

Sustainable Operations

We are taking a broad, science-based approach to measuring and reducing carbon emissions in our operations.



Carbon Footprint

Amazon's corporate carbon footprint quantifies the total greenhouse gas (GHG) emissions attributed to our direct and indirect operational activities. We measure our total impact on the climate, map the largest activities contributing to this impact, and use this information to develop meaningful carbon reduction goals, including our overall goal to reach net zero carbon across Amazon by 2040.

Our carbon footprint includes emissions from Amazon-operated and third-party freight, electricity use, Amazon branded products, capital goods, business travel, packaging, customer trips to Amazon's stores, and other purchased goods and services. The system boundary of our carbon footprint meets widely adopted international standards, including the Greenhouse Gas Protocol and ISO 14064. Our carbon footprint is externally assured by Apex.

Through our commitment to The Climate Pledge, Amazon is investing in a range of large-scale solutions to decarbonize our business, some with immediate carbon savings and others with longer-term payoffs. We have already seen an improvement in the carbon intensity of our business in 2019 as a result of operational efficiencies such as energy efficiency technologies in fulfillment centers and alternative vehicle pilots. Carbon intensity is the metric we use to benchmark our performance year over year, as it provides a relative comparison between annual performance metrics regardless of other changes to our business. While Amazon's net sales increased 22% in 2019 (excluding changes in foreign exchange rates), our total carbon footprint increased 15% during the same period. While still early days, our 2019 carbon intensity metric is 122.8 grams of CO₂e per GMS, down 5% year over year from 128.9 grams of CO₂e per dollar in 2018.

Like many companies in high growth mode, we look at the absolute tons of carbon in our footprint, but also at how we are improving our carbon intensity. Our first year-over-year comparison shows progress as we continue to make investments in innovation, technologies, and products that will decarbonize our operations over future years.

These investments include renewable energy projects like our new solar farm in Virginia, and our order of 100,000 electric delivery vehicles, which will be on the road delivering packages to customers starting in 2021. It will take several years for the carbon reduction benefits of these investments to be fully reflected in our carbon footprint. Over time, both our carbon intensity and our absolute carbon footprint will drop as we continue to make progress toward net zero carbon. With the launch of The Climate Pledge Fund, we look forward to making additional major investments in the coming years that will result in long-term payoffs.



Amazon's 2019 Carbon Footprint

| Catergories | MMT CO ₂ e |
|--|-----------------------|
| Emissions from Direct Operations (Scope 1) | 5.76 |
| Fossil Fuels | 5.57 |
| Refrigerants | 0.19 |
| Emissions from Purchased Electricity (Scope 2) | 5.50 |
| Emissions from Indirect Sources (Scope 3) | 39.91 |
| Corporate purchases and Amazon-branded product emissions (e.g., operating expenses, business travel, and Amazon-branded product manufacturing, use phase, and end of life) | 15.41 |
| Capital goods (e.g., building construction, servers and other hardware, equipment, vehicles) | 8.01 |
| Other indirect emissions (e.g., third-party transportation, packaging, grid line losses) | 12.44 |
| Lifecycle emissions from customer trips to Amazon's physical stores | 4.05 |
| Amazon's Total Footprint | 51.17 |

Our carbon intensity metric, measured as grams of carbon dioxide equivalent (CO₂e) per dollar of Gross Merchandise Sales (GMS), is equal to 122.8 CO₂e per dollar (USD).

Carbon Methodology

Learn more about the science and technology behind our carbon footprint.

amzn.to/measuring-carbon

Greenhouse Gas Emissions Verification Statement

Read the greenhouse gas emissions verification statement from Apex.

amzn.to/carbon-assurance

Renewable Energy

Amazon is committed to powering our operations with 100% renewable energy as part of our goal to reach net zero carbon by 2040. We have a company-wide goal to reach 100% renewable energy by 2025.

In 2019, we reached 42% renewable energy across our business. As of June 2020, Amazon has 91 solar and wind projects across the globe that have the capacity to generate over 2,900 megawatts (MW) and deliver more than 7.6 million megawatt hours (MWh) of energy annually—enough to power more than 680,000 U.S. homes.

In March 2020, Amazon announced four new renewable energy projects—the first in Australia, second in Sweden, second in Spain, and 11th in the Commonwealth of Virginia in the U.S. Combined, these projects are expected to produce almost 300 MW of additional renewable capacity and approximately 840,000 MWh of energy annually—enough to power more than 76,000 average U.S. homes.

