May 13, 2010

Dear American College & University Presidents Climate Commitment:

As the first institution in North Dakota to sign the ACUPCC, the University of North Dakota believes that taking a leadership role on sustainability issues is essential to the education of our students and the community. The attached report, representing the first steps in that direction, reflects our commitment to a more sustainable way of life for our students, our community and our planet.

As a signatory to the Presidents’ Climate Commitment, the University of North Dakota supports the efforts of college and university presidents around the country to address the critical issue of climate neutrality. A Council on Environmental Stewardship and Sustainability was appointed and charged with developing and implementing a climate action plan to reduce our carbon footprint. Subcommittees were established to address a wide range of areas in which sustainability may be implemented. Their work and recommendations are found in the accompanying Climate Action Plan.

The Council recognizes that the success of the plan to achieve climate neutrality depends largely on funding and the support of the community and campus. In addition, due to improvements in technology and unforeseen challenges, the Climate Action Plan is seen as a living document that will be updated at least annually.

We respectfully submit this Climate Action Plan for your review and will welcome all comments and recommendations for future updates.

Sincerely,

Robert O. Kelley

President
Executive Summary

“UND has done much to diminish its carbon footprint and to become environmentally friendly. In addition to signing the American College and University Presidents Climate Commitment, UND already has several strategies in place to make a difference. But we’re going to do more. UND’s Climate Action Plan proposes several specific strategies for us to become even greener.”

Robert O. Kelley, 2010

Overview
On January 29, 2008, former President Charles Kupchella signed the American College and University Presidents’ Climate Commitment (ACUPCC). Kupchella recognized that anthropogenic behaviors influence global climate change. Kupchella stated, “It is prudent that the nations of the world and, indeed, institutions like UND begin to take steps to reduce the generation of greenhouse gases.”

In achieving lower greenhouse gas emission rates, Kupchella wanted UND to experience a reduction in energy costs and thus operating costs. By signing the President’s Climate Commitment, he set in motion the process for developing a plan over the next several years to reduce greenhouse gas emissions and ultimately achieve climate neutrality by a future date to be set by UND.


As the first institution in North Dakota to sign the ACUPCC, it is UND’s vision to set in motion a process by which the University might model positive corporate behavior. To become a leader in sustainability efforts, UND must recognize its social responsibility to substantially improve the culture of the campus to address sustainability issues associated with all of its operations and its missions of teaching, research and service to the state and beyond. To facilitate this action, campus professionals were appointed to an institutional standing Council on Environmental Stewardship and Sustainability. The council branched to include more UND representatives to serve on subcommittees and address a wide range of areas in which sustainability may be implemented. The work and recommendations of the subcommittees are found in this Climate Action Plan. The Climate Action Plan is recognized as a working document and will experience alterations and changes in the years ahead.

Greenhouse Gas Emissions Target
An important component to the University’s commitment with the ACUPCC is the documentation of current greenhouse gas emissions as well as formulation of a plan for future trajectories. UND has identified its current greenhouse gas emissions in a study published in January of 2009. Future trajectories, estimated using current investment plans, project a 7% reduction in Metric Tons of Carbon Dioxide Equivalent (MTCE) below 1990 levels by 2020 and a 51% reduction by 2050.

Summary of Recommendations
The Sustainability Improvement Measures (SIM) (Section 3) and Appendix IV provide summarized versions of proposed relevant actions for meeting those trajectory goals set forth by the university. Sections 4 to 10 present the goals and relevant actions as determined by each of the subcommittees. Further detail can be found for the recommended relevant actions in Appendix V. Table 1 below outlines a sample of SIM recommendations extracted from the body of the Climate Action Plan that may be viable methods for establishing the University of North Dakota as a leader in sustainability and reduce campus carbon emissions.
## Executive Summary

### Table 1: Sample Recommendations for Reducing Carbon Emissions at the University of North Dakota

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Estimated Initial Capital Cost ($)</th>
<th>Potential Annual Cost/Savings ($)</th>
<th>Simple Payback (years)</th>
<th>Annual Carbon Reduction (MTCDE)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adopt an energy and sustainability policy for campus procedures</td>
<td>75,000</td>
<td>175,000</td>
<td>.43</td>
<td>5,175.29</td>
<td>Establishing an energy policy which sets forth clear guidelines for campus energy use would conserve both costs and carbon. Example guidelines could include the purchase of ENERGY STAR products, set temperatures for classrooms, energy audits for campus buildings.</td>
</tr>
<tr>
<td>Installation of a wind turbine on campus</td>
<td>1,900,000</td>
<td>120,450</td>
<td>15.77</td>
<td>3,562.08</td>
<td>Although this project requires a significant capital investment, grants are available to offset the cost. Such a system could supplement the coal-based steam energy that supplies energy to the campus.</td>
</tr>
<tr>
<td>Develop and promote an education and research platform</td>
<td>10,000,000</td>
<td>2,000,000</td>
<td>5</td>
<td></td>
<td>UND is recognized as a research-intensive institution. This action further expands this role of the University and directs it to this new area of expertise. Campus return is based upon new F&amp;A from $5 million in increased on-campus research.</td>
</tr>
<tr>
<td>CO₂ control of HVAC outside air</td>
<td>259,500</td>
<td>86,975.71</td>
<td>2.98</td>
<td>2,572.14</td>
<td>The energy used toward makeup air can be reduced by installing CO₂ control units on HVAC systems.</td>
</tr>
<tr>
<td>Establish a sustainability coordinator</td>
<td>20,000</td>
<td>(100,000)</td>
<td></td>
<td></td>
<td>By implementing a sustainability coordinator position all sustainability efforts can be organized and employed by a single person acting on behalf of the CAP. This will reduce confusion and increase efficiency. It is intended that this position will eventually fund itself through grants, cost savings, and initiatives.</td>
</tr>
<tr>
<td>Heat recovery from ventilation makeup air</td>
<td>3,993,722</td>
<td>567,022.56</td>
<td>7.04</td>
<td>16,768.59</td>
<td>Recover heat from exhaust air and insert into makeup air to reduce energy costs and emissions associated with heating outside air.</td>
</tr>
<tr>
<td>Incorporate sustainability education into U-Life and Welcome Weekend</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Instilling UND’s commitment to reduce carbon emissions in its students is an excellent way to reach large groups of people and alter their environmental behavior. Such behavior changes could potentially have a high cost and energy savings for the university.</td>
</tr>
<tr>
<td>Promote energy efficient modes of transportation like mass transit, biking, walking, etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Educating and influencing behavioral changes can have a dramatic environmental impact. This action promotes services the University already provides and expands them to serve more people as well as addresses healthy, low/no cost modes of transportation that are mutually beneficial.</td>
</tr>
</tbody>
</table>

### Implementation

The council recognizes that the success of the plan to achieve climate neutrality depends largely on funding and he support of the community and campus. In addition, due to improvements in technology and unforeseen difficulties, the Climate Action Plan is seen as a living document that will be updated at least annually.
1.1 History of Sustainability at UND

**UND Demographics**
UND was founded by the Dakota territorial assembly in 1883 as a public university in what is now Grand Forks, N.D. (pop. 50,000), which is located on the Minnesota border and approximately 75 miles from the Canadian border. The university employed 739 faculty and 2,062 staff, and had 13,172 students enrolled in FY 2009 (Table 1). North Dakota residents make up 46 percent of the students, while the rest represent 50 states, eight Canadian provinces and more than 50 nations. The campus includes 229 buildings (5.33 million square feet) on 549 acres. UND has a large campus, covering 425 square feet per student in FY 2007.

In April 1997, the campus was significantly affected when a flood that rose eight feet above street level and required the entire city to evacuate. Seventy-two university buildings were damaged and had to be rebuilt or renovated. Although student enrollment and significant institutional infrastructure declined, the University has since recovered and is experiencing record enrollments.

**UND Signs Climate Commitment**
In January 2008, former UND President Charles Kupchella signed the American College and University Presidents’ Climate Commitment (ACUPCC). UND is the first institution in North Dakota to sign the commitment. Upon signing the commitment, Kupchella said it is important to set into motion a process by which the university might model positive corporate behavior. In addition to the commitments required by all signatories, Kupchella committed UND to the following steps: 1) within two months, appoint an institutional standing Council on Environmental Stewardship and Sustainability; 2) within one year, identify all curricular and academic programs being offered by the university and assess the degree to which each of these courses and programs address the issue of sustainability; 3) within one year, prepare an inventory of all current, directly environmentally relevant UND research projects, which will then be kept up-to-date on an ongoing basis. All of the steps Kupchella outlined have been accomplished.

To date, UND has fulfilled several of the requirements of the climate commitment. Immediately after signing the commitment, Kupchella appointed a core group of individuals to the Council on Environmental Stewardship and Sustainability. The Council finished the Greenhouse Gas Inventory in January of 2009 and started the Climate Action Plan.

In addition to signing the ACUPCC, the following accomplishments have been documented:

- UND President Robert O. Kelley was appointed to a prestigious 15-person Energy Initiative Advisory Committee by the Washington, D.C.–based Association of Public and Land-grant Universities.
- The University has embarked on a comprehensive energy efficiency improvement program using state bond funding. This currently generates a savings of about $500,000 a year, which is being used to pay off the bonds. The lighting efficiency program alone has eliminated the use of the equivalent of 164,610 100-watt bulbs.
- The University has a number of environmental programs, including a wide variety of programs at the Energy & Environmental Research Center (EERC). UND also has programs in such areas as
Introduction

environmental engineering, sustainable energy engineering, environmental geoscience, environmental management, and environmental studies, and is home to such units as the Environmental Training Institute and the Tribal Environmental Law Project.

- UND coordinates the Sustainable eNergy Research, Infrastructure and Supporting Education (SUNRISE) program, a student-centered, faculty organized supercluster consisting of 29 faculty in 13 separate academic departments at UND, NDSU, Mayville State University and the ND State College of Science. SUNRISE research is focused on the production of fuels, chemicals, polymers, and composites from renewable sources; harvesting of energy from diffuse sources (wind/solar/hydrogen), and developing technologies to enable the environmentally sustainable use of coal.

- University Place, apartment-style housing for students, is the first campus building in North Dakota built to meet various LEED standards. In addition to incorporating many green features in the new building, UND took steps to properly recycle the bricks, ceiling tiles, steel columns, carpet and old street materials from the previous building site before construction began on University Place.

- UND has a well-established recycling program which keeps nearly 500 tons of waste material annually out of area landfills. The ongoing quest to find a suitable replacement for the current landfill is a major regional issue.

- The Plains CO₂ Reduction (PCOR) Partnership, led by the EERC, is embarking on the Phase III of a major effort to demonstrate the technical and economic feasibility of carbon sequestration, a major emerging strategy in greenhouse gas mitigation.

- The University operates a transportation shuttle program, and the City of Grand Forks has established bus transportation to and from campus. In addition, a student organization through the Wellness Center implemented a Green Bike project which encouraged students to ride. The program will likely start again with a few changes as a part of the Climate Action Plan.

- UND recently completed and opened a parking ramp, which helps alleviate on-campus automobile travel.

- Research is being carried out by SUNRISE and the EERC on the use of bio-fuels and other renewable fuel projects.

- Professor Yong Hou, Ph.D, is an expert on renewable energy economics. He is involved in commercializing several renewable projects including a windmill compatible with the average consumer’s backyard and an electric bike conversion kit supplier from Clean Republic, LLC.

- Beginning in 2000, UND executed a $3.9 million comprehensive energy efficiency improvement program reducing electrical and steam usage. This currently generates a savings of about $500,000 each year, which is used to pay off the improvement cost. An additional $2.1 million facility energy improvement program reduced electrical, steam, natural gas and water usage, beginning in 2005. These actions were guided by an effort to reduce energy consumption, but were not based on a campus-wide survey of energy consumption and GHG emissions. For these efforts, UND received the Administrator Award for Energy Efficiency and Renewable Energy from Western Area Power Administration in 2001. The award recognized UND’s advances in high-tech energy, which has allowed it to heat more buildings with less energy. Prior to that, UND received a National Energy Award in 1994 from the U.S. Department of Energy for the New Dimension in Boiler and Building Technology project.
Introduction

1.2 Current Status

According to the UND Greenhouse Gas Inventory Report, in 2007 UND was responsible for the emission of 138,633 Metric Tons of Carbon Dioxide Equivalent (MTCDE). From 1993 to 2007, total emissions increased by 9 percent while total energy consumption decreased by 0.3 percent. Meanwhile, square footage increased by 8.1 percent. Emissions per campus member grew by 6.7 percent, while emissions per 1000 square feet increased by just 0.4 percent. A potential reason for the increase in emissions is the increase of research activities, which consume more coal-based electricity. Energy use per full-time student has decreased by 8 percent and energy use per 1000 square feet has also decreased by 8 percent.

As seen in Figure 1, the major sources of UND’s emissions in 2007 result from on-campus stationary sources (62%), purchased electricity (18%), and transportation (commuting, air travel, direct transportation—17%). The steam plant, which uses coal as its main fuel source, was responsible for 62 percent of total emissions on average from 1993-2007. The electricity contribution to emissions has increased by 29 percent since 1993.

![Graph showing emissions sources]

When emissions are normalized by gross MTCDE per 1000 square feet and gross MTCDE per full time enrollment, UND’s emissions are higher than the average emissions of 16 selected institutions that have reported their emissions to the ACUPCC. The average MTCDE per full time student is 11.0 MTCDE, compared to UND’s 13.9 MTCDE. The regional average MTCDE per 1000 square feet is 19.4 MTCDE, compared to UND’s 26.0 MTCDE. A contributing factor to UND’s higher-than-average MTCDE per student and square foot is its climate zone, which is colder than all of the institutions selected for comparison.
**Introduction**

Figure 2: Comparison of emissions of other institutions, as reported to the Association for the Advancement of Sustainability in Higher Education. *MTCDE = Metric tons of carbon dioxide emissions.*

### 1.3 Goals

UND will set about implementing the Climate Action Plan once it is approved. While the Climate Action Plan is recognized as a working document and is expected to experience alterations and changes in the years ahead, the Council hopes to pursue the following goals:

- Create a campus culture of sustainability
- Reduce greenhouse gas emissions 7% below 1990 levels by 2020 and 51% by 2050
## 1.4 Comparison of Goals Across Institutions

<table>
<thead>
<tr>
<th>School (full time students)</th>
<th>Date Adopted</th>
<th>Emissions Target</th>
<th>Interim goals</th>
<th>Reductions to date</th>
<th>Inventory baseline year &amp; MTCDE</th>
<th>Date of PCC*</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of North Dakota (12,700, fall 2009)</td>
<td>January 2008</td>
<td>Climate neutral TBD</td>
<td>7% reduction by 2020, 51% reduction by 2050. Percentages based on 1990 baseline</td>
<td>Emissions have increased 16% based on 1990 baselines. Although we have eliminated 18,826 MTCDE through energy efficiency projects.</td>
<td>2009, 138,633</td>
<td>January 2008</td>
</tr>
<tr>
<td>Bowdoin College (1,710)</td>
<td>October 2009</td>
<td>Climate neutral by 2020</td>
<td>8% reduction by 2015</td>
<td>Not available</td>
<td>2008, 24,500</td>
<td>January 2006</td>
</tr>
<tr>
<td>Cornell University (19,800)</td>
<td>September 2009</td>
<td>Climate Neutral by 2050</td>
<td>20% reduction by 2010</td>
<td>Not available</td>
<td>2008, 319,000</td>
<td>November 2007</td>
</tr>
<tr>
<td>Middlebury College (2,500)</td>
<td>August 2008</td>
<td>Climate Neutral by 2016</td>
<td>40% reduction by 2011</td>
<td>(Est. 40% from baseline by December 2008)</td>
<td>2007, 30,000</td>
<td>May 2007</td>
</tr>
<tr>
<td>Tufts University (9,530)</td>
<td>April 1999 and 2004</td>
<td>7% reduction by 2012, 10% reduction by 2020</td>
<td>No formal goal</td>
<td>Emissions have increased (2003)</td>
<td>1990, 15,000</td>
<td>No</td>
</tr>
<tr>
<td>University of Wyoming (8659)</td>
<td>September 2009</td>
<td>Climate neutral by 2050</td>
<td>15% reduction by 2015, 25% by 2020</td>
<td>Not available</td>
<td>2007, 155,634 MTCDE</td>
<td>Signed December 2008</td>
</tr>
<tr>
<td>University of California, Berkeley (34,000)</td>
<td>April 2007</td>
<td>By 2014: 26% below 2006 levels (= same as 1990 levels)</td>
<td>No formal goal</td>
<td>Not available</td>
<td>2006, 209,000</td>
<td>March 2007</td>
</tr>
<tr>
<td>University of North Carolina at Chapel Hill (23,000)</td>
<td>September 2009</td>
<td>Climate neutral by 2050</td>
<td>10% below 2005 levels by 2015; 20% by 2030; 30% by 2040</td>
<td>Not available</td>
<td>2000, 415,700</td>
<td>November 2007</td>
</tr>
<tr>
<td>University of Oklahoma (26,200)</td>
<td>September 2009</td>
<td>Climate neutral by 2050</td>
<td>40% reduction by 2050</td>
<td>Not available</td>
<td>2008, 257,000</td>
<td>September 2008</td>
</tr>
<tr>
<td>Yale University (11,300)</td>
<td>October 2005</td>
<td>By 2020: 43% below 2005 levels (10% below 1990 levels)</td>
<td>No formal goal</td>
<td>14% (approx. 6% per year)</td>
<td>2005, 260,000</td>
<td>No</td>
</tr>
</tbody>
</table>

*PCC: Signatories of the American College and University Presidents Climate Commitment*
Introduction

1.5 Development of Climate Action Plan
This is an ideal time for UND to develop a Climate Action Plan. The institution is currently developing a strategic plan and a facilities master plan. The Climate Action Plan will dovetail nicely with both and provide opportunities for collaboration, innovation, and synergy. In addition, the broad goals and mission of the Climate Action Plan correspond with improving the health and wellness of faculty/students/staff, contributes to environmental betterment, helps to contain costs and improve efficiency of campus operations, and builds an increased sense of community on campus. To ensure that all facets of campus operation, education, research, and life were incorporated into the Climate Action Plan, subcommittees were formed and contributed to the drafting of the document.

