

Appalachian Energy Summit

APPALACHIAN STATE UNIVERSITY

The University of North Carolina Energy Leadership Challenge

Breakout Session Notes

High Performance Campus Design

Charged with envisioning and executing plans for designing the campuses of the future that are both energy efficient and environmentally friendly while promoting and inspiring our core purpose, higher education

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Please provide notes that are clear, concise, high level, and actionable. These notes will be initially forwarded to team leaders for final editing before publishing. Working Groups will utilize these discussion points as a basis going forward in taking action towards the Energy Leadership Challenge.

Best Practices

Introductions by session participants

- . A summary was provided of the mid-year meeting for High Performance Campus Design
- . Project should be scalable in nature and have a positive cost return on investment

Challenges:

- . Funding limitations are significant
- . Space Utilization – the key is accountability at the Dept. level
- . Flexibility is needed for building design, renovation and use
- . Potential partnership with community (public or private partnerships)
- . How do we model construction project and upgrade them
- . Training and support of personnel to assist campuses in building design and operations

Summary Points for The mid-year meeting of the High Performance Design Team

1. Use the master-plan of the institution as a tool to drive high performance buildings

- Energy requirement / usage / conservation, campus infrastructure, (drainage, internet etc) should be part of the campus master plan (design campus charette).

- What are the university's policy / goal for energy use.

2. Use a budget model to provide incentives

3. Maximize space efficiencies and utilization

The group was asked to comment on the extent of information available on campuses on space utilization.

On many campuses, there is annual update on the campus building inventories

Are there incentives on campuses on utilization of space?

There are guidelines for space for faculty, staff, labs, classrooms etc.

During the design process for new or renovation buildings to assess the current use of space in departments and other units. They also bring in stakeholders into the design changes. Clarify what is the best and highest use of space to be renovated. Integrate future plans for academic units into the design plans for buildings to be renovated.

Issue: Bd. Of Governors will be reviewing space utilization as new buildings are considered. Ie: greater overview, monitoring and assessment of current use and allocation of space.

- There must be a incentive for campus units to give up space if not needed.
- Libraries are in great transition on campuses.
- Current practices on campuses have a very fragmented discipline oriented process for allocation of space and does not provide for new approaches to support multi-disciplinary research or academic program initiatives.
- Are there operation disconnects between building use and efficiencies. Buildings should be designed for operational flexibility. Do smart 'zoning' to support building operations – smart renovations. How does design and construction support the ever changing campus operations.
- Building design needs to now consider 'security / safety' for the building use.
- One campus reported that they do a post construction assessment to determine if space utilization – show the use be altered given energy costs and use.
- (There needs to be a building operational plan that includes building use / repurpose / energy requirements) There may not be incentives for continuing use of space – How can we more efficiently use our classrooms and reduce energy costs?
- A new campus sustainability is required to deal with energy use, utilization, transportation, etc in order

to reach the goal of a sustainable campus. How do we use campus master planning to support this new view of sustainability on our campuses – (wholeistic master planning). What is the vision of the number of students, faculty and function of higher education in the future?

4. Set process & performance standards to cover broader range.

I:

- **There are two separate budget processes for Design and Construction and then on Operations** (life cycle analysis including both construction and maintenance are critical in understanding actual costs of building)

The community college system operates as a single funding model. Planning and operations are managed within a single system. Maintenance and operations are also included in understanding the total costs for a building - life-cycle-cost-analysis is in place.

State of NC law requires life cycle cost analysis. There is limited input from the design community in an assessment of building design costs consideration.

Universities have control in defining values and processes associated with building design. Institutions should clearly define 'best practices' (such as integrating energy managers in the design process). Set sustainable goals and ensure that they are included in the process.

- There is a policy of the UNC System - The Sustainability Policy (see the link below)

<http://www.northcarolina.edu/policy/index.php?pg=vs&id=5606>

The President is charged with the development of best practices for building design, construction and operations (see master plan document / policy).

"Sustainability principles related to infrastructure natural resources and site development and community impact shall be incorporated into comprehensive master plans."

- *Sections of the policy discussed by the group are highlighted below.*

The University of North Carolina Sustainability Policy

The University of North Carolina ("The University") is committed to leading the State of North Carolina as an environmental steward that endeavors to proactively and effectively manage its impact on energy, water and other natural resources. Further, The University is obligated to ensure full compliance with all applicable local, state, and federal environmental laws and regulations. Therefore, it is the policy of The University's Board of Governors (the "Board") that The University, including General Administration, the constituent institutions, and affiliated entities, shall establish sustainable development and resource management, or "sustainability" as a core value of institutional operations, planning, capital construction, and purchasing practices.

