2011 Annual Summary

Kentucky Department for Energy Development & Independence

Kentucky Energy & Environment Cabinet

DEDI
KENTUCKY DEPARTMENT for ENERGY DEVELOPMENT & INDEPENDENCE

Foreword

In November 2008 Governor Steve Beshear unveiled his comprehensive energy plan for Kentucky, "Intelligent Energy Choices for Kentucky's Future." The plan is designed to improve the quality of life for all Kentuckians by simultaneously creating efficient, sustainable energy solutions and strategies; by protecting the environment; and by creating a base for strong economic growth.

The Governor's plan incorporates recommendations to improve energy efficiency for Kentucky's homes, businesses and transportation fleet, and calls for an increase in our use of renewable energy. The plan discusses the potential for biofuels as well as coal-to-liquids and coal-to-gas technologies and recommends the initiation of an aggressive carbon capture/storage program for coal-generated electricity. Finally, the plan begins the discussion of whether or not nuclear power should provide a portion of Kentucky's electricity portfolio in the future.

By refining and adopting this energy plan, Kentucky can establish leadership in the United States for innovating and creating efficient, sound and environmentally compatible energy solutions and strategies. The energy plan serves as a roadmap toward energy independence that is designed to accomplish six important goals:

- Conserve and use energy more efficiently
- Achieve energy independence for transportation fuels
- Use coal more cleanly and efficiently
- Diversify electricity generation to optimize use of renewable and alternative fuels in addition to coal, Kentucky's leading fossil fuel
- Mitigate carbon dioxide emissions
- Establish Kentucky state government as a leader in green practices

During the course of the past twelve months the Energy and Environment Cabinet and the Department for Energy Development and Independence (DEDI) have worked diligently to implement the Governor's energy plan on a broad array of fronts. This annual summary provides a brief overview of those activities that are driving results.

More information about the Governor's energy plan and DEDI's activities to implement the plan can be found at ***http://energy.ky.gov.***

Dr. Len Peters

Fellow Kentuckians -

I am pleased to report that 2011 has been a year of impact and results. Energy programs that touch Kentucky's schools, homes, businesses, communities and government facilities are taking hold and making a difference. Today we are seeing what can happen when Kentuckians join together and work toward a common goal. This year all 174 Kentucky public school districts participated in the Energy Education Collaborative; 26 Kentucky energy providers supported the Kentucky Home Performance Program; more than 34,000 Kentuckians participated in and received rebates from the Kentucky Energy Efficient Appliance Rebate Program; 106 Kentucky industrial, commercial, and institutional facilities took advantage of sustainability and retrofit programs; 192 farm operations joined the On-Farm Energy Efficiency Initiative; 45 state government buildings were upgraded using the Kentucky Green Bank; and 60 Kentucky municipalities implemented energy efficiency projects.

Many of our American Recovery and Reinvestment Act (ARRA) of 2009 energy programs and projects are either fully implemented or complete. By wisely investing ARRA funds Governor Beshear has created new jobs, retained our industries, reduced our energy dependence and lightened our impact on the environment. Together, Kentuckians are helping transform Governor Beshear's energy plan into a reality that will produce dividends for generations to come.

The Kentucky Climate Action Plan Council issued a final report that presents the methods and the pros and cons of more than 70 policy options that are intended to reduce greenhouse gas emissions from all sources in the Commonwealth while also encouraging energy efficiency, energy security, and economic growth. Also the General Assembly passed legislation that defined legal issues associated with the geologic storage of carbon dioxide that better positions Kentucky for future carbon capture and storage federal funding. We continued to develop our biomass, biofuel and renewable energy markets to enhance the diversity of our energy portfolio mix. Numerous private companies have expressed interest in Kentucky's potential, but uncertain financial markets delay us from moving this potential to a reality.

An uncertain national economy coupled with new federal environmental regulations placed new challenges on the development of our fossil energy resources. Companies have expressed interest in expanding Kentucky's coal-to-gas and carbon capture initiatives, but long-term financing remains a hurdle. We are seeing some electric utilities move from coal–based power plants to natural gas to comply with federal clean air regulations. To help analyze the impacts of these actions, we developed a dynamic computer model that forecasts electricity prices, demand, emissions, and fuel consumption based on various assumptions. There is no question that our role to find balance between energy, the environment and our economy is becoming increasingly more important.

