



Energizing Kentucky: Higher Education Responds to the Shifting Energy Environment

**A White Paper Summarizing the Energizing
Kentucky Conferences and Proposing Next Steps
for the Initiative**

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Table of Contents

Executive Summary	3
The Development of Energizing Kentucky	5
Energy Challenges	11
Industrial and Commercial Perspectives.....	11
Policy Perspectives.....	13
Federal Policy.....	14
State Policy.....	15
Local Policy and Practices.....	18
Educational Perspectives.....	19
Directions for the Future	22

Executive Summary

Our nation is faced with several historic and unavoidable energy challenges, including global climate change and economic and national security issues that compel us to reduce our dependence on foreign oil. The challenges in Kentucky are especially formidable, since we rely on fossil fuels to supply well over 90 percent of our energy needs.

In the fall of 2007 we, the presidents of four of Kentucky's leading colleges and universities, recognizing that energy would perhaps become *the* key issue for the Commonwealth, decided to sponsor over the next two years a trio of conferences called Energizing Kentucky. We knew it was critical to get three different and sometimes adversarial constituencies talking and thinking together: those who produce and consume large quantities of energy (industry and business), those who set policy (our elected and government officials), and those who educate our future citizens (K-20 education institutions).

The three Energizing Kentucky conferences attracted increasing numbers of people (300, 500, 700) and a diverse array of local as well as national energy experts, such *New York Times* columnist Thomas L. Friedman, Utah Governor (and now U.S. Ambassador to China) Jon M. Huntsman, prize-winning author Jared Diamond, and President Obama's Assistant for Energy and Climate Change Carol Browner. The speakers illuminated the enormous energy challenges facing the world, the country, Kentucky, and our local communities. At the same time, the conferences gave us reasons for hope and optimism, as speakers noted the country's environmental strides since the 1970s. Momentum is surely building in Kentucky, as it is nationally.

What should we now be doing to prepare for and to capitalize on a very different energy future? Here are three suggestions: encourage in various ways a “culture change” toward energy sustainability; focus even more on research and development initiatives; and lend our strong support for the Governor’s energy plan, a carefully articulated and progressive blueprint for our energy future.

In the near future, we four presidents will focus on strengthening those K-12 STEM (Science, Technology, Engineering, and Mathematics) and PLTW (Project Lead the Way) initiatives that address energy and that will create capacities for Kentucky workers and businesses to prosper in a world where energy conservation, renewable energy, and carbon emissions restrictions will soon be facts of life. Because our institutions train not only our own students but teachers for K-20, we are in a position to influence Kentucky’s entire educational agenda.

Our four institutions will sponsor a follow-up Energizing Kentucky conference in January, 2012, two-and-a-half years after the last conference. Its goals will be to keep improving the partnership that has developed among the three different constituencies, to assess the energy progress that has been made since the last conference, and to continue to educate the broader public on the crucial importance of energy issues.

The Development of Energizing Kentucky

Background

During the fall of 2007 we, as presidents of four of Kentucky's leading colleges and universities, recognized a need for the state's higher education institutions to play a public leadership role on policy issues that matter to Kentuckians. As college presidents, we are less constrained by political considerations than are state policymakers, which positions us to exert some leadership on issues that may be difficult for elected officials. And as presidents of two public universities and two private colleges that train not only our own students but teachers for K-20, we are in a position to influence Kentucky's educational agenda and to promote, for example, the STEM (Science, Technology, Engineering, and Mathematics) initiative. We chose as our initial focus a topic of grave importance to the Commonwealth, the nation, and the world—energy. By now, scientists have agreed that global climate change is a reality. In addition, national security issues compel us to reduce our dependence on foreign oil. Yet the challenges to addressing these issues are formidable, especially in Kentucky where we rely on fossil fuels to supply well over 90 percent of our energy.

In light of these challenges, we decided to host a trio of conferences about the role of energy in Kentucky's future. We determined that it was critical to bring three key constituencies to the table: those who produce and consume large quantities of energy (industry and business), those who set policy (our elected and government officials), and those who educate our future citizens (K-16 education institutions). Each of the three conferences included all three constituencies, but highlighted representatives from energy and other industries in the first conference, state and local policy bodies in the second conference, and education organizations in the third conference. Keynote and plenary

speakers spread across the conferences placed Kentucky's energy challenges within a national and global context.

