Duke Carbon Offsets Initiative

Guide to Carbon Offsets Purchases

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DUKE UNIVERSITY

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History

In 2007, Duke University signed the American College and University Presidents' Climate Commitment (ACUPCC) and set a target of achieving climate neutrality by 2024. To be climate neutral, Duke will have to offset an estimated 185,000 metric tons per year of carbon dioxide in 2024. The Duke Carbon Offsets Initiative was created as a branch of Sustainable Duke to help Duke University reach climate neutrality. Since DCOI's beginning in 2009, it has developed a number of innovative carbon offset programs in swine waste-to-energy, urban forestry and energy efficiency.

Vision

To make Duke University a model climate-neutral institution and to lead peer institutions in their efforts to become climate neutral.

Mission

- To meet Duke University's climate neutrality goal by 2024 by **developing and implementing the University's strategy** for identifying, creating, and purchasing carbon offsets.
- To implement the strategy in a way that **provides educational opportunities** for students, faculty, and staff.
- To **prioritize local, state, and regional offsets that provide significant environmental, economic, and societal co-benefits** that are beyond the benefits of greenhouse gas reduction.
- To **facilitate and catalyze high-integrity, unique offset projects** by serving as a resource for other institutions.

How Does DCOI Choose Projects?

What is a Carbon Offset?

According to the American College and University President's Climate Commitment (ACUPCC) a carbon offset is a **reduction or removal of one metric ton of carbon dioxide equivalent** (CO_2e) greenhouse gas (GHG) emissions that is used to counterbalance or compensate for ("offset") emissions from other activities.

Basic Requirements of a Carbon Offset

Permanent—The reduction must last in perpetuity.

Additional—The reduction would not have occurred during business as usual.

Verified—The reduction must have been monitored and confirmed to have occurred.

Enforceable—The reduction must be counted only once and then retired.

Real—The reduction must have actually occurred.

Co-Benefits

Co-benefits are the additional, non-GHG reduction benefits of a carbon offset. Duke University prioritizes carbon offsets with high co-benefits. Below are a few examples of co-benefits that Duke considers.

Educational Opportunities—Most important to Duke University is that our carbon offsets provide opportunities for students and faculty to engage with the projects through site visits, research on current projects, and development of new projects.

Location—Duke focuses on carbon offsets that are developed near its educational sites such as main campus, the marine lab, and study abroad locations.

Community Engagement—Duke strives to involve local communities and organizations in the projects. For example, the urban forestry project brings together community organizations, municipal government, schools, and citizens to provide volunteering opportunities.

Partnership Development—Duke has developed partnerships with dozens of organizations including the UNC Environmental Finance Center, the City of Durham, Google Inc, Duke Energy, and many more.

Air and Water Quality—Many of Duke's projects have strong environmental co-benefits such as its swine waste-to-energy project, which reduces the amount of ammonia, odors, and pathogens from the waste water.

Duke's Carbon Offset Portfolio

Energy Efficiency and Renewable Energy

Most homeowners and businesses purchase electricity from a local energy utility. The utility company generates this energy from many different sources including, but not limited to, coal, natural gas, nuclear, hydro, wind, solar, and biomass. Producing electricity from fossil fuels, such as coal and natural gas, results in significant greenhouse gas emissions (GHGs). Projects that help reduce overall energy use reduce the utility's need to produce energy, and thereby reduce associated GHGs. These emission reductions can be counted as carbon offsets if the project meets the criteria listed on page 2. Two such project types are Energy Efficiency and Renewable Energy.

Energy Efficiency

Increasing energy efficiency can reduce the amount of energy that a home or business uses each year. For example, a homeowner can reduce their energy use by changing light bulbs, installing a programmable thermostat, or replacing dirty air filters. Other projects such as re-insulating the attic, sealing air ducts, and replacing appliances are more costly, but can provide higher energy savings.

One example of an energy efficiency project is the Duke University Home Energy Affordability Loan (DCOI-HEAL) pilot program, which provides homeowners with access to reliable information, highly skilled contractors, and low-interest loans to help employees increase the energy efficiency in their homes. Currently, over 35 employees have participated in the project and are already saving energy!

Renewable Energy

Installing a renewable energy system reduces the need to generate electricity from fossil fuels, thereby decreasing overall GHG's. The most common forms of renewable energy are wind, solar, hydro, and biomass. In North Carolina, many homeowners and businesses are installing solar panels, due to strong federal and state tax incentives.

One example of a renewable energy project is the Bass Connections Solar Discount Pilot Project that is working to provide Duke employees with reliable information and discounts for solar. The goal is to encourage as many homeowners to install solar before existing state and federal tax credits expire.

