

GOING ENVIRONMENTAL

Emory University

Paper prepared for 2001 AUA Conference in Kansas

April 27, 2001

By: Jennifer Fabrick, AIA

Director of Campus Planning, Emory University

The world is the theater of the environmental movement of the twenty-first century. The continuous complex play of systems, both natural and human based, renders a dialog both comedic and tragic. Some of the theater actors have talent, some are hobbyists with bit parts, and many others strive to be technicians changing sets, only to find the fly loft is orbital. This world environmental stage represents a story of scientific and human history yet unfolding, gripping us in a tension unproven.

This green dialog has been often repeated, but again let's remind ourselves of the situation:

- The world economy, that system of human goods produced bought and sold, since 1980 has tripled in size, and the population has grown 30 percent to 6 billion people. Economists predict the global economy may expand by a factor of 5 in the next 50 years. ¹ World population in 2050 will be 9 billion.
- 86% of the world's resources is consumed by 20% of the population. ²

What do all the figures mean? That as an earth society we are consuming more goods per person every year than ever before in the history of man. On top of that, add the fact that we are continuously increasing the number of people on this planet. The more goods we consume the more waste we create. How long until we are consumed by waste?

Look at a few statistics reflecting our consumer culture here in the United States:

- U.S. is 4.5% of the world's population and consumes 25% of the world's energy. ³

- 54% of U.S. energy consumption is directly or indirectly related to buildings and their construction. ⁴
- Over 30% of the total energy and 60% of the electricity use in the United States is in buildings. ⁵
- This energy use produces nearly one-quarter of the country's carbon emissions. ⁶
- Americans consume 125 pounds of material per person per day (23 tons per person per year) in fuels, forests, grasslands, metals, minerals, stone and cement and agricultural products. ⁷
- Making 100 pounds of product produces 3,200 pounds of waste. ⁸

Taking it one step further, consider the State of Georgia, recently headlined as the state that cuts down the most trees per year of all the states in the union. And, in Atlanta, the fourth fastest growing city in the country, the headlines highlight the loss of 50 acres per day of forestland due to population sprawl. Now first a rational look at these two media "bites". One of Georgia's major industries is pulp and paper production. We cut and plant those skinny pine trees like people in Kansas grow corn. We may cut down more trees than anyone else, but we are also planting more trees, too. And 50 acres per day is the equivalent of 18,250 acres per year, or 28.5 sq. miles. 30 square miles is the size of Disneyworld (?)

Zooming in closer, let's take a look at the Emory University campus, all 631 acres. This small parcel of land lies within the perimeter highway that mentally marks urban from suburban Atlanta. At 631 acres it would take Georgia developers just thirteen days to

destroy our urban pristine setting in DeKalb County. We are the largest employers in the County with 16,230 faculty and staff. Add to this another 11, 398 students and a total campus population of 27,628, or a density of 44 people per acre. Not bad when considering that Yale has a density of 23.5 people per acre, Duke University has 3.5 people per acre, and the University of Southern California has 242 people per acre.

But can a 631acre campus have any impact on such an overwhelming issue as environmental sustainability? Can our trees help contribute to cleaning Atlanta's air pollution? Is our recycling really being recycled? Can we reduce traffic congestion at a time when Atlanta can't get federal highway funding? Can we reduce our energy consumption when we are building 800,000 square feet of new construction? Aren't we a bit guilty of peer pressure and consumption?

The answer to all of the above is "yes", but it is going to take a major change in campus culture. Emory University has now started on the path of "going environmental".

It is our responsibility to environmentally educate the people who will grow our future generations. We say we must set an example, we must grow a campus culture of environmental responsibility. We have started a new chapter in Emory's history.

Now that the stage has been set, lets take a look at the actors and the script.

So who are all these "we's" at Emory that insist on creating a culture of environmental responsibility? As you can guess it takes people at all levels. At Emory we count the

supporters regularly, the naysayers only when we need to vote, and the fence sitters watch with growing enthusiasm.

So who are the supporters? First, and most importantly, the President, Bill Chace. Add two Senior Associate Vice Presidents of key areas, facilities and business (includes parking and traffic), Bob Hascall and Eric Gaither. Mix in a large assortment of Deans and Directors. Next, stir it up with some faculty, especially if you have a newly formed Environmental Studies Department. And, then add in the students. At Emory we do have a full spectrum of students. Our student body is diverse, representing all 50 states and 90 foreign countries. 70% of students receive some sort of financial aid, yet many were raised in affluent suburbs in houses where energy savings is not just “turning out the lights” but also turning off the TVs and the computers.

