

May 2013

The Structure, Content and Implementation of the Ball State University Climate Action Plan: 2010-2050

An Executive Summary

NOTE:

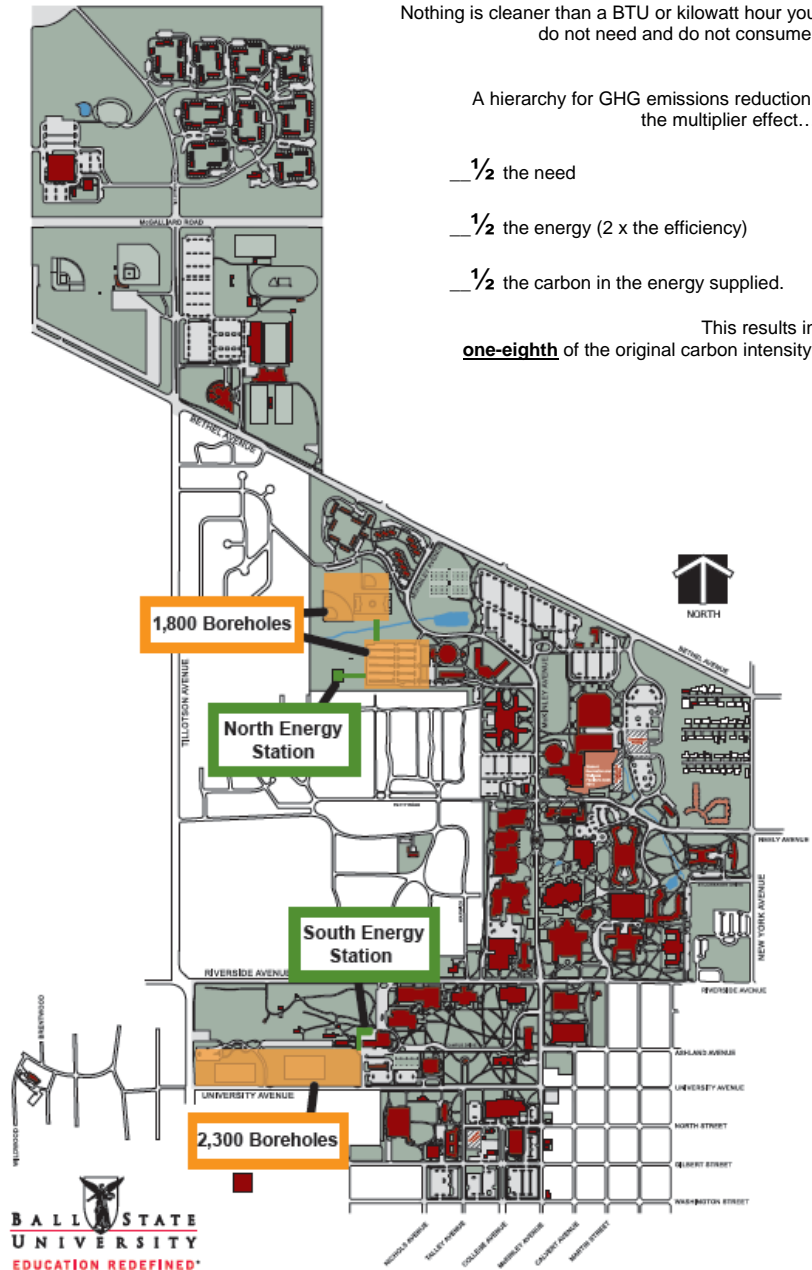
In the five years since filing our initial (August 2008) Greenhouse Gases Emissions Report we have been able to build a larger data-set on the history of campus-wide energy use and have loaded that data-set into the latest version of the Clean Air-Cool Planet Greenhouse Gas Assessment Tool (v.6.9).

We now can document that a portion of our originally-reported Scope 1 Greenhouse Gas Emissions which resulted from the burning of fossil fuels, in fact, was assignable to the regional hospital to which we have been providing steam under a standing purchase agreement.