The trajectories (Chapter 2) set by the Climate Action Group indicate the emission trend UND needs to pursue in order to meet its goals and fulfill the commitment it made with the ACUPCC. In order to follow this trajectory, sustainability improvement measures (Chapter 3) were developed as a starting point for possible emission-reduction investments and projects. The committee highlighted certain areas that are particularly significant for an institution, such as UND, and set goals and relevant actions to achieve said goals. These areas include research, education, energy, procurement, environment and recycling, transportation, and outreach (Chapters 4-10). In developing this document, representatives from Facilities and Operations, Dining Services, Purchasing, University Relations, the Dean of the College of Arts & Sciences, the student body, and professors from various campus departments were consulted.

1.6 Implementation of Climate Action Plan
The University of North Dakota views the Climate Action Plan as a comprehensive look at university operations, identifying where sustainability measures can be implemented to reduce greenhouse gas emissions. Seven main areas have been identified in which sustainability improvement measures can have the greatest impact—research, education, energy, procurement, environment and recycling, transportation, and outreach. Within each of these areas relevant actions, or potential project proposals, are recommended. The details associated with these recommendations are expanded upon in Appendix IV in the form of individual abstracts. Further research and feasibility studies, as well as administration cooperation and approval, are needed before many of these projects can be implemented. However, the committee feels that including recommendations and how they may fit into the overall goal of the Climate Action Plan are worthwhile especially as an initial starting point.

1.6.1 Prioritization
Because the list of recommended relevant actions (Appendix III) is lengthy and certain projects have a shorter or longer timeframe associated with their implementation, the subcommittees have prioritized the actions. It is also recognized by the Climate Action Group that certain realities such as funding sources and feasibility of projects will influence the priority of the actions. This noted, it is the hope of those involved in this report that all actions will be given consideration and that the full impact of actions, products, and investments on reducing greenhouse gas emissions will be considered as well as cost.

1.6.2 Continual Updates
The Climate Action Plan is a living document subject to change and alterations as UND begins to implement actions, discover new technologies, and identify new projects to fulfill its commitment to the ACUPCC. Continual monitoring will ensure that the University is on its chosen trajectory. As projects are implemented, and new projects are identified and become feasible, updates will be made to the Climate Action Plan and the ACUPCC.
1.6.3 Responsibility
This document is not intended to be relied upon by any person, entity, or institution. It is an aspiration, and none of the contents shall be binding on the University of North Dakota, its employees, or assignees.

1.7 Structure of this Report
The Council on Environmental Stewardship and Sustainability includes seven subcommittees. Each subcommittee developed a plan to help the institution reach the goal of climate neutrality. The specific plans are outlined in Appendix IV. In sections 2 through 8, the plans are summarized and divided in the following subheadings:
1. Introduction
2. Goals and Actions
3. Challenges
2.1 Introduction
The first essential step in reducing carbon emissions at UND is to determine the past and current trends of climate impacts generated by the institution. In 2008, a class of Earth System Science & Policy graduate students compiled a Greenhouse Gas Inventory Report for the university\(^1\). The report covered fiscal years 1993 to 2007 and found emissions increased by 9 percent while total energy consumption decreased by 0.3 percent. The report also found that energy use per full-time student has decreased by 8 percent, energy use per 1,000 square feet decreased 8 percent, and the average carbon dioxide emissions (MTCDE) per full-time student at UND is 13.9 metric tons.

While monitoring greenhouse gas emissions and climate impact generated by the University is an ongoing, annual activity, the initial study provided awareness for the campus’ current activities and a baseline from which trajectories can be determined. It is important to note that the campus’ facilities and management departments have been implementing energy-saving technologies and projects for several years. UND’s lighting efficiency program has resulted in energy reductions equivalent to 164,610 100-watt bulbs. UND also targets LEED standards for new construction. For example, University Place is a new apartment-style housing complex, the first of its kind on the UND campus and the first on-campus building in North Dakota designed to meet LEED standards, including recycled content in building materials, and natural storm water filtration and erosion control systems. Such efforts demonstrate innovation and commitment on behalf of the staff associated with the University that predates the Climate Action Plan.

As the University identifies the future trajectories and goals associated with the institution’s climate impact and greenhouse gas emissions, it is notable that projects and relevant actions taken to meet these targets incorporate various levels of investment and return. For instance, certain activities may require behavioral changes, education, and reallocating purchasing choices and funds, which are low initial investments. In other cases, green projects or renewable energy initiatives may require a high initial capital investment; however, the potential savings on return ultimately determine the bottom line. Often these higher investment projects also return high rates of savings for UND. Due to such potential savings, foresight, research, planning and progressive thought are factored into the implementation of goals, trajectories and suggested sustainability improvement measures incorporated into the Climate Action Plan.

2.2 Goals and Actions
The University’s GHG emissions have increased 16 percent from 1990 baseline levels of 120,000 MTCE. Since 2007 however, 11.5 percent of GHG emissions have been prevented from a business as usual trajectory through energy efficiency projects (Figure 2.1). UND’s projected trajectory, based on an annual investment of $500,000 in efficiency projects estimates a 7 percent reduction by 2020 and a 51 percent reduction by 2050 (Figure 2.2). This annual investment is consistent with the current investment strategy for energy efficiency and sustainable projects.

\(^1\) The Greenhouse Gas Inventory Report was published in January of 2009 with the University of North Dakota. The report was produced in part, to fulfill requirements set forth by the ACUPCC.
Figure 2.1: UND’s current GHG emissions status, the lighter area on the figure represents the GHG emission reductions from energy efficiency projects.

Figure 2.2: UND’s projected trajectory if consistent with current amount of annual investments ($500,000) in efficiency projects. The projected trajectory estimates a 7 percent reduction by 2020 and a 51 percent reduction by 2050.
Table 2.1: GHG levels for the 1990 baseline and estimated trajectory for 2020 and 2050.

<table>
<thead>
<tr>
<th>Years</th>
<th>GHG Levels</th>
<th>Percent Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>120,000</td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td>111,333</td>
<td>7%*</td>
</tr>
<tr>
<td>2050</td>
<td>58,833</td>
<td>51%*</td>
</tr>
</tbody>
</table>

*Estimated at $240/MTCE and current annual investment of $500,000 per year in efficiency projects.

2.3 Challenges

Undoubtedly there will be innumerable challenges associated with reducing carbon emissions at UND. Determining the targeted future trajectories still leaves the actual actions and methods of reducing carbon to be determined. While this Climate Action Plan includes recommendations and potential initiatives for the University to pursue, each project will still require substantial research, feasibility details, and funds to see them to fruition. The most significant challenge could be determining the priority of each and sustaining momentum to advance from project to project. To this end, the subcommittees associated with this Climate Action Plan have developed a priority list associated with each chapter.
Sustainability Improvement Measures

3.1 Introduction
The Sustainability Improvement Measures (SIM) table outlined in this chapter summarizes the proposed relevant actions to help the University of North Dakota meet its carbon neutrality projections. The Climate Action Plan—including the SIM table—is a living document and will change. Nonetheless, the SIM table provides the UND administration with potential projects to reduce the University’s carbon emissions. The following chapters in the Climate Action Plan discuss many of these projects and their non-monetary potential benefits in greater detail as well as their role in university functioning.

In part, the purpose of the SIM table is to ensure that sustainable activities are incorporated throughout the campus. No one department can or will be responsible for implementing all relevant actions. But a comprehensive approach is needed to reduce carbon emissions. In addition, increasing sustainability at UND requires students, faculty, administration, facilities, and technical operations to alter their procedures and behaviors. To this extent, in formulating both the Climate Action Plan and SIM the committee focused on areas of research, education, energy, procurement, recycling, transportation, and outreach. In order to specifically address each of these areas and ensure goals are met, relevant actions were proposed and prioritized.

In addition to prioritizing projects and relevant actions, the SIM table also evaluates the estimated cost, potential annual cost or savings, simple payback over the years of the project, the net primary value after 20 years, and carbon reduction associated with each action. These numbers are estimates based on proposed projects, available costs, and projected savings, and they provide a baseline for prioritization and capital investment. As sustainability advances at UND, this list can be altered for projects completed, in progress, to indicate what’s next. It will become a snapshot of progress.

3.2 Goals and Actions
The Sustainability Improvement Measure (SIM) table follows below. Projects that are defined in the abstracts from each subcommittee are included in the SIM table. The table includes quantifiable carbon reduction, and defines qualitative benefits. This reiterates the goals defined in the Introduction which are to change the campus culture and reduce greenhouse gas emissions.

3.3 Challenges
Estimates about the future are inherently challenging. While the SIM table was created with attention to detail and the most accurate information available, this list will inevitably change, especially the exact initial capital costs, costs and savings, payback, and annual carbon reduction. In the spirit of this being a living document, the SIM offers a clear starting point as projects are begun and progress is made toward carbon neutrality. Accuracy of the numbers will improve as projects are begun and known costs are calculated, and the SIM will transition into a tracking sheet as well as a proposal.
## Sustainability Improvement Measures

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</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Publish funded sustainability research projects</td>
<td>H d</td>
<td>$0</td>
<td>$2,500</td>
<td>$0</td>
<td>NA</td>
<td>PR/Disc</td>
<td>PR/Disc</td>
<td>4.1</td>
<td>Project ID</td>
<td>Estimated Initial Capital Cost</td>
<td>Potential Annual Cost</td>
<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
</tr>
<tr>
<td>4.2</td>
<td>Facilitate the development of a network of researchers</td>
<td>M d</td>
<td>$0</td>
<td>$35,000</td>
<td>$70,000</td>
<td>NA</td>
<td>FR/Disc</td>
<td>FR/Disc</td>
<td>4.2</td>
<td>Project ID</td>
<td>Estimated Initial Capital Cost</td>
<td>Potential Annual Cost</td>
<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
</tr>
<tr>
<td>4.3</td>
<td>Market UND research capabilities</td>
<td>H d</td>
<td>$0</td>
<td>$40,000</td>
<td>$450,000</td>
<td>NA</td>
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<td>Project ID</td>
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<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
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<td>4.4</td>
<td>Faculty Training on Public Relations</td>
<td>M d</td>
<td>$0</td>
<td>$2,000</td>
<td>$0</td>
<td>NA</td>
<td>PR/PR</td>
<td>PR/PR</td>
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<td>Project ID</td>
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<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
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<td>4.5</td>
<td>Administrative Grant Writing Support</td>
<td>H d</td>
<td>$0</td>
<td>$120,000</td>
<td>$136,000</td>
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<td>FR/Disc</td>
<td>FR/Disc</td>
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<td>Project ID</td>
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<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
</tr>
<tr>
<td>4.6</td>
<td>Sustainability Seed Grant Program</td>
<td>M d</td>
<td>$0</td>
<td>$150,000</td>
<td>$115,000</td>
<td>NA</td>
<td>FR/Disc</td>
<td>FR/Disc</td>
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<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
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<td>4.7</td>
<td>Research and Education Energy Platform</td>
<td>H e</td>
<td>$10,000,000</td>
<td>$50,000</td>
<td>$760,000</td>
<td>14.1</td>
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<td>FR/Disc</td>
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<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
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<td>5.1</td>
<td>Establish interdisciplinary freshman course</td>
<td>H b</td>
<td>$0</td>
<td>$10,000</td>
<td>$16,000</td>
<td>NA</td>
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<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
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<td>5.2</td>
<td>Establish an Environmental Studies major &amp; minor</td>
<td>M a</td>
<td>$50,000</td>
<td>$70,000</td>
<td>$65,000</td>
<td>NA</td>
<td>BA/BA</td>
<td>BA/BA</td>
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<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
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<td>5.3</td>
<td>Sustainable education to U-Life and Welcome Weekend</td>
<td>M d</td>
<td>$0</td>
<td>$7,500</td>
<td>$0</td>
<td>NA</td>
<td>BA/BA</td>
<td>BA/BA</td>
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<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
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<tr>
<td>5.4</td>
<td>Competition for sustainability course</td>
<td>L d</td>
<td>$0</td>
<td>$5,000</td>
<td>$0</td>
<td>NA</td>
<td>BA/BA</td>
<td>BA/BA</td>
<td>5.4</td>
<td>Project ID</td>
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<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
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<td>5.5</td>
<td>Establish a sustainability internship</td>
<td>M d</td>
<td>$0</td>
<td>$4,000</td>
<td>$0</td>
<td>NA</td>
<td>PR/PR</td>
<td>PR/PR</td>
<td>5.5</td>
<td>Project ID</td>
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<td>Potential Annual Cost</td>
<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
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<tr>
<td>5.6</td>
<td>Infuse sustainability into essential studies</td>
<td>M d</td>
<td>$0</td>
<td>$3,500</td>
<td>$0</td>
<td>NA</td>
<td>BA/BA</td>
<td>BA/BA</td>
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<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
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<tr>
<td>5.7</td>
<td>Provide activities for staff and faculty to learn environmental wellness</td>
<td>M d</td>
<td>$0</td>
<td>$5,000</td>
<td>$0</td>
<td>NA</td>
<td>BA/BA</td>
<td>BA/BA</td>
<td>5.7</td>
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<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
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<tr>
<td>5.8</td>
<td>Encourage students to publish letters and articles on sustainability</td>
<td>M d</td>
<td>$0</td>
<td>$4,000</td>
<td>$0</td>
<td>NA</td>
<td>BA/BA</td>
<td>BA/BA</td>
<td>5.8</td>
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<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
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<tr>
<td>6.1</td>
<td>Development of Sustainability Center</td>
<td>L e</td>
<td>TBD</td>
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<td>Potential Annual Savings / Revenues</td>
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<td>Annual Carbon Reduction (MTCDE)</td>
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<tr>
<td>6.3</td>
<td>Energy Education</td>
<td>M d</td>
<td>$25,000</td>
<td>$10,000</td>
<td>$40,460</td>
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<td>1,246</td>
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<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
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<tr>
<td>6.5</td>
<td>On-Site Renewable Energy</td>
<td>L c</td>
<td>TBD</td>
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<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
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<tr>
<td>6.7.1</td>
<td>Wind Turbine Large (1MW)</td>
<td>H b</td>
<td>$1,900,000</td>
<td>$20,000</td>
<td>$144,540</td>
<td>13.15</td>
<td>1,323</td>
<td>$1,436</td>
<td>6.7.1</td>
<td>Project ID</td>
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<td>Potential Annual Savings / Revenues</td>
<td>Simple Payback (years)</td>
<td>Annual Carbon Reduction (MTCDE)</td>
<td>Annual Carbon Cost ($/MTCDE)</td>
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<tr>
<td>6.7.2</td>
<td>Wind Turbine Medium (500 KW)</td>
<td>H</td>
<td>b</td>
<td>$1,150,000</td>
<td>$15,000</td>
<td>$60,225</td>
<td>19.10</td>
<td>551</td>
<td>$2,087</td>
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<tr>
<td>6.7.3</td>
<td>Wind Turbine Small (125 KW)</td>
<td>M</td>
<td>d</td>
<td>$700,000</td>
<td>$10,000</td>
<td>$27,101</td>
<td>25.83</td>
<td>248</td>
<td>$2,823</td>
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<tr>
<td>6.7.4</td>
<td>Wind Turbine Micro (10 KW)</td>
<td>L</td>
<td>d</td>
<td>$40,000</td>
<td>$2,500</td>
<td>$660</td>
<td>60.61</td>
<td>6</td>
<td>$6,623</td>
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<tr>
<td>6.8</td>
<td>Establish an Energy and Sustainability Policy</td>
<td>H</td>
<td>c</td>
<td>$75,000</td>
<td>$50,000</td>
<td>$175,000</td>
<td>0.43</td>
<td>5,175</td>
<td>$14</td>
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<td>6.9</td>
<td>Carbon Tax on Steam</td>
<td>L</td>
<td>d</td>
<td>FS</td>
<td>FS</td>
<td>FS</td>
<td>FS</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>6.10</td>
<td>Heat Recovery</td>
<td>H</td>
<td>c</td>
<td>$5,993,722</td>
<td>$10,000</td>
<td>$567,022</td>
<td>10.57</td>
<td>16,768</td>
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<td>6.11</td>
<td>Building Retro-commissioning and Ongoing Commissioning</td>
<td>M</td>
<td>d</td>
<td>$1,525,000</td>
<td>$20,000</td>
<td>$250,000</td>
<td>6.10</td>
<td>1,800</td>
<td>$847</td>
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<tr>
<td>6.12</td>
<td>Installing Occupancy Sensors in Classrooms, Labs, and Restrooms</td>
<td>H</td>
<td>a</td>
<td>$195,068</td>
<td>$0</td>
<td>$21,436</td>
<td>9.10</td>
<td>196</td>
<td>$995</td>
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<tr>
<td>6.13</td>
<td>Biomass -Lignite Briquettes</td>
<td>L</td>
<td>d</td>
<td>TBD</td>
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<td>6.14</td>
<td>Building Energy Audit</td>
<td>M</td>
<td>a</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>6.15</td>
<td>Vendor Machines</td>
<td>H</td>
<td>c</td>
<td>$78,050</td>
<td>$0</td>
<td>$26,550</td>
<td>2.94</td>
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<td>6.16</td>
<td>Steam Retail Price Increase Earmarked for Carbon Reduction Projects</td>
<td>L</td>
<td>d</td>
<td>FS</td>
<td>FS</td>
<td>FS</td>
<td>FS</td>
<td>NA</td>
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<tr>
<td>6.17</td>
<td>Solar Thermal Energy</td>
<td>M</td>
<td>d</td>
<td>TBD</td>
<td>TBD</td>
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<td>6.18</td>
<td>General Fund/Plant Improvement</td>
<td>H</td>
<td>c</td>
<td>FS</td>
<td>FS</td>
<td>FS</td>
<td>FS</td>
<td>NA</td>
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<td>6.19</td>
<td>HVAC CO2 Control</td>
<td>H</td>
<td>b</td>
<td>$733,552</td>
<td>$8,000</td>
<td>$214,843</td>
<td>3.41</td>
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<td>6.20</td>
<td>Bio Mass with existing boilers</td>
<td>L</td>
<td>d</td>
<td>$355,000</td>
<td>$50,000</td>
<td>-$331,250</td>
<td>(1.07)</td>
<td>46,133</td>
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<td>6.21</td>
<td>Independent Ground Source Heat Pumps for Buildings</td>
<td>M</td>
<td>d</td>
<td>$10/SF</td>
<td>$0.12/SF</td>
<td>TBD</td>
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<td>6.23</td>
<td>High Efficiency/Green construction for New Building and Major Remodel</td>
<td>H</td>
<td>d</td>
<td>TBD</td>
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<td>6.24</td>
<td>Production of synthetic natural gas through gasification</td>
<td>H</td>
<td>d</td>
<td>TBD</td>
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<td>6.25</td>
<td>Campus Energy Cockpit</td>
<td>H</td>
<td>d</td>
<td>$30,000</td>
<td>$10,000</td>
<td>NA</td>
<td>NA</td>
<td>PR</td>
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<tr>
<td>6.26</td>
<td>Establish Energy Task Team in each building or department</td>
<td>H</td>
<td>d</td>
<td>$40,000</td>
<td>$5,000</td>
<td>NA</td>
<td>NA</td>
<td>PR</td>
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<td>6.27</td>
<td>Solar photovoltaic Cells</td>
<td>M</td>
<td>d</td>
<td>$8,000/KW</td>
<td>$100/KW</td>
<td>144.54/KW</td>
<td>55.35</td>
<td>1.32/KW</td>
<td>$110</td>
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<td>6.28</td>
<td>Water Saving Measures, water efficiency, storm and grey water capture</td>
<td>L</td>
<td>d</td>
<td>TBD</td>
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<td>6.29</td>
<td>Replace Central steam plant with low carbon plant</td>
<td>M</td>
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<tr>
<td>6.30</td>
<td>Medium HP Energy Center</td>
<td>L</td>
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### Sustainability Improvement Measures

