

**Attaining Climate Neutrality:  
Climate Action Plan  
2010-2020**

Antioch University New England

March 2010

## Just Sustainability

**“In recent years it has become increasingly apparent that the issue of environmental quality is inextricably linked to that of human equality. Wherever in the world environmental despoliation and degradation is happening, it is almost always linked to questions of social justice, equity, rights and people’s quality of life in its widest sense”**

***Just Sustainabilities: Development In An Unequal World*  
(Agyeman, Bullard and Evans 2003)**

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# Carbon Neutrality Task Force

## Antioch University New England Work Groups

### Curriculum, Research & Public Engagement

Tom Wessels – Core Faculty, AUNE Environmental Studies Department – chair

Mikaela Engert – City of Keene Planning Department – co-chair

Jack Calhoun – Assistant to the President for Community and Government  
Relations, AUNE; Interim Director, Antioch New England Institute

*Julia Feder* – Manager of LEED Education Systems, U.S. Green Building Council

\**Sue Gentile* – Core Faculty, AUNE Environmental Studies/Education Departments

Diane Kurinsky – Core Faculty, AUNE Applied Psychology Department

*Katie Stoner* – Assistant Coordinator, Tompkins County Climate Protection  
Initiative; Curriculum Manager, Performance Systems Development

George Tremblay – Core Faculty, AUNE Clinical Psychology Department

*Michael Whigham* – Adjunct Faculty, AUNE Organization & Management  
Department

*Jessica Zane* – Independent Filmmaker

Staffing: Steve Alexander – AUNE Sustainability & Social Justice Committee  
(SSJC) Research Coordinator

### Energy

Jim Gruber – Core Faculty, AUNE Environmental Studies Department – chair

*Diana Duffy* – AUNE Board of Trustees

Dan Lewis – Partner, Kohler/Lewis Engineering

Charles Michal – Principal, Weller Michal Architects

Tom Weller – Principal, Weller Michal Architects

Alex Wilson – Executive Editor, Environmental Building News

Advisory: *Michael Spitze* – PC/Network/AV Administrator, AUNE

Paul “Doc” Whicker – AUNE Facilities Director

Staffing: Rachel Thompson – AUNE SSJC Green Guru

### Purchasing/Finance

Abigail Abrash Walton – Chair

Don Woodhouse – AUNE Grants Office Director

Jim Duffy – Keene City Councilor & Chair, Cities for Climate Protection  
Committee

Advisory: *Tim Jordan* – AUNE Vice President for Finance & Administration

Tracey Thompson – AUNE Vice President for Institutional  
Advancement

Staffing: Steve Alexander – AUNE SSJC Research Coordinator

\* italicized names are those of AUNE alumni

### Solid Waste/Food

*Anne Nordstrom* – Project Director, Vision 2020, AUNE – chair

*Duncan Watson* – Asst. Public Works Director, City of Keene

*Bonnie Hudspeth* – Fellow, Monadnock Farm & Community Connection/AUNE  
Americorps

*Amanda Hopkins* – Garden Manager, Stonewall Farm

*Dave Morrill* – Assistant Recycling Coordinator, Keene State College; Founder,  
Compost Doctor

Staffing: Jess Skinner – AUNE SSJC Solid Waste Coordinator

### Transportation

*Sherman Morrison* – Administrative Assistant, AUNE Office of the Vice President  
for Institutional Advancement/Communications – chair

*Susan Psaropulos* – Database Specialist, AUNE Admissions Office

*Erin Russell-Story* – Clean Cities Program, U.S. Department of Energy

Advisory: *Steve Linnell* – Senior Transportation Planner, Greater Portland  
Council of Governments

Staffing: Mike Goudzwaard – AUNE Transportation Coordinator

### Steering Committee

Abigail Abrash Walton – Assistant to the President for Sustainability & Social  
Justice, AUNE; Faculty, AUNE Environmental Studies Department  
Chairs of Work Groups

Staffing: Steve Alexander – AUNE SSJC Research Coordinator

Advisory: Jen Andrews – Clean Air-Cool Planet Campus Coordinator

## Introduction & Background

*Here at Antioch University New England, we are committed to ecological stewardship and social justice, cultivating local as well as global perspectives to educate students with diverse backgrounds and opinions to become leaders of change.*

*(excerpted from [Antioch University New England's Values Statement](#))*

Sustainability and social justice are at the core of Antioch University New England's purpose and values. Indeed, our curriculum across departments focuses on the 3-E or 3-P definition of sustainability: Equity, Economy, Environment; People, Prosperity, Planet. A simple definition of environmental sustainability is using the earth's natural resources at a rate slower than those resources regenerate. Added to this is a broader concept of “just sustainability” which embraces and integrates respect for individuals’ human rights and the understanding that prosperity is a key element of sustainability. We view our sustainability challenge as how we meet the needs of the present in a socially just and economically sensible manner without jeopardizing the ability of future generations to do the same.

We also know that, as the old business maxim goes, “if you don’t measure it, you can’t manage it.” Completing this 10-year Climate Action Plan provides Antioch University New England (AUNE) with a roadmap for attaining our institutional goal of achieving climate neutrality by the year 2020. Its implementation will be reviewed on an annual basis, in the third quarter of each fiscal year, by AUNE’s President and the President’s Cabinet.

The human and organizational aspects of making change sustainable are as central to achieving the goals stated in AUNE’s Climate Action Plan (CAP) as the technical analysis. We at AUNE know that, according to the organization development and change literature, about 75% of major organizational change efforts fail, in part because they do not anticipate, plan for or tend to the significant human and organizational challenges of facilitating change. We at AUNE have, in the past 7 years, been in the midst of significant organizational changes at the campus and university levels. Our ability to successfully embrace and implement the action steps outlined in this CAP will depend, in large part, on our ability to identify and thoughtfully foster and support the human and organizational capacity to make the transitions that this CAP envisions.

In terms of achieving the specific goals and action steps in this CAP, we will tackle several overarching challenges. These include:

- 1) Developing enhanced data about AUNE community members’ building use, commuting and solid waste disposal habits, so that we can be better at innovating energy-saving initiatives. By strengthening our understanding of these patterns, which encompass the food & solid waste, energy and transportation sectors of this CAP, we can more effectively inform decision-making throughout the institution.
- 2) Continuing to build on our solid track record of achievement in integrating sustainability across the curriculum, conducting cutting-edge climate and sustainability research, and leading a range of public engagement initiatives that focus on fostering climate neutrality and sustainability.

## **Background**

In April 2005, AUNE set out to examine its achievements, roles and practices in the arenas of social justice and environmental sustainability. The process began with the formation of the Sustainability and Social Justice Committee. The committee's mission was to study the school's performance in providing "transformative education through scholarship, innovation, and community action for a just and sustainable society" (excerpted from [AUNE's Statement of Purpose](#)).

AUNE's Sustainability and Social Justice Committee plays a key role in supporting AUNE's efforts to be a responsible sustainability steward and a model for other universities in the region by assessing and reducing AUNE's contribution to the problem of global climate change and addressing associated social justice concerns.

The Committee developed two paths for examining Antioch New England's performance in these areas. First, the Committee completed a Social Justice Audit of AUNE in 2006. Second, the Committee formed the Energy and Climate Action Task Force. The task force's mission was to assess AUNE's greenhouse gas emissions, set a target for reducing them, and determine the steps to take in order to meet that target. The Task Force concluded its work in August 2007, and based upon its work, [AUNE has set a formal target of achieving carbon neutrality by the year 2020](#). Since that time, the school has been implementing the action steps in the Task Force's initial plan to work toward that goal.

"I am so proud of Antioch for taking this step. I feel like this is a critical action, so that we, as an institution, can practice what we preach. It makes me more proud to have the Antioch University New England sticker on my car...Thank you for taking this step!"  
— **Molly Lipovsky Morgan, E.S. Teacher Cert. '08**

These measures have included the Carbon Counts: You Can Too conservation and energy-efficiency education and outreach campaign, launched in September 2007; modifications to AUNE's restroom lighting; removal of vending machines and switch-outs of CRT computers; and upgrades to the school's recycling and composting infrastructure. Collectively, we credit these and other measures with reducing the school's electricity usage by a cumulative 19% over the past three fiscal years (FY07-09). Specifically, AUNE reduced consumption by 152,400 kilowatt hours, which saved 188.8 metric tons equivalent of CO<sup>2</sup> emissions (MT eCO<sub>2</sub>) from entering the atmosphere. AUNE estimates it has saved \$19,995 on its electricity bills during this period.

What does it mean to be carbon neutral? At a basic level, that means that AUNE either no longer relies on, or is offsetting the impact of, carbon dioxide-spewing fossil fuel-based sources of energy for our electricity (which includes our air conditioning each summer), our heat in winter, our business and academic travel, employee and student commuting, and disposal of waste (see graphic, Defining Carbon Neutrality at AUNE, for additional detail). ACUPCC defines climate neutrality as "having no net greenhouse gas (GHG) emissions, to be achieved by minimizing GHG emissions as much as possible, and using carbon offsets or other measures to mitigate the remaining emissions."

Our focus on climate action has been strengthened by AUNE's Memorandum of Understanding with [Clean Air-Cool Planet](#) and AUNE President David Caruso's pledge to the [American College and University Presidents Climate Commitment](#). Both agreements commit AUNE to reduce its carbon impact.

Indeed, as a signatory to ACUPCC, AUNE is one of the 667 higher-ed institutions, from all 50 U.S. states and the District of Columbia, that have committed – in the past three years -- to achieving climate neutrality. Antioch University Los Angeles and Antioch University Seattle are also ACUPCC signatories. In completing and submitting its Climate Action Plan early this year, AUNE will be joining an anticipated 124 other schools that will be doing the same.

“In all cases, campus GHG emissions reduction goals should be challenging and they should encourage colleges and universities to demonstrate real leadership by committing to significant reductions and achieving the lion’s share of them very quickly. Leading climatologists like NASA’s Jim Hansen have said that the window for action is closing and that if we – as a species -- do not make significant progress reversing GHG emissions trends within the next ten years; it will be too late to avoid the worst consequences of climate change.” -- **The 2009 Association for the Advancement of Sustainability in Higher Education Climate Action Planning Wiki**

## **Overview of Climate Action Planning Process**

In developing a Climate Action Plan, AUNE’s goal has been to develop an official campus-approved 10-year plan or road map to achieving carbon neutrality by the year 2020. The plan reflects the comprehensive assessment of emissions-reducing projects undertaken by the AUNE Carbon Neutrality Task Force (CNTF) established in September 2009. All participants in this climate action planning process have recognized that the result will be a living, flexible document that can be adjusted over time, as needed.<sup>1</sup>

The purpose of AUNE’s climate action planning process<sup>2</sup> has been to:

- Better understand the scope of the challenge
- Define goals and action steps
- Create a blueprint for action
- Set milestones to measure progress
- Keep emissions reduction on track both in the short *and* long term
- Account for the big picture by avoiding the “Random Project Portfolio”
- Continue in a leadership capacity in the region

The keys to a successful Climate Action Plan include:

- Building in backup ideas/projects in order to have multiple options in the CAP in the event that one proposed action step falls through due to fiscal, technical or other factors

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<sup>1</sup> Components of this paragraph are adapted from the National Wildlife Federation Campus Ecology Guide to Climate Action Planning.

<sup>2</sup> Components of this section are adapted from AASHE’s Cool Campus! A How-to Guide for College and University Climate Action Planning as well as from the NWF Campus Ecology Guide referenced above.

- Building on common/shared language in order to dovetail with AUNE’s strategic plan
- Having the plan coincide w/ AUNE’s normal budget planning process
- Ensuring that its development/implementation are an **iterative process**
- Building in mechanisms for response in order to be open to and prepared for new technologies, curriculum proposals or research/funding opportunities

The key components of AUNE’s CAP are:

- **Goals and Action Steps** to:  
Integrate climate change into the curriculum  
Expand climate change-related research & public engagement  
Reduce GHG emissions
- **Target dates** for achieving goals, including interim objectives
- **Mechanisms** for tracking progress on goals & actions

### **Carbon Neutrality Task Force Mandate**

The Carbon Neutrality Task Force (CNTF) was charged with drafting Antioch University New England’s 10-year *Climate Action Plan* – the road map for how Antioch University New England (AUNE) will reach its stated goal of achieving *carbon neutrality* by the year 2020.

### **CNTF Timeline**

- September 10th – introductory CNTF general session & work group break out session
- September 11 – November 17 – work groups
- November 17 – general session to review work group proposals
- November 17-December 15 – Steering Committee drafting process
- January 19 – Steering Committee completes and circulates AUNE Climate Action Plan (CAP) to AUNE President, Vice Presidents, Chairs Group, Faculty Senate, Administrative Council, Staff Senate and President’s Council
- February 3 – Steering Committee presents draft CAP to AUNE Community and seeks input on ongoing basis until March 8
- February 10 – AUNE President and Cabinet initial review of CAP
- March 16 – AUNE President and Cabinet final review of CAP for endorsement/approval
- March 23 – submit Climate Action Plan to American College & University Presidents Climate Commitment
- 2010-2020 – Implementation of plan by AUNE

### **Work Groups: General Overview**

The CNTF Work Groups were charged with recommending actions specific to their topic areas to be considered for incorporation by the Steering Committee into AUNE’s CAP. Work Groups were encouraged to estimate the value associated with each recommended action step in terms of emissions reduction and cost in dollars and to identify how those costs might be financed. Members of the Purchasing & Finance work group were available, on a consultative basis, to the four primary issue-

area work groups (i.e., Curriculum/Research/Public Engagement, Energy, Food & Solid Waste, and Transportation) to provide input re: funding strategies for proposed actions. Each work group also had an assigned staff member who was available to assist with background research, testing of proposed mitigation strategies via the campus carbon calculator, and meeting logistics.

Work groups were encouraged to divide their recommendations into two rough categories: 1) Actions to be implemented in the first five years of the Climate Action Plan, from 2010-2014 (these actions may be characterized as the “low-hanging fruit” on the road to carbon neutrality); and 2) Actions to be implemented in the second five years, from 2015-2019 (these are actions that may have the deepest impact and result in achieving carbon neutrality with minimal use of offsets). Work Groups were also charged with evaluating their proposed actions through the broad lens of sustainability, which includes social justice. AUNE must achieve carbon neutrality while maintaining fairness, equity and respect for the basic rights of all stakeholders.

Work group participants were encouraged to review what AUNE has already achieved in each of the areas to be covered by the CAP at: <http://www.antiochne.edu/ssj/achievements.cfm>. The chair also provided and recommended reviewing the relevant excerpts from AUNE’s Sustainability & Social Justice Action Plan. Those excerpts provided a reference to those actions that AUNE has already committed to as an institution along with what steps have been taken towards those commitments.

### **Work Groups: Specific Charges**

- **Curriculum, Research, and Public Engagement:** The Curriculum, Research, and Public Engagement Work Group was charged with recommending the actions AUNE will take to make climate change/neutrality and sustainability a part of the curriculum and other educational experience available *for all students*, as well as actions to increase AUNE’s research and public engagement concerning climate change/neutrality and sustainability.
- **Energy:** The Energy Work Group was charged with recommending the actions AUNE will take in the areas of energy conservation and efficiency (including water conservation), on-site renewables, and green power purchasing to achieve carbon neutrality and minimize greenhouse gas emissions.
- **Food & Solid Waste:** The Food and Solid Waste Work Group was charged with recommending the actions AUNE will take regarding waste disposal, waste management, and food service operations to achieve carbon neutrality.
- **Transportation:** The Transportation Work Group was charged with recommending the actions AUNE will take to encourage alternative transportation (e.g., walking/biking/public transport) and to minimize greenhouse gas emissions from employees and students commuting to/from campus, as well as institution-sponsored employee and student travel.
- **Purchasing & Finance:** The Purchasing & Finance Work Group was charged with the responsibility of providing consultation to the other work groups on an as-needed basis concerning financing and purchasing strategies. This work group was also charged with offering a proposal for how AUNE should obtain carbon offsets.

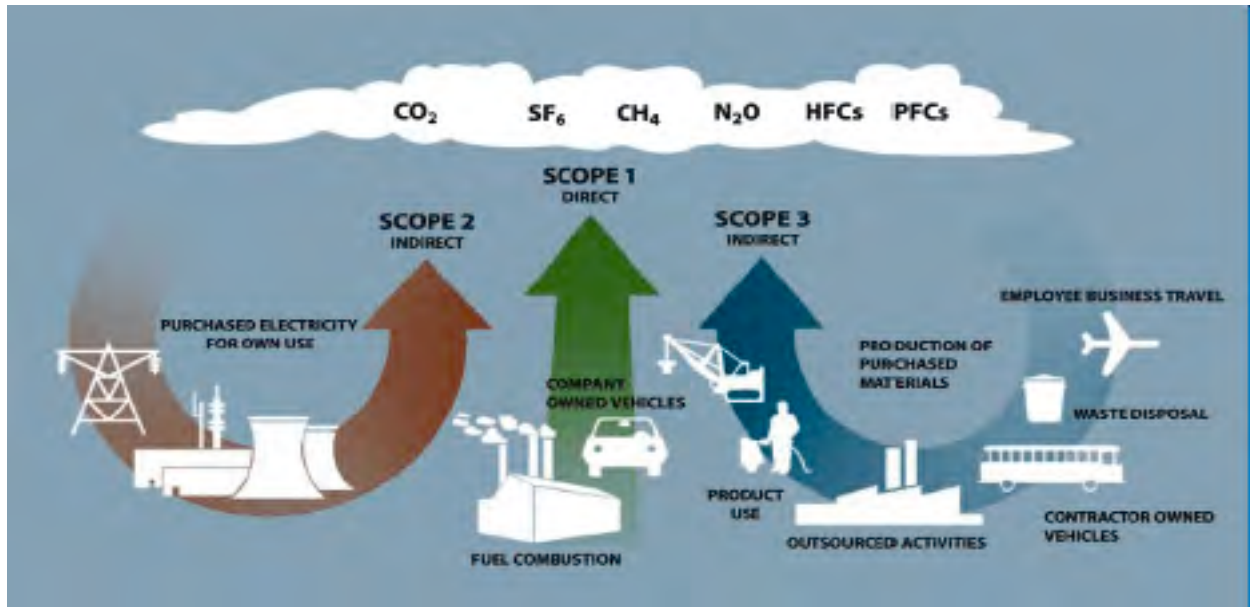
- **Steering Committee:** The Steering Committee was charged with compiling the recommendations of each work group into a final Climate Action Plan. This involved the selection of decision-making criteria by which work group recommendations will be evaluated and ranked, with subsequent determination of staging for implementation of recommended emission mitigation strategies.

“At its most basic level, the science is simple and clear. Since the Industrial Revolution we have been emitting greenhouse gases at a faster rate each year than the planet can absorb, especially during the rapid and energy-intensive growth of the last sixty years. The gases trap the sun’s heat as it is radiated back from the earth and cause global warming. This in turn causes climate change, with direct impacts on our livelihoods. Continuing with current practices will, by the end of this century, take us to a point where global warming in the subsequent decades of 5 degrees Celsius above pre-industrial times is more likely than not. Temperature increases of this magnitude will disrupt the climate and environment so severely that there will be massive movements of population, global conflict and severe dislocation and hardship...These huge risks can be reduced drastically at reasonable cost, but only if we act together and follow clear and well-structured policies starting now. The cost of action is much lower than the cost of inaction...”

– **Nicholas Stern, *The Global Deal: Climate Change and the Creation of a New Era of Progress and Prosperity***

## Defining the Challenge: Establishing Boundaries

An institution's total greenhouse gas (GHG) emissions are commonly measured in metric tons of carbon dioxide equivalent or MT eCO<sub>2</sub>. The total GHG emissions are categorized into three distinct scopes, as presented in the graphic below.



Source: World Resources Institute

On the basis of strong and robust scientific evidence, the IPCC stated clearly that “warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.” The evidence from observations of the past 150 years or so leads to some profound conclusions. For instance, 11 of the last 12 years are among the 12 warmest years ever recorded in terms of global surface temperature.

