

The New College of Business will employ these strategies to create a sustainable building:

From the very outset, building development affects and transforms the land. On a macro level it contributes to deforestation, destruction of wetlands, sprawl, and other environmental problems. Nearly half of the forests that once covered the earth are gone. Over 50% of the wetlands of the contiguous United States have been destroyed - filled, contaminated or otherwise "reclaimed" (National Science and Technology Council, 1994). In addition to the sheer quantity of loss of forest cover it is the quality and biodiversity of the remaining ecosystem that is under threat by human enterprise. According to the Natural Resources Defense Council (NRDC), at least 50,000 species become extinct per year (137 per day or 6 per hour). The sprawl of cities also affects the environment adversely. Further, when development is spread out at a low density it requires more infrastructure - sewer pipes, power lines, water mains, roads and so on. In addition, the thousands of energy burning vehicles driving out to these areas contribute to environmental damage.

Sustainable Sites Goals

1. In view of these environmental concerns, sustainable design embodies the following goals:

θ Reduce sprawl due to new development.
θ Maintain and/or restore the biodiversity of natural systems.
θ Respond to microclimate and natural energy flows.
θ Restore, maintain, and/or enhance the natural character of the site.
θ Reduce energy use for transportation.

Sustainable Site Strategies

The sustainable development goals listed are translated into the following strategies:

2.1	Erosion and Sedimentation Control
2.2	Site Selection
2.3	Urban Redevelopment
2.4	Brownfield Redevelopment
2.5	Alternative Transportation
2.6	Reduce Site Disturbance
2.7	Stormwater Management
2.8	Landscape and Exterior Design to Reduce Heat Islands

Building construction and operation draw heavily on water from the environment. Most of the earth's water is located in oceans and is too salty for residential, commercial or industrial use. Only about 0.003 percent of earth's water is readily available as fresh water for human use (Miller, 1992). Building materials manufacturing, construction and operations consumes 16 percent of available fresh water annually. This does not reflect the impact of the building industry on the quality of water. Growth in urban water use is lowering water tables and necessitating large projects that siphon supplies away from agriculture. Since the turn of century, the worldwide municipal use of water has grown 19 times and industrial use has grown 26 times. In contrast, agricultural use has increased only 5 times (Worldwatch Institute, 1999).

1. Water Goals In view of these environmental concerns, sustainable design embodies the following goals:		Water Strategies The sustainable development goals listed are translated into the following strategies:	
θ	Preserve site watersheds and groundwater aquifers.	<u>3.</u> <u>1</u>	Water Efficient Landscaping
θ	Conserve and reuse stormwater.	<u>3.</u> <u>2</u>	Innovative Wastewater Technologies
θ	Maintain appropriate level of water quality on the site and in the building(s).	<u>3.</u> <u>3</u>	Water Use Reduction
θ	Reduce potable water consumption.		
θ	Reduce off-site treatment of wastewater.		

Buildings are energy intensive in their construction and operation. According to the Worldwatch Institute about 40 percent of the world's total energy usage is dedicated to the construction and operation of buildings. Buildings consume energy, from the mine to foundry to construction site. In the United States, construction and material production account for roughly 9 percent of energy use. In contrast, buildings operation accounts for approximately 30 percent of U.S. energy consumption. This energy use has serious impacts on the environment. Buildings account for about one-third of the emissions of heat-trapping carbon dioxide from fossil fuel burning and two-fifths of acid rain-causing sulfur-dioxide and nitrogen oxides. Buildings also contribute to other side effects of energy use, including oil spills, nuclear waste generation, river damming, toxic run-off from coal mines, and mercury emissions from coal burning (Worldwatch Institute, 1992, 1994).

Energy and Atmosphere Goals

1. In view of these environmental concerns, sustainable design embodies the following goals:

θ Reduce total energy consumption of buildings.
θ Reduce air pollution, global warming, and ozone depletion impacts of energy sources.
θ Slow depletion of fossil fuel reserves.

Energy and Atmosphere Strategies

The sustainable development goals listed are translated into the following strategies:

4.1 Fundamental Building Systems Commissioning
4.2 Minimum Energy Performance
4.3 CFC Reduction in HVAC&R Equipment
4.4 Optimize Energy Performance
4.5 Renewable Energy
4.6 Additional Commissioning
4.7 Ozone Depletion
4.8 Measurement and Verification
4.9 Green Power

4.10	Reduced Mechanical Equipment
4.11	Efficient Equipment and Appliances

A healthy, productive, and comfortable environment is expected at home and in the workplace. Yet many modern buildings create unhealthy and potentially dangerous interior environments for their occupants. Lighting may be inadequate or incorrect for its intended function. Thermal conditions may become extreme, and its control may be unaccessible to the occupants. Ventilation systems installed to protect air quality often subject occupants to stale air, or harbor and spread unhealthy molds, bacteria, and viruses. The medical, human comfort, performance and productivity costs of unhealthy interior environments may run into the tens of billions of dollars each year (Roodman & Lenssen, 1995). Research also shows that buildings with daylight, fresh air, and occupant control are consistently rated as more comfortable and contribute to occupants' performance and productivity. In a typical U.S. office, salaries are so high that if productivity rises just 2 percent, it is worth more to a company than entirely eliminating utility bills (Romm, 1994).

