



**Environmental Sustainability, Campus Energy Conservation and  
Green Building Practices  
Bowling Green State University  
Office of Design and Construction (*Draft - September 2006*)**

**Progress on Campus Environmental Sustainability**

We continue to pursue integration and promotion of environmental sustainability in projects and to encourage campus development. Continuous use of Leadership in Energy and Environmental Design (LEED) criteria and specification are being furthered in our work. Criteria categories for consideration are: sustainable sites, water efficiency, energy and atmosphere, materials resources, indoor environmental quality. The design of new buildings and facilities should articulate a quality and philosophy that is sensitive to environmental design, along with sustainable principles and systems. Additionally, we continue to review the campus in a holistic way to determine optimization measures to build improved integration, functionality, and efficiency into all of our work. Environmental sustainability will continue to be on a progressive path for development and consideration.

The importance of “green building” considerations for all buildings on campus is the belief that “green” concepts are valuable and can produce resource-efficient buildings and buildings that are healthy for the occupants. If the “green building” process is conducted appropriately, with the correct assessment, a building will optimize the use of resources. The important element is to design with “green” care in mind. The ultimate objective is to improve the life of the building occupants and to reduce the expenditure of energy.

The Campus Master Plan that was developed and finalized in 2004 also incorporates the idea of a permeable, green, sustainable campus by creating and preserving key green spaces. This plan focuses on enhancing campus beauty, sustainability and a beautiful, walkable pedestrian campus setting. The intent is to establish and maintain a culture of sustainability.

## **Campus Energy Conservation Development**

Strategic planning and development for campus energy conservation is ongoing and important considerations are being reviewed and addressed to determine best options and opportunities for the future of our campus. This includes development of next round priority energy efficiency and conservation projects; preparing to meet and control energy demands; discussion with municipal utilities; assessment of alternate energy resources; and evaluating costs and financing alternatives.

This process combines careful consideration regarding how best to control our knowledge about peak and valley energy demand periods and preparing the campus infrastructure to control and adjust various systems on demand. The idea is to control energy use, maximize environmental controls, optimize energy use, and save money. Some options for future thought are geothermal systems, cogeneration, thermal storage, wind power, hydrogeneration, and synthetic gas production. There is soon to be an open review of our developments and to offer perspectives that can be considered for implementation of future projects.

### **Sustainability Initiatives Put to Practice by BGSU Design and Construction:**

1. Actively considered environmental sustainability in the BGSU Campus Master Plan.
2. Discuss the importance of environmental sustainability in presentations about the Campus Master Plan.
3. Work to establish general objectives for sustainability in our work and projects.
4. Comprehend and seek continuous understanding about the broad and narrow spectrum of environmental sustainability for the campus and our work and projects.
5. Employ continuous discretion related to our work and projects regarding environmental sustainability.
6. Continue to discuss the integration of sustainability in work and projects with Design and Construction staff and I insist on continuous improvement in the integration of the same by project managers. We continue to build a more consistent and evolving vocabulary of practices related to integration.
7. Director/University Architect developed the concept and demonstrated the need for a Central Data Hub and Resource Center Manager and a Data Hub and Resource Center Manager was hired. Tracking and documenting will be

key to the campus development of environmental sustainability.

8. Cross-coordinated and communicated about environmental sustainability with various other departments related to Design and Construction and continue to seek broader understanding within the campus.
9. Actively participate in the campus environmental sustainability committees and continue to advocate for environmental sustainability.
10. Strive to generate thorough Design and Construction Standards regarding projects that will solidify our position and the quality level of environmental sustainability for future work and projects.
11. Generated the first consultant architect/engineer criteria and legal contract record for inclusion of environmental sustainability in the process of design and the construction. This project is the Sebo Student Athlete Center and anticipate that this building may become LEED certified.
12. Integral in implementing the Ice Arena alternate energy system, photovoltaic project.
13. Conducting the first energy savings projects that will provide a 10 year payback, including condensate capture, lighting improvements, chiller replacement, gas line extensions, etc.
14. Conducted a study and planning of landscape work for the new Wooster Street widening which will enhance campus environmental sustainability.

### **The Office of Design and Construction Incorporates Environmental Sustainability and Energy Conservation in Projects**

#### **PROJECTS:**

A few years ago, two-phased construction project replaced the Central Heating Plant. The building and the smoke stacks were demolished and the University switched from coal as a fuel source for the old steam production system to a new, state-of-the-art facility that uses gas as the fuel resource. The emissions levels for the new system are considerably improved over the former coal operated heating system.