Budgetary constraints, capital improvement and modernization requirements, and training and management needs required to

facilitate the implementation of these sustainable practices are limiting factors and, as such, the University's General Administration, in collaboration with the constituent institutions and affiliated entities, shall pursue the appropriate enabling legislation and funding to implement this policy. The Board recognizes that the goals of this policy range from short-term to long-term and adds further emphasis on the importance of the aspirational nature of the highest ideals of sustainability. In addition, the Board values Return on Investment (ROI) as a factor in institutional resource planning and decision making and requires an ROI calculation for any new project.

The Board delegates authority to the President to implement the following sustainable practices to apply to each constituent institution and, when appropriate, General Administration and affiliated entities:

Systematic Integration of Sustainability Principles: Systematically incorporate sustainability throughout the institution by integrating the policy goals into the institution's processes, administration, teaching, research, and engagement. Each constituent institution and affiliated entity and General Administration shall designate an appropriate individual to serve as "Chief Sustainability Officer" to be responsible for implementation of this policy.

Master Planning: Sustainability principles related to infrastructure, natural resources, site development, and community impact shall be incorporated into comprehensive master plans.

***Design and Construction:* Capital project planning and construction processes shall meet statutory energy and water efficiency requirements and deliver energy, water, and materials efficient buildings and grounds that minimize the impact on and/or enhance the site and provide good indoor environmental quality for occupants.**

***Operations and Maintenance:* The operation and maintenance of buildings and grounds shall meet or exceed statutory requirements to reduce energy and water use, provide excellent air quality and comfort, improve productivity of faculty, staff and students, and minimize materials use. Further, priority shall be given to the purchase and installation of high-efficiency equipment and facilities as part of an ongoing sustainability action plan following life cycle cost guidelines where applicable.**

Climate Change Mitigation and Renewable Energy: The University shall develop a plan to become carbon neutral as soon as practicable and by 2050 at the latest, with an ultimate goal of climate neutrality.

***Transportation:* The University shall develop and implement a comprehensive, multimodal transportation plan designed to reduce carbon emissions and dependency on single occupant vehicles.**

Recycling and Waste Management: The University shall develop policies and programs that work toward achieving zero waste and will comply with the provisions of NC General Statute 130A-309.14 regarding recycling and waste management.

Environmentally Preferable Purchasing (EPP): Any purchasing shall, to the extent practicable, improve the environmental performance of its supply chain with consideration given to toxicity, recycled content, energy and water efficiency, rapidly renewable resources, and local production and shall also improve the social performance of its supply chain with consideration given to working conditions and historically underutilized businesses.

The President shall develop and implement best practices, guidelines, and implementation plans necessary to achieve the goals of this policy to the constituent institutions and affiliated entities. This policy shall be reviewed every two (2) years by the President, and any necessary revisions and modifications shall be recommended to the Board for its consideration.

- Renee Hutcheson (NC State Energy Office) provided a summary of considerations for assessing building performance: "Designing for good baselines and M & V' Why am I getting these wacky numbers. (*Measure & Valuation*) ??

Why are the modeling programs not providing good estimates of the building energy use?

Inaccurate usage information of the building

All the right stakeholders on the campus must be included in the design.

Needed adjustments to the program may not have been made to adjust for a changing program design.

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Did not do a reality check

Value of engineered out (sub) meters

Lack of adequate (good) commissioning

Improper operation / maintenance of equipment after occupancy

Lack of planning during the design phases for subsequent M&V functions.

- **Other lessons learned:**

What is the value of modeling? When do you leave the model and shift focus to metered data?

- **What conclusions can we make?**

Compare like buildings (We need more reliable data to support what we think we know)
In the end it takes teamwork, people with the right blend of skill sets and knowledge and proper level of attention.

. The time required from design and coming on-line, it may take up to 4 years. The model thus could be affected by this long time period. The question then centers on our expectations for the model; the model then could be considered more of an aid in the design process than an estimate on the cost of operation. The key is to use the model as a design aid.

There is a need to update the model for as the building was constructed and is operated.

The development of 'models' to anticipate energy use is continuing to evolve.

- **Guidelines for Design**

What are your guidelines for building design? Much of the costs are associated with Office of Design & Construction (NC).

Given the significant limitations on funding there may be a great reduction in new building design & construction. A greater focus on renovations may be needed for a few years.

Should there be a penalty imposed for poor performance?

Keep accurate energy records. Include feedback to the design team following construction.

Have a broad based team engaged in the design process that includes operations.

Hold those who run models in the design process accountable for the operations of the building.

Develop checklists for campuses to use in the design phase.

- Blake Herrshaft suggested the development of pre-design energy goals - set energy goals for the building; establish a reference base case building model; and evaluate passive elements such as shape, orientation and fenestration / lay lighting.

- A discussion centered on effective models to be used in building design.