And with the conversion of our 47-building campus to geothermal (ground source heat pump) district-scale heating and cooling we will eliminate the production and distribution of steam to our campus; thus, to meet our obligations to the regional hospital, we will switch from coal-fired to gas-fired production of steam for its use alone. Those GHG emissions will continue to sit "outside the boundary" of our campus calculations.

Nonetheless, the campus-wide geothermal system installation and the fuel switching for steam provision to the regional hospital will completely eliminate on average 85,000 metric tons of annual coal-fired emissions, no later than March 2014.

Finally, even with this clarification of GHG emissions attributable to our campus boundary, the structure and content of our Climate Action Plan remain unchanged.



Nothing is cleaner than a BTU or kilowatt hour you do not need and do not consume.

A hierarchy for GHG emissions reduction; the multiplier effect...

$\frac{1}{2}$ the need

$\frac{1}{2}$ the energy (2 x the efficiency)

$\frac{1}{2}$ the carbon in the energy supplied.

This results in **one-eighth** of the original carbon intensity.

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Within the document we use shaded boxes to highlight updated data.

All new annotations are in red font.

Foreword

Climate Action Planning at Ball State University

In September 2008 in compliance with the requirements of the American College and University Presidents Climate Commitment (ACUPCC), President Jo Ann Gora appointed a Ball State University (BSU) Climate Action Task Force (CATF).

The members of CATF were asked to bring forward recommendations to assist Ball State University in achieving climate neutrality; a zero net-carbon-dioxide-equivalent (CO₂e) of emissions into the atmosphere by some future date.

This report is the result of a full year of Task Force work; information-gathering, fact-finding, and brainstorming. This report begins with a working narrative of Ball State's position within the national landscape and outlines a set of recommendations for the structure, content and implementation of a BSU Climate Action Plan which can move BSU to climate neutrality.

The recommendations cover the full breadth of impact on Scope 1, 2 and 3 Green House Gas (GHG) emissions.

Scope 1: Direct Emissions:

These are GHG emissions that occur from sources owned or controlled by the reporting organization, such as boilers, vehicles, furnaces, etc.

Scope 2: In-Direct 'Upstream' Emissions

These are GHG emissions that result largely from Electricity Production and its distribution, as well as the manufacture and distribution of consumable products in the supply chain (procurement).

Scope 3: Other In-Direct 'Downstream' Emissions:

These are GHG emissions that result from the activities of the organization but are not owned or controlled by the organization. This includes production of materials for purchase, transportation of fuels purchased, transportation and disposal of material waste, and employee travel.

Development of the plan was heavily influenced by the decision this past February to decommission our four coal-fired boilers and to supply the district heating and cooling campus-wide from high performance ground source heat pumps networked to some 4100 boreholes and two energy stations.

The Ball State University Senior Administration:

Dr. Jo Ann Gora	President
Dr. Terry King	Provost and Vice President for Academic Affairs
Dr. Randy Howard	Vice president for Business Affairs and Treasurer
Mr. Phil Repp	Vice president for Information Technology
Dr. Kay Bales	Vice President for Student Affairs and Dean of Students
Mr. Tom Collins	Director of Intercollegiate Athletics
Dr. Ben Hancock	Vice President for University Advancement
Dr. Tom Taylor	Vice President for Enrollment, Marketing and Communications

The Climate Action Task Force Membership:

Mr. Vernon Draper	Networking and Communications Integration
Dr. James Eflin	Natural Resources and Management
Mr. Greg Graham	Facilities Planning and Management
Ms. Carissa Hipsher	Udall Scholar
Mr. Kevin Kenyon	Facilities Planning and Management
Mr. Robert J. Koester	Council on the Environment (COTE) and Task Force Chair
Mr. James Lowe	Facilities Planning and Management
Dr. M. Annette Rose	Technology
Dr. John Vann	Marketing & Management
Dr. G. Vasquez de Velasco	Architecture and Planning

Overview

The Climate Action Plan distinguishes three levels of presentation: structure, content, and implementation.

