Eanth Day 2023





Nicole Sullivan Director of Climate Services nicole@carbonbetter.com

www.carbonbetter.com hello@carbonbetter.com e're CarbonBetter, a minority-owned sustainability consulting and energy logistics firm headquartered in East Austin. We help companies align what's good for their businesses with what's good for our planet. To celebrate Earth Day 2023, and to build upon the impact of our inaugural <u>Earth Day Austin 2022</u> Impact Report, we partnered with the <u>Naturally Network</u> and invited businesses nationwide to take a step toward a net-zero future with us by participating in our 2nd annual free day of climate action. We believe that progress comes step by step; a series of distinct choices and small changes create significant shifts. We intend for this 2nd annual Earth Day Impacts Report to encourage a regular rhythm of action, spurring changes in how business leaders advance sustainability initiatives in their businesses and the communities they serve.

"We believe that climate action should be part of business as usual, and our Earth Day event celebrates businesses working to create that future while inspiring others to do the same."

Tri Vo, CarbonBetter Founder and President

Through our work at CarbonBetter, we understand that while most businesses desire to be more sustainable and reduce their environmental impacts, they may not have access to the right support. We believe that events like this one make climate action more accessible to a range of businesses, which makes additional steps easier to take in the future.

The CarbonBetter Climate Services team donated time and resources to estimate and offset the operational carbon footprint of participating businesses for Earth Day, April 22, 2023, at no cost. In total, CarbonBetter measured and offset the carbon footprint of 38 businesses that requested to join us on this 2nd annual endeavor, an increase from our 29 participants in 2022. The carbon impacts of participating businesses and the positive impacts made through carbon offsetting are summarized in this report. Together we can influence the societal shifts necessary to fight climate change, starting with this one day of action.



Earth Day 2023 Partner Highlight

Every step forward in addressing climate change is a step in the right direction, including facilitating meaningful climate-related conversations within business communities and seizing opportunities for climate action. Our team thanks these partners for sharing this event within their communities.



Participating Businesses

Before we dive into the Earth Day 2023 impacts, we want to highlight the efforts of some of our participating businesses. Whether on their first steps toward being more sustainable or actively exploring options for continuous improvement, these businesses—and how they're navigating sustainability in various industries—can inspire you to take action. Industries represented in Earth Day 2023 include retail, manufacturing, consumer packaged goods, restaurants, offices, and distilleries.

We are excited to share that 79% of participating businesses are actively taking steps to address sustainability within their company. Of those not actively taking steps, 50% said it is important to them to do so but that they need more information about where to start. We're eager to help these participants kick-start their sustainability journeys through participation in Earth Day 2023.

Of the participating businesses, 53% regularly employ waste and water reduction efforts, and 55% select partners with similar sustainability goals, while 63% regularly select sustainable packaging choices. We hope this initiative will encourage more businesses to seek guidance when needed to take those first steps toward more sustainable business practices.



Our Carbon Footprint

→ UN Sustainable Development Goals

The United Nations (UN) has published 17 Sustainable Development Goals (SDGs) as a call to action to meet the UN's 2030 Agenda for Sustainable Development goals. The Earth Day 2023 day of climate action directly supports the following SDGs:



→ Carbon Emissions

Carbon dioxide (CO_2) that is produced and released into the atmosphere. We have estimated the carbon emissions from natural gas and electricity usage on Earth Day, April 22, 2023, for all participating businesses, producing a measurable, transparent, and traceable summary of the carbon impacts. Whether quantifying your impacts for a day or a year, we believe that carbon impacts and progress toward decarbonization should be shared in ways that reach your customers, competitors, and community. By sharing the carbon impacts of participating businesses and highlighting their successes, our goal is that the collective impacts will go beyond the numbers by enabling participating businesses to drive change locally and beyond.

There are many ways to calculate carbon emissions, and many assumptions and choices must be made. In any selected approach, transparency and traceability are essential. To that end, we have documented the assumptions and key calculation inputs for Earth Day 2023 herein. To facilitate quantifying carbon emissions across a range of business types and operations, assumptions are necessary to keep the process simple and efficient without creating too complex of a data-gathering task for participating businesses.