Changes Since the First Conference

The economic and political landscape of the nation has shifted significantly since we first laid plans for what came to be known as the Energizing Kentucky initiative. During the time of our first two conferences in June and September of 2008, crude oil was trading on world markets at around \$140 per barrel and gasoline hovered close to \$4 per gallon. Other energy prices had been increasing as well, driven up by global demand as well as instability in the Middle East and other "hot spots" around the world. Energy prices were playing a role in the presidential campaign, with both parties attempting to use the issue to their own advantage.

By the time of our third conference in April of 2009, we were well into a national and indeed global recession of significant proportions. Largely as a result of the economic slowdown, energy prices had returned to earlier, more modest levels. We also had a new administration in Washington that promised to be much more aggressive about reducing greenhouse gas emissions and pursuing cap-and-trade legislation. The administration had also engineered a stimulus plan, with substantial new federal spending on research and development for alternative energy production systems, and other federal support for reducing energy consumption in homes and businesses. Finally, a few weeks after our first conference, Kentucky's own Energy and Environment Cabinet had released a seven-component blueprint for guiding Kentucky toward a new energy future.

Fundamental Structural Features of the Dilemma

While these changes illustrate neatly how economic conditions and government policies can fluctuate from year to year, the speakers at our conferences addressed fundamental structural features of our energy dilemma that will not disappear even in the face of shifting

current events. Most pre-eminently, as Jared Diamond, Thomas Friedman, and several others argued, we are entering a phase of human history in which there will be unprecedented demands for energy, which will push the long-term costs of energy to higher levels than ever before. The U.S. has long been the world's heaviest user of energy on a per capita basis. As China, India, and other developing countries strive to build economic and social infrastructures that rival that of the U.S., demand for energy will skyrocket and prices will rise accordingly. To remain competitive, our nation will need a smarter and more effective energy system than it now has.

A second and related aspect of our dilemma involves greenhouse gas emissions and the need to reduce our nation's carbon output into the atmosphere. The aforementioned explosive economic growth in China and India has prompted those countries to expand energy production substantially, primarily through coal-fired power plants. Given that carbon emissions from existing energy production facilities are already destabilizing the environment, it is imperative that the U.S. lead the way in developing carbon reduction technologies for fossil fuels, and for developing alternative energy production approaches that have little or no adverse impact on the atmosphere.

A third component of our dilemma involves the net outflow of hundreds of billions of American dollars to unstable nations, the result of our reliance on foreign oil. Though the U.S. has ample domestically produced electricity, it still imports around 60 percent of the petroleum it needs to meet demand for gasoline and diesel for the nation's vast highway transportation system. As Friedman asserted in his address to the second conference, a significant portion of the money we spend on foreign oil props up the regimes of "petrodictators" and may even help fund terrorist activities. Reducing our dependence on foreign oil will not only staunch the outflow of U.S. dollars, but will also weaken the regimes of some oil-exporting nations. The side effect, Friedman predicts, will be to render some unfriendly nations more prone to democratic reforms and less belligerent in international affairs.

The final element of our structural problem is that *any* significant move away from our current energy system will take many years to accomplish. As our speakers acknowledged, the U.S. produces the majority of its electricity from fossil fuels, primarily coal and natural gas. A modest portion comes from our aging nuclear production facilities, and only a small percentage comes from “green” technologies such as hydroelectric, solar, and wind sources. While improved conservation is “low-hanging fruit” that we should certainly harvest, shifting this distribution will be a slow and resource-intensive process. Moreover, technologies to reduce carbon emissions from current and new coal plants—such as sequestration techniques—are still under-developed or untested. And expanding nuclear power remains a controversial option that would take years and many billions of dollars to accomplish.

Kentucky’s Energy Challenges

Our conference speakers and panellists effectively presented Kentucky’s energy challenges within the larger national context described above. Kentucky Governor Steve Beshear pointed out, for example, that Kentucky is more dependent on coal-fired electricity than most other states, deriving well over 90 percent of its power from this source and only about 3 percent from green sources. Kentucky’s economy is also heavily dependent on coal and coal-based energy production, which together support thousands of jobs and produce significant amounts of direct and indirect revenue for citizens of the state. Because of coal’s bounty in Kentucky, its modest costs, and our energy production infrastructure, the Commonwealth has some of the lowest energy prices in the nation. This in turn has made Kentucky a haven for energy-intensive industries.