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<td>Improve bicycle infrastructure</td>
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<td>Convert University Avenue to pedestrian mall</td>
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<td>Promote ski commuting in winter months</td>
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<td>Convert state vehicles to bio diesel or hybrid vehicles</td>
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<td>Expand bicycle lanes on campus</td>
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## Sustainability Improvement Measures

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<td>Administer short-term competitive challenges</td>
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**Key**

TBD: To be determined by process/additional study required to determine project viability

NA: Not applicable

PR: Item puts forward positive image of campus/impact on carbon emission difficult to quantify

BA: Item increases – changes behavior awareness/impact on carbon emissions difficult to quantify

DISC: Item fosters discovery of new potential methods of reducing carbon emissions/impact of carbon emission difficult to quantify

FR: Item has the potential to develop into a funding resource for the university

FS: Item is potential funding source for energy efficiency and sustainability projects

*- The gas produced is Methane, not CO2

**Priority:** H=high, M=medium, L=low

**Status:**

- a - approved, funded and underway
- b - approved, funding pending
- c - under consideration - approval pending, funding pending
- d - idea conceptualized but not put forward for administrative review
- e - detailed research required to evaluate project
- f - external decision process - State Board of Higher Education, etc.
- g - removed from list
4.1 Introduction

The University of North Dakota has made sustainable research an institutional priority. Statistics compiled by the UND Office of Research, Development, and Compliance show that several contracts focused on energy and environmental related research were active at UND in calendar year 2009. This level of energy and environment related activities follows a long history of finding solutions to the energy problems. As early as the 1930s, the UND Department of Chemical Engineering was performing research on more efficient and environmentally friendly techniques for utilizing coal. This research led to the establishment of the U.S. Bureau of Mines Robertson Lignite Research Center in 1949. These efforts evolved into major research enterprises focused on sustainable energy research, including the UND Energy & Environmental Research Center (EERC).

The Department of Chemical Engineering and the Department of Chemistry have established the Sustainable Energy Research, Infrastructure, and Supporting Education (SUNRISE), a student-centered, faculty-organized supercluster consisting of 29 faculty members in 13 separate academic departments at UND, North Dakota State University, Mayville State, and the North Dakota State College of Science. SUNRISE research focuses on three areas: the technologies to enable the environmentally sustainable use of coal; the production of fuels, chemicals, polymers, and composites from renewable sources; and the harvesting of energy from wind, solar, and hydrogen. More than 150 students have worked on SUNRISE research projects over the past four years. SUNRISE researchers submit, on average, more than 50 proposals annually and performed about $5 million of research in FY09.

The Robertson Lignite Research Center evolved through several federal agencies and was transferred to UND in 1983. The EERC employs more than 330 full-time employees. Its mission is to improve the global quality of life through visionary, multidisciplinary research and development leading to the demonstration and commercialization of innovative energy and environmental technologies. Most of the 341 projects and $39.2 million in research expenditures for FY09 focus on problems related to energy and the environment. The EERC is the lead organization of the Plains CO2 Reduction Partnership (PCOR), the largest collaboration among industry and government in the United States and Canada, working on practical and environmentally sound CO2 capture, storage, and sequestration technologies.

One of UND’s latest efforts, the Institute for Energy Studies, became a primary strategic initiative of the School of Engineering and Mines after a yearlong strategic planning initiative. The Institute’s stated vision: “The University of North Dakota Institute for Energy Studies pursues new frontiers in energy research and education that enables the development of the next generation of integrated energy technologies that are economically competitive, reliable, sustainable, and politically and environmentally acceptable.” This vision is well aligned with the goals of this Climate Action Plan.

Though UND has many faculty capable of performing research directly related to the reduction of greenhouse gas emissions, the University is not taking full advantage; moreover, there is a significant untapped potential for research collaborations. The Research Subcommittee has developed the following recommendations to improve the research climate and activities in sustainable energy. Many of these will require a minimal investment and could be implemented through the Office of the Vice President for Research and Economic Development. Others will require a more significant investment by the University and a commitment to provide long-term base funding.
4.2 Goals and Actions

Goal 1: Publish Funded Research
Publishing a list of sustainability energy research projects that are funded at UND will demonstrate the level of commitment afforded by the University and its faculty.

Relevant Actions:
UND should highlight proposals and active projects in the area of sustainable energy by publishing a list of projects on the UND Sustainability Web site. This effort could be coordinated with the Office of Research and Economic Development. Specific action items required to facilitate this includes:
- Review current project RC&D data base, tag projects related to sustainability, sort and submit the data for uploading on the Web site.
- To facilitate future identification of related projects, add a “Sustainability Project” check box on the proposal transmittal sheet.
- Update Web site with relevant projects on a monthly basis.

Goal 2: Facilitate Network of Researchers
Increasing the awareness of the common interests and capabilities of researchers on campus will facilitate more and larger collaborative proposals.

Relevant Actions:
Several UND researchers are involved in environmental/sustainability research. However, they may be unaware of each other partially due to the size of UND and their differing specialization areas. The development of the interactions among faculty is critical when applying for funding, in particular for new faculty. Methods proposed to facilitate the networking between UND researchers include the following:
- Make it a priority to hire new faculty with expertise and interest in climate change and sustainability.
- Create a listserv with interested participants.
- Publish a data base indicating the research interests of UND faculty working in the area of sustainability.
- Develop a newsletter highlighting three to four researchers per quarter.
- Establish a colloquium/seminar/brown bag series featuring UND researchers,
- Celebrate, reward, and publicize research by faculty members on climate change and sustainability.

Goal 3: Market UND Research Capabilities
Promoting the capabilities of UND researchers and facilitating strategic alliances with other universities, industry, and national laboratories will enhance UND’s ability to participate in major nationwide research activities.

Relevant Actions:
Promotion of the capabilities of UND faculty with other universities, industry and national labs should increase the number of collaborative, multi-university and consortia-based proposals. While a part of this function is the responsibility of the individual faculty members, methods should be developed to raise UND’s overall visibility. Efforts should include the following:
- Providing travel funds to researchers to establish new relationships that can lead to joint proposals.
- List departmental/unit and faculty research interests and capabilities on the Research Web page.
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- Providing travel funds to researchers to establish new relationships that an lead to joint proposals.
- List departmental/unit and faculty research interests and capabilities on the Research Web page.
Relevant Actions:
An important part of UND’s Climate Action Plan includes a combination of renewable energy technologies, carbon capture technologies, implementation of smart grid techniques, and energy efficiency improvements.

As UND develops these new technologies, they should be implemented so that research and education platforms can be incorporated into the new systems. Providing access to these systems would allow UND to develop a sustainable and nationally competitive energy research and education platform. This system will connect the research initiatives to the challenges faced in the operations of the University as it implements the Climate Action Plan. While this would require additional up-front capital, it could generate substantial returns in research awards.

4.3 Goals in Progress, Implemented Goals, Measures in Motion
As stated in the introduction to this section, UND has a large, active research portfolio in a wide variety of energy and environmental research areas. UND has made sustainable research an institutional priority. Under the leadership of Phyllis Johnson who became the Vice President for Research and Economic Development in July, 2009, UND continues to make progress toward implementing a strategic plan that includes energy as a major component.

4.4 Challenges
UND has a reputation for providing high-quality education. This reputation was built around a commitment toward maintaining a student focus.

As UND continues to make the transition to a research-intensive university, a faculty model must be adopted that develops and promotes a good balance between teaching and research. UND will need to develop a strategic plan for allocating resources to fully realize its research potential. Availability of space for expansion, quality of existing space, access to cost-share, availability of personnel to support a growing research enterprise, and faculty commitments need to be addressed. Several UND units have demonstrated that a vibrant research program will help provide the resources needed to overcome these barriers and should be emulated throughout the University.
5.1 Introduction
Moving toward sustainability starts with individuals understanding global climate change-related issues. Within educational settings, we have a unique opportunity to raise awareness about our global environment, inspire innovations to decrease carbon emissions, and practice “green” choices that can benefit the health of our community. While stimulating awareness, inspiring innovations, and practicing new ways of living can be exciting; attitudes and behaviors are not easily changed. It is our hope that increasing the availability of information on sustainability can show great promise in changing the attitudes and behavior at UND.

As the main objectives of the sustainability education component are the modification of the attitudes, behavior, and choices, we believe that those goals are best met by saturating the society with messages pertaining to sustainability, leading by example, and facilitating peer interactions. We also want to ease the transition to more sustainable behavior by providing workshops. The traditional teacher-student model also has its place on campus education where the innovators of the future are learning the science of today.

The target audiences of the sustainability education can be divided into three broad categories: 1) traditional classroom teaching for students, 2) education for the UND campus community, and 3) education for the greater Grand Forks/East Grand Forks and regional North Dakota and northern Minnesota community. The prioritizing below is arranged in a three tiered system where every tier includes one goal from each of the above listed target categories.

5.2 Goals and Actions

**GOAL 1**

**CLASSROOM: Climate change/sustainability class**
Interdisciplinary freshman climate change/sustainability class taught by faculty from all schools/colleges and several departments. Class should count towards degree requirements, alternatively as a large-lecture course with Essential Studies accreditation (see goal 3).

*Relevant Actions*
Find enthusiastic faculty in all schools and colleges to teach a two week segment to give students a broad interdisciplinary view of climate change science, social effects, communications, health effects, energy options, mitigation options, and more.

The main obstacles for the creation of such class are the artificial barriers between schools and the negotiation of release time for the faculty who are interested in participating.

**CLASSROOM: Sustainability internship**
Continue the sustainability internship that is currently being offered through UND College of Business and Public Administration.

*Relevant Actions*
No actions needed.

**GRAND FORKS COMMUNITY: Healthy yard care, healthy body**
The air pollution from cutting grass for an hour with a gasoline-powered lawn mower is about the same as that from a 100-mile automobile ride (Westerholm, 2001, Environmental Science and Technology, American Chemical Society). Encourage use of snow shovels instead of gas powered blowers, motor-less push mowers instead of gas powered lawnmowers. This can be done by highlighting the direct health benefits of moderate exercise in decreasing musculoskeletal problems. Additional benefits are the decrease in air pollution, decrease in hydrocarbon usage, decrease in noise pollution, and savings in money (gas + expensive equipment).

**Relevant Actions**
Dispatch community activists to run presentations at a volunteer’s yard involving neighbors from the same city block. Advantages are the small group size, encouraged “green” behavior in each neighborhood, and hands-on trials of equipment.
- Hire enthusiastic student to run workshops five days a week through the city all the summer.
- Pool with local distributors for rebates on equipment.
- Participants who agree to switch equipment can sign up for two visits by a technician to troubleshoot the equipment and help with the transition.

**GOAL 2**

**CLASSROOM: Sustainability curriculum to U-LIFE course and Welcome Weekend agenda**
Include one week of sustainability coursework in U-LIFE courses geared at incoming students, as well as during Welcome Week events. Incoming students will immediately encounter UND’s “be green” philosophy, learn why it is important, and what is expected of them as a member of the UND community.

**Relevant Actions**
Prepare content and find instructors and facilitators.

**CLASSROOM: Offer an Environmental studies Major and Minor**
Create new program to directly cater to the increasing societal needs for people with understanding of technical, social, and scientific aspects of the environment.

**Relevant Actions**
Seek funding, faculty, and home for the program on environment.

**GRAND FORKS COMMUNITY: Compost and save**
Encourage and teach composting. By composting food scraps, we can significantly decrease the waste flow to the garbage dump. The city would directly save money on decreased collection loads, as well as increased longevity of the garbage dump. The individual would also save money directly as the need to buy mulch and fertilizer is decreased.

**Relevant Actions**
Education

- Dispatch community activists to run block presentations at a volunteer’s yard. Advantages are the small group size, encouraged “green” behavior in each neighborhood, and hands-on trials of equipment. This activity should be pooled with the lawn equipment.
- Engage the city in the discussion on how to allow for people to sign up for a smaller (much smaller) container for less money that would encourage recycling and composting.
- Hire enthusiastic student to run workshops five days a week through the summer.
- Connect with local distributors for rebates on equipment.
- Participants who agree to switch equipment can sign up for two visits by technician to troubleshoot the equipment and help with the transition.

**GOAL 3**

**CLASSROOM: Financial competitive award for sustainability course**
A competitive set of four awards ($2000 each) for sustainability courses that meet each of the four Essential Studies requirements (perhaps given through the President’s office). Syllabi and potential course materials would be submitted in the proposal. Innovative collaboration between departments would be strongly encouraged.

**Relevant Actions**
The President would offer financial compensation ($2000) and other resources to support these efforts (e.g. university publicity about these 4 innovative courses, etc.). A competitive, prestigious award with financial backing would encourage university-wide changes.

**CAMPUS COMMUNITY: Dakota Student Sustainability Column**
Work with Dakota Student to establish a column dedicated to sustainability. If they do not agree to dedicate a full column, we could perhaps submit articles periodically.

**Relevant Actions**
A dedicated sustainability column could feature articles concerning current events of climate change that apply both globally and to UND specifically. This will increase climate change awareness on campus.

**GRAND FORKS COMMUNITY: Sustainability Journalism**
A campus club will be formed (similar to Amnesty International) that will write letters to send to regional media outlets (Grand Forks, Fargo, Bismarck, Duluth, Bemidji) about sustainability, global warming, and similar topics that highlight specific policy or behavioral actions readers could utilize.

**Relevant Actions**
- Find faculty and students interested in campus club.
- Present to various departments for interest (English, honors, social work, communications, etc.)

**Benefits:**
- Students from North Dakota may have a specific knowledge about barriers to policy and behavioral change
- Aids students in writing and presenting a coherent argument
5.3 Challenges
The main challenge is to convince everyone that sustainability is not just a passing phase, but a way to create a livable world for generations to come. A serious effort needs to be allocated into the various campaigns and be prepared to maintain the effort for a considerable period. To gain better traction, the sustainability message needs to permeate the society in all shapes and forms and at many levels.
6.1 Introduction
The University of North Dakota’s Climate Action plan focuses on several key green goals, including the reduction of emissions from on-campus energy production and the purchase of electricity from outside sources. The American College & University Presidents’ Climate Commitment (ACUPCC) goal of achieving climate neutrality cannot be realized without major investments in renewable energy technologies and a new dedication to energy conservation throughout the University community.

The production and consumption of energy at UND are the main sources of greenhouse gas (GHG) emissions on campus. On-campus stationary sources provide the campus with space heating, cooling, and water heating; electricity is purchased from outside sources to provide for lighting and other pluggable loads such as personal computers, classroom equipment, research equipment, and task lighting (1). The combination of on-campus energy production and purchased electricity were responsible for 80 percent of campus emissions in 2007. The steam plant on its own burns more than 55,000 tons of sub-bituminous coal annually to heat and cool the campus and surrounding entities (1). Coal-burning operations at the steam plant provide UND with a low cost energy source, but also contribute to about 62 percent of campus GHG emissions each year. Over the last decade, the steam plant has significantly improved its efficiency and these measures have helped to keep emissions in check. However, campus growth and the associated increase in energy demand have resulted in a 6 percent increase in on-campus stationary source emissions since 1993(1).

Another cause for concern is that emissions from purchased electricity have increased by 29 percent since 1993(1). UND has a fixed contract with Western Area Power Association which supplies the campus with 100 percent hydropower electricity; increases in electricity demand due to campus growth make the University more dependent on other power companies, such as Xcel Energy, which attributed about 14 percent of its fuel sources to renewable energy in 2007(1). This trend will continue as the campus continues to grow and expand its research activities.

