

## *Sustainability Leadership at Emory University in Atlanta, Georgia*

*by Ciannat Howett*

Hello, I'm Ciannat Howett. I'm going to talk to you about what we're doing at Emory University to create a more sustainable campus and healthcare system, with a particular focus on steps to reduce our water consumption. To set the context, our trustees in 2005 passed a new Strategic Plan for Emory Healthcare and Emory University, and, in it, they identified sustainability as a top priority of our institution. The Strategic Plan contains a definition of sustainability that's very broad. Sustainability is defined as an approach that relates to the whole quality of life in a community — assessing whether the social, environmental, and economic systems are supporting a healthy, productive, and meaningful life for all community residents, present and future. When we are faced with decisions and choices, the Plan directs us to ask ourselves: What is the environmental impact? What is the social impact? What is the economic impact? What is the impact locally? What is the impact globally? And what is the impact to future generations?

That is a whole new way of thinking about the responsibility of a University because traditionally, Emory, like all colleges and universities, has mainly focused on the positive ways that we impact the local and global community and future generations through our teaching and our research. And now we're called upon to ask ourselves about all those operational pieces – the energy, water, waste, transportation, food, the buildings we build, the green space that we control, the purchasing decisions we make every day, what about those? So, it has been an important shift for us.

One of the challenges to creating a sustainable campus that we face at Emory the location, and none of this is going to be surprising to any of you from Atlanta. We're in one of the fastest growing areas of the country, and a heavily car-dependent area of the country. We rely on coal-fired power plants for most of our energy, and these plants are large sources of air pollution and greenhouse gas emissions. As you've heard all day long, we can't separate issues of energy, climate and water. And what I have read is, in Georgia, it takes between .6 and 2.7 gallons of water to produce one kilowatt hour of energy – so reducing energy use to conserve water is a big issue for us throughout the city. Also, our watersheds in metro-Atlanta are heavily stressed through the loss of green space, mainly being replaced with impervious surfaces, such as asphalt, etc., to the tune of fifty acres on average every day. In the whole state of Georgia the average is even higher at about a hundred acres of green space lost every day. And, of course, as we all know, metro-Atlanta is the largest municipal area reliant on the smallest single watershed in the country.

These challenges to sustainability that Atlanta faces, Emory faces too. We are basically a microcosm of all those issues. We are operationally very similar to a small city of about 33,000 people, so a lot of what we're trying to do at the university can be translated to communities throughout our state. That modeling of best practices for sustainability is what we hope to accomplish at Emory. Just to give you a sense of scale too, Emory is the sixth largest customer of Georgia Power, so we're heavily reliant on that coal fired power that I talked about, and we're a major water user, about 486,000,000 gallons of water last year. We have reduction targets for these resources. Our goal is to reduce our energy consumption by 25% by 2015 from what we were using in 2005. This year – like everyone – we have been

faced with a ten percent reduction target in water use – not mandatory for us – but of course we are committed to being ethically engaged and good corporate stewards, so we have embraced that goal, and we also are making plans for worst case scenarios of up to a 30% reduction in water use. This emergency reduction figure is not that theoretical because Duke Medical Center and Duke University this year during the North Carolina drought faced a 30% reduction mandate.

So here are some of the things we've been doing. In 1995, Emory adopted a statement of principal on water usage. As was discussed in the presentations this morning, one of the most important first steps for a corporation or any institution is to make a commitment and set a vision. And this was our vision on water management. Now, in the over ten years since the statement was adopted, there has been a lot of meat put on the bones of what that statement really means. One of the most exciting recent developments is the creation of our comprehensive water management plan for Emory. This is the first time we've looked at the issues of water supply, storm water management and wastewater management comprehensively. In DeKalb County, where our main 700 acre campus is located, there isn't yet a comprehensive water management plan, and we realized that we needed to do our own plan. It has been a really useful exercise for identifying opportunities for innovative technologies, like where we want to locate our underground rainwater cisterns and our green roofs. It has helped us identify the sub-watersheds on our campus that are the most stressed, and we're hoping that DeKalb County will see this as a starting point that they can just build on for a larger county-wide comprehensive water plan.

