



The Sustainable Campus

The Newsletter of the Berea College

Sustainability and Environmental Studies Program

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How Berea College Can Survive the Downward Slope of Peak Oil

By Richard Olson

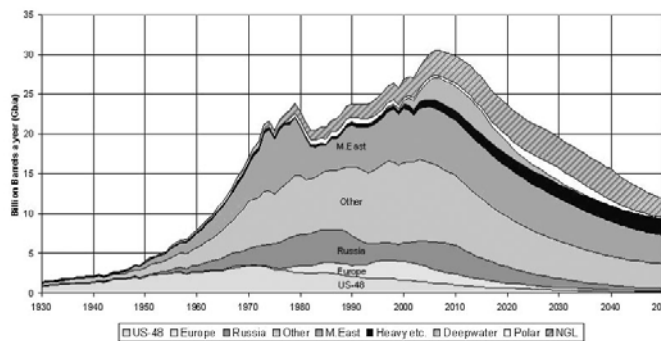
The United States economy consumes 25% of the energy used worldwide each year to support the U.S. lifestyle. One-third of U.S. energy is provided by oil, and is used to power our cars, fuel the trucks that move food and manufactured goods, heat our homes, and support our factories. Our way of life requires an ever increasing flow of petroleum, yet oil production in the United States peaked in 1971, and has steadily declined since then. Today, more than half of the oil consumed in the U.S. is imported. By 2035, U.S. domestic oil and natural gas production will be almost non-existent.¹

We've embarked on the beginning of the last days of the age of oil.

-- Mike Bowlin, Chairman, ARCO, 1999

Since 1983, consumption of oil in the United States has increased by 33% to more than 20 million barrels per day. During this time, there has always been additional global production capacity to meet U.S. demand. But there is strong evidence that global peak oil – the year in which global oil production reaches a maximum and then begins a permanent decline – will occur within 10 years if it

OIL AND GAS LIQUIDS
2004 Scenario



Projections of the Uppsala Hydrocarbon Depletion Study Group²

hasn't already happened. Production in many of the major oil provinces including the United Kingdom, Australia, and Norway has already peaked. Since 1981, global oil production has exceeded new discoveries each year. The easily pumped oil has been taken, and while much oil remains, it can be extracted only at lower rates and with greater energy inputs. Natural gas production will follow a similar pattern.

Even as global oil production nears its maximum, global demand for oil continues to increase. Oil consumption by the United States is increasing 4% per year, India by 8% per year, and China – funded by a \$200 billion annual trade surplus with the United States – by 31% per year. This convergence of supply and demand has contributed to the increase in oil price from less than \$20 per barrel in 2002 to more than \$60 per barrel today. In addition, natural gas prices have almost doubled.

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Berea's New Heat Plant – Can You Dig It?

By Jim Dontje

In case you haven't noticed, the entire Berea campus has become a construction project. You see parts of the project everywhere – open trenches running every which way, construction vehicles driving across the lawns, piles of large black pipes, and a new building rising behind the Agriculture Building. After 10 years of planning, Berea College is building a new central heating plant.

This 23 million dollar project replaces the obsolete coal- and gas-fired heat plant and its leaky steam distribution system. The replacement, an efficient natural gas/fuel oil fired heat plant and energy distribution system, will heat and cool campus buildings with reduced energy losses. But the project is more than just a new heat plant – it is part of a comprehensive look at campus energy use with the goal of reducing energy consumption by 45% in the next 15 years.

To help meet that goal, the construction project has three main components:

*A new central energy plant supplying heated and chilled water to campus buildings. Water will be heated by boilers that can be fueled by either natural gas or fuel oil. Electrically-powered chillers will generate chilled water for air conditioning. The new plant will also use less water than the old plant.

*An entirely new distribution system to deliver the hot and chilled water to campus. This distribution network uses insulated pipes designed to keep energy losses below 5%. (Continued on page 3)

Sustainability on the Campus— *Greening of the Campus VI* By Paul Smithson

Every three days in West Virginia coal country, coal companies detonate explosives equal to the total used in all US military operations in Afghanistan to date. Up to 800 feet of earth and forest are blown away to get to the underlying coal in so-called “Mountaintop Removal Mining.” Many thousands of acres in Kentucky and West Virginia have been reduced to moonscapes to feed our ever-growing hunger for power.