6.2 Goals and Actions
There have been many ideas generated by the UND Sustainability Council’s Energy Subcommittee with the goal of reducing GHG emissions. This Subcommittee hopes to see projects undertaken that will be visible on campus and also noticeably reduce annual GHG emissions. This goal requires a combination of actions from relatively low-cost options such as policy and behavioral changes to more large-scale projects such as bringing in renewable technologies to displace fossil fuels.

<table>
<thead>
<tr>
<th>Source</th>
<th>1993 MTCDE</th>
<th>2007 MTCDE</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-campus stationary sources</td>
<td>80,691</td>
<td>85,588</td>
<td>6 percent</td>
</tr>
<tr>
<td>Purchased electricity</td>
<td>17,211</td>
<td>24,403</td>
<td>29 percent</td>
</tr>
<tr>
<td>Direct transportation</td>
<td>7,297</td>
<td>6,348</td>
<td>-15 percent</td>
</tr>
<tr>
<td>Commuting</td>
<td>10,937</td>
<td>9,785</td>
<td>-12 percent</td>
</tr>
<tr>
<td>Air travel</td>
<td>5,657</td>
<td>7,042</td>
<td>20 percent</td>
</tr>
<tr>
<td>Waste</td>
<td>2,587</td>
<td>2,219</td>
<td>-17 percent</td>
</tr>
<tr>
<td>Transmission and distribution losses</td>
<td>1,702</td>
<td>2,413</td>
<td>29 percent</td>
</tr>
<tr>
<td>Refrigerants</td>
<td>477</td>
<td>586</td>
<td>19 percent</td>
</tr>
<tr>
<td>Paper</td>
<td>237</td>
<td>246</td>
<td>4 percent</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>3</td>
<td>3</td>
<td>0 percent</td>
</tr>
<tr>
<td>Total Emissions</td>
<td>126,799</td>
<td>138,633</td>
<td>9 percent</td>
</tr>
</tbody>
</table>

Table 6.1: Percent change in emissions per source for 1993 to 2007
Goal 1: Secure New Funding for Energy Projects

Before most sustainability projects can be initiated, UND must identify additional sources of funding. Facilities Management is working with about $500,000 annually in energy grants and $2 million in FY 2010 federal stimulus money. More financial investment will be needed for significant changes to occur.

Relevant Actions

☐ Acquire a 1 percent revolving loan endowment through the alumni association to generate approximately $2 million for annual projects.

☐ Student-led green projects
  - Green Committee: UND Student Government is assembling a proposal for a permanent subcommittee of Student Senate tentatively called the Green Committee, comprising student senators and representatives from several groups including UND Facilities, the Presidential Council on Environmental Stewardship and Sustainability, the UND Department of Earth Systems Science and Policy, and interested student organizations. The Green Committee would be tasked with supporting renewable energy, energy efficiency, and other green projects in ways appropriate for student government.
  - Student Investment Fund: This project would take interest generated from Student Government investment in renewable energy and energy efficiency projects at UND and would provide a separate, continuing source of capital for new green projects at UND. It would be student-led with Student Government having the final say on whether the funds would be spent on a specific project. The funds would remain in place specifically for renewable energy and energy efficiency projects and could be used in conjunction with the Green Committee, possibly funding “green” projects as deemed suitable by the committee. It could also contain monies generated by a potential “green” student fee.
  - “Green” Student Fee: The “green” student fee would be a mandatory student fee assessed to incoming and continuing students by the Student Government for the purpose of funding “green” projects and activities at UND. This fee, which would be between $.50 and $2 per credit hour with a maximum fee of $24 per semester, could be allocated to the Student Investment Fund and/or Facilities Management and reserved specifically for green projects as determined by the Council, a potential Green Committee, and/or projects determined by the Student Senate, or some combination thereof.

☐ Steam retail price increase earmarked for carbon reduction projects
  - UND sells 18.6 percent to 27.6 percent of the steam it produces at the coal-fired steam plant to outside sources, such as Altru Health System. The emissions from that steam production are not attributed to UND, but they are greenhouse gas emissions nonetheless. UND should increase the retail rate it charges to the buyers of steam by $0.25/MMBtu, which would bring in an additional $60,000 per year. The money received from this rate increase should be earmarked for carbon reduction projects, with preference to projects that would reduce steam plant emissions. It could be
allocated via Facilities Management—or others as determined by the Council—to a specific fund, such as the Student Investment Fund or another green initiative fund.

Goal 2: Establish and Implement a Campus Energy Policy

Passing a Universitywide energy policy would set specific rules and guidelines to regulate efficient use of energy and electricity on campus and in campus buildings. The following actions would be essential in promoting behavioral change and complying with energy policy.

Relevant Actions

- Establish an energy task team in each building or department.
- Develop an energy cockpit: The energy cockpit would involve programming an online smart metering system that would connect each building on campus. Energy consumption and carbon emission data would be centralized and available to the public through the UND Energy and Sustainability Web page. Students and faculty in the Computer Science Department would collaborate with staff in Facilities to initiate and carry out design.
- Education and behavioral change: Actions designed to influence campus public relations, awareness, and behavioral change are covered in more detail in Chapter 5 and Chapter 7. However, implementing an effective energy policy would be instrumental in reshaping public perceptions and attitudes toward energy conservation and sustainability at UND.
- New building construction and remodeling
  - Energy efficiency guidelines should be established for new building construction and major remodeling projects. For example, under the energy policy, new buildings should be 30 percent more energy efficient and provide 2 percent on-site renewable energy.
  - Adopting LEED Certification could be considered.

Goal 3: Vending Machine Contracts

There is potential for energy cost savings associated with vending machine contracts. The University can not only reduce energy usage, but also energy cost, if vending machines are ENERGY STAR® certified and include VendingMiser® technology.

Relevant Actions

- UND could begin saving more than $26,550 per year in energy costs by implementing ENERGY STAR® and VendingMiser® technologies. Responsibility for continued energy costs and carbon output directly related to a more efficient system of distribution must then be directly assumed by the machine owners.
  - All future contracts should include the following provisions:
    1. The number of vending machines should be reduced to the greatest extent possible without undue hardship to vendors or their customers.
    2. All new machines—whether intended for replacement of existing machines or for new distribution points—should be energy efficient with regard to the inclusion of either internal or external on-demand, energy-saving devices.
    3. All existing machines should be retrofitted with on-demand, energy-saving devices at the expense of the machine owner.
    4. By 2012, the owners of vending machines will assume the direct financial and polluting-associated burdens connected to their machines. This assumption needs to include direct electricity bills, purchase of
carbon offsets, and/or any other future charges for carbon production whether mandated by the federal government or voluntarily assumed by the University.

Goal 4: Improve Energy Efficiency on Campus
Many changes can be made to avoid wasting energy and reduce UND’s carbon footprint. These projects are often referred to as “low-hanging fruit” and some tend to be among the most cost-effective options for reducing emissions. Energy efficiency projects and improvements can provide immediate results and have short-term paybacks, while building upon, and in some cases substituting for, behavioral changes. Energy efficiency projects have already offset an estimated 11.5 percent of would-be campus CO₂ emissions to date.

Relevant Actions
- Heat recovery on make-up air
  - Heat recovery units used to transfer sensible and latent heat from return air should be installed as part of heating and ventilation systems on all campus buildings.
  - High potential for energy savings and emissions reduction.
- CO₂ control of HVAC outside air
  - CO₂ control units should also be installed on HVAC systems for makeup air reduction.
  - High potential for energy savings and emissions reduction.
- Lighting motion sensors in hallways and restrooms
  - Sensored lighting controls should be installed in restrooms, hallways, and other areas not prone to constant human traffic.
- Building audits for energy efficiency
  - Hiring a consultant to carry out building audits would provide valuable information regarding effectiveness and return on investment associated with potential energy efficiency projects.
- Retro-commissioning and building renovation
  - Retrofitting and renovations can benefit the campus through improved energy efficiency, reduced emissions associated with energy use reductions, and energy cost savings..
- New building construction and remodeling
  - All new buildings and remodeling projects should be carried out in compliance with adopted energy policy and specified guidelines as mentioned in Goal 2.
- Water savings measures
  - Improve water efficiency, establish system for storm and grey water capture.

Goal 5: Develop and Produce On-Campus Renewable Energy
Climate neutrality will not be realized at UND without major technological advances and large-scale renewable energy projects. A growing number of constantly improving fossil fuel alternatives are now available for energy production, and UND should pursue all options through experimentation, research, and construction of renewable energy facilities. Many projects could have high capital costs but will prove to be valuable investments in the long-term due to the future cost of carbon, the benefits of energy independence, and the exhaustible nature of fossil fuels. In addition, renewable energy facilities will be highly visible and demonstrate UND’s leadership and commitment to sustainability.

Relevant Actions
- Retrofit boiler in steam plant to burn 10 percent biomass.
Existing boilers in the steam plant can be affordably retrofitted to be able to burn a blend of up to 10 percent local biomass with coal. Co-firing biomass offers a one for one emission offset for every ton of coal that is displaced. Co-firing biomass will become increasingly cost-effective as CO₂ costs increase. Creating a market for crop residues and energy crops will benefit the local economy. There is already a demand for disposal of wood waste to avoid brush pile burns on agricultural land. Biomass resource potential in the Red River Valley is extremely high.

- **Install wind turbines:** Install wind energy turbines to produce local, renewable electricity. Depending on funding, UND could install a single large turbine off-campus that would produce 1-2 MW; or it could install smaller turbines on campus, such as a 250 kW turbine, 160 kW turbine, or a small demonstration 10kW turbine. UND also could install a series of small wind turbines.

- **Install ground-source heat pumps (geothermal energy):** A ground-source heat pump is an electrically powered system that taps the earth’s stored energy to provide heating, cooling, and hot water. This can be installed on individual buildings. UND could also develop a medium-sized heat pump energy center, which would provide enough energy for a few buildings like the campus apartments. The university could also install a large heat pump energy center that could theoretically replace the steam plant with geothermal energy.

- **Install solar thermal energy:** UND should investigate utilization of solar thermal energy for hot water and steam, which could supplement and displace the use of coal-fired steam in several applications across campus. When economically viable, solar thermal should be utilized in the following projects: steam plant makeup water, ground-source heat pump well recharge, classroom/office buildings, cafeterias and food service buildings, swimming pools, campus apartments, new building construction and major remodels.

- **Develop a sustainability center west of campus:** UND could partner with the City of Grand Forks to build a sustainability center where the University could create renewable energy and process waste. The site could include a compost site, a recycling center for campus recyclables, and biomass production and storage. It could process waste from these centers, as well as other campus waste, in a gasifier, and the produced syngas could be burned in the natural gas boilers in the campus steam plant.

- **Produce a high diversity energy crop:** UND could offset some of its CO₂ emissions by producing an energy crop on campus-owned land. The Oakville Prairie property has potential to produce low-input—high-diversity grasses with considerable energy content. Managing a tract of prairie for perennial grasses would net one or two annual harvests, which would contribute to biomass resources that could be processed for use in the steam plant through grinding, pelleting, or gasification. On- or near-campus production would involve minimal shipping costs. Additional benefits would include a further offset by carbon sequestration in the roots of native grasses, valuable project and research opportunities for students, decrease in invasive species, and cover for wildlife.

- **Produce synthetic gas through gasification:** The campus steam plant has natural gas boilers that are used rarely, mainly because of the price difference between natural gas and coal. UND could reduce the amount of coal it consumes by burning synthetic gas (syngas) in these boilers, which it could produce with local feedstocks at the proposed sustainability center.

- **Burn low-carbon briquettes in steam plant:** The steam plant could reduce its carbon output by burning coal-based briquettes instead of raw coal. The briquettes are made by gasifying coal to remove the CO₂. They are formed into pellets and can be burned in traditional coal-fired boilers. There are questions about the true emissions reduction of the briquettes.
6.3 Challenges
There are many challenges ahead. Reducing energy consumption and greenhouse gas emissions must be the Council’s top priority, but effective sustainability projects are complex.

Energy reduction projects require extensive feasibility studies, foresight to weigh short-term and long-term consequences of decisions, additional funding for high capital costs, and long-term paybacks associated with major projects. Behavioral changes and awareness on campus can help to reduce energy consumption and take some of the pressure off of Facilities.

Expenses and other obstacles associated with energy projects cannot discourage the Council from pursuing all available options. Reaching the ACUPCC goal of becoming a climate-neutral campus requires immediate steps toward funding and initiating actions that will be effective in reducing GHG emissions from campus energy production and usage.
7.1 Introduction

Working in conjunction with several other departments on campus, the University of North Dakota Purchasing Department has several programs in place that support the University’s initiative to reduce the environmental impact of the activities at UND. The University has been recycling its electronic waste for several years with a licensed e-waste recycling facility and Dining Services has prioritized the use of local food sources where possible. This past year, the University initiated a program to purchase Green Seal Certified cleaning products for all facility maintenance and cleaning and the University started to use hand towels that contain 40 percent post-consumer recycled fiber. Most recently, Dining Services had Coca-Cola® increase the energy efficiencies of their vending machines—listed in 7.2—during 2009-2010 winter break

Several items will be researched and studied for feasibility. Many of these items present challenges to the University, particularly in terms of procurement. The Purchasing Department is responsible for all large purchases; small purchases are made by individual departments. Departments will need to be educated about new programs and policies, and they will need to be monitored to ensure success.

7.2 Goals and Actions

Goal 1: Vending Machines

Complete improvement to the energy efficiencies of vending machines. All of the Coca-Cola® machines were converted during winter break 2009 – 2010. The Pepsi-Cola® machines and University owned machines remain to be converted.

Relevant Actions

- Obtain Dining Services approval and support to convert the remaining machines.
- Coca-Cola® has been reluctant to make improvements to their machines. The University will need to negotiate with Coca-Cola® to receive their approval to convert their machines.
- Establish a project time line that is acceptable to the University and Coca-Cola®.

Goal 2: Recycled Carpet

Purchase recycled carpet for use in all new carpet installations rather than purchasing carpet that is manufactured from virgin raw materials.

Relevant Actions

- Test the quality and durability of recycled carpet.
- Obtain Facilities Management approval and support of the product.
- Create carpet bid specifications that include the requirement that the product’s manufacturing process includes reclaimed materials.
- Require vendors to take the University’s old carpet and reuse it in their manufacturing process.

Goal 3: ENERGY STAR® Certified Products

Develop a University policy which requires the purchase of ENERGY STAR® certified electronic equipment and products.

Relevant Actions

- Obtain Administration support to require the purchase of ENERGY STAR® certified products.
- Develop University policy that requires all purchases of electronic equipment to be ENERGY STAR® certified.
- Update bid template to reflect policy.
**Procurement**

- Inform the campus of the policy.

**Goal 4: Coreless Toilet Paper**

Purchase toilet paper that doesn’t have a cardboard core instead of toilet paper that comes with a cardboard core.

**Relevant Actions**

- Obtain Facilities Management approval and support of the product.
- Issue a bid and negotiate with awarded bidder to determine the product source.
- Deplete inventory of current product with core.
- Replace existing dispensers that do not accept coreless paper with new dispensers that are designed for coreless paper.

**Goal 5: Unnecessary Local Travel**

The University has a number of faculty and staff that leave campus each day to make purchases at local vendors. The goal is to design a system/policy that would limit the number of university employees that leave campus for the purposes of shopping at local vendors.

**Relevant Actions**

- Create a committee to review off campus travel.
- Obtain Administration support to limit off campus travel.
- Inform the University community of the review of off campus travel.
- Seek the input from the University community for developing the best solution.
- Decide the approach the University will take to address this problem.
- Test the new program with a pilot group of departments.
- Implement the new program once the pilot group test has been successful.

**Goal 6: Trashcan Liners**

Purchase trashcan liners that are biodegradable instead of can liners that are made from petroleum based resin that take hundreds of years to decompose.

**Relevant Actions**

- Obtain Facilities Management approval and support of the product.
- Issue a bid and negotiate with awarded bidder to determine the product source.
- Deplete inventory of current product.

**Goal 7: Beverage Vending Provider**

The University currently has a shared beverage vending contract with Coca-Cola® and Pepsi-Cola®. The goal is to negotiate an exclusive beverage vending contract with one of these companies.

**Relevant Actions**

- Obtain Administration support to have an exclusive beverage vending contract.
- Create a committee to work with the University community.
- Inform the University community of the desire to have an exclusive beverage vending contract.
- Seek the input from the University community.
- Decide if the University will solicit for an exclusive beverage vending contract.
- Issue bid for an exclusive program.
- Negotiate with awarded bidder.
- Remove competitor’s machines.
7.3 Challenges

There are a number of challenges that will need to be overcome for the University to successfully implement the stated goals. The University is a large campus and as previously stated the University operates a decentralized purchasing program. There are hundreds of individuals that have the authority to make purchasing decisions. It will take a sustained effort to educate these individuals of new programs and policies that come from this initiative.

Change at the University is often difficult to implement. A large population of the University staff and faculty has been at the University for many years. They have been doing things the same way for a long time and are often resistant to change. The student population has also been resistant to change when their convenience or product offerings have been changed. The University will need to work very hard to obtain the buy-in from the entire population for programs to be successful.

Budget concerns are an additional challenge that needs to be considered. Department budgets have not increased for a number of years; many department budgets have been reduced. The programs that provide a cost savings or are cost neutral have greater acceptance. Other programs, if implemented, will result in higher purchase costs for items. These programs will receive greater resistance from the University community.
8.1 Introduction
The University of North Dakota has an extremely vibrant recycling program in place. UND recycles aluminum, cardboard, glass, paper, some plastics, batteries, computers, light bulbs, printer cartridges, and some scrap metals. About 21 percent of waste materials are diverted from the landfill. Approximately seventy five percent of the landscape waste/leaves/grass clippings are mulched. Although these activities have been in place for numerous years, many constituents are unaware of the current UND recycling efforts. Increased awareness of current recycling programs will improve the landfill diversion rate.