Kentucky’s situation is not without some negative effects. One negative effect is the resulting pollution, which is among the highest in the nation on a per capita basis. In addition, low energy prices have enabled Kentuckians to live with inefficiencies that would

not be tolerated in higher cost states. More ominously, Kentucky's energy-consuming citizens and its industries will be particularly vulnerable in an era of higher energy costs produced through greater demand for energy, new policies designed to reduce carbon emissions, or some combination of the two. As Kentucky-produced electricity becomes more expensive, the state will become less competitive in attracting energy-intensive industries and the cost of living for Kentucky residents will increase as well. Moreover, because of its geography and climate, Kentucky cannot expand its hydroelectric, wind, and solar production capacities as cheaply as can other states. As a result, citizens of the Commonwealth will have to work strategically and with great patience and forbearance over the coming decades to move the state toward the efficient and clean production and use of energy.

Expanding Conference Audience

The Energizing Kentucky conference series was conducted against the backdrop of this multi-faceted energy dilemma. The conferences grew in numbers well beyond our expectation and attracted attendees from across the state representing every sector of economy. The first conference, held at the Henry Clay Building in Louisville on June 3-4, 2008, attracted about 350 people; the second conference, held September 18-19 also at the Henry Clay, attracted more than 500; and about 700 people attended the third conference, held April 15-16, 2009, at the Lexington Downtown Hyatt. This number included about 75 K-12 students from schools around the state who demonstrated energy projects and research they were engaged in.

In the pages that follow, we summarize what we believe are the most important points for the general public to know. We recapitulate the discussions in roughly the order in which they were presented, although we acknowledge that there was considerable overlap. We conclude with some recommended steps that all of us can take—and especially Kentucky's

universities and colleges—in creating a more sustainable energy future for the Commonwealth of Kentucky.

Energy Challenges

Conference I: Industrial and Commercial Perspectives

At the first conference, we heard perspectives from an array of executives and professionals representing numerous industries and businesses in our state. These individuals clearly understand the elements of our energy dilemma and are working within their respective companies and the larger marketplace to shift practices and approaches to energy production and use.

Of particular interest to us were the perspectives of energy industry leaders. Sandra Meyer, the chief executive of Duke Energy Ohio/Kentucky, discussed her company's long-term perspective on the shifting energy landscape. She acknowledged that a confluence of factors have created receptivity within the energy industry to promoting energy efficiency and the use of clean energy. Duke Energy, for instance, will move from domination by fossil fuel and nuclear energy production to a greater mix of these with renewable resource production facilities. In the area of conservation, the company will also help build a "smart," two-way electrical grid that will continuously monitor electricity usage and have the capacity to receive electricity back from individual homes or businesses that produce more power than they consume (from solar power, for example—a process known as "net metering").

Similarly, Paul Thompson from E.ON U.S., the company that owns Louisville Gas & Electric, discussed the steps his organization is taking toward a more sustainable energy future. The company is collaborating with several others on experiments in carbon sequestration in the western part of the state. E.ON has also joined the FutureGen Alliance, a U.S. Department of Energy project to design and build a "zero-emissions," coal-fired

electric power facility. And the company is taking part in an array of additional research and development projects that aim to produce energy more efficiently and to reduce emissions from energy production facilities.

Leaders from other energy companies in Kentucky described projects and perspectives very much like those of Meyer and Thompson. But they echoed Governor Beshear's theme that conversion to cleaner production facilities will take many years—indeed will be the work of a generation—and that coal will likely remain the key ingredient of Kentucky's energy mix for the foreseeable future.

Business executives from outside of the energy sector focused on a range of issues. For example, Pearse Lyons of Alltech, a Nicholasville-based global biotechnology firm, argued that the energy dilemma was a dramatic opportunity for Kentucky to exercise leadership, entrepreneurship, and creativity. If the state is savvy, he suggested, and its people invest in areas such as biofuels and improving the education system, it can succeed in the new energy environment rather than being bested by the circumstances. One of the best examples here is the research and investment Alltech is making in novel bio-fuel possibilities. Carl Kurz, an executive manager with Toyota in Georgetown, discussed the payoff in energy savings Toyota has seen through investment in efficient lighting and other electrical products. And Rick Calvaruso of General Electric discussed his company's strong investment in the design and production of so-called smart appliances, which dramatically reduce power consumption compared to previous iterations of these same devices.

The Ideas of National Energy Experts

Rather than addressing clean energy production or innovation, several speakers focused on increasing energy efficiencies across the state's infrastructure of houses and buildings. For example, Susan Zinga, an energy policy analyst with the Applied

Energy Group headquartered in New Jersey, insisted that Americans must become better-informed about how the electrical supply system functions. As energy demand growth outstrips supply—a likely scenario given the state of clean energy production technology at the moment—Americans will need better “demand side management” to reduce power consumption. This might be accomplished by incentives or price signals to, for example, encourage the purchase of more efficient home appliances or greater use of electricity in off-peak hours. Zinga contends that in a state like Kentucky, moderate conservation efforts such as a 15 percent increase in energy efficiency could save the state nearly a half billion dollars of expenditures.