Duke's Carbon Offset Portfolio

Waste-to-Energy

Certain types of waste, such as landfills and agricultural waste, create and release methane into the atmosphere. This methane is a GHG that is over 21 times as potent as CO_2. By installing a waste-to-energy system, landfills and farms can capture methane and use it as a fuel for electricity production, transportation, or heat. When the methane is used as a fuel, it is destroyed, thereby reducing overall GHG emissions while simultaneously generating renewable energy. Aside from the energy generated, the process cleans up the waste stream leading to higher air and water quality.

One example of a waste-to-energy project is Duke University's Loyd Ray Farms project (LRF). The system anaerobically digests hog waste to produce and capture methane gas that is burned in an on-site microturbine. The renewable energy generated is used to power the waste-to-energy system and provide electricity to the hog barns. The system has improved water quality by reducing the amount of nutrients in the waste water, decreases odor within and outside of the barns, and increases the health of the hogs.

Urban Forestry

Trees are an important part of a city's landscape, providing shade, character, and environmental benefits. As trees grow they sequester carbon, reduce storm water runoff, and improve air quality by absorbing harmful pollutants. Trees require careful management to thrive in an urban environment. To this end, urban foresters collaborate with neighborhood associations, schools, and conservation organizations to maintain existing trees and plant more trees for the future.

One example of an urban forestry project is the partnership between Duke University and Trees Across Durham (TAD). TAD brings together municipal government, local schools, conservation organizations, and Durham citizens to increase the tree cover in Durham county. DCOI leads the TAD data committee in collecting and analyzing tree growth data, which can be used to generate carbon offsets. Starting this year, Duke is providing resources to plant more trees around Durham.

Duke's Carbon Offset Portfolio

Industrial Gas Destruction

While carbon dioxide is the most abundant and well known GHG, there are many additional greenhouse gases. Although less common, some of these gases have greater global warming potential than CO_2. For example, hydrofluorocarbons are 14,800 times more potent than CO_2. These types of chemicals can be captured and destroyed at a low cost, but have very few co-benefits.

One example of industrial gas destruction is the first external carbon offsets purchase by DCOI. This project captures and destroys nitrous oxide, which is 310 times more potent than carbon dioxide. N2O is a by-product of nitric acid production and can be captured and destroyed at many manufacturing plants.

Future Carbon Offset Project Development

Peatlands

According to the National Fish and Wildlife Service, peatlands have the capacity to sequester three metric tons of CO2 per acre per year when they are healthy. However, many peatlands in North Carolina were drained for agriculture, thereby releasing CO_2. DCOI has partnered with Curt Richardson, professor of resource ecology and the director of the Duke University Wetland Center, to determine how restoring peatlands can generate carbon offsets for the university.

Silvopasture

Silvopasture is an agroforestry practice where livestock and timber are grown on the same land. Combining both land uses can limit nutrient runoff from animal waste and generate carbon offsets from planted trees. In addition, the land-owner gains income from the future sale of timber. DCOI will continue to strengthen relationships with conservation partners in North Carolina to develop a pre-pilot program and draft an offset protocol.

Other Carbon Offset Resources

How do I calculate my carbon footprint?

There are many carbon footprint calculators that are available and can estimate the number of carbon offsets needed to cover emissions from commuting, air travel, and events. Below are DCOI's recommendations of calculators to use based on emission type.

Personal: Duke University calculates carbon offsets based on diet, transportation, and behavior. https://sustainability.duke.edu/action/calculator/

Air Travel: The CarbonFund calculates carbon offsets based on number of miles flown. Please make sure to click the "Radiative Forcing" box when calculating carbon offsets. www.carbonfund.org/individuals

Commuting: TerraPass calculates carbon offsets based on your vehicle's average MPG. http://www.terrapass.com/calculate-2/

Events: The CarbonFund calculates carbon offsets for an event based on number of attendees, traveling to and from the event, and hotel accommodations. www.carbonfund.org/individuals

How do I purchase carbon offsets from DCOI?

To purchase carbon offsets from DCOI, follow these steps below:

1) Visit www.sustainability.duke.edu/carbon_offsets/purchase and select whether you want to offset your own emissions, your department's, or an event.
2) Enter the number of offsets you would like to purchase.
3) Submit your order.

If you have any questions, please contact Charles Adair, Program Manager, at Charles.Adair@duke.edu.

Photo features the Loyd Ray Farms project in Yadkinville, NC.

For more information on the
Duke Carbon Offsets Initiative, please visit
http://sustainability.duke.edu/carbon_offsets/