This is but one of the issues we learned about at the 6th *Greening of the Campus* conference at Ball State University in Indiana. A 5-member delegation from Berea, including three students,

spent two very full days learning about, discussing and planning action on many sustainability issues affecting U.S. college campuses.

As world oil and gas production passes its peak and begins an inevitable decline, major changes in our lifestyle are coming. Will we in the academic community lead those changes in a positive direction or simply be unwitting victims? As student participant Megan Naseman said, “We not only have the ability but a responsibility to lead the change towards sustainability.”

Nearly 15 million students attend the 4000-plus colleges and universities in the United States. We are unavoidably part of an increasingly unsustainable economy, but we should be providing the leadership in research, demonstration and implementation of more sustainable practices.

Many presentations at the conference detailed these improved practices and how they are being implemented. For example, Ohio University converts waste cooking oil from food service to biodiesel fuel for campus maintenance equipment. By turning waste into a useful product and reducing the use of non-renewable fossil fuel, the project will save the university more than \$40,000 per year.

What made the biodiesel project inspirational to me was that it began as a student-designed classroom and laboratory course. This melding of the academic and practical involved students, faculty and staff in a truly collaborative way. These interconnections are what make learning meaningful, and allow us all to really make a difference in how we do business.

Interconnections are what will make us succeed, and in fact, “Extending Connections” was the theme of this year’s *Greening of the Campus* conference. Sustainability goes far beyond environmental science. As student participant Mary Johnson said, the conference made her appreciate that sustainability is so much more than recycling, turning off lights and saving water.

Sustainability does include those personal actions, but involves more fundamental changes as well, exemplified by the “3-legged stool” of ecology, economy and society. At Ball State, scientists, philosophers, economists, architects, educators, facilities managers and many others came together to make connections, to share ideas, and to gain inspiration to make a difference on our campuses.

Paul Smithson is a faculty member who divides his time between the Chemistry Department and the SENS Program.

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The Sustainable Campus Online

www.berea.edu/sens/sustainablecampus/default.asp

Environmental Justice Film Series

Draper 308

Films Start at 6:00 PM; discussion follows

Oct. 5

Stolen Childhoods, Len Morris, 2003
85 minutes

For 246 million children, life is nothing but work. *Stolen Childhoods* – the first feature documentary on global child labor – tells the stories of children working in dumps, quarries, weaving shops, fishing platforms, agricultural fields, and on the streets. The causes of child labor and the actions needed to eliminate it are explored.

Oct. 19

Blue Vinyl, Judith Helfand, 2002
98 minutes

A detective story, an eco-activism documentary, and a rollicking comedy, *Blue Vinyl* puts a face on the dangers posed by

PVC at every stage of its life cycle, from factory to incinerator. Consumer consciousness and the “precautionary principle” have never been this much fun.

Oct. 26

Fury for the Sound;
The Women at Clayoquot, Shelley Wine, 1997
86 minutes

Women comprise 80% of the world’s environmental activists. *Fury for the Sound* tells the story of the women-led fight to protect one of the largest remaining tracts of untouched Canadian rain forest. The result was the biggest single act of civil disobedience in Canadian history. More than 850 people – two-thirds of them women – were arrested.

Berea's New Heat Plant...

(Continued from Page 1)

*Many existing buildings are being retro-fitted with energy conserving measures: new windows that leak less energy; additional insulation, particularly in roofs; and more efficient lighting systems.

The new plant and distribution system are expected to go "on-line" late in 2006. With energy prices rising rapidly, the new energy plant is coming just in time. Diane Kerby, Berea's Business and Administration Vice President, notes that campus heating costs were more than 60% over budget in the 2004-2005 fiscal year largely due to natural gas price increases. Natural gas prices are currently spiking due to hurricane disruptions in the Gulf region. If current prices do not decline, the 2005-2006 natural gas bill may exceed \$2 million – another 50% increase in cost. Assuming today's natural gas prices, the energy efficiency gains from the current energy projects could bring future costs back to a level just below that of 2004-2005.



Heat plant distribution trench outside of Draper.