Along these same lines, Ivan Urlaub of the North Carolina Sustainable Energy Association discussed the move toward net metering, a mechanism that essentially rewards people for engaging in their own energy production. Customers with solar panels, small wind turbines, or other energy production systems can send energy back into the system when they produce excess electricity, and the meter actually credits the customer’s bill in the process. Though only small numbers of customers may take advantage of this at first, others will see the benefits and eventually the idea will spread and make a dramatic difference in energy use and production statewide. For Urlaub, an absolutely essential feature of energy in the future will be the *measurement* of its use. If citizens can see the amount and costs of their energy use, the vast majority of them will practice efficiency in ways that we cannot even imagine at the moment.

Conference II: Policy Perspectives

Public policy was the focus of the second Energizing Kentucky conference and was also embedded in presentations from Conferences I and II. Our presenters suggested current and future roles that policy can play in the energy challenge at the federal, state, and local levels.

Federal Policy

While our energy challenges are formidable, President Obama’s Assistant for Energy and Climate Change, Carol Browner, gave reason for optimism at our third conference by highlighting past successes and current efforts at the federal level. She reminded us that since the passage of the Clean Air Act and the creation of the Environmental Protection Agency in 1970, federal policy has removed lead from gasoline, capped sulfur dioxide emissions that contribute to acid rain, banned chlorofluorocarbons (CFCs) that contribute to holes in the ozone layer, reduced forest destruction, and introduced cleaner diesel fuels. Browner insists that it is possible to have both a healthy economy and a healthy environment. The American Recovery and Reinvestment Act (ARRA) of 2009, for instance, includes historical investments in renewable energy that also provide jobs, such as funds to weatherize low-income homes, which will create jobs in the weatherization industry; and investments in a smart grid to carry energy from rural to urban centers, including funds to train workers to lay the new grid.

Browner’s optimism about the role the federal government can play in changing the country’s energy future was tempered by reminders from other presenters that considerable political will and courage will be required to change direction. Currently, the U.S. marketplace has little incentive to compete with cheap fossil fuels. Both Thomas Friedman and Utah Governor Jon Huntsman (now U.S. Ambassador to China) suggested, however, that the federal government can encourage innovation by stimulating the free market. They believe the government should create incentives for industry to invest in alternative energy sources through price signals such as a carbon tax, gasoline tax increase, or a cap-and-trade system¹ that indirectly taxes carbon emissions. In short, said Friedman, the government

¹ Under a cap and trade system, each large-scale emitter (or company) would have a limit on the amount of greenhouse gasses it can emit. The company would be required to have an “emissions permit” for every ton of carbon dioxide it releases into the atmosphere, thereby “capping” the amount of greenhouse gasses a

should create an “intelligently-designed *system* of policies, tax incentives and disincentives, and regulations” to spur the development of alternative energy sources.

Jon Huntsman, as well as Steve Aumeier, a nuclear expert from the Idaho National Laboratory, identified essential features of a national energy policy. Aumeier advised us that a nationally secure energy policy should feature simultaneous environmental stability, economic stability, and resource security. Huntsman suggested six areas of focus for a national energy policy: (1) conservation, both public and private; (2) a regulatory infrastructure to move the country toward renewable energy sources, including price incentives; (3) enhanced transmission capabilities for transmitting energy from renewable sources; (4) government investment in energy research and development; (5) value placed on carbon, such as a carbon tax; and, (6) engagement of developing countries in the energy discussion. Partly because of Huntsman’s leadership, the Western Governors’ Association has acted collaboratively and effectively on energy issues that cut across state lines and energy initiatives within Utah have succeeded because of collaborative approval.

State Policy

A primary goal of the Energizing Kentucky conference series is for Kentucky’s higher education institutions to provide leadership in developing a sustainable energy policy for Kentucky and to keep higher education focused on the STEM initiative. To help us realize the public policy part of our goal, we invited speakers who could inform us about what has already been accomplished in Kentucky, as well as suggest future policy directions. Both House Majority Floor Leader Rocky Adkins and Kentucky Resources Council Director

company can emit. In recognition that it will be easier for some companies to reduce their emissions than others, those who emit less than their allowance could sell their extra permits to companies that are not able to make reductions so easily. This system, then, is designed to guarantee specified levels of overall reductions, while rewarding the most efficient companies and ensuring that the cap can be met at the lowest possible cost to the economy (Center for American Progress, <http://www.americanprogress.org/issues/2008/01/capandtrade101.html>).