Some of the things we have done to reduce water consumption at Emory are low tech or no tech solutions to try to get us to that ten percent reduction. A lot of this effort, as we've all said, requires just simple behavioral changes. One of the things we have done is to adopt a native and drought-resistant plant palette. That means only these certain plants can be planted anywhere at Emory Healthcare and Emory University. We also have converted about ten acres of turf back to forest. Really simple steps – but they have made a difference in our outdoor irrigation consumption. Also, Emory's trustees in 2004 adopted a land use classification plan. They looked at the 700 acres on campus and set aside more than half – fifty-four percent – as undevelopable protected green space. That protection of our forest has been extremely important for protecting our whole watershed. We also have a “no net loss of forest canopy” policy at Emory. Under this policy, every time a tree is removed for construction or disease, we will replace it with an equivalent number of trees to maintain that same forest canopy. So you can imagine with an older tree, it might mean planting four or five trees to maintain that same forest canopy. We conduct aerial flyovers to be rigorous with ourselves about maintaining that canopy. The “no net loss of forest canopy” policy is something that would be wonderful to see as a stronger sort of tree ordinance than what we have required in some of our counties and municipalities now. Other simple steps to reduce water use include not planting annual flower beds and conducting a water and energy awareness campaign. Our “Be Waterwise” educational campaign includes posters in every bathroom on campus containing tips for water savings, such as reporting leaks. Like has been said, a lot of this is not high tech. It's just getting the communication out there. Another one of the tips is to turn out your lights and turn off your computer to save energy. We are trying to educate people about that link between energy use and water conservation.

I will now discuss a few of the more high-tech steps we have taken to reduce water use at Emory. A lot of the strategies here were put in place before the drought started. A great example is the construction of our underground rainwater cisterns. We currently have five of these cisterns completed and operational and several more under construction or planned because they have proven to be just a wonderful solution for us at Emory. We put in these cisterns originally to capture stormwater run-off, because you know how it is in Georgia -- feast or famine when it comes to rain. We get these gully washer storms, and we didn't want the polluted run-off going to our ten perennial streams that cross our campus. The underground rainwater cisterns collect that rainwater. The wonderful co-benefit is that during this drought we've had 300,000 gallons of collected rainwater we've been able to tap into to water educational food gardens and to save some of our campus trees.

We also have installed a lot of water-saving plumbing fixtures, such as waterless urinals and dual-flush toilets. In the two new freshmen residents halls opening this August that are designed to meet LEED Gold standards, we are using collected storm water from our underground cisterns to flush toilets. We have solar panels that will pump the storm water from the cisterns up to flush the toilets. There were ordinances in place prohibiting using rainwater to flush toilets, but we were able to get a variance. It is interesting to see how culturally we still had a lot of work that we need to do to overcome barriers to some of these really basic conservation tools. We were allowed not to have Federal Safe Drinking Water Act quality water in our toilets, but we must dye the water blue so no one will be confused. We are looking into doing the same thing with gray water in our future residence halls, and again, we'll have to get a variance to be allowed to do that, but I think that's so important to start modeling these water-saving practices.

Another technology that has helped us conserve water and energy is with heat enthalpy wheels. As was the case with the underground rainwater cisterns, Emory was in a much better position going into this drought than we would have been otherwise because we had installed these heat wheels as part of our green building program. The heat wheels are a very energy efficient way to ventilate buildings, and the great co-benefit is that the condensate can be captured. We capture approximately four million gallons of condensate every year from the heat wheels on our Whitehead Biomedical Research Building and our Children's Pediatric Center. That's water that's not taken from the Chattahoochee River, and nobody bills us for it. We use it in our chilled water system.