One of our latest solar projects in the U.S. is a solar farm in Pittsylvania County, Virginia, which will power Amazon's new Virginia headquarters and other Amazon-owned operations across the Commonwealth, including Whole Foods Markets and fulfillment centers. The project is planned for completion by the first quarter of 2022. Amazon has contracted 82 megawatts (MW) of the new 120 MW solar farm, which is expected to generate 172,500 MWh of renewable energy annually.

Amazon was ranked #1 in the U.S. by the Solar Energy Industries Association (SEIA) for corporate on-site solar installed in 2018. These installations offset the carbon dioxide equivalent of more than 200 million miles of truck deliveries.

Our largest wind project to date, Amazon Wind Farm Texas, is a 253 MW wind farm in Scurry County in the western part of the state. With more than 100 turbines, the project generates 1 million MWh of wind energy annually—enough to power almost 90,000 U.S. homes for a year.

Renewable Energy Methodology

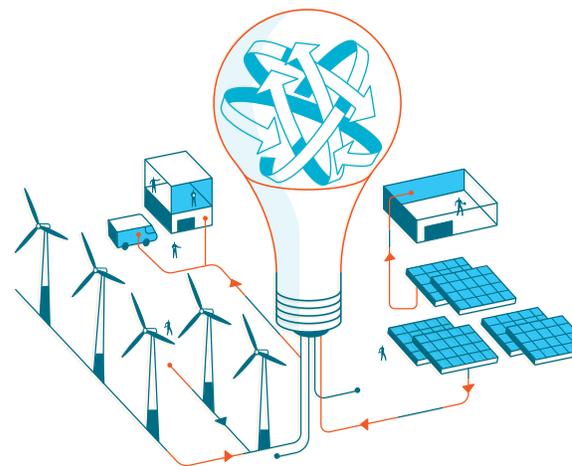
Learn more about how we calculate Amazon's renewable energy use.

➤ amzn.to/renewable-percentage

Renewable Energy Assurance Statement

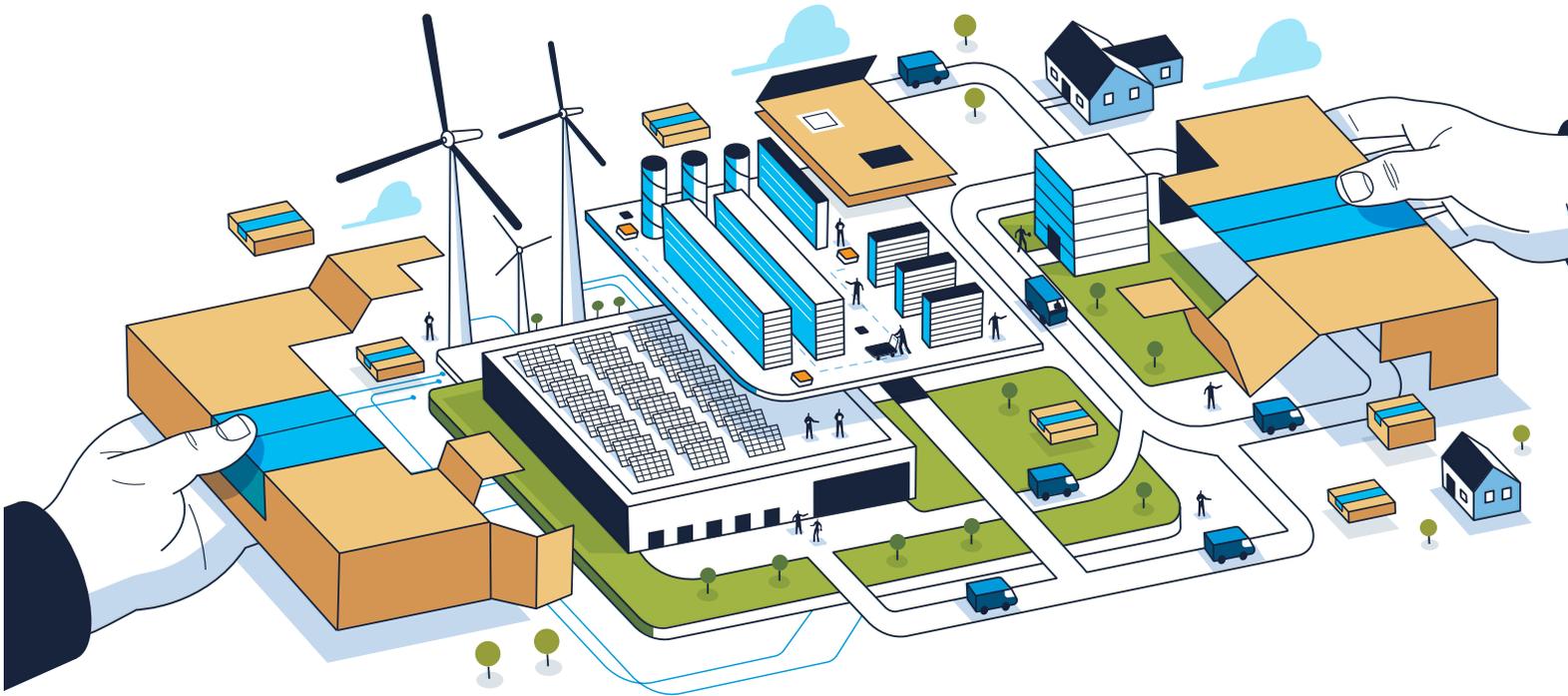
Read the renewable energy assurance statement from Apex.