Tom Fitzgerald spoke at two of the conferences; they reported on several key energy bills that have moved Kentucky toward a new energy policy. Taken together, these bills commissioned a report on carbon management and provided funding for research on carbon capture and sequestration (CCS); created a center for renewable energy and energy efficiency (now in place at the University of Louisville); requested a study on reform in utility regulatory policy; enacted a set of incentives for renewable energy and energy efficiency; set standards for the energy performance of state-funded buildings; and required utilities to offer net metering to customers.

The Governor's Energy Plan

A few weeks after our second conference, Kentucky Governor Steve Beshear unveiled a comprehensive state energy plan. We asked the Governor's Secretary for Energy and Environmental Matters, Leonard Peters, who had spoken at our first conference, to present the plan at Conference III. Entitled *Intelligent Energy Choices for Kentucky's Future: Kentucky's 7-Point Strategy for Energy Independence*, the plan includes strategies for efficiency and renewable energy, cleaner uses of coal, and study of nuclear energy, as follows:

Strategy 1: *Improve the energy efficiency* of Kentucky's homes, buildings, industries, and transportation fleet through utility-sponsored and non-utility sponsored energy efficiency programs, transportation energy efficiency programs, education and outreach programs, and an energy efficiency program for state government.

Strategy 2: *Increase Kentucky's use of renewable energy* utilizing the state's natural resources such as wind, solar, hydropower, biomass, and methane.

Strategy 3: *Sustainably grow Kentucky's production* of biofuels such as ethanol and biodiesel for use in transportation, drawing on the state's agriculture and forestry resources.

Strategy 4: Develop a coal-to-liquids industry that will use 50 million tons of coal per year to produce four billion gallons of liquid fuel per year by 2025.

Strategy 5: Augment in-state natural gas production with synthetic natural gas from coal-to-gas processing, to produce the equivalent of 100 percent of the state's natural gas requirement by 2025.

Strategy 6: Research and develop technologies for carbon capture and sequestration (CCS) for use with existing coal-fired electric power plants.

Strategy 7: Examine the use of nuclear power for electricity generation.

The Governor's plan has some of the same features as strategies undertaken in Utah under Governor Huntsman, a recognized leader of energy policy in the western states. These features include joining the U.S. Climate Registry, which will allow the state to measure its carbon footprint; and crafting an energy efficiency plan for state government. The Kentucky plan also integrates a variety of energy technologies—a feature commended by several speakers, who noted that energy in the future cannot draw on a single source.

We are encouraged by this new wave of energy policy actions taken in Kentucky in recent years. At the same time, we recognize that a good deal of research and development is needed to develop the energy policy more fully. Tom Fitzgerald of the Kentucky Resources Council, for instance, noted that critical issues surrounding nuclear energy—including waste management and cost overruns—must be addressed before nuclear power can be considered a viable source of energy. Fitzgerald also believes there is greater potential for solar and hydroelectric energy in Kentucky than policymakers have indicated. Finally, much more research and development is needed to determine if carbon capture and sequestration can be done permanently and on a large scale. These research and

development needs may present opportunities for higher education institutions to make meaningful contributions to developing Kentucky's energy policy.

Local Policy and Practices

Because colleges and universities are embedded in local communities, our outreach efforts often focus on the communities in which we reside. Recognizing, as well, that the energy challenge must be addressed at the micro as well as the macro level, we included in the conference series presentations on local energy policies and practices.

The story of an energy crisis in Juneau, Alaska, made clear the potential for local communities to change their energy habits in a short period of time. Maria Gladziszewski, special projects officer for Juneau, described at our second conference how a series of avalanches in April 2008 damaged transmission lines from the hydroelectric plant that had supplied the city with relatively inexpensive electricity. The local power company switched immediately to back-up diesel generators, but the cost of electricity skyrocketed 500 percent. With these price signals, electricity consumption by town residents was reduced by 40 percent within three weeks. Even more significant was what happened when inexpensive electricity again became available: electricity usage went up, but was still almost 25 percent less than it had been. Many of the conservation measures that citizens adopted during the "crisis" remained in place. The vast majority of the shift was due to voluntary attitude and behavior adjustments driven by price signals. This local story illustrates that energy consumption can be reduced dramatically in a short period of time if proper incentives are in place.