Nonetheless, there are areas for improvement. Major reduction in deliveries to landfill can be achieved by reducing waste at the source. Areas for change include increasing the use of digital media, installing air-dryers in the restrooms, developing an end-of-the-academic-year cleanup program, and composting kitchen waste. Additional information relevant to reducing landfill waste is included in the Procurement chapter.

8.2 Goals and Actions

Goal 1: Campus Garden
Ability to produce products locally that can be used in Dining Services to supplement or decrease the use of products shipped to North Dakota from distant locations.

With the recent emphasis on sustainability, organic farming, eating healthy and sourcing locally grown food products the consideration for a campus garden should be addressed. A campus garden could tie sustainability concerns and healthy eating concepts together.

The goal of the project would be to start and maintain a garden for UND Dining Services. Fresh herbs and vegetables produced in the garden would be used throughout UND Dining Services, providing fresh, locally produced products to the UND community. Excess product could be utilized by UND organizations or donated to local food banks.

One of the benefits of this project is the promotion of healthy eating on campus by offering locally grown, organic products. Another benefit is the building of community by working with different student groups for the planting and harvesting of the products. It will also benefit by giving back to the UND/local community of any surplus products.

Relevant Actions
- Convert a portion of current flower beds to vegetable and herb gardens
- Work with Grand Forks Health Department for compliance with local and state health codes
- Work with safety office for security and other issues
- Work with facilities on pest control
- Work with students and other UND groups for planting/maintaining/harvesting

Challenges
- Short growing season
- Meeting purchasing regulations and health codes
- Security of the garden

Goal 2: Local Biodiesel Process
Environment/Recycling

Create a local biodiesel processing facility on UND using discarded frying oils and other food product grease from UND Dining Services and community establishments.

As America seeks to curb its dependence on foreign oil, scientists have announced their support for biodiesel as a fuel alternative that will help reduce the nation’s reliance on petroleum. Biodiesel is a clean-burning alternative fuel, produced from domestic, renewable resources such as plant oils, animal fats, and used cooking oils. The technology already exists and is being used on several college campuses across the United States. Most campuses make biodiesel by chemically converting used cooking oil from UND dining facilities.

Partnerships with the Energy and Environmental Research Center (EERC) could develop this process for the greater Grand Forks area. Providing an outlet for community establishments to dispose of used grease and oils will help achieve goals of the city to reduce these products ending up in storm drains and other environmentally sensitive areas.

The end product could be used to power lawn equipment during the summer at UND. On some campuses it has been used to power buses and garbage trucks, resulting in a decreased use of petroleum based diesel fuel.

Relevant Actions

- Identify people and resources that are knowledgeable in the process to guide the implementation
- Partner with community establishments to utilize their waste products to increase cost effectiveness and available end product

Challenges

- Identifying the location for the bio-diesel processing facility
- Management of the facility
- Pick up and transportation of the used oils and greases

Goal 3: Composting of Campus Organic Waste

Develop a process to compost the post-consumer biodegradable waste generated at UND.

Composting is the process by which organic materials such as grass, tree, and kitchen waste are decomposed into a dark colored, nutrient rich soil-building conditioner called humus. Composting is an excellent way to recycle organic waste and reduce landfill volume. The composting process is a biological process that can be accelerated by controlling the temperature, oxygen and moisture content.

There are several different methods of composting. One of the most efficient is an in-vessel system where organic waste is composted in an enclosed reactor. The composted waste could be used on campus as a fertilizer for the many flower beds and gardens across campus. It would also decrease the amount of waste being delivered to the landfills reducing costs to the institution.

Relevant Actions

- Develop a process for collecting and composting biodegradable waste on campus.
- Purchase the appropriate size and number of in-vessel composters to handle the waste.
- Develop a plan for utilization of humus end product.

Challenges

- Transportation of waste to composting site.
- Storage of composted end product.
- Location of composting unit since these are designed to be located indoors.
Environment/Recycling

Goal 4: Recycling Ink Cartridges in Halls
Increase awareness of the ink cartridge recycling program not only in residence halls but across campus.

As the classroom becomes more technologically advanced, students are increasingly using personal printers in the residence halls. The majority of the printer cartridges then end up in the garbage. Once they are in the landfills, the ink from the printer cartridges decompose and emit green house gasses. In addition, the plastic casing of printer cartridges take about 1000 years to fully decompose.

This program has already been started in the residence halls. The Association of Resident Halls Recycling Board collects the printer cartridges and recycles them through the OfficeMax’s THINK program. Awareness of the program will be a key component in its success. The awareness should also be spread to all areas at UND that use printers so they can be disposed of properly also.

Relevant Actions
- Implement a program in the residence halls and computer labs to recycle printer cartridges
- Provide collection bins in each hall/building on campus
- Develop a communication/marketing plan to promote the program

Challenges
- Getting students to actively participate in the program
- Implementation in other UND offices and buildings

Goal 5: Enhance Campus Awareness of Current Recycling Program
Enhance UND awareness of current recycling program and how they can participate and benefit from the program.

UND has a comprehensive recycling program that has been active for many years. UND recycles paper, plastics (types 1 through 7), aluminum, tin/steel, cardboard, batteries, printer cartridges and special collections. These programs are done in cooperation with all divisions of campus.

Communication of the recycling programs and efforts at UND has been limited in the past. Promotion of efforts and results need to be expanded. The communication needs to explore a variety of methods for delivering the message.

The benefits of increasing awareness will: protect natural resources, reduce litter, preserve landfill space, promote jobs and conserve energy.

Relevant Actions
- Identify methods of delivery to increase the awareness of recycling programs
- Highlight and celebrate success of UND in relation to recycling programs it participates in
- Develop an promotional campaign for increasing awareness

Goal 6: Replace paper towel dispensers in all restrooms
Replace paper towel dispensers in all restrooms with electric hand dryers.

The use of paper hand towels in restrooms across UND creates approximately 72,187 pounds of waste that ends up in the landfill. During a one year period, 1,875 cases of rolled paper were purchased for a total cost of $85,200. By installing electric hand dryers the University would be able to reduce costs of paper towels and the amount of waste being transported to the landfill.
Environment/Recycling

While there would be costs related to the purchase, installation and operation of the electrical hand dryers, they would be partially offset by the savings of not using paper. Custodial maintenance of the restrooms would also be reduced. The spread of bacterial and other harmful substances will be reduced by use of the electrical hand dryers.

Relevant Actions
- Develop an implementation plan for the purchase and installation of the hand dryers across campus.
- Develop a phase out plan for the removal and disposal of the paper towel dispensers.

Goal 7: Encourage the Use of Digital Publications
Encourage all UND departments to review their printed publications and make decisions on changing to digital publications.

Every day at UND printed publications are delivered to individuals, offices, and departments. These include academic journals, professional organization publications, trade magazines, catalogs, and advertising materials. In many cases multiple copies of the same item are delivered to the same office/department. Many of these publications are available online.

By encouraging the use of digital versions, less paper will be used for publications and less paper ends up in landfill if not recycled.

Relevant Actions
- Departments should review the publications they receive and determine whether they’re available online.
- The Chester Fritz Library should review its licensing and procurement of digital publications for public use.
- Investigate whether the technology infrastructure could handle electronic delivery of multiple digital publications.

Challenges
- Academic departments have reported difficulties in receiving e-mail publications and documents under the current U-mail system.
- Balancing the need for personal copies of a publication as it relates to academic work to multiple copies in a department.

Goal 8: Remove Air Fresheners from Campus
All air fresheners in UND buildings will be removed to prevent triggering symptoms among people who have MCS (multiple chemical sensitivity).

MCS is a sensitivity or allergy-like response to air-borne chemicals such as air fresheners, perfumes, aftershaves, and smoke and other contaminants. Reaction can vary greatly from individual to individual based on their sensitivity levels. The reactions can be severe and symptoms usually disappear when the trigger is eliminated.

Relevant Actions
- Remove the air freshener systems/equipment from all buildings.
- Eliminate the use of these systems and other that emit air pollutants.
Environment/Recycling

**Goal 9: Tunnels, walkways, and other building connections**
Coordinate the addition of new walkways and tunnels to connect building with the campus master plan. These sheltered walkways can encourage physical exercise. They could also reduce the amount of automobile traffic on campus.

**Relevant Actions**
- Consult a pedestrian traffic expert to determine the best locations on campus for additional building connections.
- Work with campus master plan to determine when/if these should be constructed.
- Work with other sub-committees on their recommendations of this issue.

**Goal 10: Spring Cleanup Program**
Develop a community-based committee with members from the UND Facilities, UND Housing, Public Works, Northlands Rescue Mission, and other non-profits and churches from the greater Grand Forks area to initiate a spring cleanup program.

At the end of the academic year, students are moving out of their residence halls and apartments. Reuseable and recyclable materials are often thrown into dumpsters for transfer to landfill.

**Relevant Actions**
- Establish a working committee to develop and coordinate a cleanup program.
- Create a list of locations taking donations that can be communicated to students and housing staff.
- Create a list of volunteers with vehicles willing to pick up large items.
- Provide additional collection bins near campus housing for recyclable items: paper, plastic, aluminum, batteries, electronics, and items in good to excellent condition.
- Provide volunteers near exits and collection points to answer questions and direct students to appropriate drop off locations.

**Goal 11: Big Belly Trash Compactors**
Install up to five Big Belly trash compactors in high traffic collection areas.

Big Belly Solar trash compactors are self-powered by solar energy and use the same amount of space as regular-size trash receptacles, but can handle five times the trash intake and compacts at the point of disposal. This reduces collection trips and greenhouse gas emissions. Additionally, the unique design eliminates issues with overflow and collected rainwater/snow.

Reduced transportation costs and labor costs would happen due to fewer pickup times being needed. The initial investment is costly, but the product can provide a 62 percent savings by reducing labor, fuel for pick up and harmful emissions.

**Relevant Actions**
- Determine location for units.
- Order based on projected usage.
- Facilities would be involved for collection/maintenance.

**Challenges**
- Maintaining access to the compactors in winter when they may be blocked by snow and ice.
- Initial investment is costly.
Goal 12: Recover and Recycle Usable Materials
UND will implement a process to recover and recycle 100 percent of the reusable materials from construction, renovation, and demolition projects.

UND has a recycling/recovery program in place for construction, renovation, and demolition projects. During Fiscal Year 2009, about 41 tons of waste metal was recovered from construction, renovation, and demolition projects. UND does not require contractors to recycle/recover construction waste.

Relevant Actions
- Request for proposals, bids, and contracts for capital projects should include language requiring the successful contractor(s) to recover and recycle usable construction, renovation and demolition waste.
- UND will need to develop a process to track the quantity of material recovered or recycled.
- UND will need to develop a process to track and insure contractor compliance.

Challenges
- Requiring contractors to separate recoverable materials into separate dumpsters could increase labor costs to the contractor resulting in increased capital project costs to UND.
- The need for multiple dumpsters at the construction site will require additional space.
- Additional costs added to capital projects.
- UND may need to further separate recyclable prior to delivery to the recovery center.
- Additional UND labor to sort and transport material.

8.3 Overall Challenges
Many of the projects listed in the recycling section will require additional resources, both money and human resources to accomplish. At the time of this report, funding has not been identified. Items such as composting, solar-powered waste compactors, biodiesel processor, air hand dryers, and the addition of tunnels and covered walkways will require large amounts of capital to implement.

The development of a compost site and a biodiesel processing facility should encompass the community of Grand Forks. Although a closed-vessel system was suggested in section 9.2 Goal 3, an aerated static pile or aerated windrow system at the Grand Forks community level would provide for additional composting opportunities. The in-vessel system suggested in section 9.2 Goal 3 will allow only for the composting of kitchen waste from food services. A larger community-based system could possibly allow for the inclusion of biodegradable disposable food carryout containers and other waste.

Food services alone may not generate sufficient quantities of waste oil to support a biodiesel processor. Furthermore, as food services migrate towards healthier food selections, fewer items will be fried, resulting in less waste oil available for processing. During the 2008/2009 academic year, food services purchased approximately 23,905 lbs of frying oil. A considerable amount of the oil was absorbed into the food products during the frying process, so not all of the oil purchased would be available for biodiesel. A biodiesel processor should be large enough to incorporate Grand Forks community food service establishments into the process. A third-party vendor supplies the waste storage vessels and transport trucks. Any approach, either UND stand-alone or community-based would require resolving the acquisition of waste storage vessels and transport trucks.
9.1 Introduction
Transportation-related emissions account for 17 percent of UND’s total emissions, and 28 percent of overall energy use. While exactly determining the energy consumption and greenhouse gas emissions from transportation sources remains a moving target, reducing both is a vital part of complying with our Campus Climate Commitment. By definition, transportation includes many distinctly different activities, and consequently measuring, targeting, and assessing various transportation modes remains difficult. However, reasonable efforts and cost expenditures will result in a significant decrease in transportation-related emissions and energy use.

Potential action areas in the transportation sector at UND include promoting human powered transportation, encouraging the use of public transit, improving infrastructure, implementing carbon offset programs, and exploring alternative energy sources. Achieving the identified goals will require change from the current norms, some more than others. Since most people do not readily welcome change, successful implementation of certain goals may require gradual implementation, incentives, announcements, or education for successful implementation.

Specific implementation strategies are included with the actions for those goals.

9.2 Goals and Actions

Goal 1: Incorporate carbon offset program into parking permits
The Red River Valley and surrounding region were settled only after the wide-spread introduction of long-haul transportation systems. Starting with Red River carts pulled by oxen, then steamboats, trains, and finally highways, the region is dependent on private vehicles for personal transportation. Since the city bus system is the only alternative to personal vehicle use, offsetting the emissions produced by personal vehicle use is necessary. This goal is quite cheap, working out to a cost of only $8 per parking pass holder, and the effect will offset nearly half of UND’s transportation emissions.

Relevant Actions
1. Research available carbon offset programs, including commercial ones such as TerraPass and CarbonFund. UND could also explore investing in local reclamation projects such as wind farms in North Dakota.
2. Purchase approximately $100,000 of offset credits, which would offset 10,000 tons—half of UND’s transportation related emissions—of carbon dioxide.
3. Charge the 13,000 parking permit holders approximately $8 per person to recoup the cost of the offset credits.

Goal 2: Implement a carbon offset program for the UND aviation fleet
UND Aerospace is a world-renowned leader in the field of collegiate pilot education, and uses state-of-the-art aircraft simulation and physical aircraft technology. However, the use of training aircraft still produces a disproportionately high amount of greenhouse gas emissions because aircraft engines cannot use traditional pollution control measures. Until a viable alternative is certified for use, the most feasible solution is to offset the approximately 5,000 tons of carbon dioxide produced annually by UND aircraft.
Transportation

**Relevant Actions**
1. Research available carbon offset programs, either commercially available programs or regional and local projects.
2. Purchase approximately $50,000 of offset credits, which would offset the 5,000 tons of carbon dioxide produced by UND aircraft.
3. Determine how to apportion the cost of the offset credits, whether to apportion them to the University as a whole, UND aviation students, or some other way.

**Goal 3: Expand Shuttle Bus Service**
UND’s campus shuttle serves 29 stops 3-4 times per hour during the day, and 15 stops 3 times per hour at night. Research indicates that in order for people to consider switching from personal vehicle use to bus transit service, the service must run at a frequency of no less than one bus every five to six minutes. By increasing the service frequency, students, faculty, and staff will be far more likely to use the shuttle, since the time savings for driving a personal vehicle on campus would no longer exist.

**Relevant Actions**
1. Purchase several additional shuttle buses, preferably of hybrid design, enough to approximately triple the current level of service. Additionally, more maintenance personnel and operators will be needed. This will cost approximately $800,000 up front, and will also require about a three-time increase in shuttle bus operating costs.
2. Increase appropriated funding for the service. Although a user fee could be instated, that would detract from the goal of maximum use of bus transit and reduced use of personal vehicles.
3. Improve bus shelters. Semi-enclosed structures are necessary, at a minimum, to ensure the goal’s success, given North Dakota’s climate. This will cost approximately $1-3 million.

**Goal 4: Convert state fleet vehicles to hybrid vehicles**
Nearly all of UND’s vehicles are powered by traditional gasoline or diesel engines, which produce 7% (1,600 metric tons) of UND’s total greenhouse gas emissions. Although modern gasoline engines are much cleaner than they were even a decade ago and diesel fuel is still the most energy efficient fuel per unit mass, eventually shifting to biodiesel-powered or hybrid vehicles would comport with UND’s Campus Climate Commitment.

It is important to note that discarding a functional, reliable diesel- or gasoline-powered vehicle with usable service life still remaining and replacing it with a hybrid or alternative fuel vehicle results in more aggregate pollution and greenhouse gas emissions than continuing to use the old one, because materials extraction, shipping, and manufacturing produce more pollutants and greenhouse gases than the vehicles emit in use in most cases. The adage of "penny-wise and pound-foolish" applies in this context especially. Nonetheless, as UND’s fleet is replaced over time, moving to hybrid vehicles will reduce energy use and emissions.

**Relevant Actions**
1. Research and identify hybrid vehicles appropriate for use at UND.
2. Perform a cost-benefit analysis to determine whether current hybrid technology will help significantly reduce UND’s fossil fuel use and greenhouse gas emissions.
3. Adjust vehicle purchasing plan in accordance with research results.

**Goal 5: Implement a student car sharing program on campus**
Transportation

A simple, effective way to encourage students to reduce their use of personal vehicles and also their carbon footprints is a car sharing program on campus. Several college campuses around the U.S. have implemented such programs with much success, seeing benefits such as reduced parking pressure, less traffic volume on campus, and positive feedback from students for their contributions to greenhouse gas reduction.