The Plan is designed to synchronize with the 5-year Strategic Planning Cycle, identifies three broad categories within which to target greenhouse gas emissions reductions, including information transparency, energy conservation and the electrical supply. And within those three categories identifies a total of nine tactical areas for measuring the ongoing activities to reduce greenhouse gas emissions. A matrix of actions for achieving those emissions is also provided. These matrices identify start and stop times, needed resources and responsible parties.

To kick-start the work of implementation, nine pilot projects also are identified. These projects are to be completed as funding becomes available; some are already underway and will not require financial support, others will require low or modest investment, while still others will require a longer-term effort for obtaining the funding needed. Related to these pilot projects are suggested research activities and the monitoring and reporting out of performance as an element of university outreach.

Funding solicitation of the many dimensions of the Climate Action Plan must occur in parallel and it is recommended that Return-on-Investment be used as the decision metric for evaluating the cost-benefit of actions to be taken. Also provided is a discussion of the cost of delay and the need to avoid protraction of activity; especially since even with external financing, many projects will yield better net savings if started immediately.

The documentation of education, research and public engagement becomes a natural means of integrating the efforts of Climate Action with the 5-year Strategic Planning Cycles and can become part of the annual reporting of Strategic Plan achievement. The conclusion section of the Climate Action Plan advocates for continual and active *celebration*, *facilitation* and *anticipation* of activities by all members of the university.

The Total 2008 Greenhouse Gas Emissions at BSU:

GHG loads are typically reported as carbon dioxide equivalent (CO₂e), and are broken into three scopes of emission: Scope 1 is the on-campus GHG emissions resulting from the burning of fossil fuels, while Scope 2 is the ‘upstream’ emissions resulting from electrical power generation using fossil fuels, and Scope 3 is the ‘downstream’ emissions resulting from employee travel, production/use of purchased materials, and waste management.

