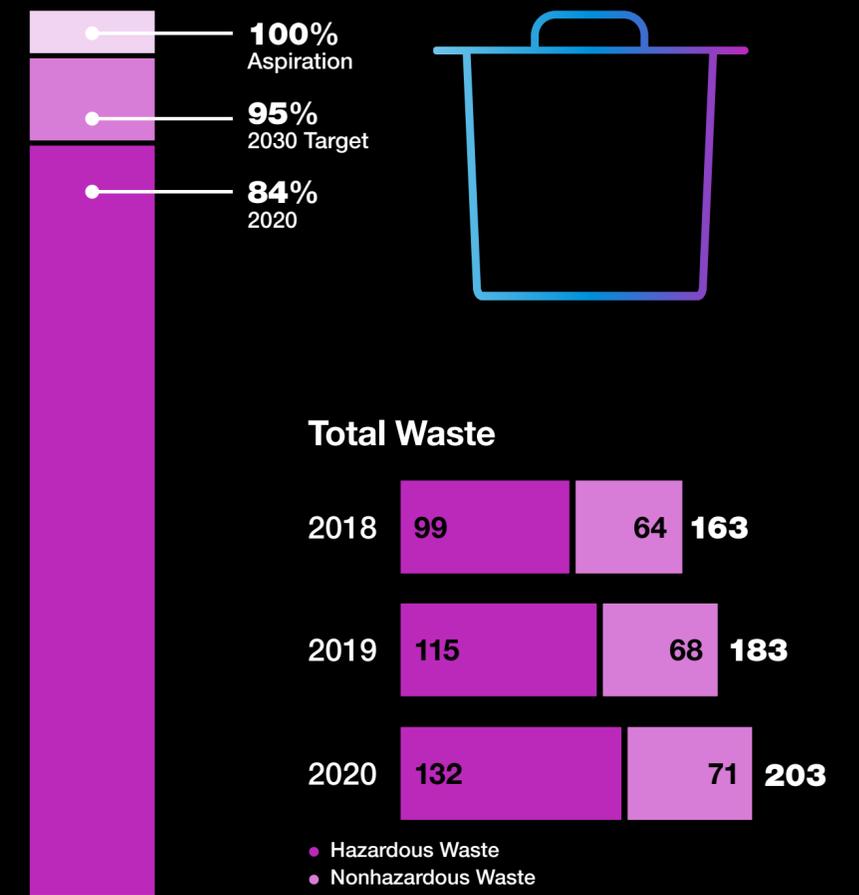
Micron - Manassas, Virginia, U.S.

Note: Micron's environmental performance is measured by calendar year. Environmental goals are targeted for the end of the referenced calendar year.

## Progress Toward Waste Goal

**84%**  
Waste Reused,  
Recycled & Recovered

Includes energy recovery



All data is calendar year

Total waste in millions of kilograms (M kg)

## Team Member Engagement

**Micron’s team members care deeply about their environment, especially as it relates to the health and well-being of their communities. Whenever possible, they put their commitment into action.**

In 2020, Micron invited all team members to rally around our new environmental goals by crowdsourcing a slogan that will support engagement and awareness for our environmental programs. Using an online collaborative innovation tool, the initiative garnered immense support: More than 730 submissions were posted and more than 8,700 team members across all Micron geographies participated. Based on this input and executive review, the slogan *Our Memory. Our Planet.* was born from a concept submitted by a Micron team in Arzano, Italy. *Our Memory* highlights our core business offering. *Our Planet* connects our business to sustainable environmental practices.

We’re also involving team members in other sustainability work inside and outside Micron. We organized a virtual Earth Day celebration in spring 2020 and launched our first global environmental roundtable connecting grassroots environmental teams across 21 manufacturing and nonmanufacturing Micron locations. Roundtable members represent committees of local volunteers who raise awareness and engage peers on sustainability issues.

Despite the challenges of COVID-19, volunteers came together where it was safe to do so to care for their local environments. Teams in Singapore, Taiwan and Japan organized cleanups of nearby waterways. In Singapore alone, nearly 850 team members gathered for 36 public space cleanup sessions, volunteering 4,185 hours and recovering 5,732 pounds of waste from the coastline.

Taiwanese team member Solo Wu recruited colleagues to help him monitor and protect the Nankan River from pollution. Once a month, volunteers patrol and clean up trash along a roughly 6-mile stretch of the river. “Biodiversity in Nankan River has been growing over the years,” said Wu, an environmental engineer for Micron’s EHS department in Taoyuan. “We have observed multiple distinctive and benchmark species. It indicates that patrol efforts are effective and water quality is improving.”

At several sites, team members organized donation and recycling drives to keep materials out of landfills,

repurposing food scraps, electronics, furniture and more. In Lehi, Utah, food waste collected from an on-site cafeteria has been used by a recycling partner to produce natural gas fuel, diverting 5.7 tons from the landfill in the first six months of operation. The Boise, Idaho, team also established a new program to reduce food waste by integrating compostable cafeteria scraps into an on-site composting system. The program recorded an average of 583 pounds a month of waste diverted from the local landfill.



Micron - Singapore

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**We are fortunate to be located near a company that operates an anaerobic digester that converts food waste to biofuel. Our ‘Scrape the Plate’ campaign allows all team members and contractors to participate in Micron’s sustainability efforts. This is an example of how small and simple things can lead to great results.”**

**Mike Smith**  
Principal Environmental Engineer



Published in April 2021, this report covers the sustainability performance of Micron Technology, Inc., in fiscal year 2020 (Aug. 30, 2019, through Sept. 3, 2020), unless otherwise stated, and includes all of Micron's controlled entities. This 2021 Sustainability Report has been prepared in accordance with Global Reporting Initiative (GRI) Standards: Core option. GRI is the most widely accepted global standard for sustainability reporting and allows companies to measure, evaluate and communicate corporate sustainability information in a consistent and comparable manner. We are also reporting to the Sustainability Accounting Standards Board (SASB) Semiconductors Standard and provide an index aligned with the Task Force on Climate-Related Financial Disclosures (TCFD) framework.

Accompanying this report is our 2021 Sustainability Progress Summary, which contains selected highlights from the past year and stories of how Micron and our team members have taken action to meet urgent global challenges, such as COVID-19, inequality and climate change.

#### **About Micron Technology, Inc.**

We are an industry leader in innovative memory and storage solutions transforming how the world uses information to enrich life for all. With a relentless focus on our customers, technology leadership, and manufacturing and operational excellence, Micron delivers a rich portfolio of high-performance DRAM, NAND and NOR memory and storage products through our Micron® and Crucial® brands. Every day, the innovations that our people create fuel the data economy, enabling advances in artificial intelligence and 5G applications that unleash opportunities — from the data center to the intelligent edge and across the client and mobile user experience. To learn more about Micron Technology, Inc. (Nasdaq: MU), visit [micron.com](https://micron.com).

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