One example of such a program, ZimRide, is a Facebook application that allows users to coordinate carpooling and share personal vehicle use. It’s published mission sums up its program nicely: "For too long we have driven our cars with empty seats. Zimride is a simple way to find friends, classmates and coworkers going the same way you are. Combining social networks and our proprietary route-matching algorithm, we’ve made it easy to share the seats in your car or catch a ride. Zimride empowers you to create social, sustainable and convenient transportation."

Relevant Actions

1. Survey student population to determine enthusiasm for such a program.
2. Determine how to fund such a program. Start up fees would be approximately $10,000, with an additional yearly administration fee of $2,500.

Goal 6: Expand bicycle lanes on campus

UND has striped bicycle lanes on both sides of University Avenue, and a dedicated cycle path running North from Wilkerson dining center to Gateway Drive along the English Coulee. Additionally, bicycle trails connect both the East and West sides of campus with other bicycle paths in Grand Forks. While these perimeter and through trails and lanes nicely connect campus with Grand Forks, a dedicated network of bike lanes on campus would facilitate more bicycle use and less car use on campus by students and employees.

Although bicycles can use the same roads as vehicles, and indeed must follow the same rules as cars, many potential bicyclists feel intimidated by the dominance of cars on the roads on campus. Additionally, those who do bicycle between locations on campus sometimes ride the wrong way on streets or endanger pedestrians by riding too fast on sidewalks. A dedicated system of bike lanes or markings would help solve these problems.

Relevant Actions

1. Paint “sharrows” (pavement markings indicating a shared car/bike lane) on secondary streets around campus. This would cost approximately $10,000.
2. Identify locations where bicycles frequently go that are not signed or marked.
3. Paint dedicated bicycle lanes on those locations, such as behind the Memorial Union, near the Wellness Center, or near Campus Place residence hall.

Goal 7: Improve bicycle parking infrastructure

UND provides numerous bicycle parking racks around campus for most of the year. While current bicycle parking capacity is adequate when measured by total number of spaces available, the geographical demand for spaces varies and is sometimes inadequate at certain places at certain times, and some buildings on campus do not have bicycle parking available.

Research indicates that many bicycle parking facilities are poorly planned. Simply purchasing additional bike parking racks is not enough. A coherent system of choosing a site, choosing the appropriate equipment, and managing it effectively is key to encouraging frequent bicycle use on campus.

Relevant Actions

University of North Dakota Climate Action Plan
Draft Revision: 2/10/2010
Transportation

1. Revise procedures for removing bicycle parking in mid Fall semester. While snow removal operations complicate matters, the effect of moving the racks away strongly discourages bicycle commuting for many months when bicycling would be a viable option.
2. In non-winter months, ensure bicycle racks are placed within 15 meters (50 feet) of popular destinations to encourage bicycle commuting.
3. Measure bicycle use by traffic count after the adjustments. If a positive effect is indicated, purchasing additional racks or upgrading the current class II racks may be indicated.

**Goal 8: Promote walking, biking, and public transit use by economic incentive**

One of the ways to encourage greater pedestrian, bicycle and public transit modes of commuting to, from, and around campus is by economic incentive. The costs of car ownership and use are quite high, but appear necessary at first glance. By increasing the perceived economic value of traveling by foot, bicycle, or transit, a perception shift and consequent change in behavior may be encouraged.

Accomplishing that perception shift by offering direct economic incentives to pedestrians, bicycle commuters, and transit users can encourage more sustainable behavior. The incentives themselves can appear anywhere along the spectrum from direct cash payments to intangible fringe benefits. For example, incoming freshmen could be offered a choice of either bringing a car to campus with the reminder of the attendant costs (fuel, parking, maintenance, window-scraping in winter, etc.) or a direct cash payment of $500 per semester to not bring a car to campus instead.

**Relevant Actions**

1. Survey students, faculty, and staff to determine the most effective incentive program.
2. Allocate funding for incentive programs.
3. Implement programs, complete with a system to ensure program compliance and avoid “free riders.”

**Goal 9: Implement free bike program for UND**

UND has experience implementing and operating a free bike program. However, the initial cost barriers, lack of ongoing program funding, and student attitudes have combined to overwhelm the program.

Several cities and campuses have successfully implemented free bike programs, and a similarly well-designed program at UND would increase bike commuting and reduce greenhouse gas emissions on campus. Research indicates that the ingredients for success appear to be a minimum density of about one bicycle for every 100 people, durable equipment, accessibility, and a tracking system to discourage theft. UND would be able to meet the minimum density by purchasing 100 bicycles.

UND students, faculty, and staff would use their UCard to check out a bicycle. Generally, the first half-hour is free, followed by a nominal charge per hour after that. The check-out program also discourages theft by holding an amount of credit in escrow until the bicycle is returned. Several stations would need to be placed around campus for the system to be usable. Generally, stations should be no further apart than 300m (1000 feet). Stations placed at the Union, near Gamble Hall, at Wilkerson Dining Hall, the Wellness Center, and at Aerospace would suffice, with perhaps a few more strategically placed around campus as well.
Transportation

Relevant Actions
1. Purchase 100 bicycles.
2. Install stations at strategic locations around campus at a cost of $250,000.
3. Maintain bicycles and track and recover lost or stolen bicycles. The cost of this is highly variable.

Goal 10: Promote Nordic skiing on campus
UND is uniquely suited to promoting Nordic skiing as an integral part of campus life. In addition to encouraging healthy activity and human-powered transportation around campus, skiing is an enjoyable activity for many people. The weather conditions from late December to early March guarantee a reliable snowpack, and the flat terrain of our prairie campus make skiing a highly efficient and relatively effortless way to travel.

Relevant Actions
1. Mark and maintain trails, such as the English Coulee trail and associated greenway and the long grassy space running alongside the railroad tracks to the South and West of campus. Connector trails would be maintained as well. Signage is necessary to prevent trails from being trampled by pedestrians. Finally, laying special plastic crossings over sidewalks would provide a surface that is simultaneously traversable by pedestrians and skiers.
2. Provide places to stow skis at destination points. These could be similar to the bicycle racks, or designated places indoors. The cost of the racks would be approximately $10,000.
3. Provide skis and gear to students if demand warrants.

Goal 11: Convert University Avenue to pedestrian mall with bus transit access
The most ambitious program by far regarding transportation on campus would be a conversion of University Avenue into a pedestrian mall with bus and bike access. While clearly controversial, such a program would positively improve the character of campus. Much research has been performed on the effects of a through street’s characteristics and speed limit on a neighborhood’s character, and generally the more cars and the faster the speed limits the more the neighborhood feels like an empty space—best used only for getting from point a to b as quickly as possible. Conversely, once a neighborhood’s streets are calmed or converted to multi-modal use and car use is restricted, it becomes an organic, livable place where humans interact.

Where it passes through UND, University Avenue’s speed limit varies from 30 miles per hour to 20 miles per hour. Both are too fast to safely mix pedestrian, bicycle, and car use safely. The road acts as a barrier; a humanity-free zone that divides campus in half. The University has tacitly acknowledged that by building pedestrian overpasses.

Although it seems counterintuitive that closing a road would reduce traffic on other nearby roads, closing University Avenue during business hours would likely result in a reduction in traffic around the perimeter of campus, since most traffic near a college campus (measured between 25-90 percent, depending on the time of day) is actually looking for parking. Homeowners would likely perceive a decrease in traffic volume around the perimeter of UND, since drivers would be less likely to use their cars multiple times during the day and need to drive around looking for parking. Through traffic would be re-routed to Demers Avenue.

Of course, an environmental impact statement and other research would need to be done to measure the potential impact of such a large-scale project. Planning would to take into account a number of situations, such as the ability to allow emergency vehicle access.
The benefits of such a project lie in improving the quality, livability, and feel of campus and in directly reducing greenhouse gas emissions by discouraging personal vehicle use on campus.

Relevant Actions

1. Consult with urban planning engineers to determine scope and feasibility of project.
2. Perform environmental impact study.
3. Begin planning and executing project, start with Centennial Drive.

9.3 Challenges

Securing adequate funding is essential for any of the goals listed above. While some are modest in scope and provide real benefits in energy use and emissions reduction, the more ambitious projects will require a financial and institutional dedication to the ultimate goal of eliminating UND’s greenhouse gas emissions.

Securing student, faculty, and staff buy-in is crucial for the success of any or all of the goals. Resistance to change is inevitable and open hostility to some of the projects likely. Transparency, open communications, and administrative fairness towards the end goal of the Commitment should never be in question.
10.1 Introduction
The University of North Dakota (UND) has a special obligation to meet the challenges of sustainability for three interrelated reasons. First, as educators we play a leading role in training the scientific, social, political and cultural leaders, professionals, and policy-makers who will make a difference in the world. Second, we consume significant resources on campus. Third, ultimately the knowledge and skills our students learn at UND will be integrated in their future behaviors in the workplace and hopefully in their personal values.

Through implementation of the goals and actions proposed, UND hopes to educate 100 percent of the campus (students, faculty, and staff) about the sustainability plan and how each person, department, and entity does or can play an active role in achieving climate neutrality. UND also intends to communicate its sustainable actions, progress, and leadership to outside audiences including Grand Forks, surrounding communities, and the region as well to the national and international audience of potential stakeholders.

10.2 Goals and Actions

Goal 2: Marketing
Educate the campus and community about accomplishments and how everyone can practice sustainable behavior continually.

Relevant Actions
Develop a comprehensive communication and marketing plan in order to educate the appropriate audiences of outreach opportunities which include, but are not limited to the following:

Campus:
1. Create a Sustainability ListServ to communicate updates, questions, and comments among folks involved and interested in sustainability topics. Moderator to be identified and listserv set-up required similar to Healthy UND moderated list serv.
2. Quarterly E-newsletter about progress of goals to be developed and distributed by Sustainability Coordinator or Sustainability Council.
3. Utilize U2 and other campus training centers to offer education on sustainability topics as requested.
4. Utilize existing campus accounts and/or develop new accounts if needed on Facebook (fans of Green UND), Twitter, YouTube, iTunes podcasts, RSS feeds, to share information, create challenges, and post pictures of events on the UND Flicker account. This would require a student to set up and maintain the Facebook and Twitter accounts. Student/staff effort and time will be needed to promote and advertise these pages to build member “following.”
5. Sign the Earth Charter www.earthcharter.org to use as an instrument for assessing progress toward the goal of sustainability.
6. Develop short videos to show current projects and progress on Climate Action Plan on Facebook and other electronic formats.
7. Recruit campus sustainability champions (staff, faculty and students) to work on various yearly projects.
Outreach

Community:
1. Develop a committee to host an Earth Charter Community Summit
   www.earthcharterusa.org to explore how to use the Earth Charter and apply its
   principles in the local community.
2. Identify meeting dates and locations for quarterly city and campus committee
   meetings to collaborate planning and actions
3. Expand sustainability champion base to include community sustainability champions
   who could provide classes such as composting and healthy yard care, healthful
   practices such as moderate exercise, and related subject areas such as reducing
   hydrocarbon usage and air pollution, and how to save money by being green.
   Showcase innovative inventions that demonstrate green principles and allow
   community members try the equipment.

Sustainable Programs/Campus Events:
1. Provide additional outreach for RecyleMania effort on campus annually
   http://www.recyclemaniacs.org/overview.htm (see Appendix IV for details) to
   encourage education and outreach of effects of recycling in a friendly competitive
   mode.
2. Expand Earth Day into a week of activities by developing a committee and various
   projects programs to highlight during the week.
3. Include sustainable activities in The Big Event (an existing volunteer program for the
   campus)

Goal 2: Commitment Strategy
Implement a campus-wide UND Commitment Challenge.

Relevant Actions

☐ Administer challenge as a pilot study (perhaps with the assistance of an academic course).
   Include any UND employee or student interested in participating (likely drawing the campus
   community with high pro-environmental interest).
☐ A pre-test will be on-line to gather baseline environmental behavior. This will include answering
   an inventory of options for recycling and energy reduction. After this is complete, the
   participants will make a signature commitment to proceed with the challenge for four weeks.
☐ Allow participants to blog about their progress on sustainable initiatives.
☐ Send weekly reminders of the commitment as well as motivational tips and tracking form.
☐ Include incentives to maximize participation levels. Repeat in fall and spring semesters.

Goal 3: Pledge Strategy
Create group pledges to increase environmental stewardship at UND, since a commitment is stronger
for those making a group-based pledge than those making an individual-based pledge. A sustainability
coordinator, student intern, or class can monitor the pledge.

Relevant Actions
Outreach

- Add an online group pledge form on the UND Web site that is available for students, faculty, and staff to sign (online) specific to one commitment they would make for a semester to reduce energy usage and decrease their carbon emissions. Incentives would be given if individuals signed commitment with partner to hold him/her accountable.
- Staff and faculty implement their commitment to their workstation (on campus) or in their homes and students implement the pledge within their residence halls, housing, and across campus. Each group/team reports weekly via the on-line blog of their successes and barriers to fulfilling their commitment.
- Add a hyperlink from the UND Sustainability Web site to connect to the larger Grand Forks City initiative, “Doing Our Part” Pledge, which can be found online at the following Web site: http://www.grandforskgov.com/gfgov/home.nsf/Green3Pledge!OpenForm.
- Success is measured by percentage of campus that makes a pledge each semester. Periodic online reminders will be sent to staff and students to remind them of their pledge.
- Award prizes to campus members who commit to pledge.

**Goal 4: Sustainability Coordinator**

In order to demonstrate its increasing commitment to this effort as well as to maximize the collective efforts of the University faculty, staff, students and partners, it is necessary to invest in a Sustainability Coordinator. This is a position that would manage UND’s Climate Action Plan, aggregate the University’s diverse efforts, coordinate functions and resources, and seek opportunities such as national and state funding and/or awareness-raising awards. In a climate of decreasing resources and increasing demands of University staff, the proposal of this office/position could be completely funded by savings from energy reduction and sustainability programs initiated or coordinated through this office. Forming a center/office and/or position would allow a focused effort toward promoting sustainability practices and ultimately executing the climate action plan. The typical job description for this position is outlined in Appendix #. By creating this center/office and/or position The University of North Dakota would be taking a leadership role through practicing sustainable development and instilling sustainable development values in its graduates and employees.

**Relevant Actions**

- Acquire funding to hire a coordinator or open an office. Estimated costs are: $90,000 annually [$45,000 salary; $15,000 benefits; $5,000 Administrative; $22,000 Marketing/Outreach and $3,000 Training/Travel].
- Decide to whom the coordinator/office should report. (Suggestions include the Vice President for Student and Outreach Services or the Vice President for Finance and Operations.)
- Support Sustainability Ambassadors, who serve faculty and staff, and Peer Educators, who serve the student population. Often programs that promote behavior change are most effective when they are carried out at the grassroots level and involve direct contact with people. While a program of this nature would depend strongly on the zeal of its volunteers, it would need the fundamental support and strength to be provided by the efforts of a Sustainability Office and/or Coordinator in order to sustain as a program.

**10.2.1 Implemented Actions**

Once the council formulated the Climate Action Plan, it was clear that the University needed a Web site to reflect the goals and actions of the University. UND has created a Web site and is continually making
improvements to make the Web site attractive and interactive. The Web site is found at http://www2.und.edu/our/sustainability/index.html.

UND and the city of Grand Forks continue to work closely together and representatives from their respective entities work with each other’s organizations (UND's Council on Sustainability and Mayor Brown's G3 Community Resource Committee and City Green Team). This collaboration results in greater opportunities to align resources and focus on shared goals. It is also an opportunity to market and implement plans of climate neutrality in a way that will position the campus and community in the forefront of national and international awareness in the sustainability and energy fields.

10.3 Challenges

Without a sustainability coordinator—or at least a designated office in charge of sustainability measures—it could fall to volunteers or existing staff to do this work. This might slow the work that needs to be done to effect the necessary long-term changes.