Few states have made energy investments with the same breadth and depth as Kentucky. We can be proud of these initiatives as they help shape our future for the better. We must continue to work together to solve the energy challenges that lie ahead of us. Thank you for the opportunity to serve you.

Len Peters, Secretary, Kentucky Energy and Environment Cabinet

Table of Contents

Intelligent Energy Choices for Kentucky's Future

Governor's Energy Plan

Kentucky's challenge for the 21st century is to develop clean, reliable, affordable energy sources that help us improve our energy security, reduce emissions, and provide economic prosperity. Kentucky can be – and in fact must be – a leader in this energy revolution.

As a state, it is imperative that we have policies and programs in place that allow us to shape our own energy future by making sure we utilize our energy resources in an environmentally sound manner. The Governor's strategic action plan, "Intelligent Energy Choices for Kentucky's Future," is intended to place Kentucky on such a path.

Strategy	Goal
(1) Improve the energy efficiency of Kentucky's homes, buildings, industries and transportation fleet.	Energy efficiency will offset at least 18 percent of Kentucky's projected 2025 energy demand.
(2) Increase Kentucky's use of renewable energy.	By 2025, Kentucky's renewable energy generation will triple to provide the equivalent of 1,000 megawatts of clean energy while continuing to produce safe, abundant and affordable food, feed and fiber.
(3) Sustainably grow Kentucky's production of biofuels.	By 2025, Kentucky will derive from biofuels 12 percent of its motor fuels demand, while continuing to produce safe, abundant and affordable food, feed and fiber.
(4) Develop a coal-to-liquids industry in Kentucky to replace petroleum-based liquids.	Kentucky will develop a coal-to-liquids industry by 2025 that will use 50 million tons of coal per year to produce four billion gallons of liquid fuel.
(5) Implement a major and comprehensive effort to increase gas supplies, including coal-to-gas in Kentucky.	Kentucky will produce the equivalent of 100 percent of our annual natural gas requirement by 2025 by augmenting in-state natural gas production with synthetic natural gas from coal-to-gas processing.
(6) Initiate aggressive carbon capture/sequestration projects for coal-generated electricity in Kentucky.	By 2025, Kentucky will have evaluated and deployed technologies for carbon management, with use in 50 percent of our coal-based energy applications.
(7) Examine the use of nuclear power for electricity generation in Kentucky.	Nuclear power will be an important and growing component of the nation's energy mix and Kentucky must decide whether nuclear power will become a significant part of meeting the state's energy needs by 2025.

"We must fully integrate the development of our energy resources with our mission to protect the environment. The seven strategies, when implemented, will restructure our energy portfolio so that we can use energy in its broadest sense – as a tool for economic development and preserving our environment – which Kentucky desperately needs."

- Kentucky Governor, Steve Beshear

Governor's Task Force on Bioenergy

In August of 2009 Governor Beshear convened an Executive Task Force on Biomass and Biofuels to establish strategic actions to develop a sustainable biomass and biofuels industry in Kentucky. The Governor recognized the need to diversify Kentucky's energy portfolio and to provide economic prosperity to rural Kentucky.

The Task Force built on existing biomass and biofuel goals and recommendations established in Kentucky's energy plan; the Kentucky Agriculture Council's "A Pathway for Kentucky's Agriculture and its Rural Communities: 2007 to 2012 Strategic Plan"; and the Kentucky Renewable Energy Consortium "25 x'25 Roadmap for Kentucky" to formulate a single plan of action for the Commonwealth.

> "Improving our Commonwealth's energy security through the increased utilization of biofuels can create economic growth and improve our environment...it is a great opportunity for Kentucky."
>
> **- Kentucky Governor, Steve Beshear**

To further develop the recommendations identified by the Governor's Task Force, DEDI and the Governor's Office of Agricultural Policy (GOAP) coordinated a bioenergy based educational trip to Missouri in May, 2011. The itinerary included participation in the International Biomass Conference and Expo in St. Louis; a visit to and economic development discussion at Show-Me Energy Cooperative in Centerview, Mo., a tour of Monsanto's research facility in Chesterfield, Mo., and an overview of Abengoa's biorefinery in Mt. Vernon, Ind.