The Ice Arena Photovoltaic Phase 1 Project was started in 2002 following a feasibility study of the Ice Arena. The project was designed to install an array of photovoltaic solar panels to the Ice Arena roof, to supply power for both the Ice Arena itself, as well as to the City of Bowling Green electrical grid. Working in collaboration with the City Utilities Director, we developed an opportunity to both assist the City with their power

needs, as well as to further enhance BGSU's energy rates. In Phase 1, repairs were also made to the roof.

As part of Phase 2, we are also looking at the installation of an energy management system for the building, which will further enhance the savings, as well as to more accurately measure the guaranteed savings generated by this installation. Phase 2 of the project has been delayed while we wait for State and Federal funding, which has not been secured as of this date. While it remains a stated priority of the State Department of Development, we cannot proceed beyond the planning stages without this funding. Once funding is obtained, we will expand the installation of the photovoltaic panels. This is a project that the University will monitor closely as part of a model for more emphasis on environmental sustainability on campus.

The Wooster Street Widening project included an agreement with the City of Bowling Green to provide new landscaping to the portion of campus that sustained damages due to demolition of sidewalks, full grown trees, and shrubs. New sidewalks were installed the length of East Wooster Street, the University's irrigation system was repaired, top soil was added and new grass was added. Sixty new trees were planted in the fall to replace the damaged trees.

Design and Construction Staff to become LEED Certified.

#### **DATA HUB – USE AND VALUE TO ENVIRONMENTAL SUSTAINABILITY**

- Tracking improvements/accomplishments
- Mapping objectives
- Organizing documents and data
- Master Planning for Environmental Sustainability
- Geographic Information Systems (GIS)
- Global Positioning Systems (GPS)

#### **GIS – USE AND VALUE TO CAMPUS**

- Data efficiency and data tracking
- Data retrieval/Query
- 2-Dimensional integrated documents

#### **Request for Qualifications (RFQ's)**

Recently, when issuing a Request for Qualifications from architectural and engineering consultants, we include as a stipulation of the Summary of Work that the Associate evaluates and offers opinions on various new energy saving initiatives. Those initiatives could be: ice storage for cooling, gray water irrigation potential, passive solar schemes, wind power, and geothermal.

We also request that the Associate make every effort to incorporate sustainability as part of the pre-design. Natural light and ventilation, building placement and orientation,

along with energy efficient mechanical and electrical systems, life-cycle cost analysis and value engineering, are to be integrated as early as possible in planning and programming.

## **CAMPUS CULTURE ADVOCACY FOR ENVIRONMENTAL SUSTAINABILITY**

- Committees
- Planning
- Implementation in work
- Collaboration
- Campus Sustainability sponsorship
- Integration into all work and projects

### **Environmental Sustainability and Working Principles for Project Development Phases:**

- Idea
- Inception point
- Program, programming, program statement
- Design in 3 phases

**Idea**—It's a point in the project process that does not require any notion of environmental sustainability, as this point is more pragmatic in originating a means to an end for a specific purpose or function.

**Inception**—At inception, this point broadens the idea and initiates a greater realization of the idea. At this point it is very likely that environmental sustainability will enter the dialogue and be the point where stipulation for inclusion of environmental sustainability be posed as the counter weight to a good idea. A good project idea should be tested against the ability to include environmental sustainability. Thus, there is a need for principles that guide this phase of activity.

#### **Principles:**

1. Those who originate project ideas to inception should be required to demonstrate global thinking that is sensitive and inclusive of environmental sustainability.
2. This should be the orientation period of those furthering ideas. Parties of project inception should be advocates of environmental sustainability and should begin to reflect on clear notions about fostering an environmental sustainability plan to accompany this growth of an idea.
3. There should be no reluctance to initiate the thinking and reasoning of environmental sustainability. Those who are unsure about the concept of environmental sustainability should begin their education of the subject matter and be proactive for its inclusion to their project evolution.

**Programming**—At this point in the project life, programming is the stage for elucidating problems associated with the future project and it is a period to ask many questions. This is not the time to propose solutions. At this point project needs are fully unveiled, but solutions remain veiled and do not accompany programming. A good program will be inclusive of the need for environmental sustainability. Thus, the general provisions and the unique provisions for dealing with environmental sustainability will be provided. There will be a comprehensive, clear, and concise path for inclusion of environmental sustainability in the workings of this project.