Calculation Approach

To quantify the impact of each participating business, we sent out a questionnaire to collect some basic information about their operations in the United States (U.S.). To do our calculations, we needed to know the following:

- → What is the approximate square footage of their physical business space?
- → Does the business use natural gas?
- → What is the main type of business operation (food service, retail, etc.)?

In the absence of looking at every individual business's utility bills, we categorized each business space by square footage and "Principal Building Activity" according to the U.S. Energy Information Administration's (EIA) 2018 Commercial Buildings Energy Consumption Survey (CBECS),¹ and then used the survey's associated consumption rates for electricity and natural gas to determine the approximate consumption per day for each business.²



"A significant challenge in making our business more environmentally sustainable surrounds community involvement. With any effort to increase sustainability, the more people are involved, the better. To that end, we experience challenges in finding ways to get people involved and join in our efforts to promote sustainable measures"

Tso Chinese Takeout & Delivery

About CarbonBetter

CarbonBetter is a privately held firm specializing in energy logistics, sustainability and decarbonization services, and clean energy and carbon offset project consulting. We're a creative and diverse team tackling the complex climate challenges that are changing our world by helping organizations transition to a net-zero future-accelerating the societal shifts that will save our planet. We're proud to be a certified minority-owned business. Learn more at www.carbonbetter.com/about/

Included Scopes

Greenhouse gas (GHG) emissions, specifically carbon emissions, in this case, are grouped into Scopes. Scope 1 emissions are from direct combustion onsite and fleet vehicles. Scope 2 emissions are indirect emissions from purchased energy. Scope 3 emissions are all other sources of emissions, such as corporate travel and supply chain. When evaluating the climate impacts for Earth Day 2023, we included Scope 1 emissions from natural gas consumption and Scope 2 emissions from purchased electricity. To minimize the data-gathering effort and the complexity of the calculations for participating businesses, we excluded fleet vehicles, combustion of fuels other than natural gas, and Scope 3 emissions sources.





"As a salon, Urban Betty's biggest challenge is probably energy use. Our stylists are constantly using blow dryers and other tools to style guests' hair. Even though we send most of our laundry off to be cleaned we are still using two dryers in the salon. We use ECOHEADS shampoo showerheads in our shampoo bowls, which reduces water and energy use by up to 65%."

Urban Betty Salon

Calculating Scope 1 Emissions (Natural Gas)

To evaluate the approximate natural gas consumption of each business, we multiplied the square footage of the physical business space with the estimated natural gas energy intensity value-given in cubic feet per square foot-for that business's size and CBECS Principal Building Activity³ to get the total natural gas consumption for that space in cubic feet per year. Dividing the consumption per year value by 365 days then gave us the total natural gas consumption for that same space in a single day, reflective of April 22, 2023. We converted this value into British thermal units (Btu) per day using the April 2023 U.S. natural gas heat content factor, 1,035 Btu per cubic foot, from the U.S. EIA's Heat Content of Natural Gas Deliveries to Consumers database.⁴ Using that single-day value of natural gas consumption in Btu, we then calculated the amount of carbon dioxide (CO₂), methane (CH₂), and nitrous oxide (N₂O) emissions using the emissions factors in kilograms (kg) per million Btu (MMBtu) from the Environmental Protection Agency's (EPA) GHG Emission Factors Hub, last updated March of 2023.⁵ We calculated the total amount of carbon dioxide equivalent (CO₂e) emissions by multiplying the CH₄ and N₂O emissions by their respective global warming potentials (GWP) and summing with the CO, emissions.⁶ Emissions factors used in our natural gas calculations are provided in the table below.

Emissions Factor	Value
CO ₂ Emissions Factor	53.06 kg/MMBtu
CH₄ Emissions Factor	0.001 kg/MMBtu
N ₂ O Emissions Factor	0.0001 kg/MMBtu
CH₄ GWP	25
N ₂ O GWP	298

Natural Gas Emissions Factors and Calculation Inputs

The sum of the GHG emissions associated with natural gas consumption on Earth Day 2023 for all participating businesses totaled 1,038 kg of CO_2e , which equates to 1.04 metric tons of CO_2e .

"We launched our business in October of 2018, and started tracking the number of bottles eliminated and water saved in 2019. Since 2019, HiBAR customers have eliminated over 4.5 million plastic bottles and HiBAR has saved over 1 million gallons of water from the production process."