– R.K. Pachauri, Chairman, Intergovernmental Panel on Climate Change, in the Foreword to the Worldwatch Institute’s *2009 State of the World: Into a Warming World*

# Defining Carbon Neutrality at Antioch U. New England

Scope 1 emissions

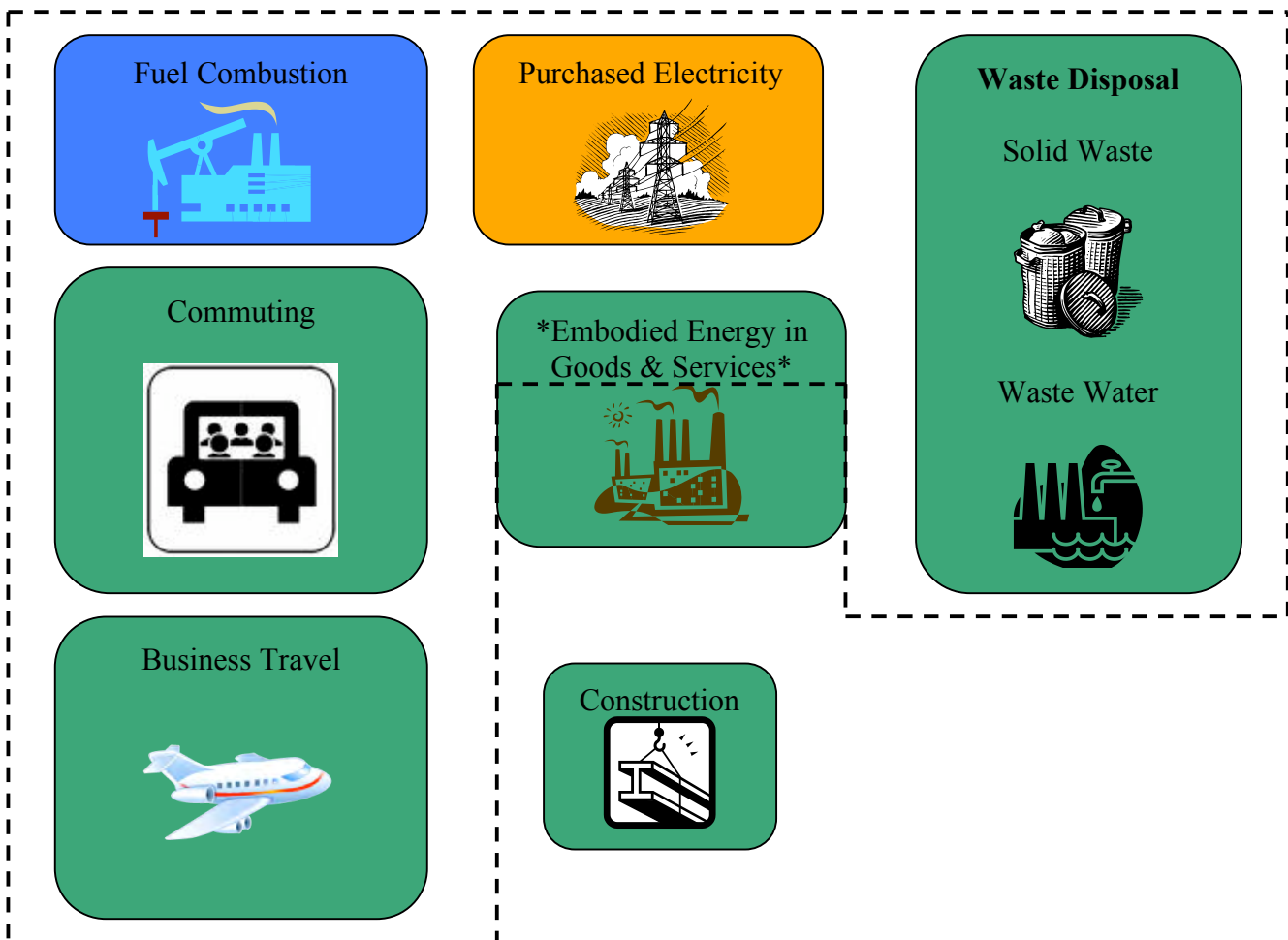
Scope 2 emissions

Scope 3 emissions

University Emission

Upstream Emissions

Downstream Emissions



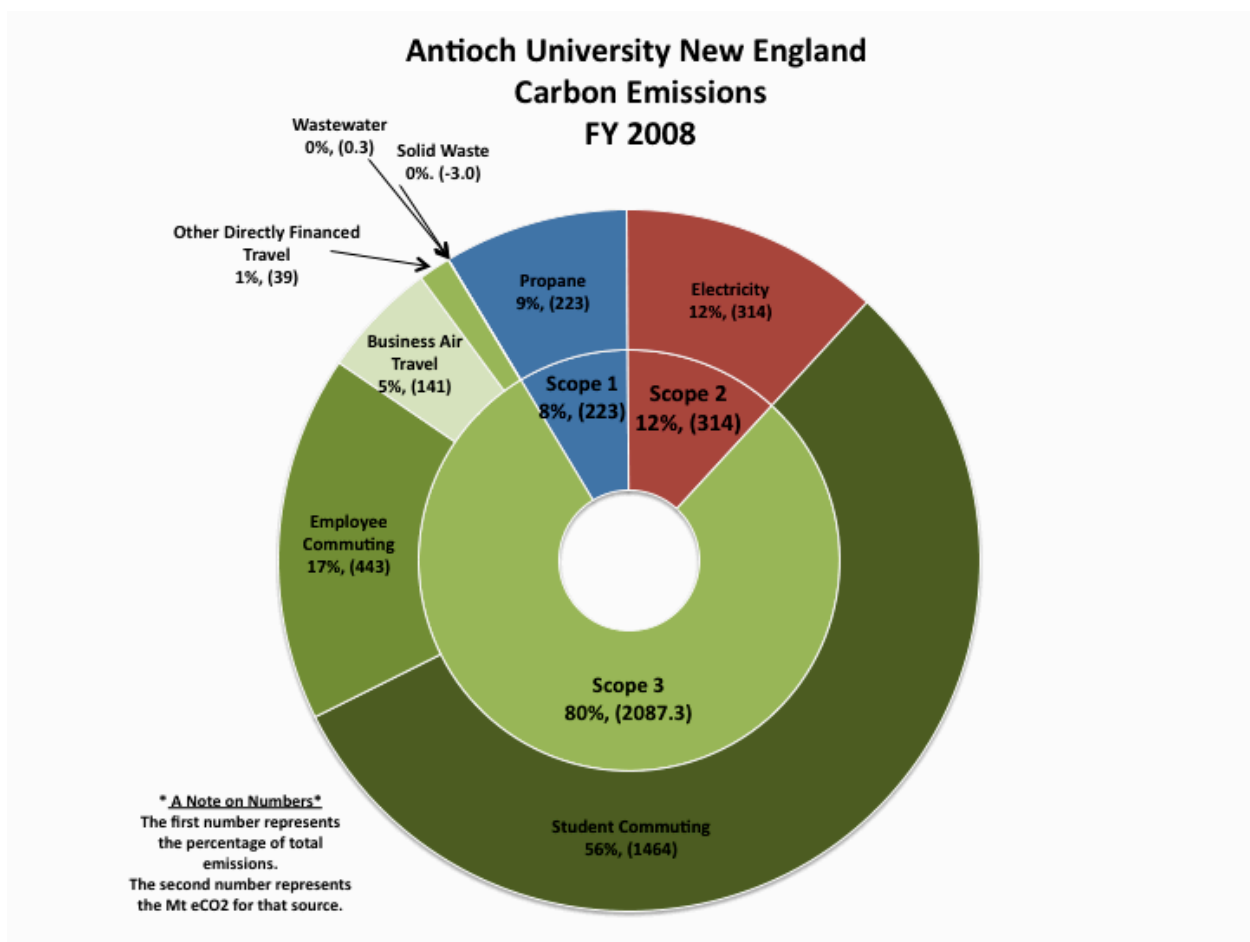
\*Antioch New England does not have a vehicle fleet or sources which would contribute to “fugitive” emissions both of which are Scope 1 Emissions which would otherwise be included

\*Paper and food will both be considered and addressed when making recommendations

## AUNE's Emissions: How Much and From What Sources?

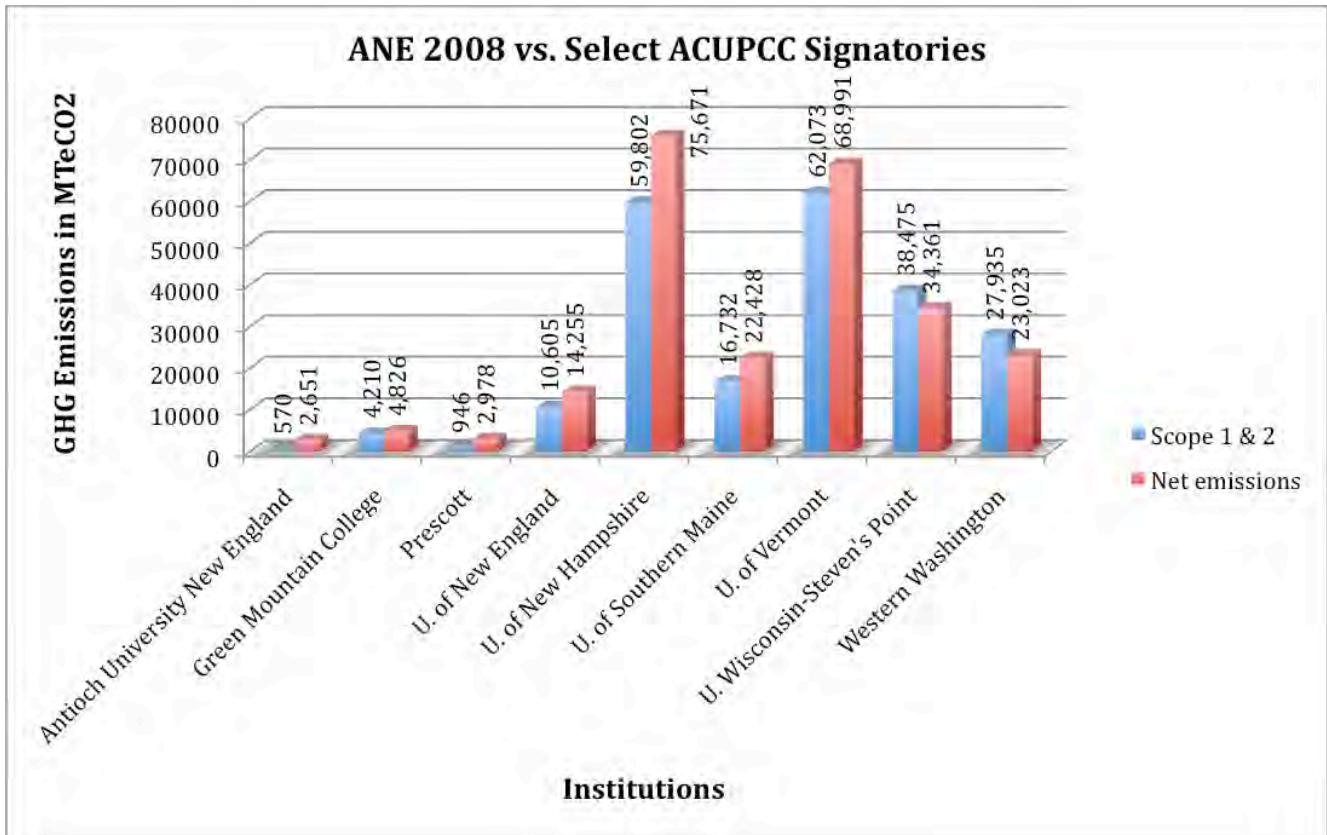
According to its FY08 greenhouse gas inventory, AUNE has total emissions of 2,627.3 MT eCO<sub>2</sub>. As presented in the doughnut graph below, these emissions break down as follow: Scope 1 (propane) – 223 MT eCO<sub>2</sub>, Scope 2 (electricity) – 314 MT eCO<sub>2</sub>, and Scope 3 (institutional travel, commuting, and waste): 2,090.3 MT eCO<sub>2</sub>.

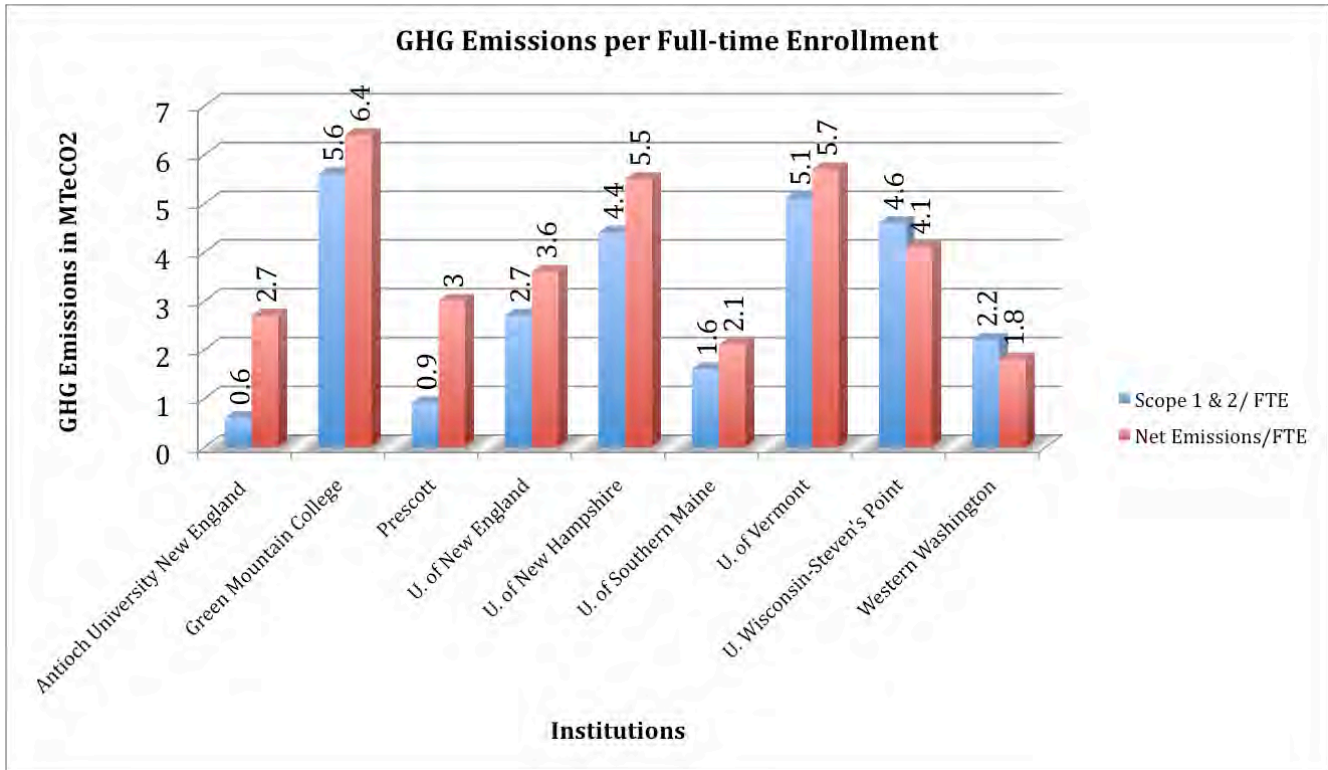
Transportation accounts for 80% of AUNE's emissions, while heating, cooling & powering AUNE's facility accounts for 20% of our emissions. As noted below, the largest percentage of AUNE's emissions (57%) is from student commuting, followed by employee commuting (17%), electricity usage (12%), propane usage (8%), and institutional travel (6%). Emissions from solid waste and wastewater are negligible.



## **How Does AUNE Compare?**

AUNE's total emissions are significantly lower than those of most other higher education institutions with which AUNE competes or that are in a similar geographic location, as presented in the bar graph sampling below. AUNE's combined Scope 1 & 2 emissions per full-time equivalent student (FTE) are just 18% of the average emissions of the other schools included below, and AUNE's total emissions per FTE are 67% of the Scope 1-3 emissions of the other schools. This likely is attributable to a number of factors, principally AUNE's innovative and highly energy-efficient delivery model, which provides education to some 1,000 commuter students annually using just 85,000 square feet of building facility. AUNE's use of propane for heating its facility, the extensive daylighting of the building and numerous other conservation and energy-efficiency measures and behaviors also contribute to this positive comparison.





Other schools with which AUNE might compare itself are not signatories to ACUPCC (e.g., Marlboro College, New England College and the University of Hartford), while others that are signatories have not yet submitted to ACUPCC a greenhouse gas inventory that would make comparison possible (e.g., Southern New Hampshire University).

## Issue-Area Work Group Goals & Action Steps

### Curriculum, Research and Public Engagement Work Group

The Curriculum, Research, and Public Engagement Work Group was charged with recommending the actions AUNE will take to make climate change/neutrality and sustainability a part of the curriculum and other educational experience available for all students, as well as actions to increase AUNE's research and public engagement concerning climate change/neutrality and sustainability.

The goals and action steps outlined below are designed to support AUNE in expanding its educational, research, and public engagement activities regarding sustainability and carbon neutrality within the institution and the greater Monadnock region. Because this may involve a fair number of ongoing projects it eventually might become necessary to add another full-time-equivalent (FTE) employee to serve as a point person, similar to a sustainability coordinator, to oversee these initiatives.

Some of the goals listed below don't at present have mid- or long-term actions steps. We assume that in those instances the mid- and long-term action steps will emerge from short-term action steps.

### Curriculum & Educational Opportunities

#### **Goal 1: Encourage students to understand that AUNE has committed to attaining climate neutrality and that sustainability is a core component of AUNE's purpose and values.**

##### **RECOMMENDED ACTION STEPS**

*Short-term (1-3 years)*

1. Develop materials and communication platform to be integrated into prospective student visiting days to highlight AUNE's commitment to sustainability and carbon neutrality
2. Printed and electronic outreach materials for prospective students should convey AUNE's commitment to sustainability and carbon neutrality
3. Develop an email document to be distributed to prospective students that carries the institution's mission, its relationship to sustainability, actions that have been done to curb carbon emissions and steps to be incorporated in the future
4. Expand new student orientation to have a sustainability module to which each incoming student has access (i.e., an introduction to the institution's sustainability culture, campus operations and actions that each student can take)
5. Have an optional part of orientation be a guided tour of Keene that highlights various organizational, community, and business sustainability initiatives.

#### **Goal 2: Increase our students' knowledge and understanding of the complexity of sustainability and climate neutrality while simultaneously supporting personal and collective behavioral change.**

##### **RECOMMENDED ACTION STEPS**

*Short-term (1-3 years)*

1. Encourage & support each program's assessment of the ways in which their current curriculum addresses aspects of sustainability. Students with strong backgrounds in sustainability could offer help with these assessments.
2. Create a faculty resource team whose charge is to organize colloquia, coach other faculty on education for sustainability, and develop cross-departmental curricula; support faculty credit release time for participation in resource team
3. Develop guidelines on the concepts that should be covered in sustainability and carbon neutral curricula
4. Develop an inter-departmental weekend course available to all first-year students
5. Develop and promote cross-departmental initiatives to address sustainability curriculum
6. Explore and utilize video conferencing technology as a means to bring alumni expertise and practical experience with issues regarding sustainability into classrooms for discussions and guest lectures

*Mid-term (4-7 years)*

7. Create guidelines and frameworks appropriate for each department as teaching sustainability becomes part of faculty expectations
8. Each department should develop at a minimum one course where sustainability is a critical theme

*Long-term (8-10 years)*

9. Sustainability should be woven across the curriculum institutionally

**Goal 3: Educate AUNE campus community members and visitors about sustainability and carbon neutrality via AUNE's institutional practices and programming.**

**RECOMMENDED ACTION STEPS**

*Short-term (1-3 years)*

1. Continue to develop the Green Guru Program to have greater outreach
2. Continue to organize and host the *Carbon Counts: You Can Too* education and outreach campaign
3. Continue to highlight and communicate strategies and achievements regarding sustainability and carbon neutrality at AUNE such as the Green Guru, decreases in printing and electrical use
4. Develop a list of case studies, as educational tools, of other institutions of higher education—Oberlin, Arizona State, UNH—that have been able to make their campuses far more sustainable
5. Develop and implement on-site interpretation of the AUNE campus regarding its energy conservation, material resource use, design principles, and carbon reduction strategies

*Mid-term (4-7 years)*

6. Install direct feedback mechanisms with interpretation in visible places such as electricity, fuel and water meters

**Research**

**Goal 1: Encourage and support AUNE faculty, staff and students to engage in research regarding sustainability and regional climate change research.**

## **RECOMMENDED ACTION STEPS**

### *Short-term (1-3 years)*

1. Develop a web-based site to serve as a clearinghouse for the posting and dissemination of ongoing research regarding sustainability & climate change being conducted by faculty, staff, and students along with an evolving list of research project needs
2. Develop mechanisms to disseminate to the AUNE community other regional research findings from leading institutions such as the Climate Change Research Center at UNH
3. Create more formal linkages with Keene State College and the City of Keene to facilitate collaborative regional research
4. Bring together leading thinkers and funders to frame research foci
5. Create a Sustainability Clinic similar to the Advocacy Clinic where students can conduct research for organizations to meet practicum and/or other curricular requirements
6. Encourage and expand opportunities for students to conduct research for classes and practicum to include natural, built, and social environments, including those of AUNE and the City of Keene
7. Encourage and offer opportunities for students to attend local, regional, and national conferences to present their research

## **Public Engagement**

### **Goal 1: Increase our campus members' active public engagement with personal, local, and regional sustainability and carbon reduction efforts.**

#### **RECOMMENDED ACTION STEPS**

##### *Short-term (1-3 years)*

1. Develop student positions similar to the Green Guru to offer assistance to the greater Keene community and in their own communities. (This might include the creation of energy audit 'kits' that AUNE students can be trained in using on site with area K-12 schools and small businesses.)
2. Develop a Sustainability Institute at AUNE to conduct practical workshops for the AUNE community and general public to help them institute sustainable practices in their homes, businesses, and communities
3. Develop workshops to help people deal with global issues so that they are empowered and not demoralized
4. Host an annual local sustainability expo possibly linked with Earth Week or jointly hosted with Keene State

##### *Mid-term (4-7 years)*

5. Reach out to Keene State, the city of Keene, and area citizens to develop a Monadnock Region Sustainability Council with state backing to develop ways to engage the public in sustainability initiatives
6. Develop sustainability service projects involving AUNE students during breaks in the academic year
7. Host a regional sustainability expo

##### *Long-term (8-10 years)*

8. The Monadnock Region Sustainability Council works on the development state and national sustainability policies

## **Energy Work Group**

The Energy Work Group was charged with recommending the actions AUNE will take in the areas of energy conservation and efficiency (including water conservation), on-site renewables, and green power purchasing to achieve carbon neutrality and minimize greenhouse gas emissions.

