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## Executive Summary

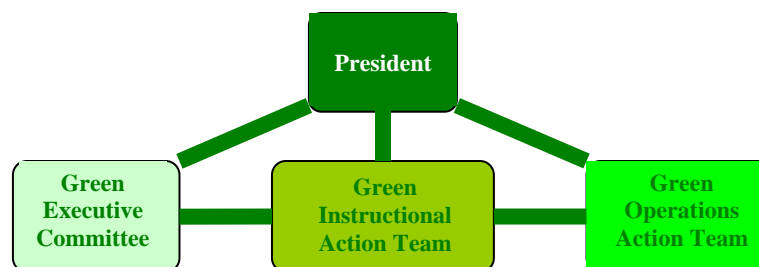
On June 18, 2007, Dakota County Technical College (DCTC) President Dr. Ron Thomas signed the American College and University Presidents Climate Commitment. The ultimate objective of the Presidents Climate Commitment is for the College to set goals and take steps to become carbon neutral. A baseline study to determine current energy consumption and related energy emissions is necessary to establish what steps need to be taken. This Emissions Inventory and Baseline Determination Report is meant to inform the College of its current performance levels, identify opportunities, and recommend next steps towards becoming carbon neutral.

This is a living document. The intent is that the data will be updated annually, and the report updated every two years. This is especially relevant for this College because the student body largely changes every two years based on the degrees offered. This allows the College to respond more rapidly than other institutions of learning in adapting their curriculum and student culture.

Dakota County Technical College has been updating the campus buildings over the past several years, changing lighting and control systems and improving the mechanical efficiencies of the buildings on the main campus. Through these efforts, energy consumption has decreased, but the overall consumption remains significant. As energy efficiency improves, emissions are reduced. This baseline report will be the starting point to track the success of implemented projects, improving energy efficiency, reducing energy consumption, and decreasing carbon emissions.

This report will identify and break down the sources of these emissions and offer suggested next steps. DCTC's educational efforts and outreach activities go above and beyond the contents of this report, but are no less significant. The enthusiasm of many of the instructors to incorporate sustainable subject matter into their courses encourages the overall success of the College.

In the summer of 2007, Dakota County Technical College founded three "Green" committees to guide the college in sustainable decision-making and implementation. The Green Executive Committee was founded to create policies to guide the College in high-level planning and assist in finding sources of funding to implement initiatives. The Green Instructional Action Team was established to incorporate environmentally-conscious initiatives into the curriculum and student experience. The Green Operations Action Team was set up to implement sustainable-design and construction initiatives for the buildings. The President oversees and helps orchestrate all decisions and activities towards the goal of reducing emissions and greening up the College.



These teams will continue to help define goals and priorities, identify and suggest opportunities, seek funding, and authorize improvements to the policies, procedures, and capital for the College.

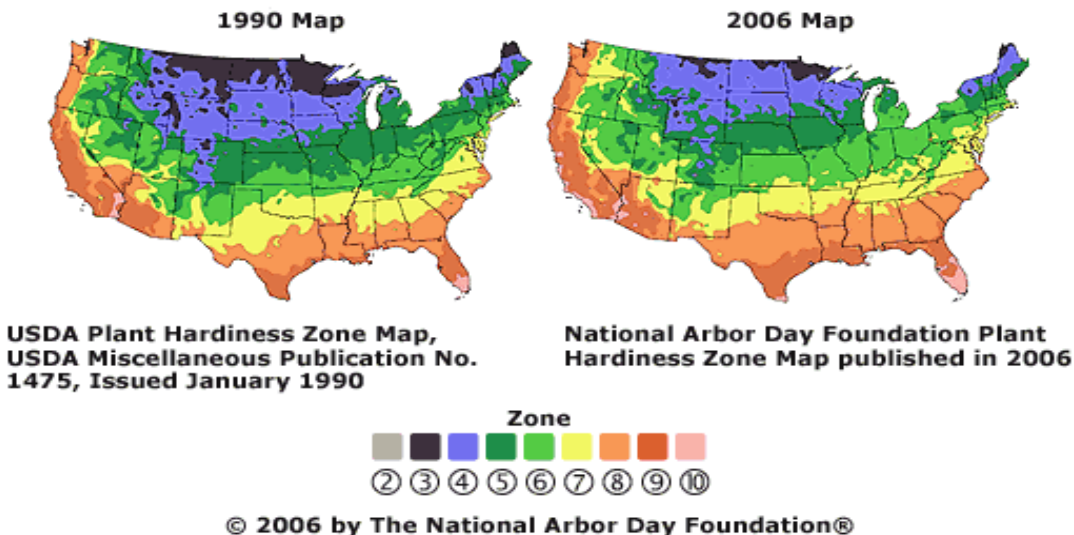


## Introduction

### Emissions Study Purpose

In October 2003, a U.S. Pentagon report stated, “There is substantial evidence to indicate that significant global warming will occur during the 21st century.” Scientists projected Global Warming, also known as Climate Change, would threaten dangerous consequences worldwide, including more severe droughts and floods, loss of ecosystems, and damage to industries relying on natural resources, such as agriculture, forestry, and tourism.

