



Duke Carbon Offsets Initiative

Guide to Carbon Offsets



**Duke Carbon
Offsets Initiative**
DUKE UNIVERSITY

Duke Carbon Offsets Initiative



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 86,000 metric tons per year of carbon dioxide equivalent 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 assist Duke University in meeting its climate neutrality goal by 2024 by **identifying, creating, and purchasing high-quality carbon offsets**.
- To implement the strategy in a way that **facilitates 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 or removal.
- To **support and catalyze high-integrity, unique offset projects** by serving as a resource for other institutions.

Carbon Offset Basics

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 (CO₂e)** 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 and not as a result of flawed accounting.

Co-Benefits

Carbon offsets projects can have benefits beyond GHG emission reductions (“co-benefits”). As institutions decide what types of projects to develop or purchase offsets from, co-benefits can become a consideration.

The following list of co-benefit categories serves to distinguish one carbon offset project from another:

- Educational Opportunities
- Social Equity
- Environmental Health and Conservation
- Economic Opportunities
- Community Engagement

This document will detail each of these co-benefit categories as well as three example carbon offsets projects that the Duke Carbon Offsets Initiative has developed to date.

Description of Project Co-Benefits



Educational Opportunities

Identifying and purchasing carbon offsets can facilitate educational opportunities for students, faculty, and staff, including:

Research

Carbon offset projects present faculty and staff with opportunities to engage in research and publish papers on their findings. Offset projects also build institutional knowledge in the project subject area.

Participating in the Project

Students, faculty and staff can become involved in the design and implementation of offset projects. They may create project-planning materials, including progress reports and guides to the voluntary carbon market. They may also participate in the project by volunteering and collecting data.

Visiting and Touring the Project

By investing in offset projects that are geographically close to campus, Duke University can maximize access to the site of offset generation. Students, faculty, and staff can organize site visits and incorporate them into curriculum.

Example Project

A local urban forestry project where students are able to help develop program materials, volunteer at tree planting events, collect data on the health and location of trees, and visit anytime.



Social Equity

Carbon offset projects can assist local and regional communities in the following way:

Improved Well Being for All

The project helps increase the well being of community members with low socio-economic status in order to decrease the inequality gap. Social equity in a project is achieved when the benefits and costs are shared equally by all participants, regardless of age, religion, race, ethnicity, gender, socioeconomic level, and education background, among other factors.

Example Project

An energy conservation education program that educates local Durham residents on how to save energy within their homes, regardless of their socioeconomic status.

Description of Project Co-Benefits



Environmental Health and Conservation

Carbon offset projects can have environmental benefits beyond a reduction or removal of greenhouse gas emissions. These environmental contributions can include:

Air Quality

Air quality refers to the health of Earth's atmosphere and the cleanliness of ground-level air. The project reduces the negative impacts of air pollution by decreasing the number of harmful pollutants such as sulfur dioxide and particulate matter from entering the air.



Water Quality

Water quality refers to the health of Earth's streams, rivers, lakes, and oceans. A project may reduce the negative impacts of pollution by decreasing the number of harmful pollutants such as nitrogen and phosphorus from running off into waterways. Projects that reduce storm water runoff will also be considered as they can lead to increases in water quality and a decrease in the amount of infrastructure needed to manage high storm water flows.



Biodiversity

Biodiversity refers to the variety of life on Earth. A project with biodiversity co-benefits maintains or leads to an increase in the variety of native flora and fauna in an area through actions like protecting important habitat, planting native trees, and minimizing the impact of invasive species.

Land Use / Soil Quality

Land use refers to the availability and quality of the land. This includes the project's effects on soil quality, erosion control, land availability, and land use. An ideal project either maintains or increases the quality of the land and the availability of the land for environmentally beneficial uses.



Example Project

The Loyd Ray Farms swine waste-to-energy system generates renewable energy and offsets while simultaneously cleaning up the waste stream. The system improves water quality by reducing the amount of nutrients in the wastewater, decreases odor within and outside of the barns, and increases the health of the hogs. Thus, this project provides positive co-benefits for air quality, water quality, and land use.

Description of Project Co-Benefits



Economic Opportunities

Carbon offset projects can have far-reaching economic benefits that improve livelihoods. These include:

Job Creation

A potential impact of carbon offset projects is the creation of employment opportunities. Purchasing carbon offsets can provide a source of income to local communities.

Increase in Livelihood

With a steady stream of revenue entering the community hosting the offset project, this can build economic capacity. Communities can invest in improved infrastructure and technology for public benefit.

Example Project

Forestry projects in developing countries can create both short-term and long-term opportunities for locals to secure a source of income. With a steady stream of revenue, communities can further invest in the local economy, infrastructure improvements, and more.



Community Engagement

Through its offset projects, Duke University has the opportunity to work with a diverse array of partners and form longstanding, impactful relationships. This can result in:

Resource Sharing

Through collaborating on offset projects, Duke can expand its network and connect with other institutions, non-profits, and communities. This can support the sharing of resources and advice, to the benefit of all.

Movement Building

Carbon offset projects raise awareness of the need for reducing and removing greenhouse gases from the atmosphere as well as the potential of different offset technologies.

Example Project

Duke University's Home Energy Affordability Loan Program raised the profile of DCOI and enabled connections with different organizations. Because of this program, DCOI was asked to consult on other carbon offset projects and help build the number of high-quality, impactful offset generations.

Example Carbon Offset Projects



Waste-to-Energy

[Duke University's Loyd Ray Farms project](#) (LRF) anaerobically digested hog waste to produce and capture methane gas that was burned in an on-site microturbine. The renewable energy generated was used to power the waste-to-energy system and provide electricity to the hog barns.

Co-benefits: The project provided site visits for employees and students at Duke University and data analysis opportunities to students and researchers to help inform future waste-to-energy projects. The system also improved water quality by reducing the amount of nutrients in the waste water and increased the health of the hogs by limiting the amount of ammonia in the flush water. Finally, the system decreased odor within and outside of the barns, increasing the standard of living for local community members.



Energy Efficiency

[Duke University's Home Energy Affordability Loan](#) pilot program provided homeowners with access to reliable information, highly skilled contractors, and low-interest loans to help employees increase the energy efficiency in their homes. Participants were encouraged to increase the energy efficiency of their home, which will save them money and increase the comfort of the home for many years to come.

Co-benefits: This project educated homeowners about how they could reduce energy use in their homes. Students helped develop the pilot program and design future energy efficiency programs through data analysis and research of best practices. Since completing their home energy improvements, participants have saved money on their energy bills and experienced higher indoor air quality.



Urban Forestry

[Duke University's Urban Tree Planting Pilot Project](#) planted 50 trees in Durham, NC. The project was developed through a partnership between Duke University, Keep Durham Beautiful, and local rotary clubs. These trees will continue to grow and sequester carbon over the next 50-100 years and will be tracked via a carbon offsets tree planting protocol designed by the DCOI.

Co-benefits: Tree planting projects provide opportunities for community engagement through local governments and neighborhood associations. Trees within the city provide a multitude of environmental benefits including stormwater and air pollution absorption, habitats for animals and pollinators, and reduction in energy use from nearby homes by providing shade on sunny days. Well maintained trees have also been shown to increase property values, reduce noise from nearby traffic, reduce instances of crime, among other co-benefits.

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