Panelists

- Greg Farley, Chesapeake College
- Charles Adair, Duke University
- Sultan Latif, U.S. Department of Energy
Greg Farley

Chesapeake College
Proven Strategies for Tackling Long-Term Campus Energy Goals

Gregory S. Farley
Director, Center for Leadership in Environmental Education
Chesapeake College
Wye Mills, MD

May 15, 2017
Chesapeake College Basics

* Serves 5 counties on Maryland’s Eastern Shore
* 20% of MD land area; 3% of MD population
* 2000 students in a typical semester
Chesapeake College and our Commitment to Environmental Sustainability

Environmental sustainability is a theme in Chesapeake College’s 2014-2018 Strategic Plan. That plan calls for Chesapeake to be “a leader in environmental sustainability.” In keeping with that mission and vision, the College is a recognized leader in the regional sustainability dialogue.

Because we are located in an agricultural region adjacent to the Chesapeake Bay, we have an obligation to make a positive impact on the environment through partnerships, leadership, education and modeling. The College has signed the American College and University Presidents’ Climate Commitment, thereby pledging to reduce our energy footprint to zero by 2025. Through our institutional actions, including installation of renewable energy, pursuit of higher than required LEED certification for building renovations, restoration of our campus watershed, and more, we model environmental responsibility on the Eastern Shore and inspire environmentally engaged citizens.
Ecological Sensitivity

1m (3.3 ft) sea level rise anticipated by 2100

Red shading: 1m rise in sea level
Climate Neutrality Plan (2025)

* American College and University Presidents’ Climate Commitment
* US DOE Better Buildings Challenge
* Reduction of on-campus electricity purchases, and fossil fuel use, to near-zero
* Offsets for remaining carbon footprint (tree planting?)

* So far, energy savings use of about 23%
* Application for HPAC: LEED Platinum
**College Carbon Footprint**

* FY16 CO$_2$ footprint: 6773MT
* This is for 374,000 square feet
* Energy costs $500,000/yr
Chesapeake College
18 MT/1000 sq. ft.

About 25% less than average
(24 MT/100 sq. ft.)
Energy Savings: What We’re Doing

* Performance contract, 2011-14
* Building renovations (geothermal HVAC; HVAC controls)
* Lighting retrofits (ongoing)
* Occupancy sensors; daylight sensors
* Energy Star buying policy (IT)
* Hired an Energy Manager (part time)
* Outreach and behavior change
Chesapeake College

SHOWCASE PROJECT
Health Professions and Athletics Center

ENERGY PERFORMANCE
View details on Chesapeake College’s progress to date

CHALLENGE COMMITMENT
373
Thousand Square Feet

GOALS
20%
Reduction in Energy Intensity

PROGRESS
Goal Achieved
Originally a Gymnasium
* 1967-68
* Pool added 1974(?)
* Pool had a solar hot-water loop!
Health Professions & Athletics Center

* Envelope technology
  * High performance insulating glass, including integral ceramic shading patterns in areas with direct sunlight exposure

* Building geometry and massing, including a) new construction wrapped around the pre-existing, uninsulated building, and b) opaque exterior components overhang glass areas to provide shading

* Exterior walls feature metal or terracotta rain screen skins over minimum R-18 insulation
Health Professions & Athletics Center

- Roof has a light-colored, high-SRI surface membrane over minimum R-25 insulation

- Central heat recovery air handlers are used for the building exhaust systems; fresh air is provided through energy recovery ventilators with heat wheels that condition 100% of outside air

- Central building energy management system is integrated into the overall campus management system
Showcase Project: Health Professions and Athletics Center

SECTOR TYPE
Education

LOCATION
Wye Mills, Maryland

PROJECT SIZE
100,000 Square Feet

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Annual Energy Use
(Source EUI)

<table>
<thead>
<tr>
<th>Baseline (ASHRAE Standard)</th>
<th>180 kBtu/sq. ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected (2016)</td>
<td>124 kBtu/sq. ft.</td>
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<tr>
<td>Actual</td>
<td>Coming Soon</td>
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</table>

Energy Savings: 31%

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Annual Energy Cost

<table>
<thead>
<tr>
<th>Baseline (ASHRAE Standard)</th>
<th>$161,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected (2016)</td>
<td>$71,000</td>
</tr>
<tr>
<td>Actual</td>
<td>Coming Soon</td>
</tr>
</tbody>
</table>

Cost Savings: $90,000
Showcase Project: Health Professions and Athletics Center

SECTOR TYPE
Education

LOCATION
Wye Mills, Maryland

PROJECT SIZE
100,000 Square Feet

Annual Energy Use
(Source EU)

Baseline (ASHRAE Standard) 180 kBu/sq. ft.
Actual (2016) 89 kBu/sq. ft.