The Energy Work Group organized the scope of their inquiry by identifying two general groups of actions:

- A. **Reduce thermal and electrical loads in the building** (use less energy to operate).
- B. **Meet the thermal and electrical loads** (use the most efficient means to generate the energy that is still required). Note: It is critical to *first* reduce energy needs *before* attempting to provide that need with more sustainable measures. Additionally, efficiency includes the wise and prudent use of existing and local resources that make the *net* impact of change have the highest value, not necessarily the technology with the highest efficiency thermodynamically.

The following specific areas were reviewed for potential load *reduction*:

- Building envelope (roof, walls, foundation/ground level slab, doors and windows)
- Lighting
- Reducing plug loads, (specifically the mix of computer equipment typically used in offices and classrooms.)
- Internal gains (heat released from equipment within a space that meets a heating demand or increases a cooling demand)
- Ventilation (ventilation falls under both the *reduce loads* and the *meet loads* categories. Thus we discuss this item at length in the second *meeting loads* section)
- Improved controls for heating, ventilation, and cooling (HVAC) systems
- Develop a computer model of the building
- Change out boilers and upgrade primary heating plant
- Ventilation and heat recovery
- Daylighting

The work group also reviewed potential alternative energy systems for *meeting* the energy needs of the building:

- Biomass wood system
- Ground source heat pumps (“geothermal”)
- Photovoltaic power generation

In order to more fully assess the alterations needed to reduce the energy loads associated with the AUNE building envelope, the Energy Work Group requested – and AUNE’s president approved – a building envelope analysis. This testing was completed in October 2009 by the Vermont-based firm Zero By Degrees, with the assistance of AUNE faculty, staff, student and alumni volunteers. Approaches to meeting loads efficiently and effectively were extensively considered. The analysis findings were considered by the work group and recommendations incorporated into the work group’s final report.

In terms of assessing options for meeting AUNE's reduced energy loads, at this time the Energy Work Group considers photovoltaic power generation as an option that *will* become more attractive with changes in future technology, but at the moment is probably cost prohibitive. The work group considered the possibility of a PV system, biomass wood system, and ground source heat pumps. (Additional information on those systems is available from the Chair of the Task Force.) The work group also considered changing out the boilers and upgrading the primary heating plant, due to what appears to be an inefficient system that is also nearing the end of its life (15 years old). Doing so should begin with an examination by an HVAC engineer to determine the extent of the need and next steps.

With the above considerations in mind, recommendations were made regarding HVAC controls and daylighting. The Task Force Steering Committee has built upon the Energy Work Group's research to include, as part of the CAP, the proposal to convert the system for meeting AUNE's thermal load to a ground source heat pump system and to convert the system for meeting AUNE's electrical load to a full array of rooftop PV panels. These recommendations are put forward for discussion purposes and as a temporary placeholder as decisions are made regarding the location and size of AUNE's facilities and as new technologies emerge and become more affordable in comparison to conventional energy systems.

In addition to their final report, the Energy Work Group included a lengthy appendix that contains notes, further discussion and in many cases, technical reports, for each recommendation. A brief background report is included in this CAP in Appendix B. In addition, a list of options that may be worth future consideration has also been included in that appendix. AUNE should use this report as a 'road map' and engage professional help in evaluating options, using a fully calibrated computer model of building energy performance.

Note: Although the group was charged to consider water conservation little attention was given to water concerns because its contribution to carbon emissions is quite minimal at AUNE.

## **Goal 1: Reduce Thermal & Electrical Loads**

### **RECOMMENDED ACTION STEPS**

1. **Install additional insulation to roof.**

This may be done from below where ceilings are exposed (for example, second-floor classroom ceilings). However, sprayed insulation may create maintenance and aesthetic issues, but will also likely increase acoustical values in classrooms. In other areas additional insulation may be added from above, but is best done at a time when re-roofing is required.

(See Appendix 1 of the Energy Work Group report for additional information. This report is available from the Task Force Chair.)

2. **Install additional insulation in numerous isolated and localized sections of the building.**

For example:

- The south wall facing the bike path, while insulated inside the building, does not have the exterior insulation system used on most exterior block walls.

(See Appendix 2 of the Energy Work Group report for complete list and additional information.)

3. **Seal the roof decking to the roof membrane at the perimeter edges where possible.**

Alternatively, this can be sealed from inside with caulk or spray foam. Where suspended ceilings

are in place this location can be spray foamed from inside in coordination with recommendations in #2 above. The roof deck in the community room and above the stairs can be sealed from inside with spray foam at the top of the wall.  
(See Appendix 3 of Energy Work Group report for additional information.)

4. **Mitigate heat loss from wall or roof penetrations. (The specific steps here have already been completed.)**

For example:

- Science lab 2 plumbing stack. Fill old plumbing stack with foam and install a waterproof cap outside to reduce air leakage in surrounding rooms. Insulate the empty wall bays in the science lab at the next planned renovation of the room. The open-ended duct appears to be part of the return plenum for the ventilation and the ventilation is well connected to the outdoors.
- Herbarium: cold interior wall, above ceiling daylight can be seen at the exterior wall. There is an air pathway from the interior wall to the outside. Seal the opening to daylight with can foam from inside.

(See Appendix 4 of Energy Work Group report for additional information.)

5. **Decrease heat loss via foundation & ground level slab.**

The foundation R-value has been estimated to be R5 to R10. An R-value of 20 would be preferable but retrofitting the foundation is not an option. Instead, four six feet (6') of rigid foam could be installed at the exterior edge of the building perimeter but should only be done if and when other site work is to be done.

(See Appendix 5 of Energy Work Group report for additional information.)

6. **Mitigate thermal loss via windows & doors.**

- a. Replace windows with R5 equivalent units that are also rated with low infiltration rates and appropriate type of glazing based on orientation of building. Could be phased in over a number of years, using a room-by-room approach or done globally throughout the building at one time.
- b. Replace old doors with new weather tight doors.
- c. Replace on older doors (and hatches) still in good condition: Thresholds, sweeps, weather-stripping.
- d. Institute a campaign to close and latch windows.
- e. Repair or replace all windows or doors where closures are not tight.

(See Appendix 6 of Energy Work Group report for additional information.)

7. **Replace opaque window sections.**

Many windows have poorly insulated opaque sections installed above the glass. Replace these with insulated walls or insulated spandrel panels.

(See Appendix 7 of Energy Work Group report for additional information.)

8. **Future expansion in basement/tombs.**

Some of the basement, (or "tombs") is a semi-finished area that is partially below grade. The warehouse is roughly 2 levels high and already has a dedicated heating system. When planning for growth, consider expansion into the "tombs" and using 2 levels in the warehouse before adding on to this building. The tombs are partially underground and will lose less heat, if insulated properly, than equivalent volumes above grade. The warehouse is an energy efficient geometric shape with high volume and relatively low surface area. In addition the warehouse already has a dedicated heating plant that will be more than enough capacity for the space as long as it is well insulated and air tight when it is refitted for classrooms and offices. The incremental cost to properly insulate

and air seal at the time of a renovation is minor and is typically paid back in less than 2 years. (See Appendix 8 of Energy Work Group report for additional information.)

### **9. Lighting.**

- Paint ceilings white at perimeter rooms (typical existing practice).
- Rewire control circuits and consider selecting dimming & bi-level ballasts when changing lights. Wiring in classrooms doesn't allow for optimal use, as all lights are either on or off. Updating light switches and controls would provide options and help with classroom use of projectors. – e.g. PowerPoint presentations need some light but not overall and switching should be aligned with need for projection in classrooms.

(See Appendix 9 of Energy Work Group report for additional information.)

### **10. Internal Gains.**

AUNE's central and shared computer servers are located in one room on the western side of the building. This high concentration of computers which run 24-hours a day creates a localized zone which generates a great deal of waste heat, which must be cooled to keep the equipment at acceptable operating temperatures. In a fully integrated sustainable building, a high percentage of this waste heat would be captured for other uses. Some form of heat-recovery may be feasible, and some additional investigation is recommended.

(See Appendix 10 of Energy Work Group report for additional information.)

### **11. Ventilation & Heat Recovery.**

- Install air-to-air heat exchangers for bringing fresh air in and exhausting stale older air – the colder air coming in is pre-heated by the warmer exhaust going out.
- Second floor dropped ceilings and return plenum: Consider replacing rooftop ventilation units with heat recovery ventilators so that up to 80% of the heat content can be recovered in the exchange of ventilation air. These can be added to the ventilation system cost effectively when the existing rooftop ventilation units need major repairs or replacement. (From Zero by Degrees report)

(See Appendix 11 of Energy Work Group report for additional information.)

### **12. HVAC Controls & Ventilation.**

- Upgrade the current software system that controls heating and cooling. Improve simplicity of software used for this system. This will enable better scheduling of occupancy for more efficient ventilation and temperature set-up/setback.
- Install CO2 sensors on walls in classrooms only, to control ventilation on occupancy rather than a schedule

(See Appendix 12 of Energy Work Group report for additional information.)

### **13. Daylighting.**

- Daylight 2<sup>nd</sup>-floor hallways at a minimum, by installing skylights.
- Daylighting of classrooms is recommended but would necessitate the addition of darkening ability as needed for use of PowerPoint, video and other electronic projection.
- Install light-shelves at upper portion of windows to project light deeper into the rooms.
- Minimize heat gain in warm months with properly set skylights or roof monitors.

(See Energy Work Group report Appendix 13 for additional information and PowerPoint sketch in Appendix 19.)

## **Goal 2: Meet Reduced Thermal & Electrical Loads More Efficiently**

### **POSSIBLE ACTION STEPS**

#### **1. Explore Installation of Ground Source Heat Pump**

- Replace current propane heating system and electrical chiller system with closed-loop ground source heat pump system that hooks into existing ventilation system.

#### **2. Explore Installation of Photovoltaic Panel Array**

- Install rooftop PV array to generate electrical load.

#### **3. Explore other relevant options & emerging technologies that are more cost effective and efficient (e.g., passive solar design changes, shading through landscaping, micro CHP system)**

“Energy experts no longer debate about whether Hubbert’s peak [peak oil] will occur, but when.” –  
**Fox News, April 28, 2006**

## **Food & Solid Waste Work Group**

The Food and Solid Waste Work Group was charged with recommending the actions AUNE will take regarding waste disposal, waste management, and food service operations to achieve carbon neutrality. In determining proposed action steps regarding AUNE's on-site food vendor, two members of the work group conducted multiple interviews with the vendor (Donna Locher of Monadnock Developmental Services). We inquired about how operations currently work, where food and supplies are obtained, and how much they cost. We shared our preliminary recommendations to get feedback and prioritized them accordingly. Further conversations with the vendor have confirmed that switching to real china and cutlery is the vendor's first preference for waste reduction, if there is infrastructure and a system in place to support this move, and if health codes can be met.

### **General**

#### **Goal 1: Enhance data collection and analysis**

##### **RECOMMENDED ACTION STEP**

1. Implement a common and accessible counting process to regularly tally students and personnel on campus

*Rationale:* Understanding the patterns in number of people on campus per department/office is critical for decision-making throughout the institution.

*Outcome:* Per capita energy, commuting, food and waste figures will be calculated on at least an annual basis

#### **Goal 2: Enhance overall capacity for reducing greenhouse gas emissions associated with AUNE purchasing**

##### **RECOMMENDED ACTION STEPS**

1. Acknowledge the limitations of the carbon calculator in its ability to include carbon costs up the supply chain of purchased goods.

*Rationale:* Understanding that every item and action has a life cycle of energy and waste associated with it encourages necessary systems thinking.

*Outcome:* AUNE community has a shared understanding that achieving carbon neutrality is a process as much as a goal.

2. Promulgate the highlights of AUNE's Responsible Purchasing Policy (see Appendix C) so that everyone who makes purchases is aware of preferred attributes, sources and how to implement the guidelines.

*Rationale:* The Responsible Purchasing Policy is very new (September 2009) and its link to the carbon neutrality effort can be more fully realized in the AUNE community.

*Outcome:* Each academic department and administrative office will understand the effects of their purchases on AUNE's carbon footprint.

3. Update the list of related sources for responsibly purchased products in the Responsible Purchasing Policy to include printer paper, computers, furniture, light bulbs, and food and identify the most local sources for each.

*Rationale:* Listing commonly purchased items and their sources will aid in purchase decision-making.

*Outcome:* Buyers will make increasingly more local and sustainable purchases.

4. Include the AUNE bookstore operators in discussions about carbon reduction practices; encourage their participation in making positive changes especially in food, packaging and purchasing practices.

*Rationale:* The bookstore represents an unexamined source of AUNE's energy consumption (through purchasing) and waste production (through packaging)

*Outcome:* The AUNE bookstore will start a waste reduction and local sourcing program.

## **Food**

### **Goal 1: Reduce Greenhouse Gas Emissions Associated with Food Consumed at AUNE**

#### **RECOMMENDED ACTION STEPS**

1. Create an Antioch work study position for a *Local Food Project Coordinator*.

*Rationale:* Someone coordinating and promoting the purchase and consumption of local food at Antioch will support and spread AUNE's sustainability message

*Outcomes:* (See Appendix D for draft position description)

2. Retain the Garden Coordinator work study position(s)

*Rationale:* Antioch's garden represents many of its values in one elegant setting and it needs to be cared for consistently

*Outcomes:*

- Monthly garden production is monitored.
- Local food availability is increased.
- The garden is a primary recipient of the finished compost.
- The waste=food loop is closed at Antioch when Donna's café, AUNE's on-site food-service vendor, receives the garden bounty.
- The garden offers educational opportunities to students.

3. Promote purchasing and eating of local food, and/or especially grains, legumes and vegetables

*Rationale:* Food purchased locally reduces food miles traveled, supports the local economy and retains more nutritional value (it's fresher). Producing grains and vegetables typically requires lower amounts of energy than meat production.

*Outcomes:*

- Farmer's market at AUNE.
- On-site food-service vendor offers more meatless dishes.
- On-site food-service vendor increasingly sources more local food.

4. Join the Real Food Challenge

*Rationale:* Real Food refers to food that is organically, locally, and ethically grown. The Real Food Challenge is a national campaign, organized by The Food Project organization, with the mission to increase the amount of real food at colleges and universities.

*Outcomes:*

- Antioch New England will officially join a national food system campaign, taking advantage of the available network and resources.
- Joining the Real Food Challenge will expand AUNE's reputation as a leader in the community.
- The use of Real Foods will contribute directly to the reduction of greenhouse gas emissions.

## **Goal 2: Reduce Energy Inputs & Solid Waste Disposal Associated with AUNE Food Service**

### **RECOMMENDED ACTION STEPS**

1. Install dishwashers for on-site food-service vendor and for staff use (lounge or first-floor Community Room kitchen area) (2010)

*Rationale:* Creating alternatives to non-compostable ware at all AUNE events and on a daily basis is the least costly and energy-intensive solution besides eating with our fingers.

*Outcome:* Lower ongoing financial and energy costs associated with washing dishes rather than purchasing paper plates and cups and plastic utensils

2. Create space for refrigerated and dry storage for food and cutlery for on-site food-service vendor (2012)

*Rationale:* Stockpiling supplies and food makes economic and environmental sense

*Outcomes:*

- Fewer trips to the grocery store.
- Fewer paper plates and cups in the trash.

3. Upgrade existing water fountain and install first-floor water fountain with filtration & water-bottle-refill features.

*Rationale:* Encourage and support AUNE building users in choosing sustainable local water source and refraining from purchasing bottled water

*Outcome:* Health of users improved and users' money saved. Greenhouse gas emissions associated with bottling/transport of water avoided and volume/toxicity of AUNE solid waste stream reduced.

4. Explore transition by on-site food-service vendor to use of re-usable and biocompostable food service items.

*Rationale:* Food service ware used by vendor is a front-line, highly visible indicator of AUNE's overall sustainability commitment and affects volume & toxicity of AUNE's solid waste disposal.

*Outcome:* Transitioning to re-usable/biocompostable establishes clear sustainability message/practice and will reduce AUNE's volume and toxicity of solid waste disposal.

## **Solid Waste**

## **Goal 1: Reduce Energy Inputs & Volume/Toxicity of AUNE Solid Waste Disposal**

### **RECOMMENDED ACTION STEPS**

1. Retain the Solid Waste Coordinator work study position

*Rationale:* This position is instrumental in organizing and promoting recycling and composting activities and knowledge in the AUNE community

*Outcomes:*

- Composting throughput and output will continue to increase to meet the full potential of processing all of AUNE's organic feedstock.
- Composting, recycling, waste and facilities audits will consistently continue.
- Education and outreach efforts to the AUNE community around solid waste and recycling issues will grow.

2. Conduct annual facility walk through

*Rationale:* Appropriate signage and receptacles are critical to getting waste, compost and recyclables to the proper destinations.

*Outcome:* Classrooms, common areas and offices will all have the receptacles they need so as to minimize waste generation at AUNE.

3. Rearrange and provide adequate receptacles in the classrooms and common areas, as needed, to encourage recycling and composting and create promotional outreach program to make campus members aware of this change and to understand the consequences of throwing stuff away.

*Rationale:* Antioch will reduce the solid waste going to the transfer station and subsequent waste-to-energy facilities to about 8 tons per year.

*Outcomes:*

- The trash dumpster will contain fewer recyclable items.
- Carbon emissions from waste generation will be miniscule.

4. Continue to work with Waste Management to match AUNE's needs to its dumpster types and pick-up schedule

*Rationale:* An increase in recycling and composting will require smaller dumpster or fewer trips, resulting in lower costs and fewer miles traveled.

*Outcomes:*

- Less waste will be transported to the Keene Transfer station, and subsequently to the waste-to-energy facilities.
- Appropriate signage and locks (maybe) will be installed on each dumpster.

5. Conduct annual waste stream audit

*Rationale:* Collecting real numbers about waste generated provides baseline and trend data for decision-making.

*Outcome:* Antioch will be able to measure its progress toward zero carbon emissions from waste.

6. Monitor and report annually printer paper purchase per administrative center and academic department and paper towel purchase, per capita

*Rationale:* If users can directly see the effects of their usage conservation will increase (especially if use is tied to budgets).

*Outcome:* We will know how much could be recycled/composted and usage patterns.

7. Create and promote a policy to guide the purchase of building materials and disposal of construction and demolition debris

*Rationale:* New construction has the ability to be “green”, if planned for.

*Outcome:* All construction at AUNE will be planned and completed within sustainability parameters.

8. Build or purchase additional infrastructure for AUNE’s compost operation (Earthtub or other in-vessel options). (2011)

\*Also recommended installing composting containers for paper towels in bathrooms (this action would necessitate an adequate composter)

*Rationale:* Increasing the capacity for composting to accept more compostable paper products and food waste into its system will divert recoverable resources from the solid waste stream.