The new energy plant highlights key dilemmas that reveal the promise and the limits of how technology can improve campus sustainability. While the project will dramatically reduce energy use, our expectations and appetites will consume some of the savings. Supplying chilled water from a central plant is far more efficient than using electric chillers at each building or window air conditioners in each room. But at the same time, it means we are air conditioning more space than we used to, and increasing our expectations for air conditioning buildings.



New Heat Plant in construction.

Because the chillers for air conditioning are powered by electricity, we won't see the burden that our desire for cool, comfortable offices and classrooms puts on other places. Most of the electricity our campus uses is generated by burning coal, so we will be cooling our spaces with destructive mountain top removal coal mining and polluting power plants. Coal is no longer being burned on campus, but we can easily forget that coal is still a part of our energy "diet".

On the heating side, the fuels, particularly natural gas, produce fewer pollutants than the coal we used to burn on campus, but they are still fossil fuels: finite resources (increasing in price even as we build the new heat plant) that produce climate destabilizing greenhouse gases even when burned efficiently. While our fossil fuel use will decrease dramatically, we will still be "hooked" on nonrenewable energy sources.

The new energy plant does include provisions for a more renewable energy future. With minimal modification, it will be able to use biodiesel instead of fuel oil. Biodiesel, a cleaner burning fuel compared

with fuel oil, is also more carbon neutral because it is made from plants that take carbon out of the air.

The heat plant also makes provisions for an even more efficient future by including space for electrical generators. While the current economic and regulatory climate in Kentucky prevented the immediate installation of this equipment, it will be relatively easy to install when conditions change. If we begin generating electricity on campus, we can either do cogeneration, which captures waste heat from electrical generation to heat the campus, or supply "peaking power" to the utility and thus reduce the need for new power plants.

No matter how efficiently we operate our new plant, we need to recognize that our most important new energy source is not one that is burned. Energy that we conserve by careful management of our buildings and good habits becomes energy we don't have to use. As we build the new energy plant, we will also need to "build" new habits of energy conservation that will make our campus more sustainable.

Jim Dontje is a faculty member in the SENS Program.

How Berea College Can Survive...

(Continued from Page 1)

The tight supply and demand situation means that relatively small disruptions in supply – from hurricanes, terrorism, civil unrest or politics – can cause large increases in price. A recent simulation by the National Commission on Energy Policy³ projected that a 4% decrease in global oil production from terrorism or civil unrest would result in more than a doubling of the price of oil. Given that 64% of world oil reserves are in the Persian Gulf region, and that other major oil producers include Venezuela, Russia, and Libya, the potential for disruption of the U.S. oil supply is high.

*The world is not about to run out of hydrocarbons, perhaps it is not about to run out of oil from unconventional sources anytime soon. What will be difficult to obtain is cheap petroleum, because what is left is an enormous amount of low-grade hydrocarbons, which are likely to be much more expensive financially, energetically, politically and especially environmentally.*⁴

As the availability of oil and natural gas decline, so will the economic activities that depend on these fuels. No alternative sources can be developed in the short term to replace more than a small fraction of the oil and natural gas shortfall. Skyrocketing prices will lead to economic recession or depression, and possibly armed conflict over the control of dwindling reserves. The end of the era of cheap, plentiful fossil fuels presents enormous challenges. The United States is particularly vulnerable as its low-density suburban development pattern, automobile-based transportation system, and links to the global economy all depend on massive flows of cheap energy. When these flows are reduced, the U.S. economy will contract.⁵

Berea College will be caught in this contraction. The campus directly uses almost 400 billion BTUs of energy per year⁶. Equally important, the College depends on daily truck deliveries of food and materials, and its financial well-being is tied through its investments to the health of the global economy. As it

currently operates, there is no guarantee that Berea College could continue to function during a severe energy-driven contraction of the U.S. and world economies.

What is an appropriate strategy for a college or university to prepare for peak oil? First, don't count on effective energy policies or leadership at the national level. Second, avoid denial or reliance on magic fixes such as the hydrogen economy.