Finally, we are using closed loop systems for cooling water in our research laboratories. This turned out to be low hanging fruit that we did not even know was there. We have a lot of lasers that we use in our research, and we found with just one closed loop cooling system that we saved 2.8 million gallons per year. The people in the research labs had never thought about it because water has been so underpriced that it had not been identified as something that they needed to start thinking about.

I just want to touch quickly on how building green gets you so many different benefits in terms of water conservation, climate change protection and energy conservation. Fortunately, Emory has been at it for a long time. We have more square feet of LEED certified green building space at Emory than any other campus in America, and there is a wide portfolio of building types. We have large biomedical research buildings, historic buildings, a cancer research center all built to the U.S. Green Building Council's LEED

(Leadership in Energy and Environmental Design) standards. What this has allowed is the accumulation of a lot of great data over time. Now, clearly the reason Emory has made a commitment to building green is because, socially and environmentally, it's the right thing to do. As our friends at Southface Energy Institute tell us, the building, operation and maintenance of buildings accounts for 48% of U.S. greenhouse gas emissions. So one could argue that building green is the single most important thing that an institution can do to address climate change. So we knew we needed to do it to walk the talk of sustainability at Emory, but the part that the corporate representatives out in the audience will find most interesting I think is that building green has worked for us in terms of economic bottom line. Emory has spent about .8 to 1.5 percent more up front to build to LEED green building standards. So there has been an additional up-front cost. But, what we have found in every instance is that building to those standards has paid for itself in four-and-a-half years or less. For example, at Emory's Goizueta Business School, we retrofitted the existing building and then we built a new wing to LEED standards. The existing business school was built in the early 1990s – not a really old building, but it pre-dated LEED. We did a retrofit to bring it up to LEED standards. It cost a good bit, but that retrofit paid for itself in less than one year. Every year after that initial payback period we continue to enjoy those reduced energy and water costs. And with increasing energy and water costs there is going to be even a shorter return on our investment. The longest payback to date has been 4 ½ years for our Whitehead Biomedical Research Building – an enormous building with animal research and really an energy and water hog. Even there, we saw an ROI of 4 ½ years. Emory's trustees have made the commitment that all of our buildings will be built to LEED standards, and our current design standard is LEED Silver.

And I think the reason that Emory case study is so interesting is that this is not happening in California. This is not happening in some state where there are a lot of incentives from the state or funding from the utility to do this work. This has all had to stand on its own two feet in terms of an economic payback. Our Winship Cancer Research Center is a LEED-certified building. It should be a no-brainer that you don't want carcinogens in a building where you are healing people from cancer. Well, there are only a handful of LEED-certified cancer care centers in the whole country. One of the others is the Fred Hutchinson Cancer Research Center in Seattle. They received approximately \$3,000,000.00 from their utility to make their building LEED-certified. We didn't get any funding from our utility. Yet, it has worked for us. So I just encourage you, if you are interested, to find out more about green building, or, if you are in a position where you are having to convince your board about adopting LEED as a standard for your own buildings, we would be happy to share our experience. Emory built the first LEED-certified building in the South so we have a lot of long-term data that shows how this has really worked for us. I would also commend to you the University of Georgia's Drought Response Plan because they have done a really wonderful job of working through tips and low tech things that you can do to reduce water consumption. Thank you so much.

*Following are several questions from the audience that Ms. Howett addressed:]*

Question: My question to Ciannat is how did you get DeKalb County to work with you? What steps did you have to go through because that obviously is a regulatory hurdle that we all need to work on?

There is a growing awareness at the state, municipal level, and county level that we need to be adopting these new technologies. We were just the first people to say “Hey we want to really do this.” There was some awareness that this is the kind of change that needs to happen. It's just a matter of getting there. So our counsel's office worked it through. I am hoping that because we were able to do this, others in DeKalb County should be able to do this – and the same thing with the gray water. I've spoken with folks at CDC and the state about the need for a clear statement on the health risks, or lack thereof, of gray water reuse for applications like flushing toilets. It is not uncommon for there to be local ordinances prohibiting grey water reuse, and there are some applications that aren't appropriate. You don't necessarily want to use this on landscapes if it is untreated or something like that, but there are definitely applications where it should be safe.