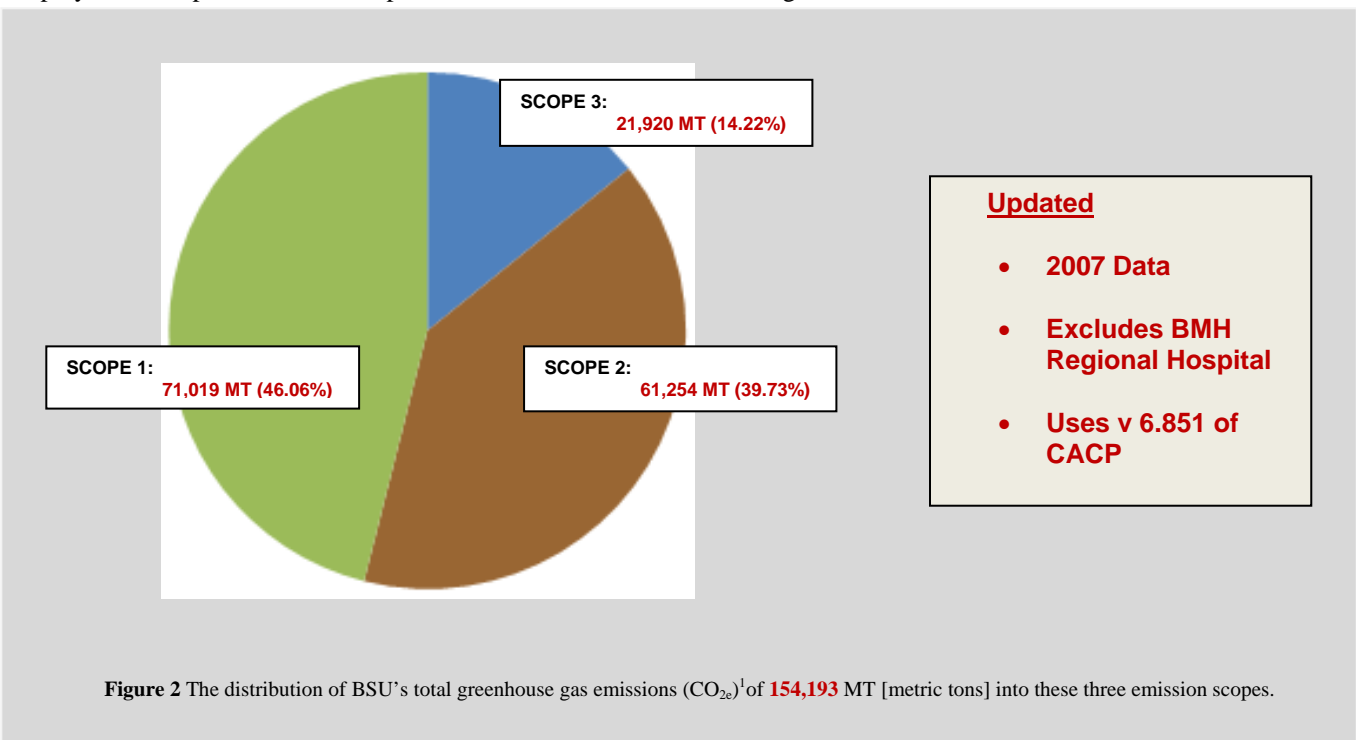


Figure 2 The distribution of BSU's total greenhouse gas emissions (CO₂e)¹ of 154,193 MT [metric tons] into these three emission scopes.

¹ Fisher, R.A. (2008, August). Ball State University Green House Gases Emissions Report. Ball State University. 15 January 2010

The Structure of the Climate Action Plan

Five-Year Time Block Planning and Scheduling GHG Emissions Reduction

This Climate Action Plan is conceived and presented as **a living instrument**; intended for use by the Ball State University community over the next 40 years.

- It is time-structured;
- It is built to accommodate mid-course corrections that necessarily will occur in the decades to come;
- It uses five-year blocks for the targeting of milestones and the benchmarking of achievements;
- It acknowledges the needs for modification to the physical campus, its day-to-day operations and the behavioral practices of the members of the university community;
- It proposes continual staged reductions in greenhouse gas (GHG) emissions, the selective issuance of renewable energy credits, and possibly the purchase of carbon offsets.

The action steps in the BSU Climate Action Plan are framed fundamentally by the Board of Trustees decision in February of 2009 to sanction installation of a ground-source heat pump (geothermal) district heating and cooling system. This geothermal system which will serve 45 buildings on campus is the first major action step in reducing BSU GHG emissions.

Given the fact that the decision happened midway through our year of Task Force work, we petitioned the American College and University Presidents Climate Commitment (ACUPCC) for a delay in submission of the BSU Climate Action Plan from its original September 15, 2009 deadline to a January 15, 2010 deadline. With approval, we have continued to explore and outline the cascading steps available to us for achieving climate neutrality by 2050.

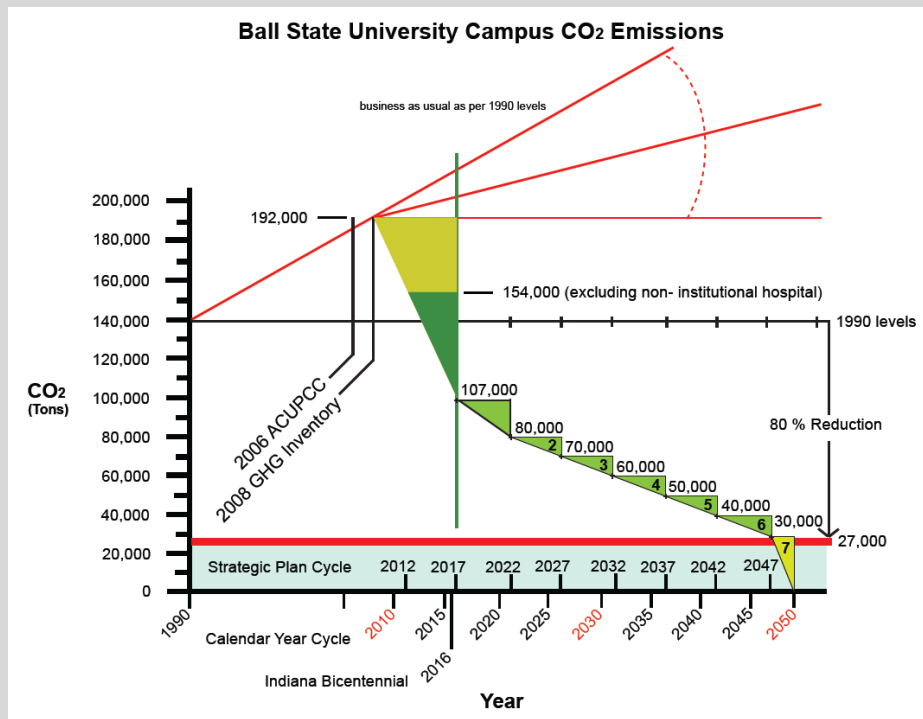
In the bullets below we outline the ways in which the geothermal installation has informed our proposal-making for climate emissions reduction.