Indoor Environmental Quality Goals

1. In view of these environmental concerns, sustainable design embodies the following goals:

θ	Provide an environment for occupants that is physiologically and psychologically healthy.
θ	Minimize production and transmission of air pollution.
θ	Provide the full range of supportive sensory conditions (olfactory, thermal, vibroacoustic, tactual, and visual) for occupants.
θ	Provide needed operational control of systems to occupants.

<p>0 Produce environments that enhance human comfort, well-being, performance, and productivity.</p>
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Indoor Environmental Quality Strategies

The sustainable development goals listed are translated into the following strategies:

5.1	Minimum IAQ Performance
5.2	Environmental Tobacco Smoke (ETS) Control
5.3	Carbon Dioxide (CO ₂) Monitoring
5.4	Increase Ventilation Effectiveness
5.5	Moisture Control to Prevent Microbial Contamination
5.6	Construction IAQ Management Plan
5.7	Low-Emitting Materials
5.8	Indoor Chemical and Pollutant Source Control
5.9	Controllability of Systems
5.10	Thermal Comfort
5.11	Daylight and Views

5.12	Effective Lighting
5.13	Appropriate Building Acoustical and Vibration Conditions

Building design and construction use significant quantities of natural resources and materials. The building industry consumes 3 billion tons of raw materials annually -- 40 percent of the total material flow in the global economy. The manufacturing process of new materials is water and energy intensive and contributes to environmental degradation and pollution. Harvesting, extraction, mining, and processing new materials pollute the air and rivers and threaten ecosystems and wildlife habitat. North America, Europe and Japan consume more than 25 percent of the world's annual 4.5 billion cubic meters of wood production (Worldwatch Institute, 1991). According to the Natural Resource Defense Council (NRDC), at present rates of destruction the rainforests will be gone by 2050. In addition, global wood production is expected to double over the next 30 years. Consumption of other raw materials and natural resources continue to accelerate.

Materials Goals

1. In view of these environmental concerns, sustainable design embodies the following goals:

<ul style="list-style-type: none"> θ Minimize consumption and depletion of material resources.
<ul style="list-style-type: none"> θ Minimize the life-cycle impact of materials on the environment.
<ul style="list-style-type: none"> θ Minimize the impact of materials on indoor environmental quality.

Materials Strategies

The sustainable development goals listed are translated into the following strategies:

6.1	Reduced Material Use
6.2	Disassembly
6.3	Resource Reuse
6.4	Recycled Content
6.5	Local/Regional Materials
6.6	Rapidly Renewable Materials
6.7	Certified Wood
6.8	Durable Materials
6.9	Reusable, Recyclable or Biodegradable Materials
6.10	Materials with Low Life Cycle Impact

Waste is generated throughout the life of a building. Brick, metals, wood, cardboard, and other waste is generated and landfilled during building demolition, renovation, and construction. According to the US Environmental Protection Agency, construction and demolition waste represents 1/4 to 1/3 of all waste landfilled in the U.S. The construction and demolition waste stream, once thought to total between 30 and 40 millions tons of waste materials annually in the United States, is more likely to total over three times that amount (Yost, 1999). Landfilling construction and demolition waste, instead of recycling it, is a loss of material resources. During building operations, waste such as paper, aluminum cans, and glass is also generated; it too is a burden on our landfills and a loss of our natural resources

Waste Goals

1. In view of these environmental concerns, sustainable design embodies the following goals:

θ Minimize use of resources.
θ Minimize waste generated from construction, renovation and demolition of buildings.
θ Minimize waste generated during building occupancy.
θ Encourage better management of waste.

Waste Strategies

The sustainable development goals listed are translated into the following strategies:

7.1 Construction Waste Management
7.2 Packaging Waste Management
7.3 Storage and Collection of Recyclables
7.4 Hazardous Waste Reduction and Disposal

1. P **Goal:** The New College of Business Administration project will attempt to innovate new and creative ways to improve the process, educate the public, and develop new techniques, products, and methods for meeting the above goals.