I'd also like to add real quickly that in 2004 when I was working with the Georgia Environmental Organization we worked with a local legislator. The gray water is not part of the code for the state of Georgia, but it's not just DeKalb County actually. The entire state of Georgia has no gray water in its code so you can't get a license bonded plumber to go and set that up and then if something's wrong have them come back and fix it. It's all got to be done kind of under the radar so to speak, but regulation is really an interesting point with the industrial developer that we were working with. Industrial development comes in -- it's usually just a lot of concrete. There are a lot of ordinances around beautification – there must be trees – there must be so much grass. And they wanted to do more native plant and more appropriate landscaping and in order to do that they had to get variances from the local jurisdictions who felt like “Ah, you're just some big developer coming and trying to get away with something” when really, they were trying to do something that had a lot of benefits. They're also looking at green pavers and other technologies that will help to get water into the aquifer and allow better infiltration because there are now in Georgia some of these low impervious surface water sheds. Some municipalities have set a limit that 25% of the land in their county is going to be impervious. The rest need to capture water because they are at the top of the water shed – they're not down in Savannah where there's a big river with plenty of water. So that's going to be a barrier to other developers of going into that market as well so they saw this as a challenge and something that they could grow and learn from to do those technologies, that their detention ponds are smaller and now have larger buildings, more leaseable space and a better return.

Question: For the speakers and for Gail [Cowie] too if she'd like to chime in, the cisterns seem like a wonderful idea but I just wonder, would those withdrawals be subject to a surface water withdrawal permit? If you put in a cistern and then you're going to withdraw the water from it, would it be subject to the same thing as the surface water withdrawal? I guess it would depend on what size the cistern is but I mean conceptually could they be subject to surface water withdrawal permits?

The buildings that we were looking at were 1500 to 2500 gallons, so well below the hundred thousand a gallon a day withdrawal which is a hundred thousand dollars a day for those who didn't hear is the rate at which you need a surface water permit.

This also deals with the cisterns. Obviously, you're catching water off of the rooftops and pavement and so forth. Is the question of pollution from those sources been a consequence and secondly the cost of pumping and so forth in order to get it back up to the toilets.

One of the coolest things I should have mentioned is that we are using solar panels to power the pump that pumps the water out of the cistern. That's been really neat. Our environmental studies students were interested in the question of water quality coming off the roofs and different roof types. You know, green roofs and what the differences were there. You do see metals and everything you would imagine in collected rainwater, but for use in toilet flushing this has not been an issue. Even where we've used it on our landscape, they haven't been to a level where it would be of concern because a lot of times you have in fertilizer those same kinds of metals. We don't hold our rainwater in the cisterns very long is another piece of it because we want them emptied so when those gully washers come, we'll be able to capture as much rainwater as we can. So they are used quite frequently and it's really worked well for us.

{Addition by other speaker] The biggest problem that we've seen with the cisterns not being pollution but being grit and dirt getting in there and fouling the pumps and having to do maintenance to the pumps but if your pump's below the water level, all of the oil and things are floating and so that hasn't been an issue that we've seen.

Question: My question is for Ciannat also. I'm struck by the leadership that Emory is demonstrating as a private institution and I'm curious if you would talk some about the university system of Georgia and if you see the innovations that you have put in place translating them to the public sector?

Well, I've mentioned the University of Georgia because I really applaud their leadership in response to the drought. We worked very closely with the University of Georgia in developing our drought response plan, and they were very open and generous with their information. I feel very optimistic that the academic community will be on the sharp point of the cutting edge of where we need to be to create a sustainable society.

There is a sustainability director now for the Board of Regents.