A shortage of funds may lead to inadequacies; however, fewer resources may spark more creative ways of marketing. In addition, all outreach efforts should be as sustainable as possible and encourage paperless options where most effective (which can be the more expensive option). Identifying behavioral changes may be challenging if we are unable to collect and evaluate the proper data. Increases in recycled material and lower MTCDE emitted will help determine whether or not the initiatives are successful. The sustainability coordinator can track the University’s awareness of the initiatives through questionnaires that will help the University understand what marketing concepts are and are not working.
Acknowledgements

Council for Environmental Stewardship and Sustainability

<table>
<thead>
<tr>
<th>Council Member</th>
<th>Membership Status</th>
<th>Title, Department</th>
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</thead>
<tbody>
<tr>
<td>Robert Kelley</td>
<td>President of the University of North Dakota</td>
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<tr>
<td>Alice Brekke</td>
<td>Vice President for Finance &amp; Operations</td>
<td></td>
</tr>
<tr>
<td>Larry Zitzow</td>
<td>Co-Chair</td>
<td>Director, Facilities</td>
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<tr>
<td>Martha Potvin</td>
<td>Co-Chair</td>
<td>Dean, College of Arts &amp; Sciences</td>
</tr>
<tr>
<td>Randall Bohlman</td>
<td>Steering Committee Member</td>
<td>Technology Advancement Coordinator, Facilities</td>
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<td></td>
<td>Sub-committee Chair, Energy</td>
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<td></td>
<td>Climate Action Plan Chair</td>
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<tr>
<td>Yvette Halverson</td>
<td>Steering Committee Member</td>
<td>Director of Wellness Facilities, Wellness Center</td>
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<tr>
<td></td>
<td>Sub-committee Chair, Community/Outreach</td>
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<tr>
<td>John Harju</td>
<td>Advisory Council Member</td>
<td>Associate Director for Research, EERC</td>
</tr>
<tr>
<td>Mike Holmes</td>
<td>Steering Committee Member</td>
<td>Deputy Associate Director, EERC</td>
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<tr>
<td>Peter Johnson</td>
<td>Steering Committee Member</td>
<td>Director, University Relations</td>
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<tr>
<td>Michael Mann</td>
<td>Steering Committee Member</td>
<td>Professor, Chemical Engineering</td>
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<td></td>
<td>Sub-committee Chair, Research</td>
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<td></td>
<td>Climate Action Plan Member</td>
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<tr>
<td>Glenn Miller</td>
<td>Steering Committee Member</td>
<td>Gov't Rural Outreach Director, College of Business and</td>
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<td></td>
<td>Climate Action Plan Member</td>
<td>Public Administration</td>
</tr>
<tr>
<td>Jaakko Putkonen</td>
<td>Steering Committee Member</td>
<td>Assistant Professor, Geology &amp; Geological Engineering</td>
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<tr>
<td></td>
<td>Sub-committee Chair, Education</td>
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<tr>
<td>Orlynn Rosaasen</td>
<td>Steering Committee Member</td>
<td>Director of Dining Services, Dining Support Services</td>
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<td></td>
<td>Sub-committee Chair, Environment/Recycling</td>
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<tr>
<td>Scott Schreiner</td>
<td>Steering Committee Member</td>
<td>Director of Purchasing, Purchasing</td>
</tr>
<tr>
<td></td>
<td>Sub-committee Chair, Procurement</td>
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<tr>
<td>Joe Vacek</td>
<td>Steering Committee Member</td>
<td>Assistant Professor, Aviation</td>
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<tr>
<td></td>
<td>Sub-committee Chair, Transportation</td>
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</tbody>
</table>

Other Members of the Council on Environmental Stewardship and Sustainability

Henery Borysewicz; CAS
Pete Haga; Grand Forks City
Jaun Pedraza; University Relations
Debra Plughoeft; Grand Forks City
Danielle Refsland; Student
University of North Dakota
Council on Environmental Stewardship and Sustainability

President Robert Kelley
Alice Brekke
Vice President for Finance & Operations

"Steering Committee"

Communications
University Relations

Climate Action Plan
Chair: Randall Bohlman
Mike Mann
Glenn Miller

Subcommittees

Energy
Randall Bohlman

Transportation
Joe Vacek

Procurement
Scott Schreiner

Education
Jaakko Putkonen

Recycling - Environment
Orlynn Rosaansen

Community - Outreach
Yvette Halverson

Research
Mike Mann

Council Co-Chairs:
Larry Zitlow; Director - Facilities (UND Sustainabilty Liaison)
Martha Potvin, Dean, College of Arts & Science

Appointed Members (Steering Committee):
Randall Bohlman, Technology Advancement Coordinator - Facilities
Jaakko Putkonen, Geology
Mike Holmes, Deputy Associate Director, EERC
Michael Mann, Chair, Chemical Engineering
Glenn Miller; Govt Rural Outreach, COBPA
Peter Johnson; University Relations
Appointed by Student Government: Student

Advisory Council Member
John Harju, Associate Director for Research, EERC

Members:
Pete Haga; Grand Forks City
Debra Pfugheoff-Hasset; Grand Forks City
Danielle Rfsland; Student
Juan Pedrazza; University Relations
Henry Borysewicz: CAS
Appendix IV: Summary of Goals

The following tables outline the goals in each chapter of the Climate Action Plan. The goals and relevant actions are described in more detail in the corresponding chapter which can be found in the body of the Climate Action Plan. Goals and/or relevant actions were based on abstracts and are referenced in the following tables. The abstracts explain the goal and/or relevant action in more detail and can be found in the UND Climate Action Plan: Volume II. Co-benefits and the possible costs or savings were defined by each subcommittee.

### Chapter 4: Research

<table>
<thead>
<tr>
<th>Goal</th>
<th>Relevant Actions</th>
<th>Co-benefits</th>
<th>Cost/Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Publish Funded Research (Abstract 4.1)</td>
<td>• Review current RC&amp;D database, submit projects related to sustainability for uploading on the University website.</td>
<td>• Increases campus awareness of sustainable energy research</td>
<td>• Initial Cost: Extra staff time</td>
</tr>
<tr>
<td></td>
<td>• Facilitate future identification of related projects by adding a “Sustainability Project” check box on the proposal transmittal sheet.</td>
<td>• Provides resource for faculty and other researchers to seek research partners</td>
<td>• Savings: Increased F&amp;A recovery from an increase in grant activity</td>
</tr>
<tr>
<td></td>
<td>• Update website with relevant projects on a monthly basis.</td>
<td>• Will help grow UND’s research portfolio</td>
<td></td>
</tr>
<tr>
<td>2. Facilitate Network of Researchers (Abstract 4.2)</td>
<td>• Creation of a listserv with interested participants.</td>
<td>• Increase in collaboration between faculty and researchers across campus.</td>
<td>• Initial Cost: Extra staff to facilitate action items plus dollars to support newsletter, colloquium, and to establish rewards</td>
</tr>
<tr>
<td></td>
<td>• Publish a database indicating the sustainability related research interests of UND faculty.</td>
<td>• Will help grow UND’s research portfolio</td>
<td>• Savings: Increased F&amp;A recovery from an increase in grant activity</td>
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<tr>
<td></td>
<td>• Develop a newsletter to highlight researchers.</td>
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<td></td>
<td>• Establish a colloquium/seminar/brown bag series featuring UND researchers.</td>
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<td></td>
<td>• Celebrate, reward, and publicize research by faculty members on climate change and sustainability.</td>
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<tr>
<td>3. Market UND Research Capabilities (Abstract 4.3)</td>
<td>• Provide travel funds to researchers to establish new relationships that lead to joint proposals.</td>
<td>• Will increase visibility of UND to researchers at other universities and national laboratories to provide additional opportunities for collaborative work.</td>
<td>• Initial Cost: Extra staff time plus the establishment of a travel fund to support faculty travel</td>
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<tr>
<td></td>
<td>• List departmental/unit and faculty research interests and capabilities on the Research webpage.</td>
<td>• Increased awareness of private and public sector of UND’s capabilities will provide more</td>
<td>• Savings: increased F&amp;A recovery from an increase in grant activity</td>
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<tr>
<td></td>
<td>• Branding of existing UND signature programs such as SUNRISE.</td>
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</table>
### Appendix IV: Summary of Goals

| 4. Faculty Training On Public Relations (Abstract 4.4) | • Promote new and upcoming efforts such as the School of Engineering’s new strategic initiative, the Institute for Energy Studies. | research opportunities |
| • Develop a policy on how faculty should represent themselves in media outlets, individuals, and organizations seeking information and opinions relating to UND’s commitment to sustainable energy policies. | • May encourage faculty to represent their opinions | • Initial Cost: Staff time to establish training plan |

| 5. Administrative Grant Writing Support (Abstract 4.5) | • Develop a proposal alert system. | • Fewer missed research opportunities |
| • Provide administrative support for grant writing (e.g. editing and formatting proposals, filling out forms, compiling resumes, routing for signatures). | • Improved Faculty morale and willingness to write grants | • Initial Cost: Extra staff time |
| • Initial Cost: Savings: Increased F&A recovery from an increase in grant activity |

| 6. Sustainability Seed Grant Program (Abstract 4.6) | • Establish fellowships or other financial support mechanisms to develop new research programs related to climate change and sustainability. | • Increased awareness of research opportunities across campus |
| • Increased opportunity for new faculty or faculty making career changes | • Initial Cost: Dollars required to support the fellowships |
| • Savings: Increased F&A recovery from an increase in grant activity |

| 7. Research and Education Energy Platform (Abstract 4.7) | • Provide access to various new energy efficient and renewable energy technologies to faculty and students for research and education purposes. | • Increase in campus awareness of sustainability activities |
| • Potential to draw national and international talent to UND |
| • Can be used to directly solve industry problems |
| • Hands on training and education opportunity for students | • Initial Cost: Cost of capital upgrades to UND’s energy systems will be increased |
| • Savings: Increased F&A recovery from an increase in grant activity. Cost of implementing will be greatly reduced if planned as a part of other campus upgrades. |

### Chapter 5: Education

<table>
<thead>
<tr>
<th>Goal</th>
<th>Relevant Actions</th>
<th>Co-benefits</th>
<th>Cost/Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Climate Change/Sustainability Class</td>
<td>• Establish an interdisciplinary freshman course in sustainability that counts towards degree requirements.</td>
<td>• Will increase student awareness of sustainability efforts on campus</td>
<td></td>
</tr>
<tr>
<td>• May encourage more students to become involved in UND’s climate action efforts</td>
<td>• Initial Cost: $10,000 per year faculty time</td>
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<tr>
<td>• Savings: $16,000 in new tuition revenue</td>
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</tbody>
</table>
### Appendix IV: Summary of Goals

| 2. Environmental Studies Program | • Establish an Environmental Studies major and minor | • Will be a good recruiting tool for UND | • $70,000 per year for faculty salary plus $50,000 start-up package.  
• Enrollment of 10 new students each year resulting in $260,000 in new tuition revenue |
|---------------------------------|--------------------------------------------------|----------------------------------------|------------------------------------------------------------------|
| 3. Sustainability Curriculum to U-Life Course And Welcome Weekend | • Include sustainability coursework for incoming students. | • Will make new students aware of UND’s sustainability efforts and may increase student involvement | • Initial Cost: $5000 for faculty stipend and $2500 for supplies  
• Savings: None identified |
| 4. Financial Competitive Award for Sustainability Course | • Offer competitive financial awards available to innovative and interdepartmental classes. | • Will engage faculty in developing new sustainability courses  
• Will reinforce the campus commitment to sustainability | • Initial Cost: $5000 per year for awards  
• Savings: None identified |
| 5. Sustainability Internship | • Maintain the current Sustainability Internship currently offered through the School of Business | • Students feel included in climate change process  
• Will provide support for Sustainability Coordinator | • Initial Cost: $4000 per year  
• Savings: None |
| 6. Sustainability in Learning | • Infuse essential sustainability learning outcomes to all learning at UND | • Will provide additional course offerings to UND’s Essential Study Program | • Initial Cost: $3500 for faculty awards  
• Savings: None identified |
| 7. Sustainability for Staff and Faculty | • Provide at least one activity per year for staff and faculty to learn environmental wellness | • Will increase community awareness | • Initial Cost: $5000 to support activities and publicize program  
• Savings: None identified |
| 8. Sustainability Journalism | • Encourage students to write articles, opinion editorials, letters to the editor, etc. to promote sustainability | • Will increase public awareness of UND’s commitment to sustainability | • Costs: $4000 to promote and administer program |
## Chapter 6: Energy

<table>
<thead>
<tr>
<th>Goal</th>
<th>Relevant Actions</th>
<th>Co-benefits</th>
<th>Cost/Savings</th>
</tr>
</thead>
</table>
| **1. Secure New Funding For Energy Projects** | • Institute a Green Committee as a permanent subcommittee of Student Government.  
• Implement a Student Investment fund to invest in renewable energy projects (Abstract 6.22)  
• Implement a “Green” Student Fee (6.4)  
• Incorporate a steam retail price increase earmarked for carbon reduction projects (6.9, 6.16) | • Student government is incorporated into emission reduction efforts.  
• Secures funding for carbon reduction projects at no cost to the university and involves the community in reduction efforts. | • Initial Cost:  
• Savings:  
• Reduction: |
| **2. Establish and Implement a Campus Energy Policy**  
(Abstract 6.8) | • Establish an energy task team in each building or department (Abstract 6.26).  
• Employ an energy cockpit.  
• Implement education and behavioral changes on campus (6.3).  
• Encourage energy efficiency with new building construction and remodeling projects (6.18). | • Allows faculty, students, and staff on campus to encourage behavior changes and take an active role in carbon reduction efforts.  
• Implementation would set guidelines for regulating energy use and consumption across campus.  
• Allows all individuals associated with the campus to participate in reducing carbon emissions.  
• Earmarks funds for energy efficiency projects without requiring additional funds. Improves foresight with which campus improvements are made. | • Initial Cost:  
• Savings:  
• Reduction: |
| **3. Vending Machine Contracts**  
(Abstract 6.15, 7.1) | • Negotiate vending machine contracts.  
• Implement Energy Star and Vending Miser technologies on campus. | • Implementation of vending machine contracts would save the campus money by saving energy and require no initial investment. | • Initial Cost:  
• Savings:  
• Reduction: |
| **4. Improve Energy Efficiency On Campus** | • Install heat recovery on make-up air technologies (Abstract 6.10).  
• Install CO₂ control units on HVAC systems (6.19).  
• Install lighting motion sensors in hallways | • Reduces the amount of outside air that must be heated.  
• Reduces the air exchange rate for buildings and classrooms with small groups of people, thereby reducing heating costs. | • Initial Cost:  
• Savings:  
• Reduction: |
### Appendix IV: Summary of Goals

<table>
<thead>
<tr>
<th>5. Develop and Produce On-Campus Renewable Energy</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>- Install wind turbines (Abstract 6.7).</td>
<td></td>
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</tbody>
</table>
- Install ground source heat pumps (6.30, 6.31). |  
- Replace central steam plant with low carbon plant (6.29). |  
- Develop a sustainability center west of campus (6.1). |  
- Produce synthetic gas through gasification (6.24) |  
- Burn low-carbon briquettes in steam plant (6.13) |  
- Provides additional method of campus energy generation while reducing carbon emissions. Takes advantage of ND energy source. |  
- A large heat pump could theoretically replace the steam plant as the primary energy source. |  
- Replacing the central steam plant demonstrates UND's commitment to carbon reduction and leadership role. |  
- Establishes community outreach and involvement with the City of Grand Forks. |  
- Allows for the university to continue using much of its current facilities while reducing carbon emissions. |  
- Allows the campus to continue using the steam plant while also reducing carbon emissions, also allows for an additional area for UND research. |
| Improves campus efficiency while maintaining safety standards. |  
Demonstrates UND's leadership, but also saves money that can be used for further renovations or investment in projects. |  |
| and restrooms (6.12).  
- Perform building audits for improving energy efficiency (6.14).  
- Reduce emissions by retro-commissioning and building renovations (6.6).  
- Adopt new building construction and remodeling policies.  
- Establish a system for storm and grey water capture (6.28). |  
- Initial Cost:  
- Savings:  
- Reduction: |
## Appendix IV: Summary of Goals

### Chapter 7: Procurement

<table>
<thead>
<tr>
<th>Goal</th>
<th>Relevant Actions</th>
<th>Co-benefits</th>
<th>Cost/Savings</th>
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</thead>
<tbody>
<tr>
<td>1. Vending Machines (Abstract 7.1)</td>
<td>• Obtain Dining Services approval and support to convert remaining machines.</td>
<td>• Converting the Pepsi-Cola® machines would save the campus money by saving energy and require no initial investment.</td>
<td>• Initial Cost: $0</td>
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<td></td>
<td>• Work with Pepsi-Cola® to convert their machines.</td>
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<td>• Savings: $26,550 (Reduce energy consumption by 300,900 kWh/yr)</td>
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<td></td>
<td>• Set Project time line.</td>
<td></td>
<td>• NPV (20 years): $200,000</td>
</tr>
<tr>
<td>2. Recycled Carpet (Abstract 7.2)</td>
<td>• Test quality and durability of recycled carpet.</td>
<td>• Prevents 14,000 yards or 89,500 lbs of carpet waste from entering the landfill.</td>
<td>• Initial Cost: $0</td>
</tr>
<tr>
<td></td>
<td>• Obtain Facilities Management approval and support of the product.</td>
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<td>• Savings: $0</td>
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<td></td>
<td>• Create carpet bid specifications that include the requirement that the product’s manufacturing process includes reclaimed materials.</td>
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<td></td>
<td>• Require vendors to take University’s old carpet and reuse it in manufacturing process.</td>
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<tr>
<td>3. ENERGY STAR® Certified Products (Abstract 7.3)</td>
<td>• Obtain administration support to require purchase of ENERGY STAR® products.</td>
<td>• Implementation of an ENERGY STAR® purchasing policy would save the campus money by saving energy.</td>
<td>• Initial Cost: TBD</td>
</tr>
<tr>
<td></td>
<td>• Develop university policy to require purchase.</td>
<td></td>
<td>• Savings: TBD</td>
</tr>
<tr>
<td></td>
<td>• Update bid template to reflect policy.</td>
<td></td>
<td>• (It’s impossible to determine any reductions in electricity. It’s unknown how many items are on campus.)</td>
</tr>
<tr>
<td></td>
<td>• Inform the campus of the policy.</td>
<td></td>
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</tr>
<tr>
<td>4. Coreless Toilet Paper (Abstract 7.4)</td>
<td>• Obtain Facilities Management approval and support of the product.</td>
<td>• Prevents 13,379 lbs of waste from being recycled or from entering the landfill.</td>
<td>• Initial Cost: $48,000</td>
</tr>
<tr>
<td></td>
<td>• Issue a bid and negotiate with awarded bidder.</td>
<td>• Building Service Technicians would fill the dispensers less frequently and would have less packaging to handle.</td>
<td>• Savings: ($48,000)</td>
</tr>
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<td></td>
<td>• Deplete inventory of current product with core.</td>
<td></td>
<td>• NPV (20 years): ($370,000)</td>
</tr>
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<td></td>
<td>• Replace existing dispensers.</td>
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</tr>
<tr>
<td>5. Reduce Unnecessary Local Travel (Abstract 7.5)</td>
<td>• Create a committee to review off-campus travel.</td>
<td>• Eliminate up to 8 trips/day or 32 miles/day (160 miles/week or 8,320 miles/year).</td>
<td>• Initial Cost: Unknown</td>
</tr>
<tr>
<td></td>
<td>• Obtain administration support to limit off-campus travel.</td>
<td>• Employees would be doing more productive tasks than running errands.</td>
<td>• Savings: Unknown</td>
</tr>
<tr>
<td></td>
<td>• Inform university community of the review of off-campus travel.</td>
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</tr>
</tbody>
</table>
### Appendix IV: Summary of Goals

| 6. Trashcan Liners  
(Abstract 7.6) | • Obtain Facilities Management approval and support of the product.  
• Issue a bid and negotiate with awarded bidder.  
• Deplete inventory of current product. | • This would prevent 44,872 lbs (613,700 liners) of can liners from entering the landfill that would never degrade. | • Initial Cost: $63,000  
• Savings: ($63,000)  
• NPV (20 years): ($490,000) |
| --- | --- | --- | --- |
| 7. Beverage Vending Provider  
(Abstract 7.7) | • Obtain administration support to have an exclusive beverage vending contract.  
• Create a committee to work with the university community.  
• Inform the university community of the desire to have an exclusive beverage vending contract.  
• Seek the input from the university community.  
• Decide if the university will solicit for an exclusive vendor contract.  
• Issue bid for an exclusive program.  
• Negotiate with awarded bidder.  
• Remove competitor’s machines. | • The number of vending machines may be reduced by as many as 70 machines.  
• Demand for electricity will be reduced by 210,000 kWh/year.  
• Weekly deliveries may be reduced from 4 to 2. Reducing the miles driven by 10 miles/week or 520 miles/year.  
• The university will receive a better financial deal from the exclusive beverage vendor. During the last RFP process an exclusive deal was $50,000 better per year than the shared program.  
• Campus aesthetics would be improved by having fewer vending machines. | • Initial Cost: $50,000  
• Savings: $10,920 |
### Appendix IV: Summary of Goals