These effects are now being seen in the increase in temperatures around the world, especially noticeable at the polar ice caps and glaciers, but also reflected within the United States. The hardiness zone map is used for determining which plant species would thrive in which locations. The most recent hardiness zone map, released in 2006 and shown below in comparison to the 1990 map, reflects the reality of Climate Change. Minnesota in particular has gained ten degrees in areas of critical habitat zones, such as the Boundary Waters, where species like moose thrived.



Over the past several years, awareness of the human impact on our global environment has initiated a movement towards “green”, or “sustainably-conscious” decisions, advocating a responsible change in behaviors to positively impact our environment. These changes in decisions and behaviors are no longer just responsible, but now vital.

### Sustainability Defined

“Sustainable development” has been defined and is most commonly accepted as development that “meets the needs of the present without compromising the ability of future generations to meet their own needs.” (created by the Brundtland Commission, led by former Norwegian Prime Minister Gro Harlem Brundtland, United Nations General Assembly, December, 1987.) The efforts we currently undertake are green and lead us towards sustainable goals, but are not truly sustainable yet. A college campus that: generates as much energy as it uses (“Net Zero Energy”), produces no harmful emissions to the air, water or soil (“Carbon Neutral”), uses and replaces clean water on its site (Complete Water Cycle), and effectively reuses its entire waste stream in productive ways (“Zero Waste”) would be considered sustainable.



## Energy Emissions Inventory and Baseline Determination Report Dakota County Technical College | December 13, 2007

Towards this ambition, in a conscientious response, the Dakota County Technical College has embarked on an exciting journey towards becoming Carbon Neutral. There are a number of goals and initiatives that will assist in greening the campus. As evident by the results of previous energy audits, review of recent projects and current visual observations, DCTC has already initiated many significant projects and steps towards this aspiration.

Climate change is recognized as the result from activities releasing heat-trapping greenhouse gases (GHGs) including primarily carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) into the atmosphere. As noted by the Greenhouse Gas Protocol (GHG Protocol) of the World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI), six GHGs covered under the Kyoto Protocol, in addition to CO<sub>2</sub> and CH<sub>4</sub>, are nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>). As PFCs and SF<sub>6</sub> were not evident on campus from our review, and CH<sub>4</sub>, H<sub>2</sub>O, and HFCs are minimal, the focus will be in terms of carbon dioxide, or carbon dioxide equivalents (CO<sub>2</sub>-e), which includes allowance provisions for other greenhouse gas emissions and incorporates them in terms of carbon dioxide.

The main sources of GHGs include burning fossil fuels such as coal, gas, and oil, and the loss of forests. GHG emissions for this building occur on-site with fuel-oil and natural gas boilers; domestic water, kitchen and space heating; fresh air heating, and distribution losses. Off-site GHGs emissions are generated by the production of electricity consumed by the facility. Unfortunately, about 75% of Minnesota's electricity comes from coal-fired power plants, including Xcel Energy, which supplies electricity to DCTC. In addition, vehicles from students, faculty, and staff commuting to the College significantly drive up the emissions.