Emory’s naysayers are faculty, in fact rumor has it that one professor in the Economics Department teaches that recycling is NOT a worthwhile endeavor, that a market economy requires the consumptive use of resources thereby forcing in new technologies. This adulterous teaching against recycling is, however, an academic freedom supported at Emory University. And then there is the Medical School, and the whole Health Sciences department. Talk about a bunch of fence sitters. They aren’t sure what they want to be other than doctors and practitioners, health givers and body menders. Sometimes their environmental interest only comes through talk of pollutants and water quality.

Now back to the topic: how did this 631 acre, 26,000 people campus start on a path to environmentalism? How are we pursuing “going environmental”? Is there any one person responsible? A special group of campus staff? Is it the desire of the President to focus on the environment? Yes, our President sees environmental sustainability as a major concern of the future.

In 1998 Emory University completed and adopted a Campus Master Plan with seven guiding principles. These principles: a walking campus, an intellectual community, centers and edges, an Emory based language, sacred spaces, enlightened frugality, and sustained implementation, do **not** address environmental responsibilities. Even though environmentalism is not a part of the Campus Master Plan, the concepts of energy and resource conservation certainly were part of new building discussions held among the relatively new Facilities Management leaders. In 1998, at the time of the Master Plan, Emory did have three programs in place that set the stage for environmentalism.

First, the notorious and well-established committee, The Committee on Environment, composed of biology, geology, law and medical research faculty, staff and students.

(And, we must kindly add, the President’s wife, an avid friend of the Environment.)

Endearingly called the COE, this University Senate committee had already caused newly designed building projects to be resited due to forest intrusion issues, they had stopped the creation of jogging paths through the Emory Forest, and were poised for a major fight over the growth of Emory’s campus and facilities. Every second Thursday of the month we tightened our belts and went in to meet with the COE about new buildings.

Secondly, in 1998, Emory University had a dynamic recycling program. Started in 1990 as LEAF (Library Environmental Action Force) by an environmentally conscientious group of librarians, the program impressed students and became an official program backed by the Student Government program and the College Council. At first the new program, Emory Recycles, was an effort to collect aluminum cans (particularly Coke cans) and white paper from high traffic areas of campus. Then 15 “Bobos”, large recycling containers were placed on campus to collect cans, glass and paper. With increased enthusiasm from students, in 1996 Emory expanded its program even further and conducted a ten-week pilot in-room-recycling program in a large residential complex. Items were sorted and collected on each floor, and with student volunteer workers, the contents were emptied into 95-gallon wheeled carts outside. Then the Facilities Management Recycling staff took over and provided central collection pick up. Four tons of commodities were collected in the ten-week pilot. With this success, the program expanded to all residence halls throughout campus. Then arrived a healthful passion for bottled water, and Emory Recycles was asked to expand, to add plastics to their commodity list. In 1998 the Recycling Center opened, a facility that allows Emory Recycles to further expand its services to the campus and to the surrounding community. Emory Recycles now partners with the Centers for Disease Control, Wesley Woods Geriatric Center and the Emory Village.

In 1999 Emory Recycles won the AF & PA best paper recycling award, the recycling staff had given papers at key national meetings, and was asked to host the 2000 College

& University Recycling Council's Eastern Region Annual Conference Series. In 2000 Emory Recycles joined as an EPA Waste Wise Partner, a goal oriented program with a five year period of commitment to waste reduction. So what are the statistics?

Emory Recycles has an annual operating budget of \$103,000. Since 1998 the average annual revenues have been between \$43 – 45,000. With simple math we can figure that Emory University is subsidizing this program to the tune of \$60,000 annually. These figures do not include the capital cost to build the recycling facility. Please note that Emory administration has made a conscientious decision to support this program and it is believed that recycling is a necessary part of our campus culture. In 2000 Emory Recycles recycled 595 tons up 25% from tonnage recycled in 1998. Waste handling was 3,631 tons, a 5% drop from the year before. 16% of Emory waste was recycled in 2000. For every \$1.00 generated from selling commodities, we saved \$0.98 in disposal costs.