➤ amzn.to/energy-assurance



Shipment Zero

Shipment Zero is Amazon's vision to make all Amazon shipments net zero carbon, with a goal of delivering 50% of shipments with net zero carbon by 2030.



Shipment Zero means that the fulfillment operations we undertake to deliver a customer's shipment are net zero carbon—from the fulfillment center where an item is picked off the shelf, to the materials used to package the item, and the mode of transportation that gets the package to the customer's door. We are working to launch Shipment Zero deliveries in Europe and the U.S., followed by India, Japan, and all other geographies where we operate across the globe.

The emissions sources considered in scope for Shipment Zero are:

1. Electricity emissions from powering operations facilities and vehicle charging;
2. Transportation tailpipe emissions from the burning of fossil fuels in vehicles that transport shipments from inventory to the customer;
3. Emissions from manufacturing and transporting the materials used in outbound packaging.

Fulfillment Facilities

A Shipment Zero order will travel through fulfillment facilities powered by 100% clean energy from wind and solar projects dedicated to Amazon's electricity needs and from the grid. Customer shipments pass through the following types of facilities, all powered by clean energy:

- Fulfillment centers where Amazon associates pick, pack, and ship customer orders;
- Sortation centers where customer orders are sorted by final destination and then consolidated for delivery;
- Delivery stations where orders are prepared for last-mile delivery to a customer's door.

More than 60 Amazon facilities across the globe are already powered by on-site solar panels, which generate as much as 80% of a single fulfillment facility's annual energy needs.

Packaging

A Shipment Zero order will be shipped without added Amazon packaging or in carbon neutral packaging. Ships In Own Container (SIOC) is a tier of certification within Amazon's Frustration-Free Packaging program, certifying that a product's original packaging is designed to ship without the need for an Amazon shipping box. We work closely with manufacturers to develop and test packaging that meets SIOC certification, and we share these innovations publicly to drive improvements across the industry. In India, we designed a new way to deliver customer orders packaging-free. Orders that ship in their original packaging are delivered in a protective, reusable crate in 100+ cities across India.

A second option is to ship in carbon neutral packaging that is made of net zero carbon materials, is produced with zero carbon emissions, and is delivered to Amazon fulfillment facilities using zero carbon. While we work to increase SIOC-certified products, expand packaging-free shipping programs, and develop carbon neutral packaging solutions, we will continue to pursue packaging improvements by optimizing the size and weight of shipping materials, inventing new recyclable mailers, and working with suppliers to streamline and innovate product packaging.

Transportation

A Shipment Zero order will be transported in a zero-emissions delivery vehicle or by a delivery associate on foot or on bicycle. Zero-emissions delivery vehicles are 100% battery electric or hydrogen-fueled, in addition to electric bikes and electric three-wheelers. Amazon's order of 100,000 electric delivery vehicles in 2019 is a major stride toward zero carbon transportation across our global network, and we are proud to operate many electric vans and trucks today. We also leverage innovative technology to maximize efficiency on the road and reduce delivery distances by placing delivery stations close to large Amazon customer populations.

Sustainable Transportation

Transportation is a major component of Amazon's business operations and a key part of our plan to meet net zero carbon by 2040. We are committed to optimizing and transforming our transportation network through innovations in electrification, efficiency enhancements, and alternative delivery methods.



Electrifying Our Transport Fleets

In 2019, Amazon ordered 100,000 electric delivery vehicles from Rivian, a U.S. electric vehicle manufacturer. This order, the largest order ever of electric delivery vehicles, sends a signal to the marketplace to start inventing and developing new technologies that large, global companies need to transition to a low-carbon economy. We plan to start using these new vehicles from Rivian to deliver packages to customers by 2021, with 10,000 new vehicles on the road as early as 2022 and all 100,000 vehicles on the road by 2030. This is projected to save millions of metric tons of carbon per year by 2030.

