Duke Carbon Offsets Initiative
2014 Annual Report

The Duke Carbon Offsets Initiative
DUKE UNIVERSITY

Letter from the Program Manager

"Change is the only constant in life." These wise words were spoken for the first time more than 2,500 years ago, and this year I have found they apply not only to our personal lives, but also to our communities, institutions, and organizations. Change can be challenging. Change can be frustrating. But, change also brings opportunities for growth, improvement, excitement, and more.

First, I would like to personally thank Tanja Vujic, DCOI's founding Director, for all that she has done for the Initiative. It is because of her hard work that DCOI has a strong foundation on which we can continue to build our carbon offset programs. Early in the year, Tanja left DCOI to build her consulting practice. We were sad to see her go and wish her the best of luck in her future endeavors.

This was a year of change for the Duke Carbon Offsets Initiative. In March, I transitioned from Research Analyst to Program Manager. By May, we completed the rebuild of the Loyd Ray Farms project (LRF), operating at over 80% uptime since restarting. With LRF running smoothly, we were able to strengthen our core areas of expertise – swine waste-to-energy, urban forestry, and energy efficiency.

In August, Jason Elliott joined the team as Program Coordinator, coming up to speed quickly and helping to manage our many projects. Jason's expertise in forestry has been instrumental to our partnership with the City and County of Durham in developing an urban forest carbon offset pilot program that we hope to launch in 2015.

For the first time this fall, DCOI led a Bass Connections project, bringing together students from all levels to tackle the question of how to increase access to distributed solar energy for Duke employees. All in all, we worked with more than 35 students and 15 faculty/staff members through 8 DCOI led academic projects in 2014.

To close out the year, we launched the DCOI-HEAL pilot program in October. This program helps employees learn about and implement energy efficiency retrofits in their homes – providing them a way to save money and help Duke University reach climate neutrality.

It is not enough, however, to complete research, develop projects, cultivate relationships, and catalyze innovation in the offset world. DCOI must also build a culture and framework that can adapt and grow with future change. An organization must be more than its people, resources, and assets - more than the sum of its individual pieces. It must have a strong enough foundation to stand on its own, but also be flexible enough to welcome change, empowering both its current and future members and stakeholders.

We invite you to help us build this foundation and to change and grow with us as we look ahead to 2015!

Charles Adair
Program Manager

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 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, energy efficiency, and urban forestry.