Hibar



Calculating Scope 2 Emissions (Electricity)

To calculate the approximate electricity consumption of each business, we multiplied the square footage of the physical business space with the electricity energy intensity value-given in kilowatt-hours (kWh) per square foot-for that business's size and CBECS Principal Building Activity⁷ to get the total electricity consumption for that space in kWh per year. Dividing that value by 365 days then gave us the total electricity consumption for that same business in a single day. We converted this value into megawatt-hours (MWh) per day using the established conversion factor of 1,000 kWh per MWh. Using that single-day value of electricity consumption in MWh, we then calculated the amount of CO₂e emissions using the U.S. average grid emission factor for CO₂e emissions, reported in kg per MWh, from the EPA's 2021 eGRID database.⁸ By multiplying the single-day value of electricity consumption in MWh by the U.S. emission factor-388.741 kg of CO₂e emissions per MWh-we can then quantify the emissions per day and convert the results from kg to metric tons of CO₂e. The GHG emissions on Earth Day 2023 for all participating businesses from electricity usage totaled 1,717 kg of CO₂e, equating to 1.72 metric tons of CO₂e.



"The fashion industry is one of the biggest polluting industries. We want to be the sustainable change but finding manufacturers with the same sustainable goals and reasonable costs is difficult."

B.D.F.O. Lifestyle

→ Carbon Dioxide Equivalent (CO₂e)

A measure used to compare the emissions from greenhouse gases based on their global warming potentials by converting amounts of emissions from other gases to the equivalent amount of CO₂.

Total Earth Day 2023 Carbon Impacts

In total, all participating businesses emitted 1.04 metric tons of natural gas-related GHG emissions and 1.72 metric tons of electricity-related GHG emissions on Earth Day 2023, for a grand total of 2.76 metric tons of CO_2e . Since one carbon offset credit is equivalent to one metric ton of CO_2e emissions, that necessitated the purchase of 2.76 metric tons of carbon offset credits and direct removals to match the emissions of all participating Austin businesses.



To put these emissions into perspective, according to the EPA's Greenhouse Gas Equivalencies Calculator,⁹ 2.76 metric tons of GHG emissions is equal to the amount of emissions produced by:



7,057 miles driven by an average gasolinepowered passenger vehicle



3,092 pounds of coal burned



335,734 smartphones charged

Through the purchase of carbon offset credits, those 2.76 metric tons of emissions have become equal to the amount of carbon captured by:



45.6 tree seedlings grown for 10 years



3.3 acres of U.S. forests in 1 year

Offsetting our Carbon Footprint

One of the most impactful and important ways to reduce carbon is to implement projects within your business that directly reduce emissions. For a collaborative day of climate action like Earth Day 2023, it would not be feasible to implement energy efficiency projects, improve equipment, or establish more efficient processes at the participating businesses.

Another way to reduce carbon impacts is to indirectly reduce emissions through carbon offsetting. If you buy and retire one carbon credit, you have essentially balanced out—"offset"—one metric ton of your carbon emissions. Carbon credits are created by either carbon sequestration (capturing and storing carbon from the environment) or carbon reduction (preventing carbon from entering the environment). Carbon offsetting is meant to "reduce greenhouse gas (GHG) emissions, increase the storage of carbon, or enhance greenhouse gas removal from the atmosphere."¹⁰

Carbon credits can be purchased and retired to offset Scope 1, 2, and 3 GHG emissions—note: emissions are not offset until a carbon credit is retired. Carbon credits can address both direct and indirect emissions through global emission reductions from external projects and are generally part of an organization's long-term plan to reduce emissions. <u>High-quality carbon credits</u> are additional, permanent, and verified by a third party. It is important to note that carbon offsets do not directly negate the original emissions source.

1 credit = 1 less metric ton of greenhouse gasses in the atmosphere

Credits can be generated immediately after the project begins or many years down the road



Credits are an actual reduction or avoidance of greenhouse gas emissions from a verified technology



Projects can take place anywhere in the world

Carbon offsetting can be a tool to reach net zero for carbon, which means you've balanced out all of your carbon emissions with the equivalent amount of carbon reductions. For Earth Day 2023, participating businesses reached net zero for a single day of operations for Scope 1 and 2 emissions through our offsetting efforts. It's important to note that not all carbon credits are created equal. In selecting carbon credits for Earth Day, we considered a variety of factors, including the rigor of the registry that the carbon credit was issued on, project documentation, the vintage (year) of the carbon credit's issuance, the geographic location, and the co-benefits of the project (how it adds value beyond carbon reductions).