Amazon already operates hundreds of electric vehicles across the globe. Amazon India is adding 10,000 electric delivery vehicles to its existing fleet by 2025, including 3-wheeler and 4-wheeler vehicles designed and manufactured in India. These vehicles are in addition to Amazon's order of 100,000 electric delivery vehicles from Rivian. Across Europe, Amazon is contracting with our service providers to launch a low-pollution last-mile fleet comprised of electric and natural gas vans and cars. We have added hundreds of electric vehicle charging stations at our European facilities for our partners to use, with plans to expand this infrastructure to support more sustainable deliveries. We use electric cargo bikes in cities around the world, including a pilot in New York City in 2019. In North America, Amazon has also deployed electric yard hostlers, which are used to move trailers around facilities.

Maximizing Efficiency on Current Vehicles

While we work to adopt the most efficient, cutting-edge vehicle technologies, we are also maximizing efficiencies on our existing fleets. Across North America and Europe, our fleet includes a mix of trailers in different sizes that are equipped with skirts (panels attached to the lower side edges of a trailer to make it more aerodynamic) and automatic tire inflation systems that keep tires properly inflated and maximize fuel efficiency.

We use mud flaps designed to allow airflow and water to pass through them, minimizing drag and saving an average of 100 gallons of diesel fuel per vehicle annually. In Europe, we have deployed over 500 hydraulically powered double-deck trailers. Double-deck trailers improve space utilization by up to 70% in comparison to standard semi-trailers, reducing the total number of trucks on the road.

Optimizing Our Delivery Logistics

Amazon is constantly working to optimize our delivery network and drive efficiencies in the process of delivering our products. To fulfill customer orders quickly, we have thousands of vehicles moving from fulfillment centers to delivery destinations. We use data and algorithms to consolidate as many shipments as possible onto one vehicle or plane. We also analyze which items are being ordered most frequently, by location, to ensure that the inventory of those items is stored nearby, minimizing the need to use planes or trucks for long-distance deliveries. By boosting efficiencies across our network, we are able to put fewer vehicles and planes into service.

Using Alternative Delivery Methods

We are continually piloting new or alternative ideas in different locations around the world in an effort to increase our efficiency and reduce emissions. In urban centers like New York City, we deliver packages on foot, have expanded our use of traditional bicycles, and use pedal-assist electric bikes connected to cargo trailers that can carry up to 45 packages. In India, our fleet includes electric three-wheelers and compressed natural gas (CNG) vehicles. Electric bikes and CNG vehicles are also part of our delivery fleet in Europe. Additionally, we're developing fully electric autonomous delivery services, such as the Amazon Scout device and Prime Air drones, which will make deliveries faster and more efficient than road deliveries.

Partnering with Experts and Industry

In 2017, Amazon signed the Sustainable Fuel Buyers' Principles, demonstrating our commitment to working with service providers to accelerate the transition to low-carbon commercial transportation solutions. Members of the nonprofit Business for Social Responsibility (BSR) Future of Fuels group developed The Buyers' Principles and vetted them through its network of 600 expert and industry stakeholders. These principles outline criteria that will catalyze the partnerships needed to drive the transition to a sustainable road freight transportation system.



Sustainable Buildings

As part of our commitment to The Climate Pledge, Amazon is working to reduce the carbon emissions associated with our buildings and facilities across the globe. We are transitioning our buildings to be net zero carbon, powered by renewable energy, and highly energy efficient, with demonstrated reductions in embodied carbon—the emissions associated with a building’s construction materials.

We are also working to improve the resource efficiency of our buildings beyond energy, with a focus on water and waste reduction strategies across our facilities. In all of our buildings, we seek to create safe, productive, and inspiring spaces that support the health and well-being of our employees, local environment, and community, both inside and outdoors.

Green Building Standards

We are committed to holding our buildings to the highest standards of sustainable design, and we pursue third-party building certification when doing so accelerates our impact. Amazon has nearly 30 LEED certified buildings in the U.S.—the majority of which have Gold and Platinum level certification—and more than 20 BREEAM certified buildings across Europe. We also engage with industry-leading programs that support the transition to net zero carbon in the built environment, such as the Carbon Leadership Forum.

Corporate Offices

Our global corporate offices are often located in vibrant communities and urban hubs. When designing our offices, we strive to integrate seamlessly with these communities while creating easy outdoor access for our employees and visitors. Many of our buildings offer public plazas and open green spaces for communal and public use. Even more feature green roofs and other green infrastructure that provide outdoor amenity space while supporting ecological functions like stormwater management.