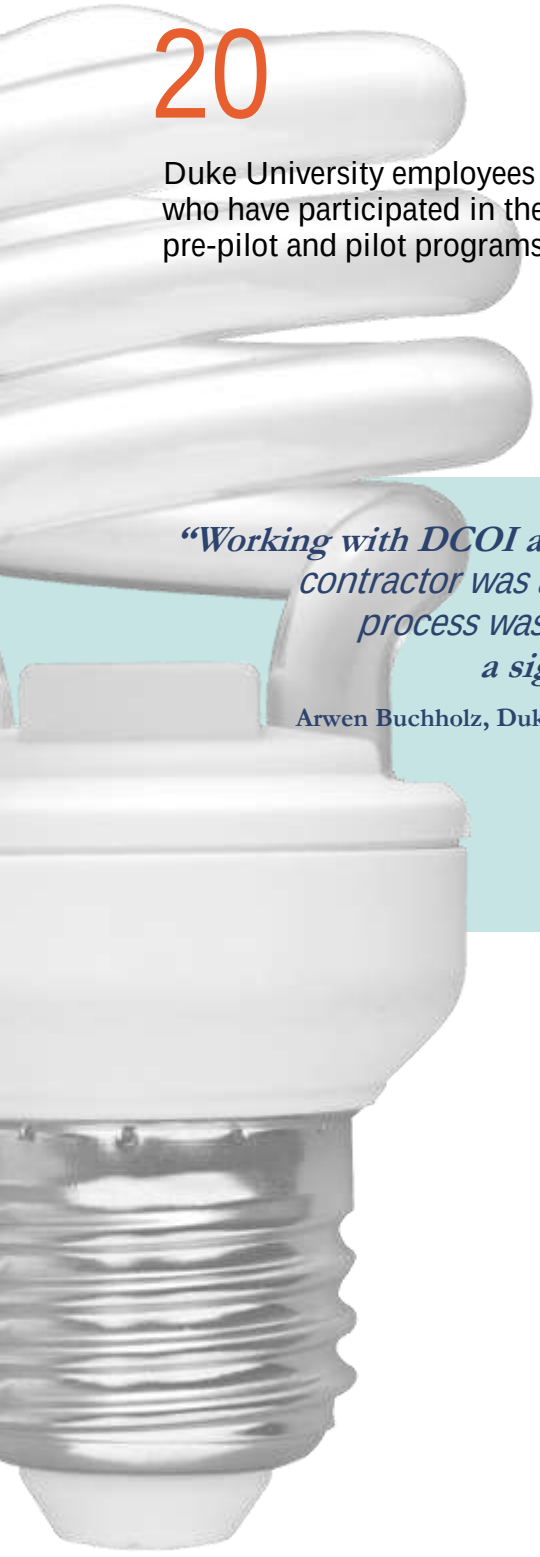
Vision

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.

Home Energy Efficiency



20

Duke University employees who have participated in the pre-pilot and pilot programs.

13%

average annual reduction in energy bills for participants in 2013-14 pre-pilot study.

18,720

estimated kilowatt hours saved to date by participants in the 2013-14 pre-pilot study.

"Working with DCOI and the recommended energy audit contractor was an excellent experience! The entire process was managed efficiently and I learned a significant amount about my home."

Arwen Buchholz, Duke's Recycling and Waste Reduction Coordinator

Jen Weiss of the UNC Environmental Finance Center, a DCOI-HEAL project partner, presenting a Personal Energy Plan to Arwen Buchholz

Major Accomplishments

- Published "Financing Energy Efficiency-Based Carbon Offset Projects at Duke University"
- Completed the DCOI-HEAL pre-pilot program
- Published "DCOI Employee Energy Efficiency Pre-Pilot" report
- Launched the DCOI-HEAL pilot program in October

Project Partners: UNC Environmental Finance Center | Clinton Climate Initiative | Duke Energy
NC State Cooperative Extension | Duke Credit Union | The Duke Endowment

Loyd Ray Farms

81%

system efficiency since May 2014.

245

megawatt hours of electricity generated on-site by the microturbine since May 2014.

1,776

carbon offsets generated by the system since May 2014.

"Buying into the waste-to-energy project was an opportunity to help transform an industry to benefit the environment, business and local communities. 'It was a win-win-win,' says Jolanka Nickerman, manager of Google's Carbon Offsets Team."

Excerpt from "Pig Poop Powers North Carolina Farm" article in Discover Magazine

Major Accomplishments

- Published in Chemosphere with Marc Deshusses and Jiele Xu of the Pratt School of Engineering "Nitrification of anaerobic digester effluent for nitrogen management at swine farms"
- Featured in Discover Magazine "Pig Poop Powers North Carolina Farm"
- Featured on Bloomberg TV "Making Clean Energy From Dirty Pig Droppings"

Charles Adair explaining the LRF project to students, Lincoln Wensley and Victor Chen.

Project Partners: Duke Energy | Google, Inc. | Cavanaugh and Associates, P.A.
US Department of Agriculture | NC Division of Soil & Water Conservation

Urban Forestry

1,080

trees planted by Trees Across Durham at Durham city schools this year.

3,900

estimated metric tons of carbon dioxide equivalent that could be sequestered by the 1,080 trees over 40 years.

Alex Johnson educating citizens of Durham about tree banding.

"Durham's urban forest will continue to improve, but it can't do this without the support of Durham's community. The DCOI plays a significant role through the measurement of benefits that urban trees provide, as well as providing resources to plant trees."

Alex Johnson, City of Durham Urban Forestry Manager

Major Accomplishments

- Led the data committee for Trees Across Durham, a collective group of stakeholders working together to plant trees in our county.
- Created urban forestry program and protocol documents in preparation for a 2015 pilot launch.
- DCOI created a brochure about controlling cankerworms and the benefits of tree banding.