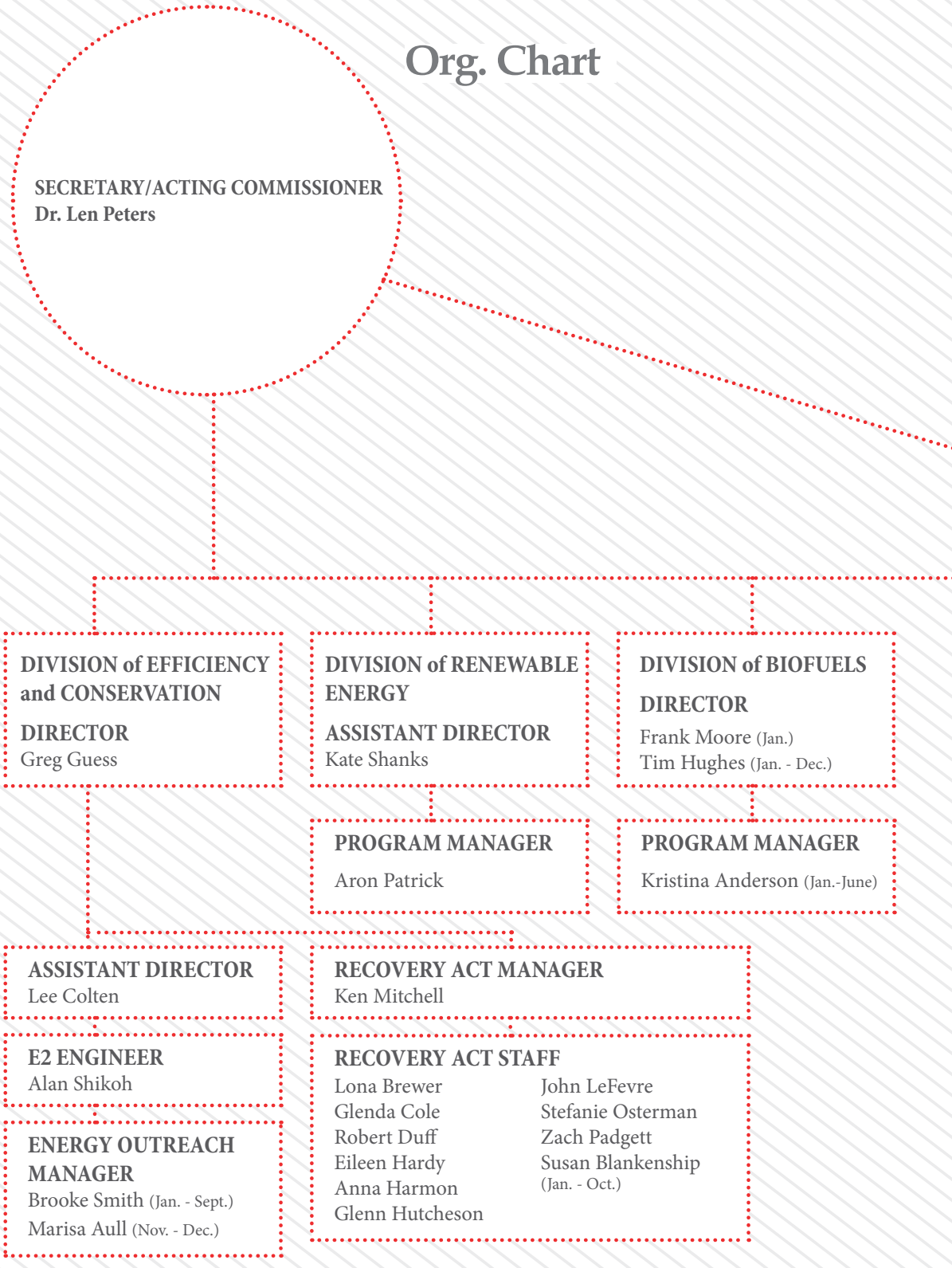
The three days of networking among the 51 Kentucky leaders traveling together created tremendous synergies as they collectively worked to advance Kentucky's future and energy security. The group included numerous business, governmental and academic leaders from across the Commonweath.

Additionally, DEDI advanced Kentucky's bioenergy development by sponsoring the Kentucky Agricultural Council's Bioenergy Symposium in November. The event focused on supply and demand risk mitigation of biomass feedstocks. Various firms addressed their procurement challenges, while potential producers learned about the developing economic opportunities for energy crops. More than 185 stakeholders attended the symposium and each was provided a copy of the Kentucky Division of Forestry's newly released "Recommendations for the Harvesting of Woody Biomass."