*Outcomes: 5 and 10 year*

- At least 75% -90% of potential food waste will be collected and composted<sup>3</sup>
- At least 75%-90% of paper towels will be composted<sup>4</sup>
- The 10-yard waste dumpster will be replaced with 4-yard waste dumpster.

11. Continue to measure and report throughput figures for the compost operation.

*Rationale:* Understanding the food waste and organics recycling figures will allow the compost program’s success to be monitored and correlated with other efforts to reduce waste on campus.

*Outcomes:*

- Food waste and other organics (paper towels, compostable ware) are weighed and charted at every collection.
- *Time to and amount of* end-product compost is measured and its use is recorded.

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<sup>3</sup> **Potential Food Waste: 40,848 lbs per year or 18.5 metric tons\***  
**Actual Food Waste collected (2008-2009): 2944 lbs or 1.33 metric tons**

\*This number is based on the following statistics collected in Fall 2009:

- Full time students = 829
- Part time students= 207
- Full time core faculty= 57
- Part time faculty= 66
- Admin/staff= 67

Assumptions made:

- Full time students on campus 2 days per week for 38 weeks/year
- Part time students on campus 1 day per week for 38 weeks/year
- Full time faculty, admin and staff on campus 5 days per week 48 weeks/year
- Part time faculty on campus 2 days per week 48 weeks/year
- Amount of food waste per meal = 6oz (or .375 lbs based off the national average)
- Everyone eats one meal

<sup>4</sup> In FY 09, AUNE purchased – and presumably used – 64 cases of paper towels. At approximately 4 lbs per roll and 6 rolls per case this equates to about 1500 lbs. or 1 cu yd of potential compostable material.

## **Transportation Work Group**

The Transportation Work Group was charged with recommending the actions AUNE will take to encourage alternative transportation (e.g., walking/biking/ride-sharing, public transport) and to minimize greenhouse gas emissions from employees and students commuting to and from campus, as well as institution-sponsored employee and student travel.

“I have always thought that the substitution of the internal combustion engine for the horse marked a very gloomy milestone in the progress of mankind.” – **Winston Churchill (1954)**

### **Goal 1: Enhance data collection and analysis**

#### **RECOMMENDED ACTION STEP**

**1. Establish commuter data collection procedures.** Data for CO<sub>2</sub> emissions from commuting were based on the 2006 Social Justice Audit. The workgroup feels that although this was an excellent starting point, we need to establish a more accurate baseline picture of how often people come to campus and how they get here. This data collection would then be institutionalized in some way so that it gets updated each year as student and employees enter and leave the institution. This will then also allow us to track emissions from commuting over time. It is recommended that the first round of data collection (Spring 2010) be administered by the Transportation Coordinator while at the same time working with the institution to figure out the best way to institutionalize this data collection. Using the work-study position results in this being a “no-cost” action step.

### **Goal 2: Reduce emissions from employee and student commuting by considering the implementation of the following options, as appropriate**

#### **RECOMMENDED ACTION STEPS**

- 1. Balance growth of online/on-campus programs with attention to reducing student commuting by offering online programs.** AUNE is in the planning stages of offering online options for some programs. It is recommended that we track the ratio of commuting students to online students over time, with a goal of increasing the number of students who do not need to come to campus at all. This could initially fall under the realm of the Transportation Coordinator, resulting in no extra cost for implementation.
- 2. Reduce student commuting by encouraging existing and new programs to be lower-residency.** Many of AUNE’s face-to-face programs are delivered in a way that requires students to be on campus 1-2 days every week. Other programs are delivered in ways that require students to be on campus only 1-3 days every three weeks. Increasing the number of programs that have lower residency requirements can significantly reduce CO<sub>2</sub> emissions from student commuting.
- 3. Reduce student and employee commuting by participating in a robust carpool/rideshare program.** The state of Maine has a very good program called GoMaine. Vermont is about to sign on to that program, and New Hampshire is expected to follow suit as well. One of the many good things about the program is that there is a “guaranteed ride home” feature, so no one ever gets completely stuck at the end of the day. Oversight of this program would be through the work-study Transportation Coordinator position. The only costs associated with participation would be those of

a concerted effort to get the word out, possibly including incentives (prizes, etc.). First year target is 5% participation amongst students and employees, and 2% per year increases thereafter. By the year 2020, that would result in a 25% participation rate for the AUNE community.

**4. Reduce employee commuting by establishing a 4-day workweek.** Currently, AUNE has a 35-hour work week. If some employees could work four 8.75-hour days, full-time employees who normally comes to campus every day could come to campus one less trip each week. While this is potentially a low-cost action step that allows for different offices and departments to re-tool who works when, there are usually unknown complexities and unintended consequences in trying to make such changes. The administrators and staff affected are the ones who will know how easy or difficult such a change would be. In addition, without having the specific data on employee commuting, it is difficult to estimate the savings in emissions. Once offices and departments determine the extent to which they can and want to implement this action step, AUNE should be able to develop an accurate estimate regarding emissions avoided, based on the data collected through the process in goal # 1/recommendation #1.

**5. Reduce employee and student commuting by incentivizing carpooling.** Establish dedicated parking spaces near building entrances that are marked for carpooling vehicles. While some drivers may ignore these signs, the intention is to socially market carpooling as a valued activity.

**6. Improve Green Bikes infrastructure by sheltering bike racks.** Protecting bikes from the weather is likely to significantly increase the number of AUNE community members who commute by bicycle, or take advantage of the Green Bikes program when on campus. Local student groups would be sought to volunteer time in designing and building the bike rack shelters, with construction materials donated by local companies. (See Appendix E for details)

**7. Improve Green Bikes infrastructure by acquiring new vehicles for Green Bikes program.** Specifically, we recommend acquiring six new bicycles & one tricycle with odometers, safety equipment & baskets

**8. Improve active transport infrastructure by making improvements to the Downtown Cheshire Branch Trail (bike path) side of the building:** Options include removal of the chain link fence, constructing a real entrance into the West Wing facing the bike path, and installing new restrooms with shower facilities in one portion of the warehouse. This is a more expensive recommendation, and one that might not have much “payback” in terms of emissions reductions. The idea is to make AUNE as walker- and bike-friendly as possible. Placing this recommendation in the second five years category allows ample time for fundraising to defray the cost.

### **Goal 3: Reduce & Offset Business Travel**

#### **RECOMMENDED ACTION STEPS**

- 1. Explore options for alternatives to travel for some university-wide meetings:** Options include acquisition and use of videoconferencing equipment.
- 2. Purchase carbon offsets for all business air travel beginning FY10-11**  
This is part of AUNE’s ACUPCC commitment.

“When I see an adult on a bicycle, I have hope for the human race.” – **H.G. Wells**

## Cost/Benefit Analysis & Financing

### Cost/Benefit Analysis

#### What will AUNE’s Climate Action Plan Action Steps cost?

Reducing the energy load for AUNE’s current building envelope is estimated to cost roughly \$2 million, as detailed in the table below. Implementing the steps recommended for meeting AUNE’s building energy load in the most carbon-neutral and efficient manner possible is estimated to cost as much as \$8.3-8.5 million, as detailed in the table below, though the actual costs could be closer to \$3.8-4.7 million, depending upon access to grants and federal incentives. Enhancing AUNE’s food and solid waste systems are estimated to cost \$4,750, and enhancements to reduce transportation emissions are calculated to cost roughly \$6,600. Purchasing carbon offsets to mitigate all remaining emissions is calculated to cost approximately \$26,600 annually, at current cost of \$12/MT eCO<sub>2</sub>. The costs associated with implementing the Curriculum, Research & Public Engagement action steps are not yet accounted for in the table below nor are the purchase of carbon offsets or renewable energy credits (RECs).

At an internal level, there are a number of factors that will influence AUNE’s decisions regarding which action steps to pursue. These factors primarily include anticipated changes to the campus’s physical plant and shifts in academic delivery models. For example, any changes that reduce commuting by students – and to a lesser extent, employees – have the potential to significantly reduce AUNE’s emissions.

At an external level, because the regulatory, grants, and energy sector landscapes are in a shifting state, it is difficult to anticipate the new technologies, federal/state/local incentives, changes to the conventional electrical grid, and availability of grant funding that could support and inform AUNE’s choices regarding which action steps to pursue. This is especially true with respect to how AUNE will meet its building energy loads.

Action Step	1-5 years		5-10 years		
	Initial Capital Investment	Average Discounted Annual Cash Flow	Payback Year	Annual Reductions of MTe CO <sub>2</sub>	Annual Cost/ MTe CO <sub>2</sub>
Continue to promote and address behavior change	\$0	\$4,029	N/A	15.2	\$-273.88
<b>Improve and expand composting</b> 1) Install composting containers for paper towels in restrooms (\$750) 2) Purchase or construct a tumbling composter (\$2,000)	\$2,750	N/A	N/A	Will divert .75 tons of solid waste <sup>5</sup>	N/A
Acquire 6 new bicycles & 1 tricycle with odometers, safety equipment & baskets	\$2,700				

<sup>5</sup> With current assumptions, solid waste sent to a waste to energy facility provides reductions in CO<sub>2</sub> and thus a reduction in solid waste results in an increase in emissions despite improvement and diversion

Action Step	Initial Capital Investment	Average Discounted Annual Cash Flow	Payback Year	Annual Reductions of MTe CO2	Annual Cost/ MTe CO2
<b>Shelter bike racks:</b> Option 1 – “volunteer built” Option 2 – “commercially built”	\$1,200/ \$3,933				
<b>Participate in an established ride share</b>	\$570 annually				
<b>Ground Source Heat Pump</b> for complete coverage of building thermal needs (heating/cooling)	\$700,000- 900,000 <sup>6</sup>	\$-28,452	15.4	Eliminates all propane usage: 235.3 MT <sup>7</sup>	\$-124.97
<b>Improve Building Envelope: Phase 1</b> 1) install additional roof insulation (\$400,000) 2) install additional insulation throughout building (\$40,000) 3) seal the roof decking to the roof membrane (\$5,000) 4) seal wall/roof plumbing penetrations (\$5,000)	\$450,000	\$9,915	N/A	24.3	\$422.36
<b>Install CO2 sensors</b>	\$9,000	\$-1,980	3.24	2,250 gallons propane/12.2 MT	\$-176.51
<b>Upgrade HVAC software</b>	\$20,000	\$-3,777	3.60	24.5	\$-168.34
<b>Improve office lighting</b>	\$160,000	\$1,750	N/A	14.8	\$122.21
<b>Improve Building Envelope: Phase 2</b> 1) Install exterior insulation at foundation (\$25,000) 2) replace all windows and doors (\$275,000)(includes insulation of upper opaque portion of windows; if implemented separately, this insulation would cost an estimated \$45,000)	\$300,000	\$8,822	N/A	7.3	\$1,252.71
<b>Replace air handling units with energy recovery ventilators</b>	\$700,000	\$12,139	N/A	13,000 gallons propane/74 MT	\$178.56
<b>Improve hallway lighting</b>	\$ 36,000	\$3,766	N/A	7.5	\$521.92
<b>Replace boilers<sup>8</sup></b>	\$200,000	\$6,539	N/A	3,000 gallons propane/16.3 MT	\$420.80
<b>Upgrade &amp; Establish 2 water fountain stations</b>		N/A	N/A		
<b>Develop materials and communication platform for integration into prospective student visiting days</b>		N/A	N/A		

<sup>6</sup> In 2009, Ball State University and Furman College both received full U.S. Department of Energy grants to demonstrate ground source heating systems on campus. Both schools have been active with AASHE, through its board of directors and reports.

<sup>7</sup> The amount of MT eCO2 reduced will depend on when the system is brought on line and what other action steps have been implemented

<sup>8</sup> If a Ground Source Heat Pump system is installed, the boilers will no longer need to be replaced, however there is the chance that they have to be replaced sooner than later as they are nearing the end of the expected life span.

Action Step	Initial Capital Investment	Average Discounted Annual Cash Flow	Payback Year	Annual Reductions of MTe CO2	Annual Cost/ MTe CO2
Expand new student orientation to have a sustainability module		N/A	N/A		
Create a faculty resource team		N/A	N/A		
Develop and implement on-site interpretation of the campus		N/A	N/A		
Encourage and offer opportunities for students to attend conferences to present their research		N/A	N/A		
Develop student positions similar to the Green Guru to offer assistance to the greater Keene community <sup>A</sup>		N/A	N/A		
Host an annual sustainability expo		N/A	N/A		
Install 2 on-site dishwashers (staff lounge & on-site food-service vendor)	\$2,000				
Ground Source Heat Pump for complete coverage of building thermal needs (heating/cooling)	\$700,000-900,000 <sup>9</sup>	\$3,551	N/A	Eliminates all propane usage: 107.2 MT <sup>10</sup>	\$34.23
Install PV Roof Array (for complete coverage of estimated average annual electrical load of 822,000 kWh <sup>11</sup> )	\$8.22 million <sup>12</sup>	\$254,961	N/A	Eliminates purchased electricity usage: 347 MT	\$763.39
Create a Sustainability Clinic <sup>A</sup>			N/A		
Develop a Sustainability Institute <sup>A</sup>			N/A		
Install direct feedback mechanisms with interpretation in visible places					
Develop a required inter-departmental weekend course that all first-year students			N/A		
Bring together leading thinkers and funders to frame research foci			N/A		

<sup>A</sup> Would require oversight/administrative duties fulfilled by addition of 1 FTE staff. This individual could also support the work of the faculty resource team.

<sup>9</sup> In 2009, Ball State University and Furman College both received full U.S. Department of Energy grants to demonstrate ground source heating systems on campus. Both schools have been active with AASHE, through its board of directors and reports.

<sup>10</sup> The amount of MT eCO2 reduced will depend on when the system is brought on line and what other action steps have been implemented

<sup>11</sup> Includes the added annual load of 150,000 kwh from a GSHP system and takes into account other action steps that would reduce the electrical load

<sup>12</sup> The annualized cost is estimated to be 22 to 35 cents/kWh, though federal incentives and other funding mechanisms might reduce cost of installation by half, yielding a long-term amortized cost of PV power similar to current conventional coal/gas/nuclear-generated power

## Graphs

The graph on the following page presents the projected discounted cost per MT eCO<sub>2</sub> reduced for each of the energy & behavior change action steps identified in the CAP.

The bar graphs on the following two pages present the projected discounted cost per MT eCO<sub>2</sub> reduced for each of the Scope 1 & 2 action steps identified in the CAP. The first graph (Graph 1) reflects installation of a ground source heat pump system during the first five years of the CAP, while the second graph (Graph 2) reflects second-phase installation of a ground source heat pump system.

The three wedge graphs that follow present the reductions in carbon emissions associated with implementation of the CAP's action steps. The first (Graph 3) focuses on Scope 1&2 emission reductions and is based on first-phase installation of a ground source heat pump system. The second (Graph 4) focuses on Scope 1&2 emission reductions and is based on a second-phase installation of a ground source heat pump system. The third (Graph 5) encompasses Scopes 1-3 emission reductions, with first-phase installation of a ground source heat pump system.

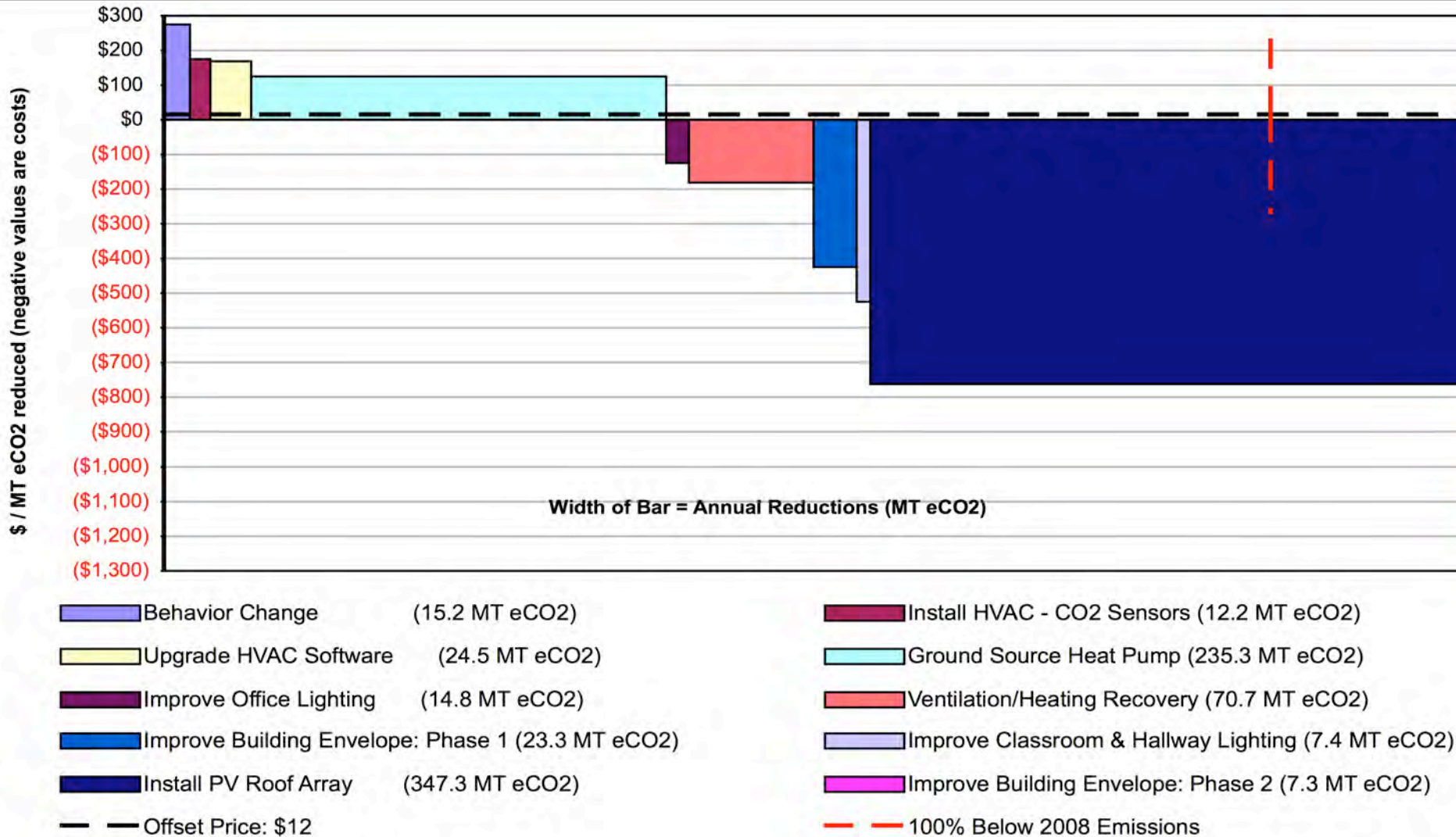
The two doughnut graphs that follow present projected emission reductions associated with Scope 1-3-related action steps (Graph 6) and Scope 1&2 only action steps (Graph 7), respectively.