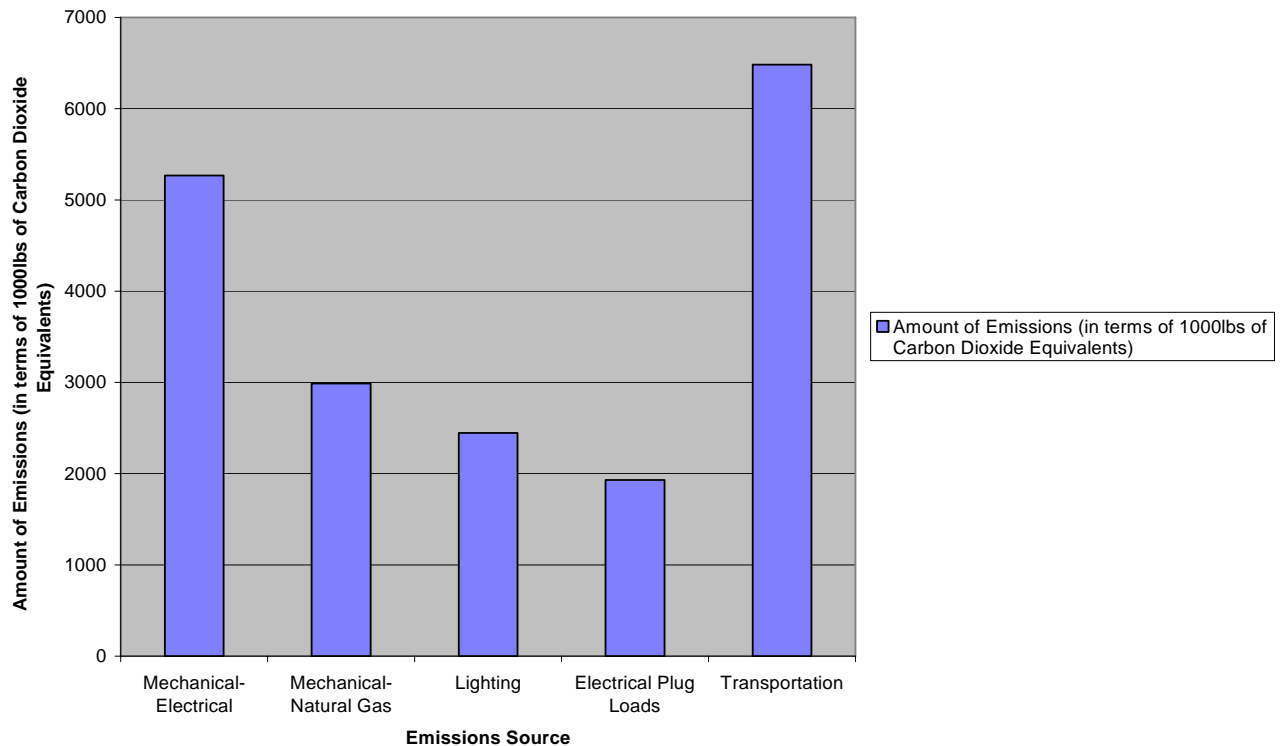
Emissions generated from electric loads, lighting, heating, air conditioning, ventilating, commuting, and air travel were all considered as part of this inventory. The results of this 2007 study are for the past calendar year, starting in November, 2006 and ending in October 2007, and include on-site data and observations for the past three months. The approximate carbon emissions are from the following sources:

<u>Emissions Source</u>	<u>Carbon Dioxide Equivalents (CO<sub>2</sub>-e) (lbs)</u>
Mechanical - Electrical	5,268,000
Natural Gas	2,988,000
Electrical - Lighting	2,446,300
Plug Loads	1,931,200
<u>Transportation</u>	<u>6,481,800</u>
<b>Sum total:</b>	<b>19,115,300 lbs</b>

A graphic representation comparing these emissions follows.



2007 DCTC GHG Emissions



It is interesting to note a few discoveries. Natural gas consumption has been fairly consistent over the years reviewed. Electrical consumption has increased over time, primarily due to an increase in computers and related equipment. In general, electrical lighting loads in total exceed the electrical “plug loads” of appliances, computers and other items plugged into outlets. The largest source of electrical plug-load consumption is the computer server room. Initiatives by DCTC to reduce lighting loads by changing out fixtures and controls have made a noticeable difference. However, the primary source of emissions is from transportation to and from this location. This year, 2007, is the first year with data that has been reviewed and for some of the vehicles listed sufficient information was not available to generate numbers. To significantly reduce emissions, one substantial goal should be to implement public transportation to this facility.

Fortunately, Dakota County is in the process of evaluating several new transit lines, one along the Robert Street Corridor and another down Highway 52, which are both expected to terminate in the vicinity of Highway 42. Encouraging discussions with county staff lead to promise in this endeavor. The challenge will be to DCTC to make driving and parking a less desirable option than taking mass transit. There are several ways to accomplish this, and the resulting reduction in surface parking lots necessary would permit conversion of valuable land to prairie and forest areas that could be used to further offset emissions.