From left to right -- Pat Henderson, Ky. Agricultural Development Board and Director Ky. Association Conservation Districts; Representative Wilson Stone; Steve Coleman, Ky. Division of Conservation; David Rowlett, Director, Ky. Association Conservation Districts; Karen Woodrich, USDA Natural Resources Conservation Service (NRCS); Dan Ellison, Director, Ky. Association Conservation Districts; Jeff Rice, Director, Ky. Association Conservation Districts; Representative C. B. Embry Jr.; Ruthi Pike NRCS

DEDI Organization

Org. Chart



DEDI Organization

In 2008 the Kentucky General Assembly enacted legislation that established DEDI within the Energy and Environment Cabinet. The department was created with six divisions that support implementation of Governor Steve Beshear's energy plan. The divisions include the Division of Efficiency and Conservation; the Division of Renewable Energy; the Division of Biofuels; the Division of Energy Generation, Transmission and Distribution; the Division of Carbon Management and the Division of Fossil Energy Development. Additionally, the department collaborates with both the University of Kentucky Center for Applied Energy Research and the Kentucky Geological Survey that provide technical expertise and advice. The Department was authorized 29 fulltime employees of which 12 employees help manage the $68 million in American Recovery and Reinvestment Act funds allocated to DEDI by the US Department of Energy.

DEDI's mission is to improve the quality and security of life for all Kentuckians by creating efficient, sustainable energy solutions and strategies and promoting clean, reliable, affordable energy sources that help Kentucky improve energy security, reduce emissions, and provide economic prosperity. Additionally, the department supports and encourages energy-related research and development that will benefit Kentuckians.

A short summary highlighting the accomplishments and future direction of each division follows.

OFFICE OF THE COMMISSIONER

DEPUTY COMMISSIONER
John Davies

EXECUTIVE STAFF ADVISOR BUDGET/PERSONNEL
Amanda Cook

EXECUTIVE ADVISOR GRANTS AND CONTRACTS
Paul Brooks

POLICY ADVISOR
Ann Randolph

GRANTS/CONTRACTS MANAGER
Donna Jones

ADMINISTRATIVE ASSISTANT
Ashley Thomas

DIVISION of ENERGY GENERATION TRANSMISSION and DISTRIBUTION

DIRECTOR
Bob Amato

PROGRAM MANAGER
Steve Dale

PROGRAM MANAGER
Alan Waddell

DIVISION of CARBON MANAGEMENT

ASSISTANT DIRECTOR
Talina Mathews (Jan. - Oct.)

ENERGY CONSULTANT
Brandon Nuttall
Kentucky Geological Survey

DIVISION of FOSSIL ENERGY DEVELOPMENT

ACTING DIRECTOR
Don Newell

ENERGY CONSULTANT
Shiela Medina
Center for Applied Energy Research

DEDI Organization

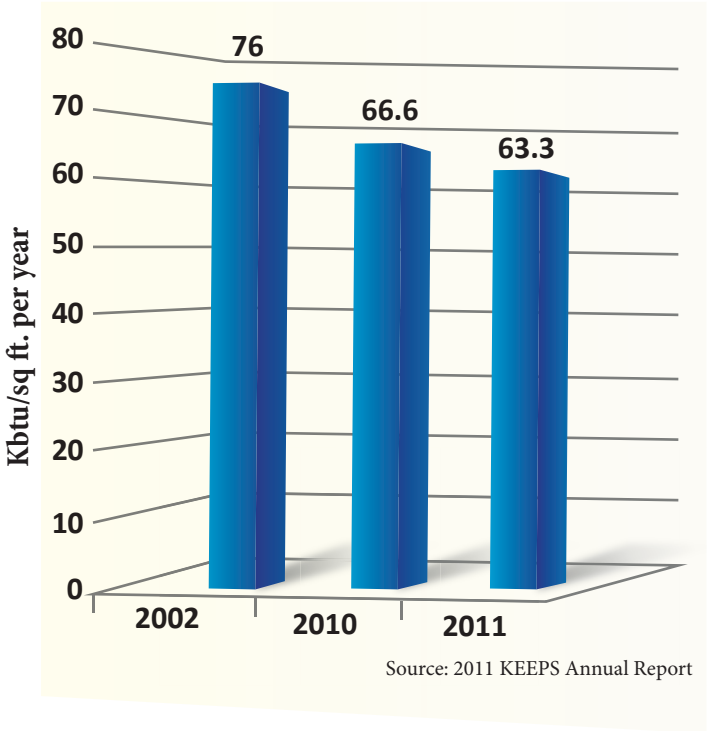
Division *of* Efficiency *and* Conservation *-Greg Guess, Director*

The Division of Efficiency and Conservation is charged with implementing the first of the seven strategies in the Energy Plan. The first strategy has the goal of offsetting 18 percent of Kentucky's projected 2025 energy demand through increased energy efficiency.