### Traditional Indigenous Communities are at the Leading Edge of Experiencing Climate Change: Attaining Climate Neutrality is a Social Justice Imperative

"At one point the heat cover - it was above 100 degrees F, and it just killed all the fish in the lake through heat exposure. And we've experienced extreme heat waves. We've got four healthy seasons, winter, spring, summer and fall and now sometimes it comes too late - like right now it's coming too late. I've seen a lot of new growth of vegetation come into our area. Other insects and other birds and animals start coming in. Tree beetles came in and ruined a lot of trees in Alaska and they had to be cut down. And due to all the water draining, there's a high potential for forest fires. There have been a lot of forest fires in our area. Also a lot of ice is melting sooner when the end of the summer comes around." – **Sarah James, Gwich'in Alaska**

*(accessed from <http://www.ienearth.org/climatejustice.html>, 2-1-10)*

Graph 1: ANTIOCH UNIVERITY NEW ENGLAND  
 Projected Discounted Cost/ MT eCO2 Reduced (Scope 1 & 2)

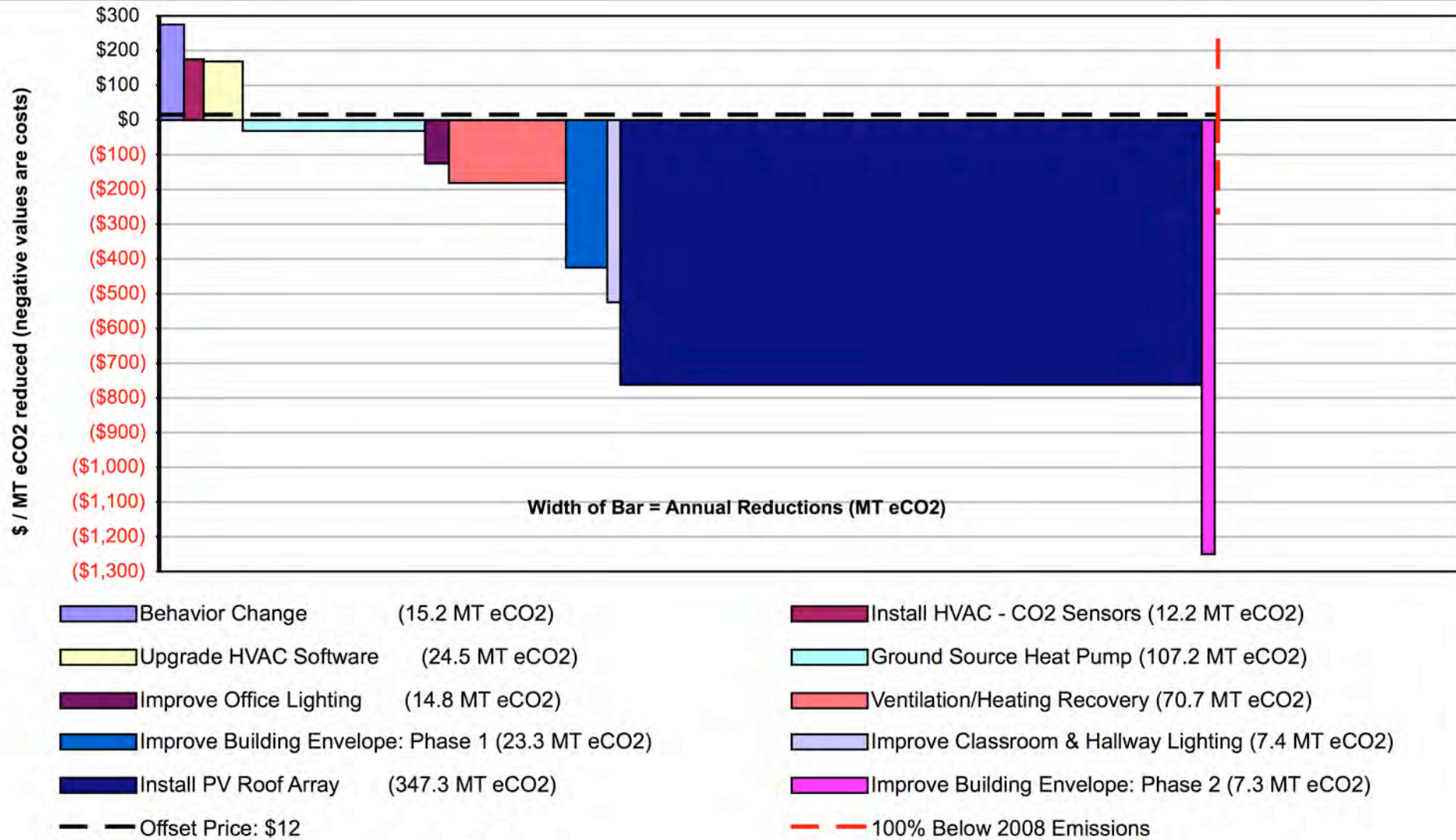


Graph \*\*First-phase installation of GSHP and second-phase installation of a PV Roof Array

2: ANTIOCH

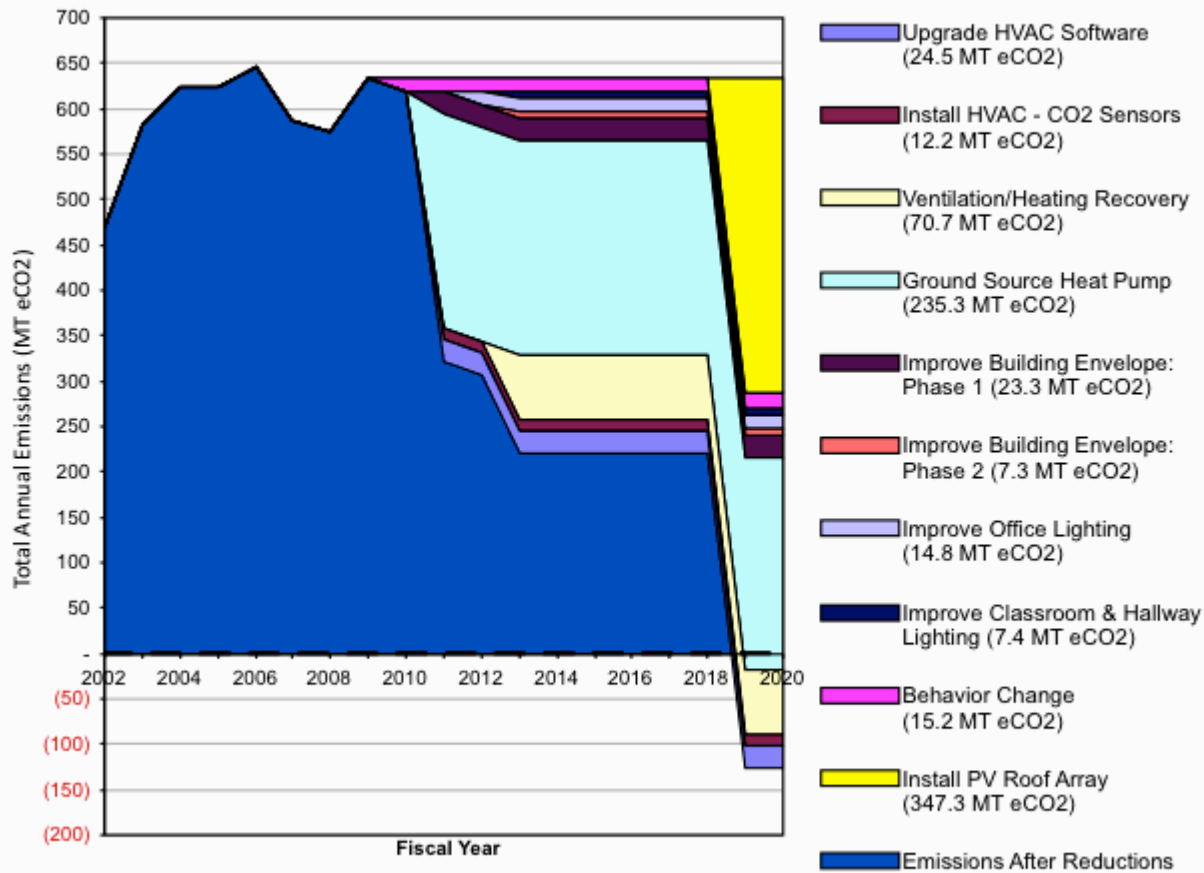
\*\*With first-phase installation of GSHP, the projected discounted cost for all other action steps that reduce the thermal load following it would be extremely altered. (eg. Install HVAC-CO2 sensors, Upgrade HVAC Software, Improve Building Envelope, etc)

## UNIVERSITY NEW ENGLAND Projected Discounted Cost/ MT eCO2 Reduced (Scope 1 & 2)



**\*\*Second-phase installation of GSHP and second-phase installation of a PV Roof Array**

ANTIOCH UNIVERSITY NEW ENGLAND  
 Project Portfolio with GSHP & PV Roof Array  
 (Scope 1 & 2 only)

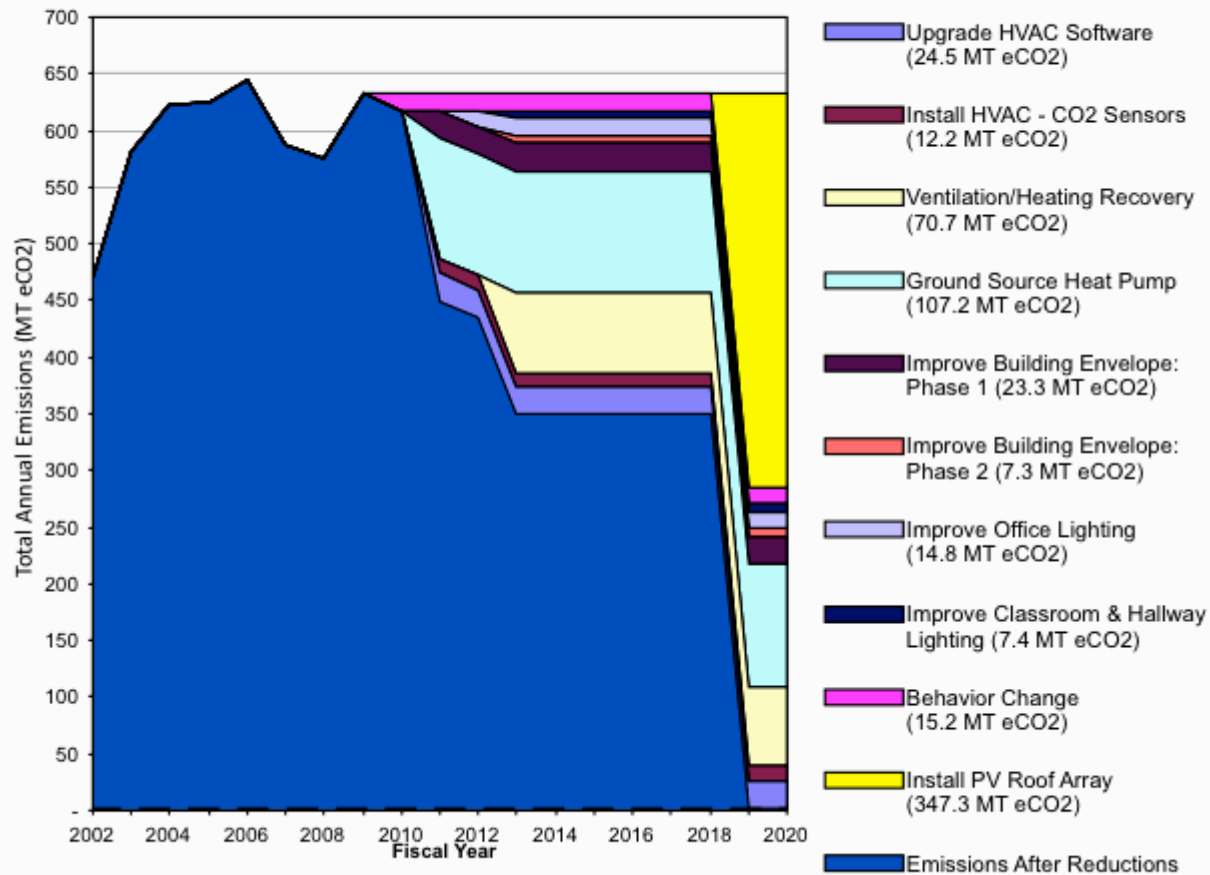


\*\*With first-phase installation of GSHP, the projected discounted cost for all other action steps that reduce the thermal load following it would be extremely altered. (eg. Install HVAC-CO2 sensors, Upgrade HVAC Software, Improve Building Envelope, etc)

\*Phase 1 Installation of GSHP

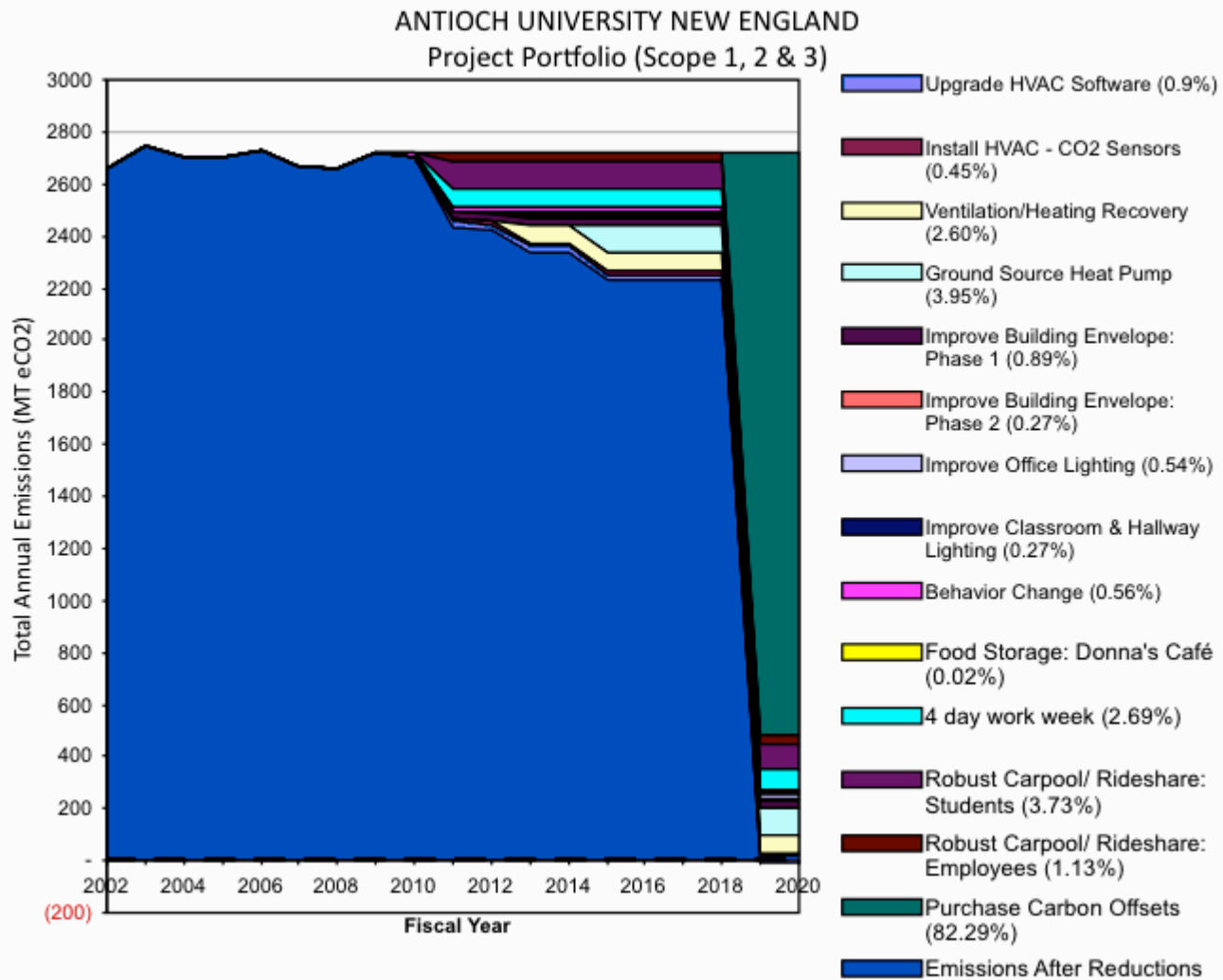
Graph 3

ANTIOCH UNIVERSITY NEW ENGLAND  
 Project Portfolio with GSHP & PV Roof Array  
 (Scope 1 & 2 only)

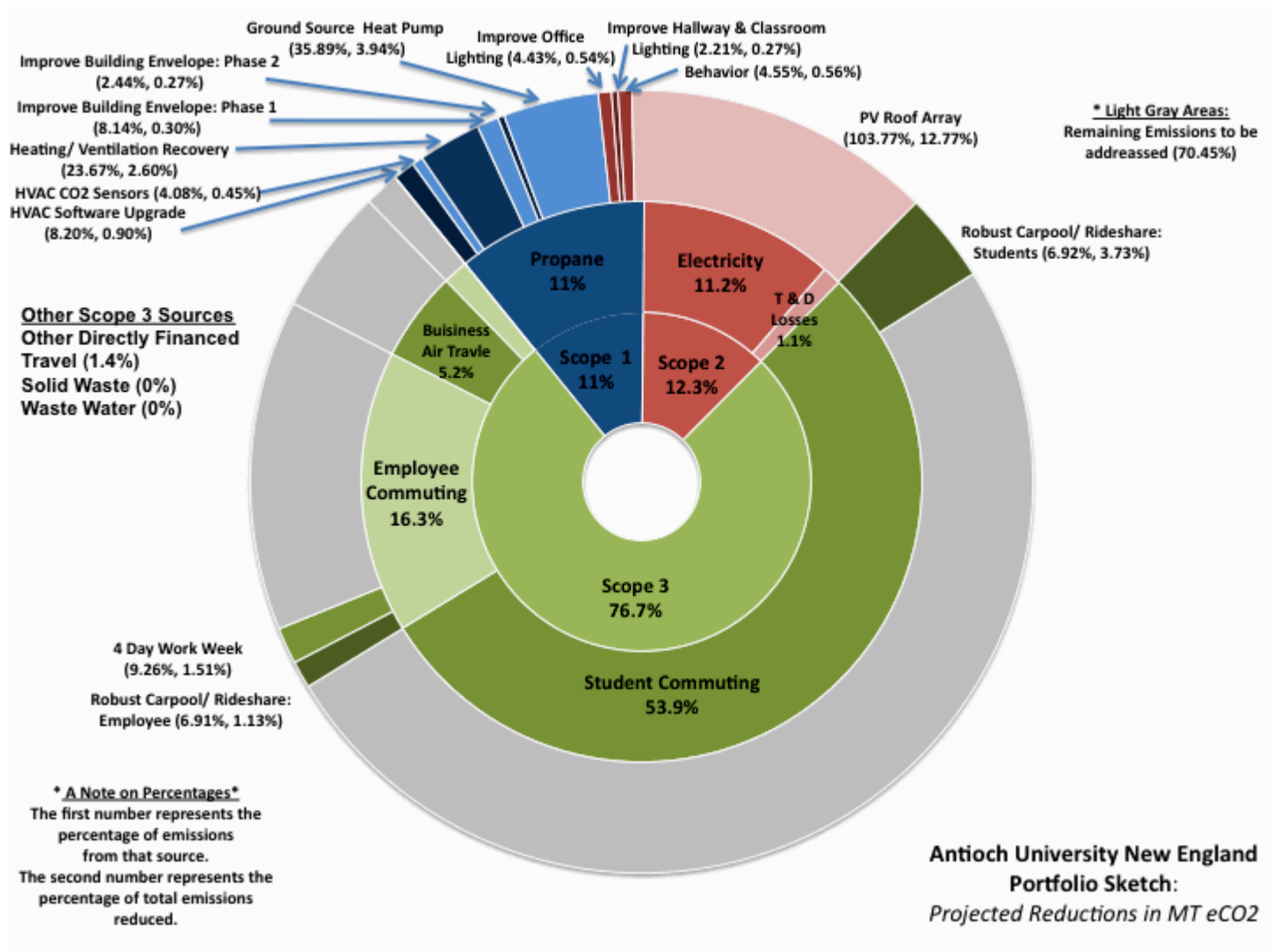


\*Phase 2 Installation of GSHP

Graph 4

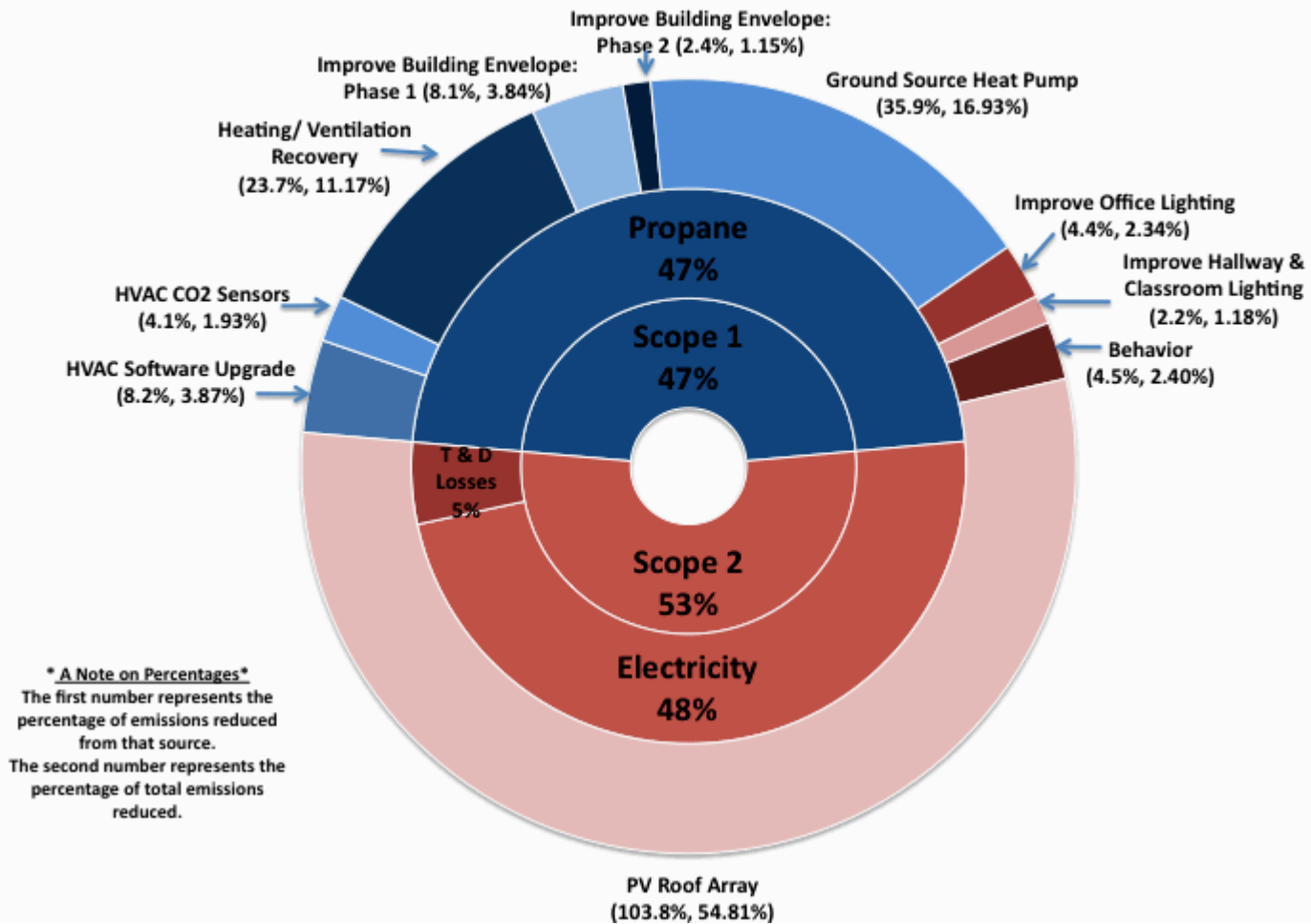


Graph 5



Graph 6

# Antioch University New England Projected Reductions Portfolio (Scope 1 & 2 Emissions)



Graph 7

## Financing

In general, the tools for financing sustainability initiatives at higher-ed institutions include these measures:

- Alumni Giving/Development-Sponsored initiatives
- Grants/Direct Financial Support
- Power Purchase Agreements with utilities
- Revolving loan funds<sup>13</sup>
  
- Tax-Exempt Bonds
- Green Student Fees
- Sale of Renewable Energy Credits created by onsite renewables
- ESCO Performance Contract
- Leasing Arrangements for capital items (e.g., lighting, compressors, fans)
- Institutional Assets
- Energy Hedges
- Collective Purchasing Power (with other institutions)

In a small survey, by the organization C2E2, of 20 U.S. higher-ed institutions, the top four tools listed above were identified as the ones those schools currently use and are likely to use in future to finance sustainability initiatives.