The third effort in place in 1998 was our van pool and mass transit program. Typical to many universities, Emory began subsidizing the use of mass transit, if no parking hang tag was purchased, and encouraged the use of van pools by offering the best parking and a small fleet of cars available for day errands and emergencies. Our next step has been to enter the realm of alternative fuels. Facilities Management has a fleet of 40 electric carts, and 2 electric pick up trucks. The Senior Associate VP for Facilities drives an electric car on loan from Georgia Power. The Community Service office (security and parking) has its own fleet of electric carts and an electric patrol vehicle. The campus provides shuttle service from remote parking areas with two CNG (Compressed Natural Gas) shuttles in

service and 14 more on order. Emory has also ordered five electric shuttles. Currently the University has purchased land nearby with the intent of setting up a CNG fueling station and overnight security for parked, out of use shuttle buses.

Moving forward in time, in 1999 a new Environmental Studies Department, part of the College of Arts and Sciences, was formed. The department was the creation of the Dean for the College, Dean Sanderson, and provides a major leading to a Bachelor of Arts or a Bachelor of Science degree. Located in a small house, the department has grown to 13 faculty for 2002. They graduated their first class of 14 majors in spring 2001. In 2002 the entire program will be moving into 18,500 gross square feet of newly constructed facilities on campus.

In 1999 ten key Emory faculty, staff and students attended a Second Nature seminar held in the Atlanta area. Out of this eye opening experience came renewed energy to “do more” in the cause of environmentalism on the Emory campus. One attendee, John Fields, Director of Project Management and Construction for Facilities Management, walked away with such determination to incorporate more environmental processes into our construction projects that we found ourselves in constant discussion and then at a LEEDS training seminar in downtown Atlanta three months later. Meanwhile, an anthropology faculty member, Peggy Bartlett, also an attendee at the Second Nature conference also decided to form an Environmental Ad Hoc committee for campus issues.

So what was my part in all of this evolution? Yes, I also attended the Second Nature Conference, became very involved in the environmental conversations (especially since Mr. Fields' office is about ten feet from mine), I attended the LEEDS Training, and was asked to join the Environmental Ad Hoc Committee. My boss, and Mr. Field's boss, the Senior Associate Vice President for Facilities, Bob Hascall, also attended the Second Nature workshop, and also became a strong voice in our environmental discussions. So, with such encouragement and support (we didn't quite know how the top administrators would receive this) we three decided to make our projects more environmentally responsible.

Before I could bat an eye, Mr. Fields had joined Emory University to the U.S. Green Building Council. And to top it off, he registered into LEED the Whitehead Research Building project for potential certification. Whitehead is a 325,000 square foot building consisting of research lab, animal facility and support space, and already poised to start construction!

So in year 2000 Emory University joined the US Green Building Council, recycling was booming, we had an Environmental Studies program, and we had a fleet of alternatively fueled vehicles on campus, and Peggy's Environmental Committee wanted to bring the an Environmental Policy into the University's official framework. What happened next?

Peggy's Environmental Committee wrote an initial policy statement and started a series of meetings with every department on campus. Interested parties were asked to sign and

endorse the temper of the statements. Some did, but the two Senior Associate VP's would not, even with their strong support of other environmental programs. They contented that the statements could be interpreted in a way to hinder growth of the institution. The meetings continued and many groups, from accounting to food service were introduced to what was happening on campus to promote environmental sustainability and to provide ideas for new programs. It took the Environmental Committee one-year to make it through all the interested departments. Meanwhile, Mr. Fields had decided to register two more buildings into the LEED's program. One, an 180,000 square foot new physical science building that was just starting schematic design, and the other a 225,000 square foot Cancer Institute facility in the midst of design development.

Now, what does it take to do a LEED building? And, for that matter what is LEED and the U.S. Green Building Council? And, of course, you want to know what kind of response came from the Senior Administration and Trustees when they found out about these building registrations? Did they find out about these registrations?

LEED stands for Leadership in Energy and Environmental Design, and is the Green Building Rating System developed by the U.S. Green Building Council. The Council began working on the rating system in 1995 and is now using the second version for building certification. LEED Version 2.0 is more of a performance based rating system and includes innovation credits for regional sustainability issues, unique projects, and innovative green design approaches. The basics of green design reduce or eliminate the negative impacts of buildings on both the environment and on occupants through

sustainable site planning, safeguarding water and water efficiency, energy efficiency, conservation of materials and resources, and indoor environmental quality.