Clearly, however, we do not wish such natural disasters on any community—and we cannot wait for these sorts of incentives to encourage energy changes in local communities. Will Cox, mayor of Madisonville, Kentucky, suggested a proactive approach involving comprehensive, long-range planning at the local level to include energy and environmental

measures. Madisonville's long-range plan, for instance, includes a recycling program and the creation of new green space at the city's center. The community, which is in the heart of Kentucky's western coal belt, has not yet developed a solution for replacing coal energy but is investigating options, including tapping into nearby methane beds found in abandoned coal mines.

Steve Austin, director of the Legacy Center at the Blue Grass Community Foundation in Lexington, urged policymakers to think outside the box and consider reorganizing local communities for energy efficiency. Suggested steps included enacting zoning policies that allow workplaces and residential areas to be located in close proximity; creating public transit programs that reduce the need for cars; returning to small neighborhood schools; using locally-grown foods to reduce transportation costs; and community planning for disruptions of petroleum supplies.

Conference III: Educational Perspectives

Our third conference completed the circle by bringing the focus back to the role of education. Here, we considered how Kentucky's K-12 and post-secondary education systems, in partnership with civic and government organizations, are beginning to take steps that contribute to a more sustainable energy future for the Commonwealth. We set the context by inviting David Blockstein of the Council of Energy Research and Education Leaders (CEREL) in Washington, D.C., and Robert Koester of the Association for the Advancement of Sustainability in Higher Education (AASHE) to describe how these national coalitions of colleges and universities provide a support network to encourage sustainable energy practices on college campuses.

We asked Kentucky's universities and colleges to share the many activities underway to promote a sustainable energy future. We were gratified to learn of the breadth of these

activities, which encompass energy research and development, as well as internal policies and practices, including:

- Energy research and development centers, such as UK's Center for Applied Energy Research with its sequestration research and Eastern Kentucky University's Center for Renewable and Alternative Field Technologies with its biofuels research;²
- Sustainability and environmental studies programs, such as the new programs at Western Kentucky University;
- Campus recycling programs, such as the ones at Transylvania;
- Sustainability or environmental committees to improve campus environmental practices, which are now a feature of virtually every Kentucky college and university;
- Policies and plans for construction of energy-efficient buildings, such as Berea's LEEDS renovation of the Boone Tavern and Centre's gold LEEDS-certified new residence hall;
- Food initiatives aimed at greater use of local agricultural products;
- Campus energy audits; and,
- University-based programs to support K-12 environmental education;
- Partnerships between the institutions and others, such as the U of L partnership with the Metro city government and the Jefferson County school system.

We also learned of several current opportunities for environmental education for Kentucky's elementary and secondary students, including:

- An environmental education master plan;
- Environmental/energy curricula and instructional materials available to teachers;

² R&D Centers at Kentucky's universities include Eastern Kentucky University's Center for Renewable and Alternative Fuel Technologies, the University of Louisville's Conn Center for Renewable Energy and Environmental Stewardship, and the University of Kentucky's Center for Applied Energy Research with its sequestration research.

- Training for energy teams to audit and facilitate efficient energy practices in schools and teacher preparation and endorsement in environmental education.³

Energy Partnerships

As the Energizing Kentucky conference series suggests, we do not expect Kentucky's colleges and universities to act alone in addressing Kentucky's energy challenges. Because all facets of our society consume energy and are affected by energy consumption patterns, we must partner with community and governmental organizations to address the current challenges. Several speakers at Conference III described what this might look like. For instance, the *Kentucky Sustainability Institute* is a partnership of the Kentucky League of Cities, NewCities Institute, and the Kentucky Energy and Environment Cabinet that promotes the "greening" of Kentucky through education and resources. The *Green and Healthy Schools Initiative* is a partnership of state government, the Kentucky Department of Education, and the Kentucky Environmental Education Council that encourages schools to take steps to improve energy efficiency. *Kentucky's Clean Energy Corps* is a partnership of state government, the Kentucky Community College and Technical System, and the Kentucky Chamber of Commerce to weatherize and improve energy efficiency in 10,000 modest-to-low income homes. And the *Partnership for a Green City* is a partnership of Louisville Metro Government, Jefferson County Public Schools, and the University of Louisville to improve energy efficiency and sustainability in the Louisville metropolitan area through education, research, joint purchasing, and advocacy.