The specific means for financing the action steps outlined in AUNE's CAP are to be determined.

### Social Justice & Human Rights are Core Lenses through which AUNE Views Its Climate Commitment

The Mobilization for Climate Justice invites you to inspire and organize a radical change in direction to put climate justice, ecological integrity and people's rights at the center of international climate negotiations.

Market-based approaches to climate change dominate the UN climate talks. Carbon-trading and carbon offset projects have allowed polluters to avoid cutting emissions and accelerated the corporate take-over of the natural world at the expense of local and Indigenous communities. Those most immediately threatened by climate change and its false solutions - Indigenous Peoples, people of color, women, peasant and family farmers, fisherfolk, forest dependent communities, youth, and marginalized communities have been systematically excluded from the negotiations. – **Indigenous Environmental Network website**

*(<http://www.ienearth.org/climatejustice.html>, accessed 2-1-10)*

<sup>13</sup> One example is Harvard University's Green Campus Loan Fund. The fund, launched in 2002, provides zero-interest loans for projects that reduce negative environmental impacts and have a payback period of 5 years or less (existing buildings) or 10 years or less for renovations and new buildings. The fund saw an average return on investment of more than 30% in first two years

## Reasons Why Transitioning to Renewable Energy is a Social & Environmental Justice Issue

### **From Energy Exploitation...**

- 1/3 of all uranium and 2/3 of all low sulfur coal come from Native lands.
- Every proposed site for a national nuclear waste dump is on Native land.
- The largest coal strip mine in the world is on a Native Reservation.
- Mega dams have flooded over 3 million acres of Native territory.

### **To Energy Justice**

- Wind power on tribal lands could supply more than half of America's electricity.
- The wind potential on 12 Reservations in North and South Dakota alone could meet 41% of U.S. energy demand.
- The sunshine that strikes American roads each year contains more energy than all the fossil fuels used by the entire world.
- The United States is the largest energy market in the world and is undeniably addicted to energy consumption. The unequal allocation of power is reflected in the relationship between the U.S. and Native America. Much of the U.S. 'domestic' energy resources originate in Native America. As a consequence, Native America suffers from disproportionate extraction of non-renewable resources on tribal lands and the resulting disastrous toxic and environmental effects.

### **Honor the Earth**

*(accessed 1-20-09 from the website: [www.honorearth.org/initiatives/energy/overview.html](http://www.honorearth.org/initiatives/energy/overview.html))*

## **Carbon Offsets & Renewable Energy Credits**

While the first objective of AUNE's CAP is to actually reduce the school's Scope 1-3 emissions, it is clear that – assuming continuing use of conventional technologies – there will continue to be some level of Scope 3 carbon emissions from commuting vehicles, business air travel and other institutionally financed travel, waste disposal and embodied energy from goods and services. To achieve complete carbon neutrality, as AUNE has defined it (e.g., Scopes 1-3), there will continue to be a need to offset these remaining emissions. At this point, the best strategy for doing so is the purchase of carbon offsets. As explained below, Renewable Energy Credits can be purchased to offset an institution's electricity usage and might be considered in the short term as AUNE moves to implement on-site renewable generation of electricity. At present, based on our research, detailed in Appendix F, we can recommend purchasing offsets/RECs from *NativeEnergy*. We also recommend that AUNE work with local, state and regional governments and organizations to identify and develop more local carbon offset opportunities.

ACUPCC makes these key statements regarding the purchase of carbon offsets as a means of achieving carbon neutrality:

- Offsets are a potentially effective mechanism for complementing internal reduction activities, but cannot replace them.
- Offsets are designed to be a short-term mechanism, and ACUPCC institutions may choose to use them as such to meet self-imposed targets or achieve GHG neutrality as soon as possible

- An effective communications strategy can protect an institution from reputational risks associated with offsets by making it clear that offsets are not a way to “buy one’s way out of the problem,” but instead are part of a broader strategy to reduce emissions and internalize the costs of carbon, while at the same time driving real reductions elsewhere.

In general, most carbon offsets fall into one of two categories:

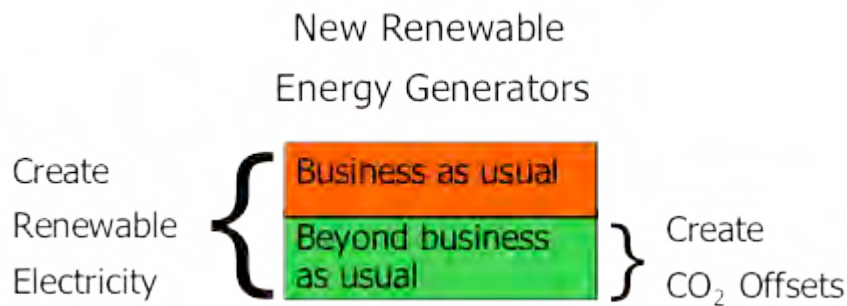
1. Emission Reductions or Avoidance
2. Carbon Sequestration

The ACUPCC Carbon Offset Protocol Guidelines specify that emissions reductions should be:

- Real
- Additional
- Transparent
- Measurable
- Permanent
- Verified
- Synchronous
- Account for Leakage
- Registered
- Not double-counted
- Retired

There are differences between carbon offsets and RECs. As explained by *NativeEnergy* on its website (*emphasis added*):

All RECs from qualifying new generators represent the environmental attributes of renewable power, principally the fact that producing that power causes less, or no, pollution. When you buy an amount of wind-generated RECs equal to your electricity consumption, you are legally entitled to claim that you are wind powered, and that your electricity use does not contribute to global warming. In other words, all wind RECs can convert your electricity to wind power. However, for a REC to be used to offset emissions from driving, flying or heating your home, it must be from a project that would not have been implemented without the opportunity to realize revenues for the carbon reductions (in other words, it must be "additional" to business-as-usual), and not all renewable energy projects can say that.



The other difference is that carbon offsets can be from non-electric sources, such as using heat given off by electric generators to reduce fossil fuel use, stopping emissions of methane (a powerful greenhouse gas) from stored manure or landfills, or sequestering carbon in forests.

According to the ACUPCC Protocol<sup>14</sup> on offsets:

Renewable Energy Credits (RECs) are not the same as carbon offsets and the two terms should not be used interchangeably. Currently most projects that generate RECs would not meet the criteria of the Protocol. However, if a developer builds a grid-connected renewable energy project with the intent of generating offsets, and demonstrates it is additional, it results in a measurable reduction in GHG emissions that will not be double-counted, and it meets the rest of the criteria laid out in the Protocol, a renewable energy project could generate offsets. Please see the “Renewable Energy Credits” section of the Guidelines document for more details.

### **Location<sup>15</sup>**

The [ACUPCC] Protocol does not prescribe any location preferences for offset projects. However, the ACUPCC has identified four areas of consideration that could have implications for choosing projects in one geographic location over another: educational value, transparency, co-benefits, and the service mission of higher education. In general, the trend amongst U.S. institutions is to give a preference towards local projects, and many are evaluating those options.

On the other hand, it is possible for projects in less industrialized nations to meet the above criteria, and potentially to have additional benefits, such as:

- Greater GHG reductions per dollar invested
- A larger sustainable development dividend in terms of meeting basic needs more effectively
- Encouraging technology transfer and leap-frogging investments in dirty infrastructure
- Cross-cultural, international educational opportunities

Furthermore, the concept of what constitutes an institution’s “immediate community” is not necessarily limited by geographic constraints. For example, many institutions have very close ties to international locations through long-time study abroad programs. Still, there can be risks associated with international projects, such as stakeholders not embracing or benefiting from the project, uncertainty around regulations, economic and political uncertainty, etc.

## **Implementation**

“Creating the world we want is a much more subtle but more powerful mode of operation than destroying the one we don’t want.” – **Marianne Williamson**

As with the significant achievements that AUNE has already made in terms of reducing our collective greenhouse gas emissions, the success of this Climate Action Plan will depend upon the participation of all on-campus AUNE community members in its implementation.

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<sup>14</sup> This is an excerpt taken from the ACUPCC website titled “Carbon Offset Frequently Asked Questions.”

<sup>15</sup> This section on Location is an excerpt taken from the ACUPCC website titled “Carbon Offset Frequently Asked Questions”

Primary responsibility for implementing the action steps associated with AUNE’s Scope 1 & 2 emissions (i.e., our heating, cooling and powering of AUNE’s campus facilities) will rest with the Vice President for Finance & Administration, in collaboration with AUNE’s President and Director of Facilities, with support – as needed – from the Assistant to the President for Sustainability & Social Justice. All of us who use AUNE’s facilities can continue to contribute significantly to reductions in emissions from electricity usage by continuing to engage in energy-saving practices such as turning off lights when they are not needed and unplugging (or using power strips to cut energy to) small appliances, laptop computers and other energy-using devices when that equipment does not require electricity.

Implementation of the action steps associated with AUNE’s Scope 3 emissions (i.e., business travel, employee/student commuting, waste disposal, and the embedded energy in products & services, notably paper and food) will rest with all of us who engage in these activities. All of us can look for ways to reduce our commuting to/from campus through use of AUNE’s Green Bikes program, walking, ridesharing or even use of public transport, to the degree it is available. At the same time, AUNE’s three Vice Presidents can address implementation of the action step to formally reduce employee commuting through establishment of a four-day work week option and other measures. Faculty can address student and faculty commuting by considering possible adjustments to program delivery models that would require fewer trips to campus.

AUNE’s administrative personnel, through the Purchasing Office and Administrative Council, can contribute significantly to the reduction of Scope 3 emissions associated with products and services. Faculty, administrators and others who engage in business travel can be mindful of the impacts of travel – particularly by air – and contribute significantly to addressing reduction of the Scope 3 emissions associated with those activities. We can reduce our solid waste disposal through reuse of items, as appropriate, recycling of paper, cans, plastic bottles and other items, and composting of food waste and bio-compostable food service items.

“Throughout history, the really fundamental changes in societies come about not from the dictates of governments and the results of battles, but through vast numbers of people changing their minds, sometimes only a little bit.” -- **Willis Harman**

## Monitoring Progress

Primary responsibility for monitoring progress in implementing this Climate Action Plan rests with the President, with the support of the Assistant to the President for Sustainability & Social Justice. Those offices will report out regularly to the campus community about steps taken to implement this CAP. Other AUNE community members also are encouraged to report out to the community, including area Vice Presidents, regarding the steps that they have taken to implement the CAP. There will be a standing quarterly agenda item for the President’s Council regarding implementation of the CAP, thereby offering the opportunity for the President and other AUNE community members to provide updates. During the third quarter of each fiscal year, the President and Cabinet will also engage in a comprehensive annual review of CAP implementation.

**Carbon Neutrality Task Force  
Antioch University New England  
Participant Bios**

**Abigail Abrash Walton**

Abigail Abrash Walton is on faculty at Antioch University New England's Department of Environmental Studies, where she founded and directs the Environmental Advocacy and Organizing Program's Advocacy Clinic and teaches courses in advocacy, environmental justice, and nonprofit leadership and management. She also serves as Assistant to the President for Sustainability & Social Justice and chairs Antioch's Sustainability and Social Justice Committee, through which she has led the development and implementation of AUNE's 2006 Social Justice Audit and 2007 Sustainability & Social Justice Action Plan. She also chaired AUNE's Energy & Climate Action Task Force, which set the goal of carbon neutrality by 2020, and has led the implementation of AUNE's two Greenhouse Gas Inventories. She is AUNE's Implementation Liaison for the American College & University Presidents' Climate Commitment. She is also founder and principal of ActionWorks, a consulting firm that specializes in organizational development and strategic planning.

Abigail has worked in the arenas of human rights, social justice and sustainability research, advocacy and community organizing at the international, national, state and local level, including as program director for the Robert F. Kennedy Memorial Center for Human Rights and New Hampshire Citizens Alliance, and as a Visiting Fellow at Harvard Law School's Human Rights Program. She is a member of the City of Keene's Planning Board, Master Planning Steering Committee and Cable Television Commission and served on the New Hampshire State Commission Studying the Feasibility of Public Funding of Elections.

Abigail's publications include "Conservation through Different Lenses: Reflection, Responsibility and the Politics of Participation in Conservation Advocacy," in the journal *Environmental Management*, "The Victims of Indonesia's Pursuit of Progress," a *New York Times* opinion piece, "The Amungme, Kamoro and Freeport: How Indigenous Papuans Have Resisted the World's Largest Gold and Copper Mine," in Blackwell Publishing's *The Globalization Reader*, and "Let Freedom Ring: Recharging and Consolidating 'Inside the Beltway' Activism," which appears in *Feminist Approaches to Social Movements, Community, and Power*. She also has served as a commentator for media outlets including *The Washington Post*, *The Boston Globe*, *The New York Times*, National Public Radio, "Democracy Now" and "The News Hour with Jim Lehrer."

Abigail holds a M.Sc. in Political Theory from Mick Jagger's and George Soros' alma mater, the London School of Economics and Political Science, a B.A. in International Relations from the University of Pennsylvania, and a Permaculture Design Certificate from the Occidental Arts & Ecology Center. She finds joy in the sustainable pursuits of gardening, canoeing, singing and birding locally.

**Steve Alexander**

Trained as a geologist, natural historian and educator, Steve has worked with students in a variety of bioregions including the Colorado Plateau, Adirondacks/ Northern Forest and the Greater Yellowstone Geo-ecosystem. He has taught and developed both curriculum and programs for several non-profits and educational institutions including the National Outdoor Leadership School, Teton Science Schools and Wild Rockies Field Institute.

For the past three years, Steve served as the Assistant Director for the Adirondack Semester at St. Lawrence University, a local study abroad which engages students in the study of nature and human relationships with nature through academic course work enriched by direct experience while living in a materially simple, close-knit community. While working with the Adirondack Semester, he was able to pilot the Adirondack Practicum as part of his graduate work which focused on bridging the gap between

## Appendix A

theory and practice in higher education through the development and implementation of experiential capstones.

Most recently, Steve has shifted his focus to community-based learning, educating for sustainability and interdisciplinary approaches to addressing the pressing ecological, social and economic challenges of our times so that we can work towards a new model of living landscapes.

### **Jack Calhoun**

John C. “Jack” Calhoun serves as Assistant to the President of Antioch University New England for Community and Government Relations. He also serves as Interim Executive Director of the Antioch New England Institute. Calhoun has worked with over 50 municipalities and local organizations, throughout New England as well as Eastern Europe. His work focuses on leadership training as well as engaging citizens with their communities. He is director of the NH Selectman’s Institute a year-long training program for local elected officials. He has conducted over 25 community visioning and public participation forums throughout New England as well as in the Transylvanian region of northern Romania. His commitment is to work with and encourage communities to look for solutions locally, and to assist them to find creative ways to address their own needs.

He more than 20 years experience as an elected government officials serving on the planning commission as well as board of education. In this capacity he helped to create a community Future Search effort that resulted in several significant initiatives, which have re-energized his New Hampshire community. Calhoun serves on a number of not-for-profit boards of trustees including the Monadnock Conservancy (a regional land trust) from which he retired as Board President. Currently he serves on the boards of trustees for the Apple Hill Center for Chamber Music, the Harris Center for Conservation Education, and the NH Local Government Center insurance trust funds. Calhoun has over twenty-five years of experience in management and consulting, working with federal, state and local governments and agencies, as well as with the private sector, including serving as Executive Director of the NH Lakes Association for 7 years. He has experience in policy development, legislative affairs, and public relations for a variety of organizations. His education includes a Masters of Business Administration from the Whittemore School of Business & Economics, University of New Hampshire, and a Bachelor of Arts in Political Science from the University of New Hampshire.

### **Diana Duffy**

Diana (AUNE Environmental Studies MSc '04) serves on Antioch New England’s Board of Trustees and chairs the board’s Facilities Committee. She manages National Grid’s residential low income energy programs in NH, MA and RI. After graduating from Oberlin College, Diana’s career adventure began as a high school teacher in Ohio and Massachusetts. She then opened her classroom to include the outdoors, and taught students of all ages in PA and CA, eventually working as a county park ranger in the Sacramento Valley. Returning to Boston, Diana managed educational programming for the science department at the Boston Children’s Museum. Upon graduation from Antioch New England, Diana dove into the corporate world as part of the residential energy efficiency team at KeySpan Energy Delivery, now part of National Grid. A car-free commuter since 2002, Diana can be spotted in Boston or Keene on her bike or push scooter.

### **Jim Duffy**

James Duffy is a Keene, NH, city councilor. He chairs Keene's Cities for Climate Protection Committee and served as chair of Keene’s Climate Resilient Communities *ad hoc* committee that drafted the city’s Climate Adaptation Plan. He is a member of Heading for Home, an organization focused on workforce housing, and of Cool Monadnock. He currently chairs the city’s Sustainable Design-Energy Efficiency *ad hoc* committee, which is working to recommend incentives to facilitate green building practices in Keene.

## Appendix A

### **Mikaela Engert**

Mikaela Engert originally hails from Rochester, NY and now works as a city planner in the City of Keene. She has well-rounded experience in many areas of planning, including food security, climate change, and in developing and implementing innovative public participation programs. Ms. Engert is currently spearheading the community master planning process. She also guides the city's implementation of its greenhouse gas emissions reduction action plan as well its climate adaptation plan – a result of Keene's participation in ICLEI's latest program, Climate Resilient Communities (CRC). The CRC program seeks to assist municipalities in planning for the predicted impacts associated with global climate change in order to improve a community's long-term preparedness for climate impacts. Ms. Engert led the team through the CRC process to create one of the first ICLEI community municipal adaptation plans in the country.

### **Julia Feder**

Julia Feder serves as the Manager of LEED Education Systems for the U.S. Green Building Council (USGBC). In this role, Julia oversees a broad range of activities related to the development of education programs, trainings, and resources in support of USGBC's mission to transform the way buildings and communities are designed, built and operated, enabling an environmentally and socially responsible, healthy, and prosperous environment that improves the quality of life. Her responsibilities include overseeing the development of green building case studies, distance learning opportunities, and a variety of publications. In her previous role as Manager of K-12 and Higher Education at USGBC, Julia worked to further integrate green building and sustainability concepts into K-12, undergraduate and graduate curriculum.