By registering the Whitehead Research building into this program, Emory University has asked that the design be evaluated by the LEED criteria. Hopefully, the Whitehead building will receive enough points for certification. There are four levels of certification, from lowest to highest: LEED certified, Silver, Gold, and Platinum. Currently there are 34 university institutions listed as members of the Green Building Council, and several hundred architects and engineers. One of the newest members is the Federal Government's General Services Administration.

When Emory decided to register the Whitehead Research building it was already designed and ready for construction. In fact, site development work had already begun. Luckily, due to the stringent oversight, or rather our desire to please the Committee on Environment, several environmental actions had already come forward in the project. Namely, existing on the site was a biology department greenhouse, a trailer and several trees starting to mature. First, we relocated the greenhouse function to the top of an adjacent parking structure, and sold the glass greenhouse structure to the Buckhead Men's Garden Club, the structure is now recycled and relocated on the site of the Atlanta History Center. The trailer was relocated to a hidden part of campus. Then we relocated several of the large trees one weekend morning. Three large oak trees were successfully transplanted to a site about one quarter mile away on campus. Two young ginkgo trees found their way to somebody's backyard, and several crepe myrtles were moved to

various parts of campus. Trees with trunk diameter up to four inches can be relocated without a large death risk. Just with great care and cost.

With the LEED decision, we named one of our project management and construction staff to be key LEED person for this project. Laura Case jumped into this project with as much environmental knowledge as anyone else in FM. She has great enthusiasm and has done a great job.

Laura says the key to a LEED building is a required “teaming approach”. In this case we were asking a project team to take on a new and very large set of design criteria at a critical point in the project. Immediately the team had to perform parallel estimating and partnering. The Whitehead job team includes: HOK as lead architect, CUH2A as Lab Planners, Nottingham Brook and Pennington as MEP engineers, URS as Civil Engineers, and Stan Lindsey as structural engineer. Contractors are Whiting Turner. Of all the firms only HOK had any background with green building design. The construction is being done CM at risk.

Each firm’s fees had to be addressed for the project change of scope. It meant a lot more work for the MEP engineers who were not familiar with the process at all. All fees were given cost plus, at an hourly rate not to exceed a fixed amount. Total fees for LEED participation added to \$150,000. The project construction initial GMP was \$57,000,000. CH2M Hill was brought to the team as a Commissioning and documentation agent for another \$50,000. Their actual team, although enthusiastic, did not have a lot of LEED

experience. The core company does. For future large projects we are budgeting an additional one half of one percent of the total cost for incorporating LEED into the project design and construction.

The Emory University construction manager estimates that she has spent an average extra 4 – 6 hours per week keeping up with the required documentation and technical data for LEED. Facilities Construction has two full time professional staff on the project.

The building users and the administration for Health Sciences were willing to go along with the green building concept as long as we stayed within the project total budget. In fact, because the project was designed by HOK we were already on the right path and could meet several requirements without any redesign work. To start the LEED effort the project went through two weeks of peer review. It was irritating to the design team at the time, but now has been much appreciated. Four entirely different consultants (MEP, architecture, and lab design) were brought in for a complete project review and comment. Many of the comments were incorporated into the project design, especially the engineering design.

The Whitehead Research Building is eight-stories, including two floors below ground level for an animal facility, and will meet all design specifications of Emory's Campus Master Plan, featuring traditional red tile roofing and stucco exterior. Every office and lab will have outside windows.

Three basic science departments within Emory University School of Medicine: Cell Biology, Genetics, and Physiology will occupy the building. An entire floor of the building will be devoted to a Neurocenter, comprising interdisciplinary programs from the Departments of Neurology, Neurosurgery, Pathology and Laboratory Medicine, Psychiatry and Behavioral Sciences.

The building will include 150 faculty offices and 150 laboratory modules, featuring the “open lab” concept, with large flexible laboratory spaces and fewer walls, designed for greater interaction and better flow among investigators. The enhanced laboratory design is intended to greatly increase the research efficiency of departments such as Cell Biology and Physiology, previously housed in older buildings constructed in the 1920s.

Looking at the research building façade we see that the windows are many and large, thus accomplishing two requirements: One, natural daylighting and, two, access to exterior views for 90% of the internal users. In fact we now have lighting sensors around the perimeter at the lab windows that will allow a cut back in lab lighting of 20% when the sun is out. All offices have motion sensors for light switching on and off. Other façade materials include precast at the lowest levels, EIFS on concrete block, and curtain wall systems. The swooping roof is clay tile as a gesture of contexturalism with the facing Emory main campus.