What is within the power of a college is relocalization – reducing ties to the global economy while partnering with surrounding communities to develop a strong local and regional economy. A relocalization strategy would greatly reduce reliance on fossil fuels and would emphasize:

1. A secure, local supply of renewable energy. For Berea, this means solar power and biomass energy coupled with major reductions in total energy use. The College has an excellent start on conservation with its goal to reduce energy use by 45% by 2015, but does not yet have a plan for developing renewable energy supplies.
2. A local/regional food supply. Berea once produced much of its own food, and could do so again. Production by the College farm and gardens could be increased and realigned to supply the College dining hall, and the food services contract could be amended to promote greater purchases of regional foods. The Berea College Local Food Initiative has done good work in investigating the possibilities for making this transition.⁷
3. A local economy: Colleges are major purchasers of goods and services. Directing even a portion of that buying power to local and regional businesses would greatly help the development of a local and more energy-efficient economy.
4. A relocalization curriculum: Most colleges have been educating their graduates to be successful members of an energy-rich global economy.⁸ We now need to begin teaching our students how to succeed in and contribute to a sustainable society in a low-energy world. The relocalization of the campus economy would provide an exceptional opportunity for a campus-wide experiential learning curriculum. With its history and mission

of service to Appalachia, Berea has the perfect foundation for such a place-based educational approach.

Time is of the essence. Creating a sustainable campus can't happen overnight, and the further we go beyond the oil peak, the fewer resources will be available to support the transition. If a college fails to prepare for a low-energy future, it fails at everything. Peak oil should be at the top of every college administration's agenda.

America faces a major energy supply crisis over the next two decades. The failure to meet this challenge will threaten our nation's economic prosperity, compromise our national security, and literally alter the way we lead our lives.

-- Secretary of Energy Spencer Abraham, National Energy Summit, March 19, 2001

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- ⁵ Numerous articles and references regarding peak oil can be found at the website of the Association for the Study of Peak Oil, <http://www.peakoil.net>
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Richard Olson is the Director of the Berea College Sustainability and Environmental Studies Program.

Bernheim Arboretum Visitors Center to Join Lincoln Hall as a Kentucky LEED-Certified Building

by Jessica Turner

Bernheim Arboretum & Research Center is a 14,000-acre nature preserve located between Bardstown and Louisville in Clermont, Kentucky. Two thousand of the acres are open to the public for hiking, classes, and workshops and 250 acres are devoted to the arboretum. I recently toured the new ecologically-designed Visitors Center with one of the project engineers.

The Visitors Center is designed to achieve Platinum-level LEED certification, the highest possible level. LEED (Leadership in Energy & Environmental Design) is a nationwide voluntary program that sets standards for high performance, sustainable buildings. The design features of the Visitors Center include the use of recycled materials, a peat-based water treatment system, a green or living roof, geothermal heating and cooling, and passive solar design. The building produces oxygen, sequesters carbon, provides habitat, adapts to the seasons, protects water quality, uses the sun for energy, and provides shade, while also being aesthetically pleasing and recyclable. Other features of the building include day lighting to minimize the need for electric lighting, thermal storage in the concrete floor, and motion sensor fans.



South side of the Bernheim Forest Visitors Center.

The Visitors Center at Bernheim educates the public on the advantages of “green” architecture by documenting and evaluating the building’s performance, and working with architects, builders, and homeowners to share ideas on ecological design.

Lincoln Hall – Berea College’s administrative building – was Kentucky’s first LEED-certified building, achieving certification at the Silver level following an extensive renovation.

For more information about the Bernheim Arboretum Visitors Center, see

<http://www.bernheim.org/Default.aspx?tabid=140>

Jessica Turner is a SENS Independent Major and works in the SENS labor program.

A Crash Course in Campus Sustainability

When Mary Johnson and Michael Hilterbrand decided to attend Berea, neither had any idea that their first labor position would involve assisting in the creation of a sustainable campus. As student assistants to the College’s Sustainability Coordinator, Mary and Michael will play key roles in collecting and disseminating information on Berea’s steps toward sustainability, and in educating the campus on how to take those steps.



Until the first Sustainability Coordinator is hired, Mary and Michael are working with the SENS House labor program. One of Michael’s projects is to develop a database describing the key people and projects that are part of the College’s transformation to a sustainable campus. The database is designed for one-stop-shopping for people seeking information on the College’s sustainability actions. For example, if someone is interested in how Draper Hall was ecologically renovated and how well the new design is working, the database will describe any design documents and performance data, and how they can be obtained.