The division has been engaged with numerous partners to manage some $68 million in American Recovery and Reinvestment Act (AARA) funding over a roughly three-year period. While some of this funding has supported renewable energy and biofuels programs managed by other divisions within DEDI, the predominant program area has been in the energy efficiency and conservation arena.

Division staff worked with 24 partner agencies/organizations on more than 30 programs that impacted every major area of Kentucky's economic activity including K-12 and higher education, local government, state government, residences, industry, commercial buildings, agriculture, and electric utility "smart grid" initiatives.

Kentucky K-12 School Energy Use Index (Kbtu/sq ft) per year



Source: 2011 KEEPS Annual Report

The division staff provided funding for a number of innovative and cutting-edge projects. Perhaps the most innovative project was the Houseboat to Energy-Efficient Residence Project. This program was designed to develop a new product to revive the distressed houseboat manufacturing industry.

The challenge going forward will be to sustain as many of the programs as possible given that two major grants will expire in the coming year. Considerable effort went into planning programs that offered the greatest opportunity for sustainability beyond the Recovery Act funding period. For example, the Kentucky Department for Housing, Buildings and Construction used ARRA funding to hire and train inspectors to enforce the state's new HVAC standards. That inspection program will now be supported by fees generated from inspections.

The programs that are profiled in the following pages have enjoyed a great deal of success and recognition because of the outstanding partnerships that have been forged. Kentuckians have benefited from these partnerships.

Division *of* Renewable Energy *-Kate Shanks, Assistant Director*

The Division of Renewable Energy is tasked with implementing Strategy 2 which calls on Kentucky to triple its renewable energy generation to provide the equivalent of 1,000 megawatts of clean energy while continuing to produce safe, abundant, and affordable, food, feed and fiber. In meeting its objective, staff primarily focused on policy development, policy analysis and education and outreach and provided technical assistance to those pursuing renewable energy.

Division staff continued to work on policy analysis and policy development related to renewable energy and, during the past year, focused on identifying barriers to distributed generation of renewable energy including solar. The National Renewable Energy Laboratory completed a review of Kentucky's net metering and interconnection standard and assessed the legality of establishing third party financing for distributed renewable electricity. Both assessments provide guidance for policy development.

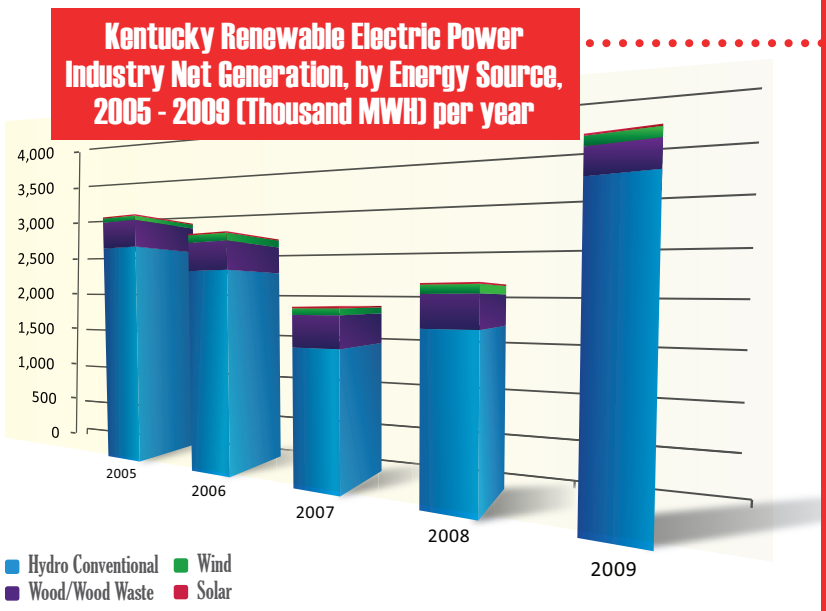
Also, several facilities in Kentucky received grants from the U.S. Department of Agriculture under the Rural Energy for America Program to install solar arrays. Renewable resources provide a small percentage of the electricity in Kentucky, but developers are assessing or initiating projects to utilize our biomass, hydro, solar and wind resources.