## Next Steps

### Suggested Emission-Reducing Solutions

A number of opportunities have been identified after reviewing the various buildings and past facility projects. DCTC has designated a Sustainability Manager, (also the Facilities Manager), to lead the facility towards the goal of carbon neutrality. Together with the Green Instructional Action Team, and in conjunction with the Green Executive Committee and Green Operations Action Team, forward-thinking decisions can be made and policies put in place that will make a difference. With the results of this baseline emissions study, priorities can be established and recommendations can be given as suggested below.

The efforts the school has made, and is making, towards conservation should increase. Ideas like further energy conservation through appliance and computer selection and building skin modification; energy capture and transfer such as capturing the waste heat in the boiler room to heat hot water, and implementing innovative technologies would all help reduce the energy consumption loads and thus the emissions.

Three Scopes can be defined for solutions in terms of the American College and University President Climate Commitment.

1. Direct GHG emissions occurring from sources owned or controlled by DCTC, including: on-campus stationary combustion of fossil fuels, mobile combustion of fossil fuels by institution owned/controlled vehicles, and "fugitive" emissions from intentional or unintentional releases of GHGs, including the leakage of HFCs from refrigeration and air conditioning equipment as well as the release of CH<sub>4</sub> from institution-owned farm animals.
2. Indirect emissions generated in the production of electricity consumed by the institution.
3. All other indirect emissions that are a consequence of the activities of the institution, but occur from sources not owned or controlled by the institution, including waste disposal and transportation of purchased goods.

Additional details for each of the above scopes are listed on the following pages.

### **Scope 1**

Starting with methane reduction options, the only farm animals on-site or in any of the campus-owned or leased buildings would be the small mammals, including rabbits, and a few sheep that currently reside in the Animal Care Building on campus, but under ownership of a different entity. The emissions from rabbits and sheep are negligible. Suggestions to reduce carbon dioxide emissions are addressed in the remaining comments.

### Transportation-related Initiatives

- Involving the student body is an opportunity to further decrease emissions. One opportunity would be to allow students who choose to commute by individual automobile to offset their emissions. The price, as determined by Terrapass or another third-party provider, could be pro-rated into the price of their monthly parking permit.
- Increase the parking fees once alternative transportation options are available to make driving in a single-occupant vehicle less desirable.



- Public transportation to this rural school site is not available at this time. Creation of a public transportation system with free transit passes or more than a 50% subsidy, to the students, faculty, and staff to the various key college and campus locations and the surrounding yet-to-be-defined neighborhoods would make a definite improvement in emissions from commuter vehicles. The transit would need to operate to more designations than just remote parking lots. DCTC could work out an arrangement with Minnesota Valley Transit Authority (MVTA) or another regional transit provider to encourage a transit service to the campus, and use hybrid, biofuel, electric, or fuel cell buses.
- Car pooling arrangements could be encouraged to start reducing the number of single-occupant vehicles and preferred carpool parking stalls could be located near the doors.
- Implement car-sharing programs like Zipcar, Flex-car or Hour Car through the campus.
- Replace or convert campus-owned vehicles for more efficient, electric, hybrids or flex-fuel (bio-fuel) vehicles (such as ethanol, E85, or bio-diesel). In particular, convert the diesel trucks used in training students to bio-diesel where feasible.
- Minimize campus-owned vehicle use.

#### Curriculum Policy-related Initiatives

- Continue to locate select courses within the communities of Apple Valley and Eagan to reduce the need for those students to drive to Rosemount and possibly allow some of the students to take existing mass transit.
- Continue to lead MnSCU with the number of courses taught on-line, thus reducing the need for students to drive to the Rosemount campus.
- Allow select staff to telecommute on certain days, if the work is such that it can be performed successfully at a remote location.
- Hold teleconferences or web-conferences with remote, joint campuses or other campus business meetings instead of driving.
- The DCTC website could be integrated with an interactive platform that ties into the building's heating, ventilation, air conditioning and energy management systems to view and track how the building is performing at any point in time. Monitoring and tracking results can provide additional educational opportunities with a benefit of being able to tweak systems as needed seasonally or operationally.
- Create a consumption reduction plan, both short-term and long-term.

#### Appliances and Equipment

- Adopt an energy-efficient appliance purchasing policy requiring the purchase of ENERGY STAR certified products in all areas for which such ratings exist.
- Adopt the Climate Savers Computing Initiative Specification for computer equipment. Have IT departments investigate and enable energy-reducing power management capabilities on desktop and laptop computers whenever possible

#### Mechanical System-Related Initiatives

- Change and update cooling towers.



### Electrical System-Related Initiatives

- Install and operate one or more renewable electricity generating devices on campus, starting with the solar panels on the greenhouse, which as of this report, are currently under construction and installation.