→ What is a Carbon Credit?



Selected Carbon Offset Projects

While choosing carbon credits from projects in the states where participating businesses operate would have been ideal, we were limited to projects available on the marketplace from which we could purchase the appropriate volume of credits to match our Earth Day impacts. We wanted to invest in a diverse cross-section of projects to fund exciting technologies with valuable co-benefits. We selected the following projects to offset the emissions from participating businesses on Earth Day 2023:

High-Impact Reforestation



The "BaumInvest Mixed Reforestation in Costa Rica"¹¹ project is on the Gold Standard registry. Nature-based solutions are an important tool for sequestering carbon, and the BaumInvest Project has planted more than 1 million trees to date across 1,280 hectares that were previously deforested land and sustainably manages 2,115 hectares of pastureland that were previously degraded by cattle ranching. Seventeen different tree species have been planted with a focus on native species comprising of a mix of pioneer trees, slow and medium growth trees, and shadow trees across five sites in northern Costa Rica. The project also prioritizes watershed protection, preventing harvest within 100 meters of rivers and creeks.





→ UN Sustainable Development Goals



Reforestation is difficult—in addition to funding the planting of trees, the trees have to be planted in the ground, cared for and maintained, and someone has to ensure the trees grow and are not cut down. To address these challenges, the project provides secure long-term employment opportunities in a rural and underdeveloped area and ensures fair working conditions by providing insurance coverage, continuous education, and training.

The project also has a biodiversity component—through biodiversity monitoring, the project has discovered that 70 new species of amphibians and reptiles have settled in the project area. Baird's Tapir (Tapirus bairdii), Jaguar (Panthera onca) and the Great Green Macaw (Ara ambiguus), which are on the "International Union for Conservation of Nature (IUCN) Red List of Threatened Species," have been spotted in the area.





While not a traditional carbon credit project generating certified offsets on a registry, Climeworks¹² is leading the charge for direct air capture (DAC) of CO₂ using a technology that pulls CO₂ molecules straight out of the atmosphere. Through Earth Day 2023, we

have invested in the removal of 760 kg (0.76 metric tons) of carbon from the atmosphere using Climeworks' innovative DAC technology. The purchase of this CO_2 removal helps Climeworks scale its technology to actively remove more excess CO_2 from the air, which helps fight climate change.

In September 2021, Climeworks launched Orca, the world's first and largest climate-positive DAC and storage plant in Iceland.¹³ Climeworks' DAC machines are completely supported by renewable energy or energy-fromwaste, and they are made up of modular CO_2 collectors that can be stacked to create machines of any size, making them a viable option for any industry. According to an independent lifecycle assessment conducted on the machines, at least 90 tons of CO_2 absorbed from the air by the machines are permanently eliminated, with only around 10 tons re-emitted on average.

Their CO₂ collectors siphon carbon dioxide from the surrounding air in a two-step operation. A fan is used to draw air into the collector, where CO₂ is captured on the surface of a highly selective filter material. Then after the filter material has absorbed all of the CO₂, the collector is closed and the temperature is raised to between 80 and 100 degrees Celsius, releasing the CO₂. Finally, the high-purity, highly concentrated CO₂ can be collected. Once the CO₂ has been collected, it is permanently and safely converted into stone via rapid mineralization, a natural reaction between CO₂ and basalt rock. By design, geological CO₂ storage is intended to be permanent. Through our investment in DAC removal by Climeworks, a portion of participating businesses' carbon footprint is being pulled from the atmosphere and turned to stone.