- The geothermal system installation will eliminate onsite combustion of a primary fossil fuel (coal).
- All heating, ventilating and air conditioning in the 45 buildings on campus will become, in effect, an electrical load meaning that continuing GHG emissions reduction opportunities will reside in electrical energy sourcing—through on-site and off-site electrical production and grid-based green power purchase.
- The geothermal system will result in an increase in use of electrical power.
- Our energy-use reduction will rely not only on continued enhancement of building envelope, air handling and water pumping efficiency but also on the use of more efficient lighting and lighting system controls;
- Given the fact that our principal energy consumption will be electrical, attention to lighting efficiencies, lighting controls, and power management will be paramount;
- Behavioral change also is critical; occupant-driven energy use can be reduced by specification of energy-star-rated equipment such as computers, printers, monitors, and appliances.
- This opens a bundling opportunity for mixing building component interventions with occupant behavior.
- And opens the door for a mix of funding which can integrate immersive education into the effort.
- New sourcing for electrical power includes on-site electrical production with photovoltaics, off-site electrical production from wind power and/or photovoltaic (PV) conversion -- likely to be located in the ECI economic development region – and/or the purchase of “green power” from our utility supplier.
- The potential for internalizing profits from electrical energy savings is high. Specifically through energy- sourcing substitution, the selling of renewable energy credits, the outsourcing of investment tax credits and production tax credits, and the use of clean renewable energy bonds or similar financial mechanisms to link the university’s climate emissions reduction to regional economic development.

In short, the installation of the geothermal district heating and cooling system has invigorated the ways in which to see the campus as a system of systems – a case study in the interactive operational metabolism of some 45 buildings. The shift to a primary (electrical) energy supply will standardize our CO₂e calculations; we are in a coal-fired utility district and the scope 2 impacts can be readily determined.

In preparing these recommendations, we examined some forty Climate Action Plans of other universities throughout the country to see how differing institutions were planning for energy-use reduction and the offsetting of GHG emissions. Virtually every Climate Action Plan uses a graphing technique to show upward-sloping trend lines of the “business-as-usual” continued growth of greenhouse gas emissions and correspondingly produces wedges of slope reduction which on aggregate illustrating a sloping-downward projection of the impact of emissions reduction strategies². Typically these are single-line slopes that project out to a target date for achieving climate neutrality – with little regard for defining numerical benchmarks of achievement at any of the interim dates between ‘now’ and ‘then’. We have chosen to structure our approach differently.

We have built our recommendations using a time-based diagram with benchmarks and targets of achievement structured in five-year blocks of conservation reduction, improved operational efficiency and green energy sourcing. Each 5-year block provides a convenient alignment with Strategic Planning windows and allows us to indicate 10, 20 and 30-year time horizons for projecting returns-on-investment for GHG emissions reduction.



The adoption of the geothermal project qualifies the challenge of conservation and efficiency for two reasons: 1) we will be eliminating the combustion of fossil fuels on campus completely and so our Scope I emissions will be brought to near zero; and 2) we will increase electrical demand to run the high performance heat pumps and related equipment to provide the hot and chilled water to the 45 buildings on campus.

This comprises a modest increase in Scope 2 GHG emissions and links directly the energy conservation and efficiency reductions for a given building to the Scope 2 sourcing. One advantage is that the coefficients of performance of the new technology leverage far more work out of the purchased source energy from the electrical grid thus expanding the impact of any conservation measures employed in our 45 buildings on campus.

