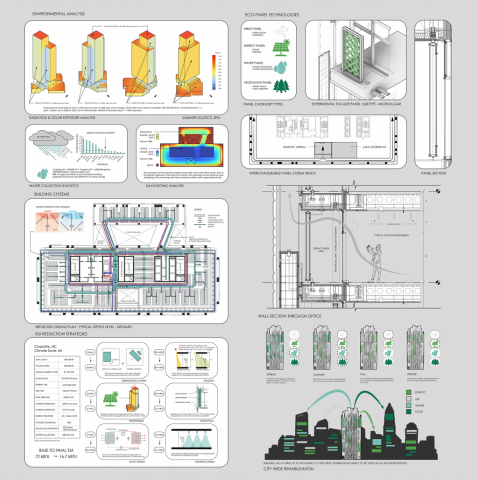
AIA
COTE Top Ten

ASSIGNMENT BRIEF #6
Energy



Measure 6: DESIGN FOR ENERGY

Sustainable design conserves energy and resources and reduces the carbon footprint while improving building performance and comfort. Sustainable design anticipates future energy sources and needs.

Narrative: How does the design seek to decrease the total energy use and carbon footprint of the building? Emphasize strategies to reduce heating and cooling loads, reduce electricity demand, reduce plug loads, and generate on-site carbon free energy.. Describe your approach towards achieving carbon neutrality.

Suggested Graphics: Open

Metric: Total energy use intensity (EUI) in kBtu/sf/yr: (build a simple energy model to calculate EUI using DesignBuilder, ArchSim, HoneyBee, eQuest, Sefaira, Autodesk® Insight 360, or another energy modeling program); Energy generation (if any) in kWh/yr: (use PVWatts® Calculator or solar-estimate.org for solar or wind); Net EUI (with renewables if applicable).

ASSIGNMENT:

1. Run conceptual energy analysis and identify opportunities to reduce heating, cooling, and lighting loads in the project and implement strategic efficiencies.
    a. Make a table listing efficiency strategies for each (Heating, Cooling, and Lighting) and link to integrative benefits associated with other Framework topics.
    b. What local/state/national incentives are available for energy efficiency and renewable energy for this project?

For Final Presentation:

2. Calculate net energy consumption in kBtu/sf/yr (EUI) using available tools for analysis:
    a. Calculate total project energy consumption.
    b. Calculate on-site renewable energy generation.

    c. Calculate net energy consumption or generation.

3. Create a graphic to express net EUI.
4. In less than 100 words, describe how the project will meet its energy needs - both integrative efficiencies and renewable generation.
    a. How does the design seek to decrease the total energy use and carbon footprint of the building?
    b. Emphasize strategies to reduce heating and cooling loads, reduce electricity demand, reduce plug loads, and generate on-site carbon free energy.
    c. Describe your approach towards achieving carbon neutrality.

DELIVERABLES:

- **EUI Graphic** - net EUI per analysis
- **Narrative on Design for Energy** (<100 words)

SUBMITTAL:

Submit as PDF via university interface (Blackboard, Canvas, Edmodo, Google…) using the following NAAB file format:

COURSENO_INSTRUCTOR_yourlastname_yourfirstname_ASSIGNMENT06_YEARTERM

DUE:

Resources:

US Department of Energy Building Energy Modeling Resources
https://www.energy.gov/eere/buildings/building-energy-modeling

Autodesk Energy Analysis https://www.autodesk.com/products/insight/overview

Sefaira Building Performance Software https://sefaira.com/

PV Watts Solar Energy Calculator https://pvwatts.nrel.gov/

DSIRE Efficiency/Energy Incentives Database https://www.dsireusa.org/

ACSA AIA COTE Top Ten Studio Guide
https://www.acsa-arch.org/competitions/2021-cote-competition/studio-guide/#tools

Associated NAAB Content:

Program Criteria

PC.2 Design—How the program instills in students the role of the design process in shaping the built environment and conveys the methods by which design processes integrate multiple factors, in different settings and scales of development, from buildings to cities.

PC.3 Ecological Knowledge and Responsibility—How the program instills in students a holistic understanding of the dynamic between built and natural environments, enabling future architects to mitigate climate change responsibly by leveraging ecological, advanced building performance, adaptation, and resilience principles in their work and advocacy activities.

PC.5 Research and Innovation—How the program prepares students to engage and participate in architectural research to test and evaluate innovations in the field.

Student Criteria

SC.1 Health, Safety, and Welfare in the Built Environment—How the program ensures that students understand the impact of the built environment on human health, safety, and welfare at multiple scales, from buildings to cities.

SC.3 Regulatory Context—How the program ensures that students understand the fundamental principles of life safety, land use, and current laws and regulations that apply to buildings and sites in the United States, and the evaluative process architects use to comply with those laws and regulations as part of a project.

SC.4 Technical Knowledge—How the program ensures that students understand the established and emerging systems, technologies, and assemblies of building construction, and the methods and criteria architects use to assess those technologies against the design, economics, and performance objectives of projects.

Illustration Credit COTE Top Ten Winner 2020

Students: Bekim Sejdiu & Devin Waddell

Faculty: Kyoung-Hee Kim & Liz McCormick

School: University of North Carolina at Charlotte