Since graduating from Antioch University New England's Environmental Science Program in 2002, Julia has also worked with the Missouri Botanical Garden EarthWays Center in St. Louis, MO, coordinating the organization's sustainability education programs. Additionally, she has taught fourth grade and helped start a farmers market to serve an urban neighborhood. While Julia loves her car-free, urban commute, she looks forward to any opportunity to get outside of the city with her two dogs.

### **Sue Gentile**

Sue Gentile grew up in Connecticut and earned a B.A. in political science and environmental studies at Williams College. She worked for twenty-three years at Northfield Mount Hermon School as a teacher, coach, dorm head, director of environmental education, chair of the executive committee of the faculty, and dean. Along the way, Sue completed an M.S. in environmental studies with a specialization in environmental education at Antioch University New England. In 2002, Sue began teaching at AUNE, where she teaches in both the Department of Environmental Studies and the Department of Education. In the Department of Education, Sue teaches in a M.Ed. program for in-service K-12 teachers focused on educating for sustainability, and she teaches in the environmental education and science teacher certification programs in the Department of Environmental Studies. She is a consultant for schools and school districts working towards educating for sustainability. Sue lives in Northfield, Massachusetts and has two sons.

### **Michael Goudzwaard**

Michael is working on his MS in Environmental Studies with a concentration in Environmental Advocacy and Organizing at Antioch University New England. In his role as AUNE Student Alliance co-chair, he works to increase bike ridership and to expand bike facilities in the Antioch and the Keene communities.

### **James Gruber**

Jim serves as core faculty in AUNE's Environmental Studies Department, where he teaches courses in ecological economics, public policy, financial administration, grant-writing, and building sustainable organizations. His current research and publications have focused on community-based natural resource management (CBNRM) strategies for sustainably managing common pool resources (or "the commons").

## Appendix A

Jim was founding executive director and founding co-director of Antioch New England Institute (AUNEI). He also served as executive director of the Greater Upper Valley Solid Waste Management District and as Acting/Assistant Town Manager of Hartford, Vermont. He was also project manager at Total Environmental Action Foundation, a Keene-based entity that advised state and federal agencies on energy conservation and renewable energy policies, codes and programs.

Jim has served as a member of the World Conservation Union, Commission on Environmental, Economic, and Social Policy (CEESP) and the Theme on Governance, Equity, and Rights (TGER); the International Association for the Study of the Commons; the Nominating Committee of the New Hampshire Audubon Society; the Vermont Act 200 (Growth Bill) Legislative Committee; and the Upper Valley - Lake Sunapee Regional Planning Commission Executive Committee.

Jim earned his PhD from the University of Zagreb (Croatia). He also holds a MPA from the Kennedy School of Government at Harvard University, a MS from Massachusetts Institute of Technology, and a BS in Civil Engineering from San Diego State University. He is a Licensed Professional Civil Engineer in New Hampshire.

### **Amanda Hopkins**

Amanda writes that “My life as I know it now began in ’05 when I entered Antioch’s Environmental Studies department to earn a degree in Environmental Education. I had little idea at the time what a loaded degree it would be and how deeply I would be inspired to educate and work for sustainability. Four years later I am still living in Keene and involved with the very same topics that occupied my time at Antioch. I am the garden manager at Stonewall Farm where I produce vegetables organically and work to connect the community to their agricultural roots.”

### **Bonnie Hudspeth**

Bonnie Hudspeth grew up in Burlington, Vermont, where she first became interested in supporting local agriculture. She worked for a number of community projects, managing the seven community gardens and locally implementing Plant a Row for the Hungry, a nationwide grassroots program to get regional organic produce to food shelves. After completing a degree in Environmental Studies from the University of Vermont and working a year for the Vermont Institute of Natural Science, Bonnie came to Keene to get a graduate degree in Environmental Advocacy and Sustainable Community Development through Antioch University’s Environmental Studies Program. In Keene, she joined the Pisgah Technical Team, working in collaboration with researchers, archeologists, teachers, citizens, and the state to create a sustainable management plan for Pisgah State Park. She has volunteered for the Monadnock Farm and Community Connection program over the last two years, on the Steering Committee and as Chair for the Co-op Committee. Recently, she worked for the Keene Downtown Group to help organize and start the Keene Buy Local Initiative, and looks forward to continue helping local efforts to strengthen the local food system and economy and add to the vibrancy of downtown Keene.

### **Diane Kurinsky**

Diane is Professor and Associate Director of Clinical Training in AUNE’s Applied Psychology Department. She is licensed both in psychology and in substance abuse in Massachusetts and is currently clinical consultant to the Mount Holyoke Drug and Alcohol Awareness Project. She has worked in addictions services and community mental health in both New York and Massachusetts. Diane also has served on the editorial board of the Journal of Mental Health Counseling, as editor of the North Atlantic Region Association for Education and Supervision newsletter and is currently president of the Northern New England Association of Counselor Education and Supervision as well as being a National Certified Counselor. She received her doctorate in counseling psychology from the University of Massachusetts at Amherst.

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Diane writes that “My two passions in life are commitment to family and making the world a better place for us all. Working for the last thirty years as a psychotherapist and having the privilege of teaching in the Clinical Mental Health Counseling Program at Antioch bring these passions together. My interests in substance abuse addictions and family systems that experience addictions allow me to work as a clinician and an educator with a teaching/learning community at Antioch who really care about other people and the state of the world.”

As a result of an interest in human behavior change in other areas (specifically, addictions), Diane has become interested in helping people make the behavior and attitude changes necessary to addressing climate change. Her emerging work in this area includes a January 2008 talk, part of AUNE’s Focus the Nation initiative, entitled “Climate Change and Human Change: Making the Connections” and serving as a panelist for AUNE’s 10<sup>th</sup> Annual John Knight Colloquium (April 2009) which addressed similar questions exploring the personal side of climate change and how what we think and feel impacts us and our ability to live fully in these times.

### **Daniel Cushman Lewis**

Dan Lewis is one of the founding partners of Kohler and Lewis Engineering and is a professional engineer (P.E.).

Kohler & Lewis is a mechanical engineering firm, serving architects, construction managers, and building owners throughout northern and western New England. They are located in southwestern New Hampshire. Since 1982, they have designed mechanical systems for more than five million square feet of commercial and institutional buildings, including more than 150 schools.

Prior to establishing Kohler & Lewis, Joe Kohler and Dan Lewis worked together at Total Environmental Action, where they were in the forefront of research for passive solar design and energy conservation in buildings. They performed research and computer simulations for Brookhaven National Laboratory, the U.S. Department of Energy and the Tennessee Valley Authority. Together, they have published more than 30 articles and have established important design criteria for south-facing glass and thermal mass ratios for passively heated buildings.

Dan Lewis received the ASHRAE New Technology Award (1999-2000) and the National Second Place ASHRAE 2000 Technology Award for New Institutional Buildings. The awards were for the design of the energy efficient mechanical system for the Vermont Law Classroom Building in South Royalton, VT. The National award recognizes “outstanding design innovation and successful implementation.”

The firm’s LEED projects include Billings Farm Forest Service (Woodstock, VT – Platinum); Society for the Protection of NH Forests (Concord, NH – Gold); UVM – 438 College Street (Burlington, VT – Gold); Vermont Law School Debevoise Hall (Royalton, VT – Silver); and the net-zero Putney Field House (Putney, VT – Platinum). He holds an M.S. in Mechanical Engineering from the University of Massachusetts and a B.A. in Physics from Bard College.

Dan enjoys biking (motor and pedal), clock making, and is a late student of classical piano. He is married to a poet and has one daughter who is a social worker in the deaf community.

### **Steve Linnell**

Steve Linnell is Senior Transportation Planner & Coordinator, Maine Clean Communities = MC2 for the Greater Portland Council of Governments. He holds an MSc degree from Antioch University New England’s Environmental Studies Department.

### **Charles Michal**

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Charles Michal is a founding principal in Weller & Michal Architects Inc., designing commercial and institutional buildings in the New England.

Charles earned a Master's degree from the MIT Department of Architecture. He is both LEED and NCQLP Lighting Certified, a member of IESNA, obtained a PE license in mechanical engineering, and is licensed to practice architecture in four states. Over the last 20 years Charles has managed Weller & Michal Architects, an architectural firm in Southwest New Hampshire serving regional clients. Charles applies his energy-engineering knowledge and expertise as a practicing architect both as a Principal in his architectural firm and as a consultant on outside projects.

Charles began his professional career in the field of energy efficient building design in the 1970's, concentrating on passive solar heating and other innovative design approaches that reduced the cost of heating and cooling buildings. He has been Principal Investigator on federally funded research projects in building energy use. Exciting early projects in Mr. Michal's career include the daylit undergraduate laboratory and classroom facility at the Colorado Springs campus of the University of Colorado, and the proposed new Seagram's Corporate Headquarters (unbuilt). These projects incorporated a variety of energy-load mitigation strategies and were early experiments in daylighting as a primary means to reduce cooling loads and energy use in commercial buildings.

Mr. Michal has consulted to National Grid, a large regional utility operating in three New England states. For National Grid, Charles helped develop commercial energy conservation incentive programs, provided program marketing assistance and project management and educated other architects and engineers on the utilities' energy conservation efforts. In this capacity, he participated in design efforts to improve the energy efficiency of several corporate office complexes, including new offices for WANG Computers and Fidelity Investments new corporate headquarters in Rhode Island.

Charles organized the New England review of the original Advanced Buildings Design Manual prepared by the New Buildings Institute. Now known as the Advanced Buildings Core Performance Guide, this major resource for environmentally sound design, is a coordinated component of generic utility rebate programs and for EA credits under the LEED NC program of the United States Green Building Council. He has been a regional instructor for "Power Your Design/Advanced Buildings", a technical and process manual based on the Benchmark, a tool for High Performance Building Design.

Charles has provided technical advice to regional utilities on building energy issues, and, as part of outreach efforts aimed at educating other architects and engineers, presented workshops on lighting design at major industry conferences. He helped revise the National Grid companies 1999 Prescriptive Lighting Program, managed the National Grid 1999 Commercial Lighting Demonstration Program and participated significantly in the development of the knowhow™ Series publications of the DesignLights™ Consortium, currently available on the web at <http://www.designlights.org/>.

The NREL (the federal National Renewable Energy Laboratory) asked Charles to review the Energy Design Guidelines for High Performance Schools. Along with other architects, building energy specialists, and educators, Charles participated in the U.S. Department of Energy's development of seven climate-specific publications. The building design criteria associated with the NH climate region make these design guidelines a more useful tool for local school districts. As a product of EnergySmart Schools, the NREL published these guidelines in the fall of 2002, both in print and on CD. In addition, they are available to download on the web site [www.energysmartschools.gov](http://www.energysmartschools.gov).

### **Dave Morrill**

Dave serves as Assistant Recycling Coordinator at Keene State College. He is also founder of Compost Doctor, a Keene-based compost consulting business, and has served on Keene's Cities for Climate Protection Committee. He received an MBA in Sustainable Business from Antioch University New England in May 2009. During his two years at Antioch, he became excited and learned a great deal about

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composting. What excited him was the concept of removing a resource from the waste stream (that would normally either be incinerated or left to sit in a landfill and become contaminated) and producing a valuable final product that replenishes our rapidly depleting topsoil. This past summer, Dave completed the Maine Composting School, a week-long intensive workshop that certifies students in commercial compost management, with the intention of going into the business of compost.

### **Sherman Morrison**

Sherman Morrison is an Administrative Assistant at Antioch New England for both the Vice President for Institutional Advancement and the Office of Communications. He received his Master of Science in Management from AUNE's Department of Organization & Management in 2007 and is now in year two of working towards his PhD in the Antioch University-wide PhD in Leadership and Change with a particular focus on Sustainability in Higher Education. In his Doctoral work, Sherman will be examining the Association for the Advancement of Sustainability in Higher Education's Sustainability Tracking, Assessment, and Rating System (STARS) to find out what organizational factors most help and what factors hinder sustainability initiatives in institutions of higher education.

### **Anne Nordstrom**

Anne Nordstrom is employed by Antioch New England Institute as the Project Director for Vision 2020, a community-based public health initiative spearheaded by Cheshire Medical Center/Dartmouth-Hitchcock Keene to ensure that Cheshire County is the healthiest community in the nation by the year 2020. Antioch New England Institute has partnered with CMC/DHK to support the evaluation and assessment work determined to be consistent with the process and goals of the Vision 2020 Initiative.

Anne is a Sociologist who specializes in solving research design, statistical analysis and program evaluation problems. She brings more than 20 years experience to the challenge of measuring success and progress in change efforts in the public, non-profit and educational sectors. Her public service includes long-time director of the New Hampshire Rivers Council and Board President of the Springfield Food Co-op in Vermont. She also volunteers her research skills to sustainability initiatives in the region, namely Post Oil Solutions and the Neighboring Food Co-ops Association. She is a graduate of the Maine Compost School and recently implemented a large-scale food-waste composting program in Sullivan County N.H.

Anne could be considered a life-long learner: she received her Ph.D. from Boston College; M.A. in Community Social-Psychology from UMass Lowell; B.A. from Boston College and graduated with the first Green MBA cohort from Antioch University New England in May 2009.

### **Susan Psaropoulos**

Susan has served as Database Specialist in AUNE's Admissions Office since 1996. She has been a member of AUNE's Sustainability & Social Justice Committee since its inception in 2005 and serves as the committee's liaison to AUNE's Staff Senate. Susan also coordinates AUNE's housing services and chairs AUNE's large-group Enrollment Services committee. She holds a BA in English from San Diego State University and an MS in Organization & Management from AUNE. Susan writes that "I'd like to work toward providing our students, staff, and faculty with access to affordable and sustainable transportation."

### **Erin Russell-Story**

Erin Russell-Story received an MS in Environmental Studies from Antioch University New England in 1996. Since that time Ms. Russell-Story has worked promoting the use of alternative fuel vehicles (AFVs) and renewable energy. In 2003, she was named the Clean Cities Coordinator of the Year by the U.S. Department of Energy for her work associated with the nation-wide AFV program. Ms. Russell-Story has also worked for the Gas Technology Institute, the Northeast Combined Heat and Power Initiative, and as a contractor for the U.S. Department of Energy. For the past several years she has been self-employed as

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an independent energy and communications contractor working for a variety of non-profits and advocacy organizations focused primarily on fund raising and the promotion of renewable energy and AFVs. For the past seven years, Ms. Russell-Story has been making her home in Warren, VT, with her husband. She has served on the Town's Conservation Committee and is ending a three-year term on the Town's Selectboard, where she doubled as the Town Energy Coordinator. Recently, Ms. Russell-Story accepted a position with the U.S. Department of Energy's Clean Cities program based at the National Energy Technology Lab outside of Pittsburgh, PA.

### **Jessica Skinner**

Jess is a student at Antioch University New England and a candidate for a Masters of Environmental Studies with a Science Teacher Certification. She is currently serving as AUNE's Solid Waste Coordinator and has been a co-chair for the Student Alliance, an ES Department student organization, since the spring of 2009. Over the past year, she has volunteered with the Monadnock Farm and Community Connection as well as Fertile Fields Farm in Westmoreland, NH, and is interested in promoting local food and farm education. She has been a key player in establishing the first raised bed gardens at AUNE and will be combining this effort with that of Antioch's compost program this year.

### **Katie Stoner**

Katie Stoner graduated from Antioch University New England in 2008 with an MS in Environmental Studies and a concentration in Environmental Education. While at Antioch, Katie was the Earth Day Coordinator for the City of Keene, served on the Cities for Climate Protection Committee, co-chaired the Student Alliance, and worked to build the foundation for a local food coop in the Monadnock Region. She also served as the Research and Outreach Coordinator for Antioch's Sustainability and Social Justice Committee, working to implement Antioch's strategic sustainability and energy efficiency goals. During her time in Keene, Katie was a Community Climate Fellow with Clean Air-Cool Planet, worked on an organic CSA (farm), and taught Environmental Science at Franklin Pierce University. These days, Katie is living in Ithaca, NY, wearing a few hats in her professional life: she is the Assistant Coordinator of the Tompkins County Climate Protection Initiative ([www.TCCPI.org](http://www.TCCPI.org)) – a group of community partners working to reduce greenhouse gas emissions by implementing the County's goal of reducing greenhouse gas emissions by 80% by the year 2012. She also works as the Curriculum Manager for Performance Systems Development ([www.psdconsulting.com](http://www.psdconsulting.com)), a consulting firm focused on providing solutions to climate change and implementing energy efficiency programs through green jobs training, software tools, and engineering solutions.

### **Rachel Thompson**

Rachel serves as Antioch New England's Green Guru, a position with AUNE's Sustainability & Social Justice Committee. Rachel is a first-year student in AUNE's Integrated Learning Program (science & environmental education focus) and comes to AUNE after working with the non-profit Maine Energy Education Program, as Carbon Footprint Educator. Her responsibilities were split between MEEP and Maine's Department of Environmental Protection, and her work focused on bringing energy and climate change curriculum into Maine 3rd - 12th grade classrooms for MEEP, and assisting public school Facility Managers conducting district-wide Greenhouse Gas (GHG) inventories for DEP. Rachel has lived in mid-coast Maine for most of her life, in the small town of Monroe, and is a graduate of the University of Maine at Farmington, from which she holds two degrees: in Political Science and an individualized program called Environmental Sustainability. During her undergraduate studies, she became very involved with the sustainability movement on campus. The Sustainable Campus Coalition hired Rachel as student sustainability coordinator, and she worked on a number of projects for this group, some of which included organizing UMF's Bike Day, auditing dining hall food waste, and beginning a GHG inventory of UMF.

### **George Tremblay**

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George Tremblay has been a core faculty member and Director of Research in the Department of Clinical Psychology for ten years. George served on AUNE's Energy & Climate Action Task Force, whose work resulted in setting the goal of achieving campus carbon neutrality by 2020. In 2003, in collaboration with two environmental educators and a business manager, George helped to found Program Evaluation and Education Research (PEER) Associates, which provides evaluation services to agencies involved in place-based or environmental projects. George also regularly consults with human service agencies to help them measure the impact of their services. Common elements in all of this work are promoting behavior change on the part of individuals, organizations, and communities, and figuring out how to better understand and measure those changes.

### **Duncan Watson**

Duncan serves as the Assistant Director of Public Works for the City of Keene, NH. He has been with the Department of Public Works since 1992. Duncan runs the Solid Waste Division which features the largest municipally operated materials recovery facility in the State of New Hampshire processing upwards of 10,000 tons per year, a 30,000 ton per year Transfer Station, an award winning Household Hazardous Waste Collection Facility, and an organics composting operation. During his tenure in the Solid Waste Division, the City of Keene was named the best Municipal Recycling Facility in the State, and Duncan was awarded "Recycler of the Year" by the Northeast Resource Recovery Association. Duncan also oversees the operation of the City's Highway Division which has over 120 miles of roadways, 52 miles of sidewalks and more than 5,000 drainage basins, as well as oversight responsibility for the City's 150+ vehicle Fleet Services Division. Duncan is a 1992 Resource Management & Administration master's degree graduate of Antioch New England.

### **Tom Weller**

Tom Weller is fascinated by architecture's ability to meet more than the utilitarian day-to-day needs of people, and explores topics such as Environmental Architecture, Sacred Geometry and Feng Shui in an effort to broaden his understanding of the philosophical and esoteric aspects of architecture. These interests combined with a deep interest in creating healthy learning and working environments, have served him well on such projects in the Monadnock Region as the Mariposa International Folk Art Museum, the Stonewall Farm Environmental Education Center, the Science Technology Building and the Main Building for Performance and Dining at High Mowing School, the Concord Hospital Child Care Center and the Keene State College Alumni Center.

Tom holds a Bachelor of Architecture Degree from Catholic University of America, and has completed coursework at Antioch University New England in Geomorphology and Land Use Planning; at Harvard University Graduate School and Tufts University – Child Care Design Institute; and at the New Buildings Institute: Advanced Building Guidelines Integrating High Performance.

Tom is a Registered Architect in New Hampshire, Massachusetts, Vermont, is National Council of Architectural Registration Boards Certified, and is a Professional Member of the American Institute of Architecture since 1988, and an Accredited Professional LEED AP through the U.S. Green Building Council. He is also a Corporate Member of the Northeast Sustainable Energy Association.