Even more significant, is the potential impact from the reduction of plug-loads since the same leveraging will occur. The most direct means of reducing electrical power demand by the buildings and thereby reducing the sourcing of grid energy is to reduce lighting demand. As a rule electrical lighting and plug loads comprise some 75% of the energy demand of buildings and the opportunity to conserve in this arena is substantial. What’s more important is that returns on investment (ROI) for conservation in lighting design are significant.

² Much of these sloped graphs build off of the modeling conducted by the Princeton Climate Emissions reduction group which calls for seven wedges of reduction; each wedge constituting one billion metric ton of greenhouse gases. The Princeton group also lists some fifteen strategies, many of which attribute to conservation through building design and operations.

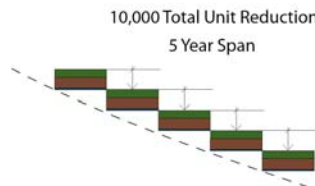
Continually Telling the Story

Changing the slope of the curve uniformly or observing periodic inflections as we move from any one 5-year block to another will be a product of how the factors above combine to influence the amount of energy demand on the electrical energy supply.

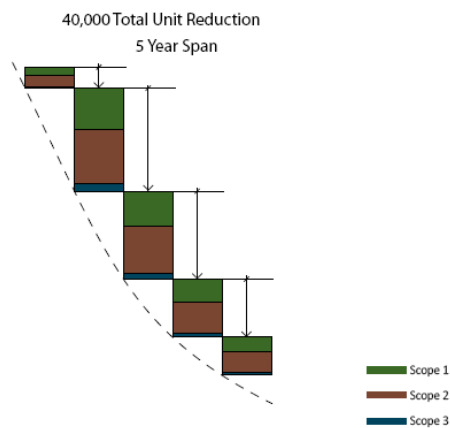
Each of the five-year blocks is broken into one-year histograms showing a profiling of reductions in scopes of emissions or in tactical areas of emissions. Any five-year block will have internal variability and any one-year histogram will have internal variability. In each case, these changes will reflect the realities of instituting behavioral change through information transparency and education as well as technology interventions.

Example #1 Illustrating Scope Reductions

In the histogram to the right, five separate years of staged reduction are illustrated; the color-coding reflects the Scope 1, Scope 2 and Scope 3 emissions areas. Over this five-year period, the total reduction in GHG Emissions would amount to 10,000 tons of CO₂e – or some 2,000 tons per year.

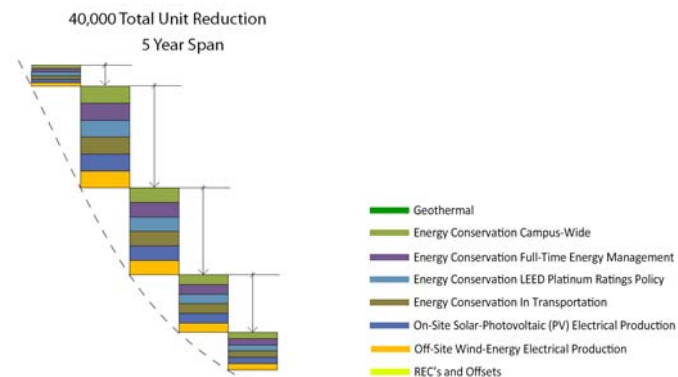


In this histogram illustration, over the five-year period some 40,000 tons of CO₂e would be eliminated from our emissions inventory. Each of the histograms is illustrating a breakdown of the 40%, 53%, 7% proportionality of our current GHG Emissions for Scope 1, 2 and 3 respectively.

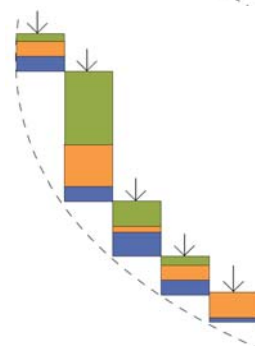


Example #2: Illustrating Tactical Areas

In this illustration a reduction of 40,000 tons of CO₂e occurs over a five-year period; each histogram is equally proportioned to reflect the reductions from energy conservation, and onsite and offsite electrical production.