#### Chapter 8: Environment/Recycling

<table>
<thead>
<tr>
<th>Goal</th>
<th>Relevant Actions</th>
<th>Co-benefits</th>
<th>Cost/Savings</th>
</tr>
</thead>
</table>
| **1. Campus Garden**  
(Abstract 8.1) | • Convert a portion of current flower beds to vegetable and herb gardens.  
• Work with Grand Forks Health Department for compliance with local and state health codes.  
• Work with safety office for security and other issues.  
• Work with facilities on pest control.  
• Work with students for planting/maintaining/harvesting. | • Promote healthy eating  
• Build city and university community involvement  
• Creates jobs  
• Marketing tool for Dining Services and campus  
• Enhances campus aesthetics | • Initial Cost:$550.00  
• Savings:$665.00  
• Reduction:NA |
| **2. Local Biodiesel Process**  
(Abstract 8.6) | • Identify people and resources that are knowledgeable in the process to guide the implementation.  
• Partner with community establishments to utilize their waste products to increase the cost effectiveness and available end product. | • Fuel can be used in campus vehicles  
• Lower fuel costs  
• Opportunity to network with biodiesel experts | • Initial Cost: $30,000  
• Savings: $6,600 per year  
• Reduction: 12 tons of landfill waste |
| **3. Compost Campus Organic Waste**  
(Abstract 8.10) | • Develop a process for collecting and composting biodegradable waste on campus.  
• Purchase the appropriate size and number of in-vessel composters to handle the waste.  
• Develop a plan for utilization of humus end product. | • Compost can be used for fertilizer, which can be used on the Campus Garden (Goal 1) | • Initial Cost: $80,000 to $160,000  
• Savings: $8,200 per year in fuel and fertilizer costs  
• Reduction: 82 tons of landfill waste |
| **4. Recycle Ink Cartridges in Halls**  
(Abstract 8.11) | • Implement a program in the residence halls and computer labs to recycle printer cartridges.  
• Provide collection bins in each hall/building on campus.  
• Develop a communication/marketing plan to promote the program. | • Work with Resident Hall Government students  
• Decrease number of ink cartridges in landfill | • Initial Cost: $250  
• Savings: $750 per year  
• Reduction: .25 tons of landfill waste |
### Appendix IV: Summary of Goals

<table>
<thead>
<tr>
<th>Appendix IV: Summary of Goals</th>
<th>Identify methods of delivery to increase the awareness of recycling programs.</th>
<th>Protect natural resources</th>
<th>Initial Cost: $2,100</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Enhance Campus Awareness of Current Recycling Program (Abstract 8.7)</td>
<td>Highlight and celebrate success the campus has in relation to current recycling programs.</td>
<td>Reduce litter</td>
<td>Savings: $2,000 per year</td>
</tr>
<tr>
<td></td>
<td>Develop a promotion campaign for increasing awareness.</td>
<td>Preserve landfill space</td>
<td>Reduction: 50 tons of landfill waste</td>
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<td></td>
<td></td>
<td>Promote jobs</td>
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<tr>
<td></td>
<td></td>
<td>Conserve energy</td>
<td></td>
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<tr>
<td>6. Replace Paper Towel Dispensers in All Restrooms (Abstract 8.8)</td>
<td>Develop an implementation plan for the purchase and installation of the hand dryers across campus.</td>
<td>Reduces custodial maintenance</td>
<td>Initial Cost: $950,000</td>
</tr>
<tr>
<td></td>
<td>Develop a phase out plan for the removal and disposal of paper towel dispensers.</td>
<td>Reduces landfill waste</td>
<td>Savings: $86,500</td>
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<tr>
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<td></td>
<td>Reduces the spread of bacteria and other harmful substances</td>
<td>Reduction: 25 tons of landfill waste</td>
</tr>
<tr>
<td>7. Encourage the Use of Digital Publications (Abstract 8.3)</td>
<td>Departments will need to review the publications they receive and the availability to receive them digitally.</td>
<td>Reduce recycling needs of printed materials</td>
<td>Initial Cost: $0</td>
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<tr>
<td></td>
<td>Library would have to review its licensing and procurement of digital publications for public use.</td>
<td>Reduce transportation and delivery costs</td>
<td>Savings: $90.00</td>
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<td></td>
<td>Investigate whether the technology infrastructure could handle electronic delivery of multiple digital publications.</td>
<td></td>
<td>Reduction: 2 tons of landfill waste</td>
</tr>
<tr>
<td>8. Remove Air Fresheners From Campus (Abstract 8.9)</td>
<td>Remove the air freshener systems/equipment from all buildings.</td>
<td>Eliminate the cost of the air fresheners and the labor to maintain</td>
<td>Initial Cost: $0</td>
</tr>
<tr>
<td></td>
<td>Eliminate the use of these systems and other that emit air pollutants.</td>
<td></td>
<td>Savings: $3.10 per unit</td>
</tr>
<tr>
<td>9. Increase the Amount of Gerbil Tubes And Building Connectivity on Campus (Abstract 8.5)</td>
<td>A pedestrian traffic consultant should be utilized to determine the best locations on campus for additional building connections.</td>
<td>Promote physical exercise</td>
<td>Initial Cost: $150 to $200 per square foot</td>
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<tr>
<td></td>
<td>Work with campus master plan to determine when/if these should be constructed.</td>
<td>Marketing tool</td>
<td>Savings: Negative</td>
</tr>
<tr>
<td></td>
<td>Work with other sub committees on their recommendations of this issue.</td>
<td>Decrease pedestrian and vehicle traffic in winter</td>
<td></td>
</tr>
<tr>
<td>10. Spring Clean-Up Plan to Promote Reusing and Recycling Appropriate</td>
<td>Establish a working committee to develop and coordinate a clean-up program.</td>
<td>Creates community cohesiveness</td>
<td>Initial Cost: $9,500</td>
</tr>
<tr>
<td></td>
<td>Create a list of locations taking donations that can be communicated to students and housing staff.</td>
<td>Enhances campus aesthetics</td>
<td>Savings: $2,075 annual</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Promotes community involvement and corporate responsibility</td>
<td>Reduction: 50 tons of landfill waste</td>
</tr>
</tbody>
</table>

University of North Dakota Climate Action Plan
Draft Revision: 5/18/2010
## Appendix IV: Summary of Goals

### Materials (Abstract 8.4)
- Create a list of volunteers with vehicles willing to pick up large, bulky items.
- Provide additional collection bins near campus housing for recyclable items: paper, plastic, aluminum, batteries, electronics and items in good to excellent condition.
- Provide volunteers near exits and collection points to answer questions and direct students to appropriate drop-off locations.

### 11. Install Big Belly Trash Compactors (Abstract 8.2)
- Determine location for units.
- Order based on projected usage.
- Facilities would be involved for collection/maintenance.

### 12. Recover and Recycle Usable Materials (Abstract 8.12)
- Request for proposals, bids, and contracts for capital projects should include language requiring the successful contractor(s) to recover and recycle usable construction, renovation and demolition waste.
- UND will need to develop a process to track the quantity of material recovered or recycled.
- UND will need to develop a process to track and ensure contractor compliance.

### Chapter 9: Transportation

<table>
<thead>
<tr>
<th>Goal</th>
<th>Relevant Actions</th>
<th>Co-benefits</th>
<th>Cost/Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Incorporate Carbon Offset Program Into Parking Permits (Abstract 9.7)</strong></td>
<td>- Research available carbon offset programs.&lt;br&gt;- Purchase appropriate amount to offset approximately half of UND’s transportation related emissions of CO₂.</td>
<td>- Boost local ND companies&lt;br&gt;- Marketing opportunity</td>
<td>- Initial Cost: $104,000 (13,000 permits at $8 per person)&lt;br&gt;- Savings: $8 per person/year&lt;br&gt;- Reduction: 10,000 tons of CO₂</td>
</tr>
<tr>
<td><strong>2. Implement a Carbon Offset Program For The UND Aviation</strong></td>
<td>- Research available carbon offset programs.&lt;br&gt;- Purchase CO₂ credits to offset aviation emissions.&lt;br&gt;- Determine how to apportion the cost of the</td>
<td>- Carbon-neutral flight training marketing value</td>
<td>- Initial Cost: $25,000 to $50,000&lt;br&gt;- Savings: $25,000 to $50,000&lt;br&gt;- Reduction: 1,000 tons of CO₂</td>
</tr>
</tbody>
</table>
## Appendix IV: Summary of Goals

<table>
<thead>
<tr>
<th>Fleet (Abstract 9.10)</th>
<th>offset credits.</th>
<th>Increase student satisfaction with transportation • Reduce parking pressure</th>
<th>Initial Cost: TBD • Savings: TBD • Reduction: 2,000-5,000 tons of CO²</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Expand Shuttle Bus Service</td>
<td>• Purchase additional shuttle busses. • Increase appropriated funding for the</td>
<td>• Increase student satisfaction with transportation • Reduce parking pressure</td>
<td>Initial Cost: TBD • Savings: TBD • Reduction: 2,000-5,000 tons of CO²</td>
</tr>
<tr>
<td>(Abstract 9.4)</td>
<td>service. • Improve bus shelters.</td>
<td></td>
<td></td>
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<tr>
<td>4. Convert State Fleet Vehicles To Hybrid Vehicles (Abstract 9.9)</td>
<td>• Research and identify appropriate hybrid vehicles. • Perform a cost-benefit analysis. • Adjust vehicle purchasing plan.</td>
<td>• Save on fuel expenditures • Marketing opportunity</td>
<td>Initial Cost: Gradual replacement of traditionally-fueled vehicles (1.2-3 times more expensive) • Savings: Equivalent maintenance costs • Reduction: 1,000 tons of CO²</td>
</tr>
<tr>
<td>5. Implement A Student Car Sharing Program On Campus (Abstract 9.6)</td>
<td>• Survey student population for program enthusiasm. • Determine how to fund program.</td>
<td>• Reduce congestion on campus • Reduce parking pressure</td>
<td>Initial Cost: $10,000 • Savings: $2,000 to $3,000 • Reduction: 1,000 to 2,000 tons of CO² from student car sharing on and off campus</td>
</tr>
<tr>
<td>6. Expand Bicycle Lanes On Campus (Abstract 9.11)</td>
<td>• Paint “sharrows” on secondary streets around campus. • Identify frequent bicycle routes that are unmarked. • Paint dedicated bicycle lanes on such locations.</td>
<td>• Improve health and well-being • Reduce parking pressure</td>
<td>Initial Cost: Minimal • Savings: Minimal • Reduction: Should be concurrent with other efforts for maximum CO²</td>
</tr>
<tr>
<td>7. Improve Bicycle Parking Infrastructure (Abstract 9.1)</td>
<td>• Revise procedures for removing bicycle parking in fall. • In non-winter months ensure location of bicycle racks. • Measure bicycle use by traffic count.</td>
<td>• Improve health and well-being • Marketing opportunity to incoming students</td>
<td>Initial Cost: Varies from $0 to $10,000 • Savings: Minimal once past initial investment • Reduction: 3,000 tons of CO² if half of all campus community commuted by bicycle for ½ the year</td>
</tr>
</tbody>
</table>
## Appendix IV: Summary of Goals

| --- | --- | --- | --- |
| • Survey students, faculty, and staff.  
• Allocate funding for such a program.  
• Implement program. | • Purchase 100 bicycles.  
• Install stations at strategic locations around campus.  
• Maintain and track bicycles. | • Mark and maintain trails.  
• Provide places to stow skis.  
• Provide skis and gear to students. | • Consult with urban planning engineers to determine scope and feasibility of project.  
• Perform environmental impact study.  
• Begin planning and executing project. |
| • Improve transit mode-share  
• Potentially eligible for federal grant  
• Improve health and well-being | • Improve health and well-being  
• Marketing opportunity to incoming students  
• Potential to advertise revenue | • Improve health and well-being  
• Unique marketing opportunity | • Improve campus aesthetics |
| • Initial Cost: Unknown, assume $50,000 maximum  
• Savings: $50,000 per year  
• Reduction: 5,000 tons of CO₂ by reducing individual commuting by 50% | • Initial Cost: $130,000 to $200,000  
• Savings: $0 to $10,000  
• Reduction: 1,000 to 2,000 tons of CO₂ | • Initial Cost: Minimal  
• Savings: Minimal  
• Reduction: Minimal | • Initial Cost: Unknown  
• Savings: N/A  
• Reduction: Unknown |

## Chapter 10: Outreach

<table>
<thead>
<tr>
<th>Goal</th>
<th>Relevant Actions</th>
<th>Co-benefits</th>
<th>Cost/Savings</th>
</tr>
</thead>
</table>
| 1. Marketing (Abstract 10.1.1) | • Identify funding  
• Develop job description | • Ensure campus is accountable for sustainability. Opportunity to work with surrounding community and private entities. | • Initial Cost: $68,000  
• Savings: Unknown  
• Reduction: Unknown |
| 2. Brand UND Sustainability (Abstract 10.1.2) | • Develop mission, vision, logo, and brand/slogan | • Provides consistency in communication | • Initial Cost: $1,000  
• Savings: $0  
• Reduction: Unknown |
| 3. Communication Plan: Technology (Abstract 10.1.3) | • Maintain and upgrade website  
• Develop listserv  
• Use network and multimedia accounts | • Provides main internal and external resource for communication of Climate Action | • Initial Cost: $12,000  
• Savings: Reduction in paper by using electronic venues rather
### Appendix IV: Summary of Goals

<table>
<thead>
<tr>
<th>4. Connecting People (Abstract 10.1.4)</th>
<th>Use U-letter, UND website, Dakota Student, Grand Forks Herald, and u-mail</th>
<th>Provide grassroots movement of initiatives, identification of experts, assistance with information dissemination and volunteers for events.</th>
<th>Initial Cost: $5,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Develop iTunes, podcasts, video and RSS feeds</td>
<td></td>
<td>Savings: Unknown</td>
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<td>Hyperlink with city website</td>
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<td>Reduction: Unknown</td>
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<td>Increase presence on UND main website</td>
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<td></td>
<td>Develop U-Newsletter</td>
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<tr>
<td>5. Provide Campus and Community Outreach Project Coordination (Abstract 10.1.5)</td>
<td>Determine moderator for Sustainability listserv</td>
<td>Provides increased collaboration with campus and surrounding area to unite sustainability projects and events.</td>
<td>Initial Cost: $12,000</td>
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<td>Develop speaker's bureau</td>
<td></td>
<td>Savings: Unknown</td>
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<td></td>
<td>Continue Sustainability Council meetings</td>
<td></td>
<td>Reduction: Unknown</td>
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<td></td>
<td>Recruit Sustainability champions</td>
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<td>Determine liaisons for other environmental meetings</td>
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<tr>
<td>6. Administer Short-term Competitive Challenges (Abstract 10.1.6)</td>
<td>Establish committee for on-going activities, expand Earth Week, include co/sustainability activities in the Big Event or similar venue</td>
<td>Provides self-awareness to inspire behavior changes and provides a venue for information sharing.</td>
<td>Initial Cost: $8,000</td>
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<tr>
<td></td>
<td>Recruit committee members to coordinate activities and programming for RecycleMania and UND 4-week commitment challenge</td>
<td></td>
<td>Savings: Unknown</td>
</tr>
<tr>
<td>7. Apply Long-Term Pledge Strategy (Abstract 10.1.7)</td>
<td>Determine moderator</td>
<td>Re-confirming pledges and providing tracking accountability can help to increase sustainability behavior.</td>
<td>Initial Cost: $1,408</td>
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<tr>
<td></td>
<td>Research funding for incentives</td>
<td></td>
<td>Savings: Unknown</td>
</tr>
<tr>
<td></td>
<td>Develop web applications, hyperlinks and develop program specifics</td>
<td></td>
<td>Reduction: Unknown</td>
</tr>
<tr>
<td>8. Sustainability Coordinator (Abstract 10.2)</td>
<td>Acquire funding</td>
<td>Ensure campus is accountable for sustainability. Opportunity to work with surrounding community and private entities.</td>
<td>Initial Cost:</td>
</tr>
<tr>
<td></td>
<td>Decide to whom the coordinator/office should report</td>
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<td>Savings:</td>
</tr>
<tr>
<td></td>
<td>Support sustainability ambassadors</td>
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<td>Reduction:</td>
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<tr>
<td></td>
<td>plans, progress and resources</td>
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<td></td>
<td>than paper venues of distribution</td>
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