Energy Savings:
51%

Annual Energy Cost

Baseline (ASHRAE Standard) $161,000
Actual (2016) $83,000

Cost Savings:
$78,000
Solar PV Array - Ground Mounted - PPA

1.75 MW; curtailment technology; battery
Solar Parking Lot Canopy & EV Charging Stations

250 kW; 14 Level II EV stations
This section of the graph reflected the pre-existing 19% reduction in energy demand… …and this is the result of our solar array.
Parking Lot & Walkway Re-Lamping
Programs & Classes Offered

* Solar Photovoltaic Installer (“teaching” panels)
* Electric Vehicle Conversion and Design
* Landscape Design (AS)
* Landscape Management (AS)
* Environmental Science (AS)
* Agriculture (AAS): 10 students, maybe more?
* Sustainability and climate change in other courses: Biology, Business, Economics, and more
* Campus-wide committee designs teaching activities
Watershed Restoration
Future Plans

* New Chillers for Todd Performing Arts Center
* Parking Lot Re-lamping
* Building Schedules
* More Watershed work
* Meadow restoration & Pollinator Habitat
* Mowing reduction
* EV courses?
* Solar PV training

* Working sustainability into coursework in all disciplines
* Continuing to merge sustainability into financial outlook for the college
Duke Carbon Offsets Initiative

May 15, 2017

For more information contact Duke Carbon Offsets Initiative staff:
Charles Adair, Program Manager, Charles.Adair@duke.edu
Tani Colbert-Sangree, Program Coordinator, nc140@duke.edu
Duke’s Goal of Climate Neutrality

• In 2007, President Brodhead signed the ACUPCC climate neutrality commitment

• Climate neutrality – reducing GHG emissions to zero by 2024
  • Internal emission reductions
  • Off-site reductions (offsets)
  • Very ambitious target compared to other universities

• In 2009, Duke Carbon Offsets Initiative (DCOI) was created.
Vision and Mission of DCOI

Vision

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

1) 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 and assisting other departments in reducing the University’s emissions baseline;

2) To implement the strategy in a way that provides educational opportunities for students, faculty, and staff;

3) To prioritize local, state, and regional offsets that provide significant environmental, economic, and societal co-benefits beyond the benefits of greenhouse gas emission reductions; and

4) To facilitate and catalyze high-integrity, unique offset projects by serving as a resource for others outside of Duke University
Duke’s Forecasted Emissions and Reductions

2024: Climate Neutrality Goal
185,000 offsets needed in 2024
Carbon Offsets, Renewable Energy Certificates, and Energy Efficiency Certificates

- **Offsets**
  - Reduction of one metric ton of CO2e
  - Ex. Landfill gas destruction

- **RECs**
  - Non-energy qualities of renewable energy generation
  - Ex. Solar panel installation

- **EECs**
  - Reduction of one megawatt-hour of electricity
  - Ex. Energy Efficiency Projects
What is a Carbon Offset?

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. (ACUPCC, 2014)
What is a Carbon Offset?

Livestock farm before carbon offsets project:

10,000 metric tons CO₂e* released into the atmosphere

Livestock farm after carbon offsets project:

5,000 metric tons CO₂e* released into the atmosphere

5,000 carbon offsets created

*Hypothetical
What is a Carbon Offset?

- Waste to Energy
- Urban Forestry
- Peatland Restoration
- Avoided Deforestation
- Energy Efficiency
- Residential Solar
- Clean Cookstoves
- Ozone Depleting Substance Destruction
Co-Benefits

- Educational opportunities for students, staff, and faculty
- Social engagement with local community members and organizations
- Environmental benefits for land, air, and water quality
- Scale projects up to increase the impact
- Public relations benefits and partnership building
Loyd Ray Farms – Description

- Swine waste-to-energy system

- Captures and burns methane from the hog waste to generate electricity and offsets
  - 350 RECs per year (65 kW microturbine)
  - 2000 offsets per year (registered with the Climate Action Reserve)
DCOI Home Energy Affordability Loan Program (DCOI-HEAL) helps employees reduce energy use through education and energy retrofits

- Leverage the employer-employee relationship to help employees complete energy efficiency retrofits at home.

2013 Pre-pilot results

- Students helped perform air and duct sealing
- 13% energy reductions on average

2014-16 Pilot

- 36 Employees participated
- Duke University paid for the home energy audits
- DCOI staff reviewed energy audits with employees
- 50% did home energy retrofits
- 3 employees accessed the low interest loan
- 15-20% energy reductions on average
- Work done by professional contractor
Energy Efficiency – Employee Education

• DCOI developed a 3 hour, hands-on educational workshop to teach employees about how their home uses energy and basic energy saving actions they can take.
  • Focuses on empowering the employee and ties energy efficiency actions to self-identified strengths/personalities.

• Designed to be ”plug and play” for employers

• Expect on a tiny amount of energy savings per employee, but this allows us to reach many more employees
  • Serves as an on-ramp to other larger energy efficiency actions at home

• Launching this summer!
Energy Efficiency – Help My House

- Electric Cooperatives of South Carolina (ECSC) use on bill financing to retrofit rural, high energy use homes.
  - 125 homes in pilot
  - Average energy reduction – 34%
  - On-bill financing makes loan repayment easy and ties it to the meter
  - Homes are saving an average of $288 per home per year after loan payments

- DCOI purchases EECs/Offsets from the program
  - $ from EECs/Offsets are used to retrofit more houses
  - DCOI gets access to data for student research
Solarize Duke

- Leveraged interdisciplinary teamwork to establish a group purchasing discount and encourage employees to take advantage of the NC tax credit before it expired
  - Created a guide on the economic and political landscape of residential solar in NC to help employees understand
- 250 employees received free home solar assessments
- 29 employees installed solar on their roofs (total of 152 kilowatts)
  - Projected to produce 4,500 MWh’s over the lifetime of the systems (25 years)
Contact Us

For more information, please visit our website.

http://sustainability.duke.edu/carbon_offsets/
Thank you!
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Dan McKay
Andy Melton
Thomas Hawk

SARE Outreach
US Army Corps of Engineers
US Department of Agriculture
Washington DNR
World Resources Institute
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