This five-year histogram also showing a 40,000 ton CO₂e reduction differentiates from year-to-year varying amounts of impact from the respective GHG Emission reduction.



The histograms are not building-centric, although the opportunity for conservation and energy source substitution for each of the 45 buildings on campus is substantial. By virtue of the switch to the geothermal district heating and cooling system, all building loads shift to Scope 2 GHG emissions; that is to say, the heating and cooling, the lighting and plug loads for any given building, combine as a load on the electrical grid.

In large measure the electrical supply grid in our sector of Indiana is supplied by coal-fired electric generating facilities. The challenge then is to reduce demand through conservation measures, and to seek source substitution for the carbon-based electrical power. Two immediate opportunities for electrical energy sourcing are the use of on-site building-integrated photovoltaic electrical production and the use of off-site wind-power or PV-electrical production trunked over the grid.

Expand Unit-level Sustainability Plans to Include GHG Emissions Reduction

Fortuitously, Ball State University required in its 2007-2012 Strategic Plan that all administrative units on campus prepare unit-level sustainability plans. With the help of the Council on the Environment, this effort was completed in 2009 and we now have in hand 102 unit-level plans which follow the framework of the STARS Rating System for categorizing information under the broad headings of Education and Research, Operations, and Planning, Administration and Engagement.

We are recommending with this Climate Action Plan that those unit-level sustainability plans be updated during the next cycle of strategic planning to include more complete and forceful engagement of energy conservation as well as education, research and outreach related to the issues of sustainability and climate action.

To assist in this process, the members of the Council on the Environment are being asked this academic year to participate in the campus sustainability discussion forums on the STARS Rating System. These forums are hosted by AASHE and provide an opportunity to network nationally with counterparts seeking to demonstrate achievements in the respective categories used for the STARS Rating.

It will be appropriate also to host working sessions at some point with the Council members to facilitate their modification to the unit-level plans for the administrative units that they represent.

We have in hand a summary matrix which lists the status of achievement of all 102 units as measured against the STARS Rating System. This tool will be made available to members of the Council and eventually posted publicly as are the unit-level plans at www.bsu.edu/cote/sustainabilityplans/.

One of the options that may be written into these unit-level plans would be the capture of split incentives for the building/spaces occupied by that administrative entity. Assuming the proposed pilot project yields the anticipated significant energy conservation (reductions in greenhouse gas emissions) through behavioral change, we anticipate the interest in this opportunity to spread quickly and become aggressively sought after by administrative units looking to capture sources of funding via energy conservation.

Update the Climate Action Plan as a part of each five-year Strategic Plan

The five-year-time-block increments of this Climate Action Plan are intentionally structured to match that of the university's Strategic Planning cycle. The recommendation is to expand the presence of the Climate Action work within Strategic Plan developments. As we approach the 2012 deadline for issuing the next 5-year Strategic Plan, the university (at minimum) will have completed installation of the first phase of its geothermal project, will have adopted and published its Climate Action Plan, and should be in a position to integrate the increments of GHG emissions reduction with the setting of goals and objectives for the next five-year block of time in the Strategic Planning effort.

The Content of the Climate Action Plan

Involve the full breadth of the university community

The reduction of Greenhouse Gas Emissions at Ball State University is not a task that falls solely on the shoulders of Facilities Planning and Management staff. Rather it is a task for the full membership of the university community. Administrators, faculty, staff and students all have a role to play in helping the university dial-down its demand for energy so as to reduce its Greenhouse Gas Emissions.

Certainly administrators have the opportunity to serve as champions of the cause by institution of policies or by employing best practice guidelines for energy conservation and emissions reduction. They also are in a unique position to work collaboratively with one another.

Faculty of course can be by definition champions of the cause in their day-to-day activities; especially in their education endeavors. This is not a suggestion for indoctrination, but rather a call for open dialogue about the complexities of social, environmental and economic interactions and the challenge for us all in being stewards of the future.

