

Sustainable Building

1. GENERAL

- A. In 2015 The Duke University Board of Trustees adopted the Duke Sustainable Building Policy, which will allow Duke University to continue to be a leader in sustainability and reinforces recommendations of the 2009 Duke Climate Action Plan. This Policy is overseen by the Board of Trustee's Facilities & Environment (F&E) Committee. The Guideline described herein supports the Sustainable Building Policy serving architecture, engineering, and construction teams working for Duke in addressing energy and water efficiency goals for building projects.
- B. Duke University designs and constructs sustainable and efficient facilities on Campus.
- C. Duke University decides on a project-by-project basis whether or not third-party green building certification will be pursued, and if so, what level of certification is desired. Project Initiation documentation, provided to the F&E committee, must indicate this information.

2. REFERENCED DOCUMENTS

- D. Duke University Sustainable Building Policy
- E. Energy Modeling Information Form
- F. Sustainable Guideline Checklist
- G. Duke Master Planning Principles document

3. SUSTAINABLE DESIGN

- A. Duke University designs sustainable and efficient facilities on campus.
- B. New construction and major renovation projects should be designed to achieve a 30% energy performance improvement over baseline design as outlined by ASHRAE 90.1-2007, Appendix G, requiring the development of an accurate Whole Building Energy Simulation model. *Note that this performance goal is based on energy savings, not cost savings.*
- C. Project teams should design new construction and major renovation projects to achieve a 35% water consumption savings over baseline design as outlined in the LEED v 2009 baseline calculation.
- D. The accuracy of the model is critical to prediction and budgeting for the life cycle cost of our buildings. Additionally, an accurate energy simulation model will aid in maximizing available LEED credits, and the selected credits are meant to ensure accuracy of the

model. To encourage the effort and to ease communication, the modeler should use the attached forms for identifying modeling input and output values for Duke review.

- E. Design teams should utilize building energy modeling during all phases of the project, beginning in early schematic design, through complete construction documentation.
- F. Whole Building Energy Simulation
 - 1. Project designers should generally use the “purchased utilities” option when developing the energy model, as central chilled water, heating hot water, steam, and electrical services are generally provided to buildings at Duke. This is preferred to modeling a “virtual plant.”
 - 2. The choice of software is left to the modeler; however, Trane TRACE, DOE 2.x- or EnergyPlus-based systems are recommended due to ubiquity in the engineering and design community.
 - 3. Designers will provide to Duke FMD both hard and electronic copies of the input and output information developed during the whole building energy simulation process. These should be provided in .pdf or other commonly-distributed file formats, such that the native modeling software is not required to review the information.
 - 4. Designers and modelers should reference and provide the requested information on the attached, Duke FMD-provided Energy Modeling Information Form in addition to other model output deliverables. This form allows summary information to be easily communicated to the project team.
- G. Life Cycle Cost Modeling for Energy, Water, and Other Utilities
 - 1. Project designers should use the resultant energy and water consumption information to develop a Life-Cycle Cost Analysis that should be used to inform the design process. A 20-year time period should be the typical consideration.
 - 2. The “value engineering” process should specifically avoid the reduction or removal of design strategies that demonstrate long-term energy and water efficiency or demonstrate a positive impact on overall life cycle cost of a facility.
- 4. GREEN BUILDING CERTIFICATION (IF APPLICABLE)
 - H. Pursuant to the Sustainable Building Policy, Project Initiation documentation provided to the Board of Trustee’s Facilities & Environment Committee shall indicate if LEED certification through the USGBC is planned on being achieved for a project, and at what target certification level.
 - I. Specific Credit Guidance, LEED v2009
 - 1. All Sustainable Sites (SS) credits should be considered during the design process.

2. The following Water Efficiency (WE) credits should be pursued, with the displayed minimum point accrual goals:
 - a. WE credit 3, Water Use Reduction
 - b. *WE credit 1 and WE credit 2 should typically be avoided, unless specifically identified as a project goal.*
 3. The following Energy & Atmosphere (EA) credits should typically be pursued:
 - a. EA credit 1, Optimize Energy Performance
 - b. EA credit 3, Enhanced Commissioning
 - c. EA credit 5, Measurement and Verification (typically Option D)
 - d. *EA credit 6 should typically be avoided, unless specifically identified as a project goal.*
 - e. All other EA credits should be considered during the design process.
 4. All Materials and Resources (MR) credits should be considered during the design process.
 5. The following Indoor Environmental Quality (IEQ) credits should typically be pursued
 - a. IEQ credit 6.1, Lighting Controllability
 - b. IEQ credit 6.2, Thermal Comfort Controllability
 - c. All other IEQ credits should be considered during the design process.
 6. Potential Innovation in Design credits should be explored during the design process.
 7. Regional Priority credits should be considered during the design process.
- J. Guidance, Future Green Building Standards
1. This document and associated reference documents will be updated as required as projects should Duke pursue future versions of green building rating systems.
5. Project Approval Steps
2. Design Approval documentation provided to the F&E committee will include:
 - a. target energy use in kBtu/GSF per year for the project
 - b. and target LEED certification level, if applying for LEED
 3. Construction Approval documentation provided to the F&E committee will include:

- a. Target energy use in kBtu/GSF per year for the project
 - b. Anticipated level of LEED certification, if applying for LEED
 - c. A projected LEED scorecard point total, if the project were to be submitted, for internal use at Duke.
6. Data Collection & Design Feedback
- K. As part of the Commissioning process, Duke FMD conducts a collaborative review of 10-month post-occupancy/warranty item review.
 - L. After 18 months of building occupancy, Duke FMD will host a collaborative building performance review with architecture, engineering, and construction team members. At this time, the team will review energy and water consumption data, and if required, discuss ways to mitigate poor building performance and inefficiency.