→ UN Sustainable Development Goals



3





Destroying Nitrous Oxide

Registered on the Climate Action Reserve (CAR) with a 2021 vintage, the Phlogiston Phase I¹⁴ industrial project destroys nitrous oxide (N₂O)—a greenhouse gas with 300 times the warming potential of CO₂—as it is produced as a byproduct of nylon manufacturing in Cantonment, FL. This is the largest voluntary N₂O abatement project in North America. N₂O emissions are a byproduct of making adipic acid, which is commonly used to make nylon products. For every molecule of adipic acid produced, a molecule of N₂O is produced as a byproduct. Most adipic acid produced today is manufactured from cyclohexane feedstock in a two-stage process, where oxidation produces the N₂O byproduct.

The Ascend plant recognized the need to capture emissions of nitrogen oxides (NO_x), a criteria pollutant, from escaping into the atmosphere during the production of nylon manufacturing. Before installing the current technology, exhaust from the adipic acid process was directed to a Selective Catalytic Reduction (SCR) unit that would destroy NO_x as part of the plant's obligations under the Clean Air Act However, this process could not also abate N₂O. A solution needed to be installed to handle both N₂O and NO_x scrubbing so the plant could meet its Clean Air Act obligations codified by the EPA and also abate N₂O.

The Phlogiston Phase I project uses an enhancement of an existing control technology thermal reduction unit (TRU) at the adipic acid plant to abate N_2O emissions. It allows the TRU to accept more waste from the adipic acid plant, resulting in a higher quantity of N_2O abated. Phase I operations of the project began in early 2021, and N_2O abatement of approximately 50%,



while achieving a nearly 98% abatement by the second phase, is anticipated.

The Phlogiston Phase I project was designed to destroy N₂O byproducts during the nylon manufacturing process so that GHG are not emitted into the atmosphere. Co-benefits of the project include reduced N₂O pollution and GHG emissions into the atmosphere as well as overall improved air and water pollution and ozone recovery. Additionally, this project has established a process that produces materials more sustainably, which helps reduce waste.

All Participating Businesses



All Participating Businesses (Continued)



All Participating Businesses (Continued)



www.social-justice-jewelry.myshopify.com



www.theosplantbased.com



www.trinityinvestors.com



www.tsodelivery.com



www.urbanbetty.com



www.wildkindpackaging.com



www.williampricedistilling.com

&wootz

www.wootznano.com

Looking Ahead

While measuring, reducing, and offsetting business carbon emissions are essential for delivering proven results that mitigate climate change, no step in the right direction is too small. In just one day of climate action, 38 U.S. businesses came together to offset nearly three metric tons of estimated GHG emissions from operations on April 22, 2023. In doing so, these businesses funded three meaningful carbon offset projects around the world!

Involvement in our Earth Day 2023 Impacts Report is just one way the business community is advancing solutions to fight climate change. Participating companies shared that they are routinely considering the climate impacts of their decisions related to materials, packaging, manufacturing, and operations, and steps toward sustainability in all of these areas make a real difference. CarbonBetter helps clients of all sizes and at every stage of their sustainability journey make decisions like these, always celebrating and sharing progress over perfection.

The CarbonBetter team is already looking forward to Earth Day 2024 to help even more businesses reach net zero for Earth Day because every small step in the right direction helps create the societal shifts that will save our planet.



Footnotes

- https://www.eia.gov/consumption/ commercial/data/2018/index. php?view=consumption#c23-c32
- For any businesses less than 1,000 square feet in size, we used the natural gas and electricity energy intensity values from the 1,001 to 10,000 square feet range as a surrogate.
- 3 https://www.eia.gov/consumption/ commercial/data/2018/index. php?view=consumption#c23-c32
- 4 https://www.eia.gov/dnav/ng/hist/nga_epg0_ vgth_nus_btucfm.htm

- 5 https://www.epa.gov/climateleadership/ghgemission-factors-hub
- 6 https://www.epa.gov/climateleadership/ghgemission-factors-hub
- 7 https://www.eia.gov/consumption/ commercial/data/2018/index. php?view=consumption#c23-c32
- ⁸ https://www.epa.gov/egrid/download-data
- https://www.epa.gov/energy/greenhouse-gasequivalencies-calculator

- 10 https://ghgprotocol.org/standards/projectprotocol
- 11 https://marketplace.goldstandard.org/ collections/projects/products/bauminvestbauminvest-reforestation-project
- 12 https://climeworks.com/
- 13 https://climeworks.com/roadmap/orca
- 14 https://market.climatetrade.com/projects/ phlogiston-phase-i/?id=520