Our buildings’ interiors integrate biophilic design concepts, such as green walls and locally-sourced woods, in addition to energy-efficient lighting, composting and recycling, and amenity spaces for employee wellness. Many Amazon buildings also offer plug-in electric vehicle charging stations for employees and visitors.

Sustainability in Action at Our Seattle Campus:

Our flagship Seattle campus features some of our most innovative sustainable design practices. A subterranean district energy system heats many of our buildings in the Denny Triangle neighborhood using waste heat generated from a neighboring data center. Above ground, employees and visitors can enjoy The Spheres, an indoor plant conservatory featuring 40,000 plants from the cloud forest regions of more than 30 countries, along with a 4,000 square foot green wall.



100% Renewable Energy at HQ2 in Arlington: Our second U.S. headquarters in Arlington, Virginia, known as “HQ2,” will use 100% renewable energy to power the four-million-square-foot campus, which is scheduled to be completed by 2022. We are constructing a new solar farm in Pittsylvania County, Virginia to power HQ2 and other Amazon-owned operations in the area, including Whole Foods Market stores and nearby fulfillment centers. A portion of the renewable energy generated from this solar farm will be allocated to Arlington County, a move that also helps advance the county’s renewable energy goals. The location for the HQ2 campus was strategically determined to provide walkable access to public transportation, bike storage, and local amenities such as shops, restaurants, and childcare.

International Offices: We aim to take best practices from across our global locations and embed them at our offices all over the world. Our corporate offices in Munich, Germany, have been certified Gold for environmental design by the German Sustainable Building Council based on their energy-efficient interiors and use of sustainable building materials. In Luxembourg, efficient chillers and an advanced building management system cut energy costs, while rooftop beehives supply honey, and food is served in compostable and biodegradable containers.

Operations Facilities

With more than 175 facilities covering 150 million square feet of space across the world, Amazon fulfillment centers, sortation centers, and delivery stations account for a major part of our embodied carbon. In 2020, Amazon began an in-depth study of our operations buildings in order to transition these facilities to net zero carbon. The study examines the energy intensity of these buildings and identifies ways to meet zero carbon through energy efficiency enhancements, new technology pilots, and significant reductions in embodied carbon. This year, Amazon will update its design templates and criteria to capture these changes, and apply net zero strategies across all global regions.

On-Site Solar: Many of our facilities throughout the U.S., Europe, and India are powered by on-site solar, where a rooftop installation can power up to 80% of a facility’s energy use. In 2019, we achieved a goal to install solar technology on 50 rooftops worldwide by 2020, a year ahead of schedule. We now have more than 60 rooftop solar installations on operations facilities around the world and we continue to scale this program.

Minimizing Energy Use at Operations Facilities: Our operations facilities are designed with efficient building systems to minimize energy use. We are expanding our use of building control system technology and real-time data analytics to optimize our heating and cooling systems for occupant comfort while operating as efficiently as possible. We use highly-efficient motors and advanced controls in our conveyor systems to move packages efficiently throughout our facilities, and we are testing new technologies to further reduce the energy use of material handling equipment. Through building retrofits and energy studies, we are continuously improving and learning to optimize the efficiency of our operations, uncover savings opportunities, and help drive carbon out of our fulfillment operations.

Data Centers

Amazon Web Services (AWS) has always focused on efficiency and continuous innovation in our data centers to improve operational excellence and reduce our impact on the environment. In addition to our efforts on energy efficiency and our goal to achieve 100% renewable energy for our global infrastructure, AWS has multiple initiatives to improve our water use efficiency and reduce the use of potable (drinking) water for cooling data centers.

AWS develops our water use strategy by evaluating climate patterns for each AWS Region (a physical location around the world where we cluster data centers), local water management and availability, and the opportunity to conserve drinking water sources. Taking a holistic approach, we assess both the water and energy usage of each potential cooling solution to select the most efficient method.

Whole Foods Market

Whole Foods Market has several all-electric stores in California and dozens of buildings certified by LEED and Green Globes across North America. Every store provides a high-quality indoor experience for employees and customers, with ample daylight and amenity space. Stores in the San Francisco Bay Area have piloted a technology that combines advanced cloud computing, predictive analytics, and a thermal energy storage retrofit to modulate their refrigeration systems during peak energy.

Whole Foods Market is a founding partner of the U.S. Environmental Protection Agency's GreenChill program, which helps food retailers transition to alternative refrigerants, reduce refrigerant charge sizes, eliminate leaks, and adopt green refrigeration technologies. Whole Foods Market has piloted various technologies to reduce carbon emissions from the use of refrigerants. For example, multiple stores across the U.S. and Canada use natural refrigerants, which contain zero ozone depletion potential and very low global warming potential.