Mary is working with Megan Naseman, head SENS House Director, to develop workshops and resource materials to help students and staff “green” their dorms and offices. Mary has observed that “Lots of students and staff want to conserve energy and buy green materials. We can provide information that will make it easier to do.”

Michael and Mary are becoming highly visible members of the campus community as they work to educate themselves about sustainability even as they begin to educate others. They look forward to hearing from students, staff or faculty who would like assistance in greening their office or residence or who have suggestions on the types of information and workshops that would be most useful.

You can contact Michael at Michael_hilterbrand@bera.edu and Mary at Mary_johnson@bera.edu. For more information about the Berea College Sustainability Coordinator, contact the Provost’s Office, Carolyn_newton@bera.edu

SENS House Guest

By Wes Lowe

Though we have four Residential Directors, there has been a fifth resident in the SENS House this past week. Mollie Curry, a natural builder from Earhaven Ecovillage near Black Mountain, North Carolina, has come to Berea to work on our strawbale structures.

Natural building makes use of natural materials such as bales of straw, cob, or earthen paints and plasters. Mollie has been working in natural building for nine years, and first came to Berea about a year ago. She's been working to apply a lime plaster (a mixture of hydrated lime and sand, an age-old technique used for many Old English cottages) to the outside of the SENS House's strawbale wall and to make some repairs to the plaster of the wall interior and to our information kiosk.

Mollie has worked as a Wilderness Ranger in Washington as well as working with organic farming and permaculture. She first developed an interest in natural building when she attended workshops in Arkansas led by Becky Bee, author of *The Cob Builders Handbook*. Mollie says she has "learned by doing," developing her skills through reading and experimenting with natural building. "I like physically changing

things for the better. It's tangible; it feels good" states Curry. Mollie loves her work, and isn't above sleeping on the SENS House couch to get the job done.

In addition to the SENS House, Mollie has worked on numerous projects at Earhaven and many areas in North Carolina, including an adobe building affectionately referred to as "The Wedding Chapel" in Fairview, NC, and Earhaven's "House of Oneness." In addition, Mollie has also given many workshops on natural building, including classes at "Build Here Now" at the Lama Foundation in Cristobal, New Mexico.

For more information on the SENS House, visit:

Wes Lowe is a residential SENS House Director and editor of "The Sustainable Campus."



Mollie Curry applies lime plaster to SENS House strawbale wall.

Peaceful Tree Snakes

By Megan Naseman

Robert Fulghum, author of *All I Really Need to Know I Learned in Kindergarten*, believes in the simplicity of life's greatest lessons. I too believe that the greatest lessons are repetitions of earlier, simpler ones. This phenomenon was evident at the last meeting of the Berea Tree Snakes, Berea's local Roots&Shoots chapter.

Roots&Shoots is a children's group that focuses on environmental education, service projects, and fun. The Ecovillage chapter is mostly composed of pre-schoolers. The Tree Snakes threw a Peace Party to celebrate the United Nations' International Day of Peace. As part of our celebration we read the children *The Butter Battle Book* by Dr. Seuss, a story about two neighboring communities that go to war over which side of the bread should be buttered. Though we had planned to let the kids have their own "butter battle" with newspaper balls to illustrate what a mess we make when we don't work together, the kids taught us when they decided not to have a butter battle, but just enjoy snacks together instead.



Berea Tree Snakes fly giant peace dove puppet for International Day of Peace.

If you'd like to be a part of Roots&Shoots, please e-mail Paige Cordial at Paige_cordial@berea.edu. We are always looking for little people and volunteers.

Future meeting dates are: October 15, October 22, November 19, and December 3. For more information see our website: www.orgsites.com/ky/roots-and-shoots/

Megan Naseman is the Head Student SENS House Director for Fall '05.

I was very impressed with the children's grasp of the concept of peace. If only everyone grew up learning about peace and ways to make the world a better place; how wonderful the world would be! It's so difficult to change adult mindsets, but it seems that if people are exposed to ideas at a younger, more impressionable age, it can make all the difference.

October 26 is National Campus Sustainability Day. SENS is coordinating a week's worth of programs. Events will be co-sponsored by the Black Cultural Center, HEAL, and Student Life. Watch for more information soon!