A community-oriented architect, Tom has enjoyed working on projects such as the Harrisville Town Hall and Recycling/Transfer Station, the Olivia Rodham Memorial Library and Town Hall Renovation in Nelson the Philip Read Memorial Library in Plainfield, the United Congregational Church Addition and a new Town Hall in Sullivan, the Rise Program Center, the Community Kitchen in Keene and the Monadnock Covenant Church. With an interest in sharing his passion for architecture he has taught at the High Mowing High School, Keene State College and AUNE.

### **Tom Wessels**

Antioch University New England Environmental Studies core faculty member Tom Wessels is an ecologist and founding director of the department's master's degree program in [Conservation Biology](#).

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He is former chair of the [Robert and Patricia Switzer Foundation](#) that fosters environmental leadership through graduate fellowships and organizational grants. He serves as an ecological consultant to the Rain Forest Alliance's SmartWood Green Certification Program. In that capacity Tom helped draft green certification assessment guidelines for forest operations in the northeastern United States and adjacent Canada. Tom has conducted landscape level workshops throughout the United States for over 30 years. His books include: *Reading the Forested Landscape*, *The Granite Landscape*, *Untamed Vermont*, and *The Myth of Progress: Toward a Sustainable Future*.

### **Alex Wilson**

Alex Wilson is the Executive Editor of *Environmental Building News*. For more than 25 years Alex has written about energy-efficient and environmentally responsible design and construction. Prior to starting his own company in 1985 (now BuildingGreen, LLC), he was executive director of the Northeast Sustainable Energy Association for five years; before that he taught workshops on the construction of solar greenhouses in New Mexico in the late '70s. Alex is author of *Your Green Home* (New Society Publishers, 2006) and coauthor of the *Consumer Guide to Home Energy Savings* (New Society Publishers, 9th Edition, 2007) and the Rocky Mountain Institute's comprehensive textbook *Green Development: Integrating Ecology and Real Estate* (John Wiley & Sons, 1998). He has also written hundreds of articles for other publications, including *Fine Homebuilding*, *Architectural Record*, *Landscape Architecture*, the *Journal of Light Construction*, and *Popular Science*. Along with writing about design and construction, Alex has written four guidebooks on quiet-water paddling published by the Appalachian Mountain Club --covering all of New England and New York State. Alex served on the board of directors of the U.S. Green Building Council for five years and he is currently a trustee of The Nature Conservancy - Vermont Chapter.

### **Don Woodhouse**

Don Woodhouse is the Grants Office Director at Antioch New England. He (almost) always turns off the lights when he leaves a room.

### **Jessica Zane**

Jessica Zane is a graduate of Antioch University New England with a master's degree in environmental studies. She pursued an individualized program that focused on individual and social psychological experiences of living in uncertain times. She recently produced a short documentary film, *Beyond Denial: The Emotional Terrain of Climate Change*, which explores the emotional responses people have to climate change. Zane was formerly an independent corporate event and video producer, working for nearly 20 years with Fortune 500 clients such as Merck Pharmaceuticals, IBM, and Sony. She is also a mixed media artist, creating multi-dimensional works that often incorporate photographic images.

## **Energy Work Group Background**

### **Bio-Mass Heating Systems:**

Wood-Chip and Pellet systems have the potential of nearly eliminating the use of propane for heat. The average propane use over the past three years is 46,000 gallons per year. (We have made the simplifying assumption that all of this is for heating, in actuality a small amount is used for hot-water heating.) The required boiler size for the Antioch New England campus is at the top end of pellet boilers and near the bottom end of wood-chip boilers, which leaves either as a possibility.

In October 2009, at the time that the Energy Work Group was assessing options for meeting AUNE's thermal load, the price of propane was \$1.57 per gallon, which made it less expensive than oil on a per Btu basis. This low cost has never happened during the past 30 years. In fact it is very close on a Btu basis to the current price of pellets, \$17.07/MMBtu for propane compared to \$15.34/MMBtu for pellets (at \$250/ton). This makes 25-year paybacks unachievable for either system on a dollar basis.

The cost effectiveness of either system is very sensitive to the price of the fuels. The Energy Work Group report's appendices include the payback worksheets for both systems, with the current cost of propane, and with a doubling of the cost of propane. At the current cost of propane neither system has a net cumulative dollar savings over 25 years. With a doubling of the cost of propane both systems have a cumulative savings in the first year.

### **Assumptions:**

Propane at \$1.57/gallon, and \$3.14/gallon.

Pellets at \$250/ton.

Wood-chips at \$60/ton.

Fuel and Maintenance inflation at 4.0%

Cost of money at 4.5%

Level principal bond payments.

Wood-chip system cost at \$1,100,000.

Pellet system cost at \$325,000.

100% fuel offset with wood-chips (46,000 gallons propane).

97% for pellets (44,620 gallons propane).

### **Ground-Source Heat Pumps:**

Ground-source heat pumps could eliminate entirely the use of propane for heating, but at the cost

of increased electrical consumption. To the extent that the grid is cleaner than propane this is advantageous. Assume that 44,600 gallons of propane are saved and 235,000 kWh are added to the annual electric consumption.

The cost of developing the ground source field is estimated to be between \$300,000 to \$500,000. The cost of the indoor work to convert to (central) water-source heat pumps is estimated to be approximately \$400,000 plus the cost of the place to put them. This would be for five 35-ton

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water source heat pumps plus piping, etc. The building piping and heating/cooling terminal units would mostly remain, and the system would remain two-pipe changeover (the entire building is either in the heating mode or cooling mode).

### **Ventilation Energy Recovery:**

Ventilation can account for nearly half the energy used for heating. Energy recovery units can save a significant portion of that energy use by recovering heat and moisture from the exhaust air to pre-condition the incoming ventilation air.

With the exception of nine larger perimeter spaces that are served by unit ventilators, eleven air-handling units ranging in size from 1700 cfm to 5575 cfm serve the entire building. The total design ventilation air from these units totals 10,375 cfm. This might equate to roughly 19,000 gallons propane annually used to heat ventilation air. Saving two thirds of that with an energy recovery ventilator would be 13,000 gallons propane saved annually.

The cost of replacing the eleven air-handling units with energy recovery air-handling units is estimated to be approximately \$600,000 to \$800,000.

### **Boiler Replacement:**

The current propane-fired boilers are probably 80% efficient at best. Replacing them with more efficient gas boilers at 85% efficiency would save 3000 gallons propane and would cost approximately \$200,000.

### **Controls:**

The controls need upgrading to facilitate nighttime temperature set-back/set-up. Allow \$20,000 to upgrade the scheduling and to provide web-browser interface. Savings are difficult to quantify but a 10% energy savings (4,500 gallons propane) is reasonable. In addition considerable savings are possible with demand-controlled ventilation of the nine larger areas served by the unit ventilators. This would be accomplished by installing CO<sub>2</sub> sensors in those areas to control the outside air dampers at the unit ventilators. Allow \$1,000 per classroom for CO<sub>2</sub> control. This might save one-half the cost of ventilating these spaces or 250 gallons propane per classroom.

**Lighting:** AUNE's existing lighting is relatively efficient overall.

Offices account for 31% of lighting power and have 27% more installed lighting power than current code & design practice. Redesign of office lighting could cut electrical use for ALL lighting by 10%.

Classroom lighting is perhaps only 10% higher than current practices; however, daylighting opportunities and lighting controls are lacking.

Hallway lighting is efficient, but some fixtures are outdated resulting in poor quality light and dark spaces. Retrofits could result in higher light quality at the same electrical consumption.

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### **Daylighting:**

Properly designed skylights could potentially reduce 2<sup>nd</sup>-floor classroom electrical use by 50% and all but eliminate daytime electrical lighting in 2nd floor hallways (if skylight area is kept below 3% of total roof area, the net energy benefit is usually positive).

### **Roof:**

In addition to the specific recommendations made concerning AUNE's roof, the Energy Work Group discussed the following options, but chose to make no specific recommendations at this time:

- Grow produce (greenhouses)
- Stormwater management (modular green roof system)
- Generate electricity w/PV
- Generate domestic hot water – solar DHW panels
- Harvest rainwater – cistern storage for non-potable water use and irrigation
- Reduce heat island effects and increased R-value – install green roof system
- Reduce heat island effects and decreased cooling loads – install white PVC or TPO roof system

## **Antioch University New England Responsible Purchasing Policy<sup>16</sup>**

Antioch University New England (AUNE) is committed to the use and procurement of environmentally sustainable, ethically produced and socially responsible and inclusive products and services.

AUNE will consider social justice and sustainability (SSJ) criteria as well as cost, convenience and quality in decisions regarding procurement and other business relationships. Given AUNE's strong and clear commitment to sustainability and social justice, as expressed in our statement of purpose, those engaging in purchasing decisions are strongly encouraged to prioritize SSJ criteria when there is a tension amongst competing purchasing criteria.

### **Policy Goals**

- **Maintain High Social Justice and Sustainability Standards:** Procure products and services that meet the highest and most credible ethical, social and environmental standards without compromising quality, effectiveness, cost or convenience.
- **Access/Safety:** Ensure that the products and services purchased by AUNE support or improve the accessibility, health and safety of AUNE students, employees and visitors.
- **Inclusivity:** Ensure that the products and services purchased by AUNE support or improve the inclusivity of AUNE students, employees and visitors.
- **Waste & Greenhouse Gas Reduction:** Develop and maintain a supply chain and purchasing process through which waste and greenhouse gas emissions are first avoided or eliminated and where remaining waste can serve as feedstock/inputs for new product development.
- **Strengthen the Local Economy:** Support the local Keene and larger regional economy by purchasing goods and services from local vendors.

### **Responsibility for Policy Implementation**

The VP for Finance & Administration will be responsible for overseeing implementation of the Responsible Purchasing Policy by all those at AUNE who engage in purchasing on behalf of the institution. The Assistant to the President for Sustainability and Social Justice will work with the VPFA and purchasers to support implementation of the policy with technical research assistance and outreach to the AUNE community.

### **Implementation Guidelines**

Those responsible for making purchasing decisions at AUNE are encouraged and expected to support AUNE's commitment to environmentally, ethically and socially responsible and inclusive purchasing. To support these purchasing decisions, an appendix is attached that details specific preferred attributes and that provides a resource list of vendors & third-party certifications. This appendix is updated at the beginning of each fiscal year by the Assistant to the President for Sustainability & Social Justice. **If you have questions, suggested additions or changes, please contact that office by email to: [aabrash@antioch.edu](mailto:aabrash@antioch.edu).**

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<sup>16</sup> Approved on September 22, 2009

## **Local Food Project Coordinator**

### **Draft Position Description**

**Description:** The Local Food Project Coordinator is a work study position at AUNE.

**Oversight:** Assistant to the President for Sustainability and Social Justice

### **Job Tasks:**

- 1) *Education and awareness.* Get the word out and inform folks about the importance of buying local food and the Local Food Project. Begin this relationship and awareness-building process by offering tours for staff and students of the Antioch garden and local farms; work with staff and faculty to connect the Local Food Project to the curriculum and to special events; and publicize the program in newspapers and on the local radio stations.
- 2) *Bring together* farmers, students, faculty, food service staff, and community groups to address the barriers and opportunities involved in making more local food available at Antioch (and to serve as a model for Keene State and other schools).
- 3) *Build a relationship* with food service staff (Donna & co.) and work with them to find out their current barriers to buying more local food and to brainstorm solutions and see what is realistic and what works for them in moving forward.
- 4) *Institutionalize* the program through incorporating buying local requirements into the food service's contract and Antioch's purchasing policy and through getting students, staff, faculty, and the administration engaged in supporting and promoting the program.
- 5) *Promote* the purchasing of local food through bringing farmers in to speak at special events or in the classroom; create an annual Local Harvest event (like at UNH); through farm tours; through posters, labels, table tents, and information tables; and through publicity in local newspapers, on local radio stations, and on the Antioch web site.
- 6) *Publicize* the local buying that is already happening
- 7) *Create partnerships* with Donna's, Antioch Garden coordinators and Compost/Waste Coordinator, local farms, local food distributors, and groups/organizations working on supporting and promoting local food (The Monadnock Localvore Project, Monadnock Farm and Community Connection, Stonewall Farm, Monadnock Buy Local, etc.).
- 8) *Research fundraising* opportunities to support the project and to offset the costs of purchasing local food. Some of Farm to College projects seek grants to sustain a student position to coordinate the project and/or to help subsidize farmers to form selling cooperatives to the institution. Compile a list of potential grants that could be used in the future and distribute to Antioch grant writing classes so students can help with the grant writing effort.

## Transportation Workgroup Recommendations Details

- **Recommendation #6: Improve Green Bikes infrastructure by sheltering bike racks.**

CNTF-TW reviewed two options:

- Option 1 – Build pitched roof utilizing volunteers.
  - Roof would be designed in standard post and beam construction and anchored in concrete.
  - Materials – 4x4 pressure treated posts, bolts, corrugated roofing.
  - Basic design would be completed by Transportation Coordinator
  - Build would be coordinated with AUNE Facilities Director and student volunteers would provide labor.
  - Base cost for each shelter - \$600 x 2 shelters = **\$1,200**
- Option 2 – Purchase a commercial steel pre-fabricated roof. Duro Bike Racks (<http://www.dero.com>) manufactures several models including this “Bike Haven.”



### **Simplicity**

The Dero Bike Haven bridges the gap between short and long term bike parking. Starting with a simple canopy design, the Dero design team worked to provide a solid, secure structure with full coverage.

### **Protection**

Optional polycarbonate side and back panels are available for additional protection.

### **Expansion**

The Dero Bike Haven is available with or without racks to accommodate existing bike parking. And as demand grows, the Dero Bike Haven’s modular design makes it easy to add more sections.

- Base cost for one shelter (add-on wings are less) - **\$3,933**

- **Recommendation #7: Improve Green Bikes infrastructure by acquiring new bicycles and tricycle with odometers.** Source: Workman Cycle – NYC, NY (<http://worksmancycles.com>)

- Cost of each 2-wheeled cruiser style bike - \$280
- Additional cost per bike with safety equipment (bell, baskets, helmet etc) - \$110
- 6 bikes x \$390 = \$2340.00
- 1 tricycle - \$360 (inclusive)
- **Total: \$2,700**



## Carbon Offset & REC Options

AUNE has researched a number of carbon offsets/RECs options, some of which are described below.

### *Native Energy*

- Have developed a unique “Help Build” model (also known as Forward Crediting)
  - They have developed this model in the hopes of fixing a market failure which often stalls the development of smaller, distributed projects.
  - These smaller projects would not be able to wait for the carbon revenues that would come in 5 years, 8 years, 10 years etc. to finance the upfront costs.
- Their current project is the Greensburg Wind Farm which is being developed by John Deere Renewables
  - The town of Greensburg, Kansas was devastated by a tornado, which touched down in May 2007 destroying 95% of the town’s infrastructure. Eleven of the towns 1,400 residents died in the disaster.
  - Project details
    - 10 new wind turbines, 1.25 MW each for a total 12.5 MW new wind energy
    - Enough energy to power ~4,000 homes
    - Construction scheduled for August 2009
    - Commercial operation date expected first half of 2010
- Excerpts from *NativeEnergy’s* website regarding the project:
  - **Offset type:** NativeEnergy's 20-year offsets purchase is consistent with the duration of the power purchase agreement and the grant of RECs to the town. The offset type is commonly referred to as Forward Stream, Help Build offsets for the first 20 years of the projects operating life, with forward crediting of carbon offset against current year carbon emissions by offset purchasers.
  - **Additionality:** This project demonstrates financial additionality according to UNFCCC definitions in that the project faces barriers to implementation that are overcome by the opportunity to receive carbon revenues. The principal barriers are capital costs of the equipment and lack of economy of scale. The upfront payment commitment from NativeEnergy is required to satisfy the developers investment requirements.
  - **Verification/Monitoring:** The project plan will be validated by a third-party to the Voluntary Carbon Standard, with extension of the standard project term from 10 to 20 years and additional discounts to be conservative. The project's electrical performance will be third party verified annually, and the resulting CO2 reductions will be third party verified every five years.
- ACUPCC on Forward Crediting:
  - The response during the Carbon Offset webinar:
    - “The ACUPCC does not prohibit Forward Crediting Carbon Offsets however it does discourage them. Schools must make a case for their use.”
  - On page 17 of the ACUPCC Carbon Offsets Guidelines:
    - Forward crediting carries the most risk to buyers, and as such this type of offset credit is typically the least expensive. In this transaction, the buyer pays for a certain number of offsets yet to be produced. Generation of these offsets is not guaranteed and the provider is not contractually

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obligated to replace credits if there is a shortfall from the project (WWF 2008, p. 46)

- NativeEnergy does track the progress of every project and their current portfolio stands at 103.6% when comparing “Contracted tons for performance period vs. Actual tons for performance period”
- On page 42 of the ACUPCC Carbon Offsets Guidelines:
  - Since many renewable energy projects have high up-front costs, offsets can play an important role in investing in such projects and getting them off of the ground
- Compatibility with ACUPCC Protocol:
  - Supports development of renewable energy market-YES
  - Helps to eliminate dependence on fossil fuels-YES
  - Must meet proper additionality standards
  - Must not be double-counted
- Also offer vintage 3rd party certified RECS
  - The two current projects include:
    - Paraiso Hydroelectric Project in Brazil
    - Des Plaines Landfill Gas Collection and Destruction Project in Illinois, USA

*NativeEnergy* meets AUNE’s social justice purchasing criteria. The company focuses on financing construction of Native American, family farm and community-based renewable energy projects that would not otherwise succeed. The company, founded in 2000 by two Vermonters, also is a majority American Indian-owned company.

### *The Climate Trust*

- Is another tier 1 Carbon Offset provider according to CA-CP
- The majority of their work takes place in the Pacific Northwest
- Their approach appears to be similar to *NativeEnergy* in that the Project Portfolio is composed of a variety of projects that they were able to help fund through carbon offsets
- This is who College of the Atlantic teamed up with in 2007 when it first started purchasing Carbon Offsets

### *Other CA-CP Tier 1 Carbon Offset Providers identified:*

- AgCert/Driving Green (Ireland)
- Atmosfair (Germany)
- Carbon Neutral Company (UK)
- Climate Care (UK)
- Co2balance (UK)
- Sustainable Travel/MyClimate (US)

## **Geographically Connected Communities & Carbon Offsets at AUNE**

Through its faculty, education and research foci, AUNE has connections to several international locations that might make sense to target for carbon offsets purchasing. These include:

### *Rwanda*

- Mana Energy, Houston, Texas based water technology start-up

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- Have started the Rwanda Natural Energy Project which, when completed will provide clean drinking water to 250,000 teachers, students and staff
- Waiting for final approval from UN of carbon funding for the project (may be eligible for carbon offsets under the UN Clean Development Mechanism)
- Ecosystem Restoration Associates, Vancouver, BC based company
  - Appear to be in the process of developing a carbon offset project in Rwanda
  - Recently, ERA began developing REDD (Reduced Emissions from Deforestation and Degradation) opportunities and programming with various levels of government and "grass roots" community associations in Canada, in the Great Lakes region of east-central Africa (Rwanda), Ecuador and Peru. (Excerpt from Website)
  - This programming is intended to catalyze sustainable bio-economies that will generate equitable employment, new infrastructure, renewable energy sources and education for the communities in these regions. (Excerpt from website)

### *Yucatan Peninsula*

- Rainforest2Reef,
  - has partnered with the Environment Resource Trust and the Climate, Community and Biodiversity Alliance to be able to offer carbon credits for their work protecting 300,000 acres of tropical rainforest
  - Seeking to be registered under the standards of the Voluntary Carbon Standard
  - Does not look to be established yet

### *Gaviotas (www.gaviotasoffsets.org)*

- This cutting-edge sustainable community in Colombia has teamed up with the Marion Institute and ZERI (Zero Emissions and Innovation) to offer Carbon Offsets
- 90% of funds go to supporting the planting regimen and related research at Las Gaviotas.
- 10% of funds are retained by the Marion Institute to cover the costs of administering the program and to fund the ZERI Learning Initiative
- Highlights that the program not only offsetting emissions, it is also:
  - Helping in the conservation of local biodiversity
  - Recreating ancient tropical rainforests
  - Providing quality drinking water to local communities
  - Helping to create new social conditions
- Highlights the importance of tropical rainforests such as having a large net cooling effect
- Could not find any document that says that they are third party certified, retired, etc.

### ***Other CA-CP Tier 1***

#### *Agcert/ Driving Green*

- Have a number of projects in Mexico and have explored the Yucatan Peninsula
- The majority of their projects are methane recovery from CAFO's...feedlots
  - Reducing Greenhouse gasses...yes...but we have to ask if we support the initial work...