**Principles:**

1. Include the requirements for a general commitment to environmental sustainability for the project and the continuous proactivity required during design, construction and post construction.
2. Identify all environmental sustainability items to be researched and reviewed for a project. Reference relevant documents to be complied with in the process of design solutions.
3. Determine the level of commitment and level of investment this project would be suited for regarding environmental sustainability.
4. Provide and define the particular design requirements for environmental sustainability in this project. Provide the necessary and comprehensive level of environmental sustainable design required by the architects and engineers of the project.
5. Include requirements for any and all space requirements, functional aspects, building form, or systems associated with environmental sustainability.
6. Provide the global and micro connectivity to campus master plan for this particular project.
7. Provide the global and micro connectivity to campus environmental sustainability plan for this particular project.
8. Generate the needed budgetary and financial commitment to environmental sustainability for this project. Provide involvement with BGSU Development for attainment of funding as it relates to the project's environmental sustainability.
9. Provide the analysis aspects of including environmental sustainability in the project. Includes life cycle cost analysis and reduction of such, expected operating costs and reduction of such, return on investment and maximum return, energy source costs and energy conservation, building efficiency and space utilization, value engineering, environmental impact, etc.

10. Provide all hazard control and mitigation of hazards in the process of producing the project. Include thorough requirements of evaluation of hazards or potential hazards to the project. This includes how the project will be constructed and the procedures to be used in construction process.

**Design**—The design point in the project development means that all architect and engineer and specialty consultants will be contracted with and are ready to engage in design solutions to the program established. All the parameters of the design professional's service requirements should be fully, clearly, and concisely included in the legal contract for professional services. At this point, there is little opportunity or cost effective opportunity to modify the service and scope requirements for design. Thus, the consultants should already know what level of environmental sustainability should be performed and the requirements and expectations for environmental sustainability in the design process and the final design solution.

### **ENVIRONMENTAL SUSTAINABILITY COMMITTEE RECOMMENDATIONS AND ACTION STEPS FOR NEW CONSTRUCTION AND RENOVATIONS**

The University Architect/Director of Design and Construction was a member of the Environmental Sustainability Committee that developed recommendations concerning new construction and building renovations. The following recommendations are among those that were made and most suggestions have been implemented:

- Environmental sustainability standards should be incorporated into the design, construction, post construction and renovation of new and existing buildings and their surroundings.
- All major operations should be audited in such areas as waste reduction, energy conservation, green purchasing, and educational/information sharing programs.
- The capital planning process should incorporate designs that maximize the efficient use of energy.
- The reuse or recycling of buildings should be the primary alternative considered before the construction of new facilities.
- Building designs should include space that facilitates recycling.
- Building designs should incorporate proper maintenance access for the provision of good indoor air quality.
- Building design should incorporate community spaces into the building design.

- The process for selecting project architects should give consideration to the firm's present capabilities to evaluate sustainable options and past accomplishments.
- Project designers and engineers should offer "low environmental impact construction materials" options that minimize product packaging.
- Building designs should be based upon flexible structures that are easily reused.
- Project designers should attempt to minimize construction and demolition debris.
- Project designers should attempt to incorporate educational exhibits highlighting elements of a building that support a sustainable environment.

Education and Training Opportunities Sponsored by the Office of Design and Construction

***SCUP Sustainable Building and Design on Campus – Building a Restorative Educational Environment – Virtual Seminar.*** Wednesday, October, 20, 2004 from 1:00 p.m. to 2:30 p.m. Webcast.

### **Managing the cost of "Green"**

The Current Paradigm –

- There is a baseline cost of construction
- Sustainable design adds cost above that baseline

The New Paradigm –

- Statistical analysis demonstrates that sustainability / LEED can typically be achieved without the need for augmentation of initial budgets.
- Sustainability is another program element that needs to be managed in the mix of expectations to achieve this neutral impact.
  - Factors that influence the cost of "green" are: location, design standards, intent/values, climate, timing of implementation, building size, point synergies, point feasibility, and procurement.
- Cost Factors: Procurement and Risk Control
- Sustainability is a Program issue – not a below-the-line item
  - Establish team goals, expectations and expertise
  - Include specific goals in the Program
  - Align Budget with Program
  - Stay on track through design and construction

***SCUP Report to the Academy: The State of Sustainability on Campus in 2004 – Audiocast*** on Thursday, October 28, 2004 from noon to 1:30 p.m. Invitation sent to campus community. [www.scup.org](http://www.scup.org)

Topics included:

- Is sustainable design, architecture, and construction possibly the fastest-growing sustainability realm on campus?
- Who is successfully implementing sustainability in the curriculum? Is curriculum reform more successful in specialized professional fields?
- What are campus activists and enthusiasts doing with regard to team building and collaboration? Where are they finding influential champions?
- What's the best way to talk about the "costs" of a green campus? How can you be sure that you can articulate the benefits in the most persuasive way?
- Which operational and administrative units are leading the sustainability charge on campus? Residential life? Student services? Plant operations? Purchasing?

SCUP Planning book, *Sustainability: Taking the Long View*. Maintained in the reference library of the Office of Design and Construction.

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