Project Partners: City and County of Durham | Keep Durham Beautiful | Trees Across Durham

Student Interns

"Through the summer internship program, DCOI allowed me to explore the field of environmental policy in a welcoming, exciting environment. The educational experience exceeded my expectations with involvement in projects ranging from analyzing climate action plans to conducting research for ***future offsets possibilities."***

Mary Skapek, junior studying biology and dance

"Working with the DCOI was a tremendous opportunity to *apply the academic knowledge gained in the classroom towards solutions to real challenges. I drafted an urban tree planting protocol that will be used to calculate carbon offsets* ***while simultaneously bringing more trees to Durham."***

Alec Brown, Master of Environmental Management and Master of Forestry (2014)

"Working at the Duke Carbon Offsets Initiative was one of the *most rewarding aspects of my time at Duke. As an intern I was involved in policy interpretation, data analysis, and project management, all of which provided the perspective and skills I used to secure a full-****time position after graduation."***

Kim Cesafsky, Master of Environmental Management and Master of Forestry (2014)

Academic Connections

2014 Spring Semester

- Barriers to Implementing Energy Efficiency Retrofits, ENV 557 - Social Science Survey Methodology
  - Identified barriers that prevent homeowners from installing energy-efficient products

- Excel and Access Based Budget Modeling for Loyd Ray Farms, Independent Study
  - Developed a budgeting model to help track LRF finances to expedite the invoicing process

2014 Fall Semester

- Cost-Benefit Analysis of a Campus Digester, ENV 711 - Energy and the Environment
  - Researched the inputs and outputs of a theoretical on-campus digester

- Carbon Offset Opportunities for Duke, ENV 245 - Theory and Practice of Sustainability
  - Reviewed Climate Action Plans from southeastern universities to identify potential carbon offset and renewable energy projects

Summer Internships

- Urban Forestry Program and Protocol Drafting
  - Developed an urban tree planting protocol draft to calculate carbon offsets

- Climate Action Plan Review for Southeastern Universities
  - Reviewed Climate Action Plans from 40 universities and colleges in the Southeastern U.S.

Ongoing Student Research Projects

- Distributed Solar Generation for Duke University Employees, Bass Connections
  - Developing a scoping brief that summarizes the economics and politics of residential solar

- Carbon Offset Opportunities for Duke University, Nicholas School Group Masters Project
  - Researching local carbon offset opportunities including on-campus energy efficiency, local urban forestry, solar installation at Duke University, and innovative waste digester

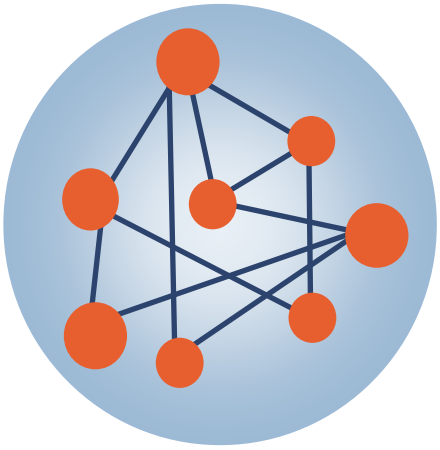
Looking Ahead

Peatlands

According to the National Fish and Wildlife Service, peatlands have the capacity to sequester three metric tons of CO_2 per acre per year when they are healthy. However, many peatlands in North Carolina have been drained for agriculture and became sources of CO_2. DCOI has partnered with Curt Richardson, professor of resource ecology and director of the Duke University Wetland Center, to determine how restoring peatlands could generate carbon offsets for Duke 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, all while the landowner gains income from the future sale of timber. DCOI will continue to strengthen relationships with conservation partners to develop a pre-pilot program and draft offset protocol.



Relationship Network Analysis

In collaboration with Charlotte Clark, assistant professor of the practice in sustainability education and faculty director of sustainability at Duke University, and two students, DCOI is conducting a social network analysis. The students will be documenting how different campus groups interact with, support, and are supported by Sustainable Duke. The data will be collected through interviews with key stakeholders and the final product will be a network analysis framework.

Academic Connections

- Residential Energy Efficiency and Environmental Messaging, Nicholas School Group Master's Project
- Feasibility Study for a Campus Digester, Bass Connections
- Introduction to Carbon Offset Markets and Trading, Independent Study

Research

- Loyd Ray Farms operations report and case study
- Peatlands carbon offsets pre-pilot development
- Scaling and program design for Duke employee energy efficiency program

Pilot Projects

- Collaborating with the City of Durham to plant 500 trees during upcoming year
- Assisting the Bass Connections residential solar group in developing a Duke employee-based solar discount program

If you would like to purchase carbon offsets, to collaborate on research and project development, or to learn more about DCOI, please contact Charles Adair at Charles.Adair@Duke.edu

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