Division *of* Renewable Energy...*continued*

Perdue Farms is collecting biogas at a chicken processing facility and converting it to electricity. Developers in Bowling Green installed nearly 2 megawatts of solar photovoltaic (PV) panels, and Kentucky is now home to a 5 megawatt solar manufacturing facility near Danville. The roof of the new visitors' center at the Governor's mansion now provides a display of solar PV and hot water panels. Division staff assisted with these projects and others by providing information about permitting, zoning, tax credits and potential partners.

Division staff provided education and outreach services through presentations, webinars and workshops. Staff utilize numerous resources to develop outreach materials including a model that has been designed to simulate different electricity portfolios under various policy and economic situations. Staff can model a renewable electricity portfolio to quantify the impact of developing renewable sources on price, emissions and resources.

The division provided primary staff support for the Kentucky Center for Renewable Energy Research and Environmental Stewardship. The Center's purpose is to promote renewable energy, energy efficiency and environmental stewardship. The division is also a liaison to the Conn Center for Renewable Energy Research at the University of Louisville.



Source: EIA.gov

Division *of* Biofuels - *Tim Hughes, Director*

The Division of Biofuels' mission is to provide leadership to grow Kentucky's biofuels and biomass industries through research, development and commercialization while continuing to produce safe, abundant and affordable food, feed and fiber. The division has oversight in implementing Strategy 3 of the Governor's energy plan for biofuels production, and coordinates the biomass power generation features of Strategy 2 for production of renewable electricity.

Diminishing federal funds, uncertainty in federal regulatory definition and implementation, volatility in fuel prices, instability in several foreign governments, timidity in the financial markets, and extreme national weather events made for many interesting debates regarding the future of renewable energy development and implementation. Even with these challenges our division was able to strengthen the networking opportunities among our academic, governmental, and industry leadership to improve awareness, leverage resources, stimulate investment, and move Kentucky toward greater bioenergy development and independence.

In February, more than 300 agricultural leaders attending the Governors Office of Agricultural Policy Conference in Bowling Green were challenged by Governor Beshear to explore economic development opportunities. Other speakers identified avenues to become more involved in "green" energy. Later that month, farmers were given an opportunity to visit with more than 20 agencies, researchers, and grant consultants in one room at the National Farm Machinery Show to get advice on new production opportunities and ways to secure federal and state funding for energy projects. More than 50 stakeholders traveled on a bioenergy exploration to Missouri to investigate opportunities for Kentucky which resulted in DEDI helping to commission a feasibility study for a biomass pelleting business in Bracken County. Appetite for further integration of agriculture, forestry, and energy fostered a statewide Bioenergy Symposium as part of the Kentucky Agricultural Council's November Summit. Numerous other educational and networking events were initiated throughout the Commonwealth.

Biofuels Continued...

Our universities provided great leadership in securing federal funding and advancing bioenergy intellectual capital throughout the state: Murray State – expansion of a farmer network to explore additional cropping opportunities and identify renewable feedstocks for various chemical processes; University of Louisville – licensing of technology to generate jet fuel from biomass; University of Kentucky – receipt of a $6.9 million federal grant to expand their biofuel research efforts; Eastern – hosting of the Interim Joint Committee on Agriculture to discuss bioenergy growth.

There were significant gains made in the private sector as well. UPS built biofuel infrastructure at its Worldport in Louisville and is transitioning to a 20 percent biodiesel blend for its ground support vehicles. Perdue Farms in Ohio County is capturing methane from its waste lagoons and converting the biogas to electricity. South Kentucky Rural Electric Cooperative Corporation investigated the biomass resources in its region to determine the viability of biomass generated electricity with encouraging conclusions. ecoPower Generation, LLC continues to make progress toward the construction of a wood-fueled power plant in Hazard. Recast Energy, LLC is retrofitting a thermal plant in Louisville to generate steam heat from woody biomass for adjacent industries. A number of other firms are in discussions with state personnel and are finding that we have the workforce, support systems, transportation infrastructure, climate, agricultural expertise, and market access to facilitate additional bioenergy growth and utilization in Kentucky.