### Site-related Initiatives

- Evaluate existing building structural capacity for possible green roof or at a minimum, increased insulation.
- Replace excessive asphalt and concrete impervious paving and restore habitats with native prairie grasses and trees. This could offer nature preserve paths to reintroduce students to native species in the area as well as provide an opportunity to enact carbon fixing through planted open space.
- Reduce mowing efforts and emissions – Install xeriscaping at current mowed lawn locations.

### Purchasing–Embodied Energy

- Buy locally produced goods and services to reduce emissions associated with transportation.
- Buy lower impact products, such as those made with recycled-content materials, thereby reducing the lifecycle emissions associated with extraction and processing of materials.
- Support 'cradle-to-cradle' sustainable product design by purchasing goods deliberately designed to be entirely recycled and/or composted.
- Promote education around the concepts and practices of climate neutrality and sustainability by engaging with suppliers throughout the supply chain.
- Purchase wood only from FSC certified managed forests with a chain-of-custody responsible partner documentation for each hand that touches it before final installation.

### **Scope 2**

- Purchase Renewable Energy Credits (RECs, also known as Green Tags) such that 15% of the institution's total electricity consumption is mitigated through the purchase of RECs.
- Purchase renewable electricity produced off-site, but directly connected to campus such that 15% of the institution's total electricity consumption is derived directly from renewable sources. Convert current energy sources purchased from Xcel Energy such as electricity generated by coal-fired power plants to wind power.
- Purchase Carbon Offsets from vendors that are third-party verified and green e-certified.
- Install on-site renewable energy generators until DCTC can sell their excess power.

### **Scope 3**

- Reduce waste through recycling initiatives, including participating in the Waste Minimization component of the national RecycleMania competition, and adopt three or more associated measures to reduce waste.
- Reduce waste through composting initiatives.
- Develop 'green' contracts, and a comprehensive sustainability policy for purchasing, to encourage potential vendors providing materials and goods to DCTC to use bio-diesel in trucks or electric and hybrid vehicles when making deliveries to DCTC.
- Reduce waste by requiring vendors/manufactures to take-back and reuse packaging.
- Require suppliers providing materials to reduce the amount of packaging and provide compostable plastic (corn-starch based) in lieu of petroleum-composite plastic.



- Replace under-utilized areas of surface parking lots with native prairie grasses and trees to help sequester carbon emissions. The implementation of this conversion should follow the GHG Protocol Land Use, Land-Use Change, and Forestry Guidance for GHG Project Accounting.
- Reduce emissions from waste management, including those associated with removal and transportation of waste materials. DCTC could also be held accountable for the methane emissions from their portion of the landfills served by the waste haulers.
- Enact campus planning to minimize the physical footprint of campus facilities (such as unused buildings) and parking areas.
- Meet or exceed the U.S. Green Building Council's LEED New Construction Silver standard or equivalent for new construction projects.
- Meet or exceed the LEED Existing Building Silver standard or equivalent for facility renovation projects.
- Promote education for sustainable design and engage students to work on campus projects.
- Establish a policy of offsetting all greenhouse gas emissions generated by air travel paid for by DCTC. Encourage individual travelers to embrace offsetting their mileage as well.
- Provide local and organic foods and compostable utensils and dishware by the food service.

### **Opportunities to Offset Carbon Emissions**

After energy consumption and emissions are reduced as much as possible, there are four general methods to offset the carbon emissions identified in this report:

1. Purchase accepted renewable energy sources, such as wind and solar, from the energy providers that currently serve the various school buildings.
2. Purchase carbon offsets from third-party providers, who use those funds to invest in the creation of wind technologies, solar systems, and greenhouse gas reductions through planting trees.
3. Install on-site renewable energy technologies, such as wind towers, geothermal heat pumps, evacuated tube solar hot water and photovoltaic arrays, to replace the energy currently provided by carbon-emitting sources, such as coal power plants.
4. Convert parking lots into forested areas of native species, to provide carbon sinks, where the plants take carbon dioxide out of the air and store it as carbon.

A carbon-neutral, net zero energy/zero emissions/zero waste campus for Dakota County Technical College is the ultimate goal and this report has provided the 2007 baseline. Once successfully implemented, DCTC could even consider becoming energy-positive and carbon negative.

The appendices that follow provide the breakdown data and summation for the baseline emissions for each of the different disciplines. It is anticipated that these spreadsheets will be used as a living document, which will then be updated every two years.