Staffs, in their day-to-day activities, have perhaps the best sense of the 'pulse' of the institution. The routine operations which permeate the campus are a significant frontier for engaging energy conservation and Greenhouse Gas Emissions reductions. These opportunities are integral to the operations outlined in the unit-level sustainability plans.

Students are the promise of the future and must develop skill-sets and understandings to engage the complexities of social, environmental and economic interaction. In their day-to-day life during their four years on campus (+/-), they will have the opportunities for immersion in these issues and contribution to a reduction in energy demand and Greenhouse Gas Emissions.

Three Strategic Categories for targeting and Nine Tactical Areas for measuring GHG Emissions Reduction

As mentioned previously, the installation of the geothermal project has set the primary frame of reference by which we have developed our Climate Action Plan. We are recommending the targeting of reductions in **three strategic categories**: information transparency, energy conservation, and electrical energy sourcing.

Within those categories we have identified **nine tactical areas** for measuring Greenhouse Gas Emissions reduction. These include:

1. real-time communication, monitoring and reporting
2. energy management through the geothermal district heating and cooling network
3. energy conservation within information technology
4. transportation efficiency
5. building efficiency
6. energy conservation policy
7. on-site solar photovoltaic (PV) production
8. off-site wind energy electrical production
9. off-site PV electrical energy production

A Matrix of Support for achieving GHG Emissions Reduction in each of the Tactical Areas

For each of the nine tactical areas, we have also constructed a **matrix of support** for achieving the proposed Greenhouse Gas Emissions reduction; each matrix identifies specific line-item actions, starting and ending dates, major milestones and responsible parties.

Implementation of the Climate Action Plan

Initiate and Secure Funding (as needed) for kick-starting the work with Nine Pilot Projects

Of the nine pilot projects proposed, all but three can be instituted at little or no cost using existing campus personnel and financial resources. In fact the first-listed pilot project which focuses on information transparency is already underway. This “Get on the Map” opportunity will be available to all members of the university community. Anyone will be able to self-report success within the categories of the STARS framework -- education and research, operations, and planning and administration.

Establish Immersive Education and Research Activities for Each Pilot Project

Under the university branding of immersive education, we are proposing that students be actively recruited and involved in the implementation of each of the pilot projects.

A qualifying factor of course is the semester-scale modulation of student availability so careful attention must be given to the start and stop times for these projects, the potential inclusion or connection of this work with classes already on the books and the opportunity for service clubs, student government and residence hall associations to collaborate and contribute to the success of the university’s efforts

Monitor and Report Pilot Project Performance (Outreach)

Real-time display of performance will affect human behavior. To the extent that we can maintain a transparency of information about the workings of the institution, its energy consumption and its Greenhouse Gas Emissions, we are confident that all members of the university community will actively contribute to the success of Ball State University in becoming a climate neutral campus.

Although we have proposed that achievement over a 40-year time horizon, we can only get there with routine annual reporting of our progress and the integration of our planning and efforts with the five-year strategic planning cycle.

Moreover, we anticipate opportunities to link some of this work with the growth of the green economy in the state of Indiana and especially in the East Central Indiana economic development area.

Conclusion

Actively Celebrate, Facilitate and Anticipate

Ball State is poised to demonstrate Climate Action Planning as a form of an Industrial Ecology – the management of a system of systems. We have balanced the structure and content of our approach; identifying targets of reduction and a proposed institutional structure to foster, implement and sustain continuing reduction.

Our history as a university involved in the Green Campus movement is significant; we are known for:

- our recently-announced geothermal initiative, now under construction;
- our hosting of the biennial Greening of the Campus Conference Series;
- our status as a signatory to both the *Talloires* Declaration and the American College and University Presidents Climate Commitment (ACUPCC);
- our involvement in the development of the Sustainability Tracking Assessment and Rating System (STARS) as a pilot and now charter participant;
- our maintenance of the longest-standing Council on the Environment within Indiana Higher Education; and
- our creation of 102 unit-level sustainability plans as part of the 2007-2012 Strategic Plan Implementation.

The Ball State University community can actively *Celebrate, Facilitate* and *Anticipate* its reduction of GHG emissions and the achievement of Climate Neutrality with the implementation of this Climate Action Plan.