³These resources and opportunities are provided by numerous organizations, agencies, and programs, including the Kentucky Environmental Education Council, National Energy Education Development (NEED), the Kentucky Energy Efficiency Program for Schools (KEEPS), and Western Kentucky University's Center for Environmental Education and Sustainability.

Directions for the Future

The Energizing Kentucky Conference series illuminated the enormous energy challenge facing the world, the country, the Commonwealth, and our local communities. At the same time, the conferences gave us reasons for hope and optimism as conference presenters noted the country's environmental strides since the 1970s. We also believe that momentum is building nationally under the Obama administration and in Kentucky through the leadership of Governor Steve Beshear, House Majority Floor Leader Rocky Adkins, Senator Robert Stivers, and others.

At the federal level, the American Recovery and Reinvestment Act of 2009 directs substantial resources into the field of renewable energy. More recently (on June 26, 2009), the U.S. House of Representatives passed the American Clean Energy and Security Act, which includes many provisions suggested by conference presenters, such as setting a declining cap on greenhouse gas emissions and establishing a cap-and-trade program. While the fate of the bill in the Senate is still uncertain, its passage by the House with broad support from both industry and environmentalists signals a sea change at the national level to address the country's energy challenges.

Momentum has developed in Kentucky as well, as evidenced by energy bills that have passed in nearly every legislative session since 2006, and which laid the groundwork for the Governor's 2008 energy plan. Kentucky's post-secondary institutions have begun working to improve energy efficiency and institute sustainable environmental practices on their campuses, and several universities have created Centers to support research, development, and education around energy and the environment. Curricula, instructional materials, and teacher preparation programs are available to assist Kentucky's elementary and secondary teachers in providing environmental education to K-12 students. The STEM initiative is becoming more publicized and apparent at all levels. And partnerships among

various governmental and civic groups are emerging in recognition that taking on the energy challenge will require a collaborative effort across all segments of society.

At present, however, these activities are not widespread or widely known. We commend individuals and organizations for voluntarily beginning to address the energy challenge, but we recognize that a commitment to doing so has not yet become institutionalized, nor have efficient and sustainable energy practices become a matter of routine. We also recognize the difficulties of making progress on energy in the midst of an economic downturn. We suspect federal and state policymakers as well as voters will be reluctant to make significant but costly moves on the energy front until the nation is moving out of recession. But this is all the more reason why our work in this arena should be strategic and long-term in orientation.

In the face of these challenges, how do we use the wealth of information shared at these conferences to propel the state toward a new energy future? We offer below some suggestions for next steps that the Energizing Kentucky community—and particularly the state’s higher education institutions—might take to keep a better energy future on our collective agenda. We offer these in a spirit of collaboration and creativity, recognizing that other participants in our project will also have useful ideas. Our focus is primarily on activities that Kentucky’s higher education institutions would be ideally suited to pursue.

The ideas below are arranged in three separate categories: I covers ideas our four institutions will pursue, II proposes ideas that other Kentucky institutions, both public and private, might pursue, and III proposes ideas for Kentucky’s public policy and business leaders.

I: Proposals for Our Four Institutions

First of all, our four institutions intend to continue our leadership in Energizing Kentucky activities that include our K-20 educational colleagues, state political and policy leaders, and members of the business community. We intend to focus next on K-12 STEM initiatives that have an energy focus and that create capacities for Kentucky workers and businesses to prosper in a world where energy conservation, renewable energy, and carbon emissions restrictions will be limiting parameters. We also intend to keep putting our state and local energy issues in national and global contexts. We will collaborate where possible with other groups and institutions on core energy issues as our time and resources allow. With this overview in mind, we would anticipate the following future activities:

- *Sponsor a Follow-up Energizing Kentucky Conference.* Given the significant benefits to the Commonwealth that have come about through our three Energizing Kentucky conferences to date, we propose to sponsor a follow-up conference in January, 2012, two and one-half years after our last conference, in order to:
 1. Keep the three main constituencies (business and industry, government policy leaders, educators at all levels) collaborating,
 2. Assess the changes that have occurred since our last conference, and
 3. Continue to educate the broader public on energy issues.

- *Focus in the Next Several Years on K-12 Education.* In December, 2008, the STEM (Science Technology, Engineering, and Mathematics) Task Force presented its 21-century implementation plan to the Interim Joint Committees on Appropriations and Revenue and Education. The plan gave detailed information about the strategy and desired outcomes of four main initiatives: public awareness and promotion, professional development, curricula alignment, and partnership engagement. Strategy II proposed expanding Kentucky's STEM talent through Project Lead the Way (PLTW), a nationally recognized middle and high school curriculum that focuses on

project- and problem-based contextual learning. Its success depends on partnerships involving middle and high schools, colleges and universities, and the business sector. Of the 450 middle and high schools in Kentucky, 94 had registered to participate, but only 28 had implemented the program by the end of last year.