MEP plays a large part in this building’s green approach. First, an energy recovery system (enthalpy wheels) added \$500,000 to the cost of the building, but has a payback

of just three years. Being all lab and with a large animal facility this building moves quite a bit of air. Fume hoods within the labs can be major air movers, so we have placed a mid point stop with cutback to 60 fpm across the fume hood face. There are motion sensors within the fume hood for safety. The building is a constant volume system utilizing Phoenix valves at the individual zone boxes.

Another green application is to recycle the air conditioning condensate to nearby cooling towers, saving an estimated 2.5 million gallons of water a year that would otherwise have been discarded into the County's sanitary sewer system. The water is collected at the base of the AHU coils and pumped via pipe to the cooling towers as make up water. An extensive building automation and control system saves energy by optimizing HVAC and lighting use. Along with these sophisticated equipment items we have added a "state of the art" robotic cage washing system that will use less water, chemicals, and energy than other washers. The robotics of this system free staff from a repetitive undesirable task.

Inside the labs and offices the design uses products that are manufactured using post consumer and postindustrial waste. Many are manufactured locally reducing the energy used in transportation. Manufacturing sites within a 500-mile radius of the project are the recommended standard.

The lab counters are made of Vespa, a material made of 70% recycled products. The casework is oak by Kewanee. The carpet is manufactured by Bentley in a totally solar powered plant and is made from recycled products. The vinyl floor tile is "Stonetex" by

Armstrong and has an 80% limestone content. All paints and adhesives are low VOC and the entire facility is non-smoking.

The roof and plaza drain storm water to an underground concrete vault oversized to allow for the collection of water to be used for landscape irrigation. Part of the immediate hardscape around the building offers shading and safe passageway for pedestrians and bicyclists raised above the roadway.

During construction Emory has had the opportunity to implement an active recycling program through the Emory Recycles facility. Emory Recycles has picked up dumpsters of cardboard, metal and paper from the construction site, thus saving a huge amount of landfill and fees.

Parallel to this project construction we registered the Science 2000 project, which is now under construction. Many of the same design approaches apply to that project, but with a different and more difficult design team. Briefly, we found out the true advantage of the architectural team knowledge of HOK. In this case Cooper Cary, the lead design firm did not have a concept of green design short of the idea of using recycled products. It was hand holding from the start. Both experiences have taught us that it is important to decide as early in the project as possible whether to pursue LEED certification and this needs to be incorporated in our specs and design contracts. We have learned not to use architectural firms that have a “Design Cookbook” of details and preconceived design

ideas. We have found architects to be very hard to educate, because they don't keep a green eye on the integration of all of the building systems into the total project.

While working on our LEED's lessons, the Emory Environmental Policy was finally supported and signed by the President of the University, and it then went to the University Senate for a vote. Lo and behold Health Sciences came alive and refused to consider it as a University Policy. In a lengthy letter to the Senate, the Health Sciences department identified major concerns for implementation, academic instruction and future consideration. The Policy was tabled. But, good fast politics brought it forward again the next month as a "University Statement", rather than a policy, and it readily passed in the Senate. To view the Mission Statement on the web go to:

www.environment.emory.edu/who/policy.shtml

A few months earlier, it was decided that we had better let the President's Cabinet and the Trustees know about our Green Building involvement with the U.S. Green Building Council. As expected, the only real questions had to do with money and operating costs. It's funny how well business executives understand the concept of life cycle costing. So far, we have not gotten an honest negative remark, and in fact, the Trustee Finance Committee recently voted to add the cost of heat exchange wheels for the Cancer Institute to that project's budget.

So what lies ahead? First we are lighting candles to the Green God that our projects receive LEED certification. A list is sitting on President Chace's desk of suggested

members for a new implementation committee to carry out the new Environmental Mission Statement for the University. We are looking at expanding our recycling program to include more construction waste. We have our charging stations in place and just need delivery of our electric shuttles. And, most importantly, more students are interested in being a part of campus environmental programs.

In facilities, Mr. Fields and I are now scheming our environmental wishes for future projects. We want to explore the potential use of green or living roofs and the use of solar technology, particularly photovoltaics.