Because the PLTW curriculum includes an energy component, and because Kentucky's ability to meet the energy challenges ahead is related to the success of the STEM initiative, in the coming years our four institutions will study the PLTW curriculum with the goals of:

1. forming partnerships between PLTW schools and our own institutions,
2. encouraging other higher education institutions to form such partnerships,
3. encouraging business partnerships with PLTW schools, and reporting the outcomes of such PLTW partnerships to legislative leaders.

II: Proposals for Other Kentucky Public and Private Institutions

Every one of the public institutions and most of the private ones have been involved in some way in the three Energizing Kentucky conferences to date. At the conclusion of Conference 3, it was clear that other Kentucky colleges and universities had ideas about how they too might engage energy issues within their institutional contexts. The ideas below are intended to give some ideas about how other higher education institutions might choose to engage energy issues:

- *Smaller, More Specialized Energy Conferences*. The three Energizing Kentucky conferences organized by our four institutions have been large in scope. Perhaps any one of our Kentucky colleges and universities could sponsor smaller conferences on more specialized topics. One example of this occurred on September 10 when U of L's Kentucky Renewable Energy Consortium (KREC) headed by Cam Metcalf sponsored a

one-day conference at the Frazier International History Museum, “Agriculture and Forestry in a Reduced Carbon Economy: Solutions for the Land.” The conference drew more than 100 people interested in this specialized topic that will be of increasing importance.

Other Kentucky colleges and institutions might sponsor conferences on more specialized areas of energy. They could do this under the aegis of Energizing Kentucky or on their own. There have been several good suggestions for more specialized gatherings, which might consider topics in relation and both state and federal policy:

1. Nuclear energy
2. The science, economics, and politics of coal
3. The conservation and distribution of energy
4. Transportation of the future
5. Energy and education (perhaps coordinated by CPE)
6. Sequestration research.

These are just a few of the ideas that other colleges and universities might want to pursue in addition to joining our four institutions in the occasional events and activities we will pursue together. Of course, our occasional conferences and K-16 STEM initiative would invite all Kentucky educators to the table.

III: Proposals for Kentucky’s Public Policy and Business Leaders

➤ *Bringing about a “Culture Change” Toward Energy Sustainability.* While the Kentucky General Assembly has made important progress in promoting cleaner energy, we believe that it, along with Kentucky’s business leaders, can take additional steps to hasten the state’s transition to a new and sustainable energy future. Policy changes often meet with resistance until there is a simultaneous change in our “energy culture”: that is, our attitudes around efficiency and energy use. In our first conference, leaders

from key Kentucky businesses and industries (e.g., Toyota, Duke Energy, General Electric, Ford, Alltech, E.ON U.S., etc.) spoke eloquently about many changes they have already made to conserve energy and prepare for the future. Through focused advertising and public relations efforts, they can more effectively share what they are doing in this regard with a much wider public. Similarly, legislative leaders can emphasize to their constituents and the media the progressive bills relating to energy the Kentucky General Assembly has passed in the past two years, bills of which the general public is still largely unaware

- *Greater Focus on Research and Development.* Legislative, business, and education leaders should enhance the energy research and development efforts in the Commonwealth. Because of our current dependence on coal, R&D on the feasibility of carbon capture and sequestration as a long-term strategy for carbon management is of key importance, along with increased R&D on renewable energy resources.

- *Support for the Governor's Energy Plan.* Under the leadership of Leonard Peters, Secretary of the Energy and Environment Cabinet, Governor Beshear issued “Intelligent Energy Choices for Kentucky’s Future” six weeks after the first Energizing Kentucky conference, at which Dr. Peters gave concluding remarks. Of the seven points in the plan, the first three focus on conservation, the “low-hanging fruit” of sustainability; the last point calls for a discussion of nuclear energy, which Kentucky legislation currently prohibits. The plan maps the way for a 20 percent reduction in greenhouse gas emissions, increased coal research, and the creation of 40,000 new jobs in the energy sector by 2025. It represents a dynamic and progressive blueprint for the future. We encourage governmental, business, and education leaders to become better acquainted with it, and, in their different ways, work to bring about its goals.