Division *of* Fossil Energy Development

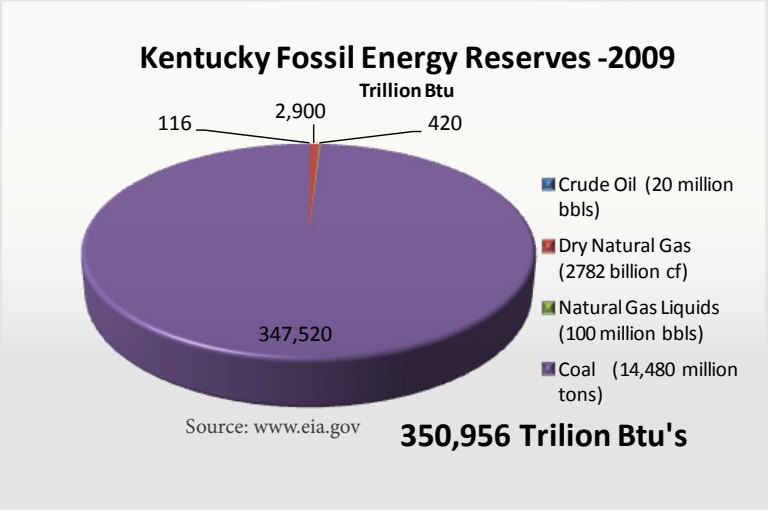
-Don Newell, Acting Director

The Division of Fossil Energy Development's mission is to maximize the benefits of Kentucky's fossil energy resources in a clean and sustainable manner while creating a base for strong economic growth and fostering national energy independence and security. The division has oversight in implementing Strategies 4 (coal-to-liquids) and 5 (coal-to-gas). As an area of special interest the division also assists in the development of waste-to-energy (WTE) projects.

The recent recession still has electricity demand depressed below pre-recession levels. Therefore, there has been virtually no expansion of Kentucky's fossil fueled electricity generation capacity. While the depressed demand situation will not continue indefinitely, future expansion of electric generating capacity fueled by coal is unlikely. Risks to coal-fueled electricity projects include new United States Environmental Protection Agency air and water regulations; the probability there will be more regulations and tighter emissions standards; requirements for greenhouse gas control; and difficulties obtaining new mining permits in Appalachia.

Given the current federal regulatory climate, natural gas is considered by many to be the fuel of choice for electricity generation, at least for the next forty to fifty years. Improved drilling techniques (like horizontal fracture drilling, or "fracking") have greatly expanded recoverable gas reserves. These increased reserves, relatively cheap and easy to bring to the market, are expected to keep natural gas plentiful and its price stable for the foreseeable future. This projection of natural gas availability and price stability, combined with relatively low construction costs compared to alternatives such as nuclear and solar, make natural gas combined cycle power plants an attractive choice for new electricity generation.

Another area where the roles of various fossil fuels (oil, coal, and natural gas) may soon undergo a fundamental shift is in transportation. While coal and natural gas supplies have been plentiful and their prices have been relatively low and stable, the same hasn't been true of oil. Conflicts in Libya and Iraq, social unrest in Iran, and environmental concerns over Canadian crude oil derived from tar sands, all contributed to great uncertainty of supply and higher prices.



Fossil Continued...

Consequently, there has been renewed interest in coal-to-liquid (CTL) fuel projects and conversion of heavy diesel engines (both on road and off road) to compressed or liquefied natural gas (CNG or LNG). There are currently three (one in western Kentucky, two in eastern Kentucky) CTL plants permitted in the Commonwealth, and there are two active projects (one east, one west) for conversion of fleets of heavy trucks to CNG or LNG. Also, the Cincinnati/Northern Kentucky International Airport is pursuing building a CNG fueling station to service the taxis, buses, other airport vehicles, and privately owned vehicles in Northern Kentucky.

There are also several Waste-to-Energy (WTE) projects being developed in Kentucky. The Kentucky Horse Park is gasifying horse muck (horse manure mixed with straw) and making electricity; ecoPower Generation is planning a 50 MW wood waste power plant in Eastern Kentucky; Recycling Solutions Technology in Martin County is in the process of modifying its municipal solid waste (MSW)-to-electricity plant, and will have it operating at its permitted 400 ton per day rate next summer (2012). These are just a few of the more advanced WTE projects; there are others that have been proposed or are in the planning stage.

CTL, WTE, and CNG/LNG conversion projects offer the promise of addressing several national and local issues such as energy independence, reduced transportation costs, solid waste disposal, and reduced air pollution. Continued development of these types of projects will enable Kentucky to take a leadership role in a more secure, more affordable, and more environmentally friendly energy industry.

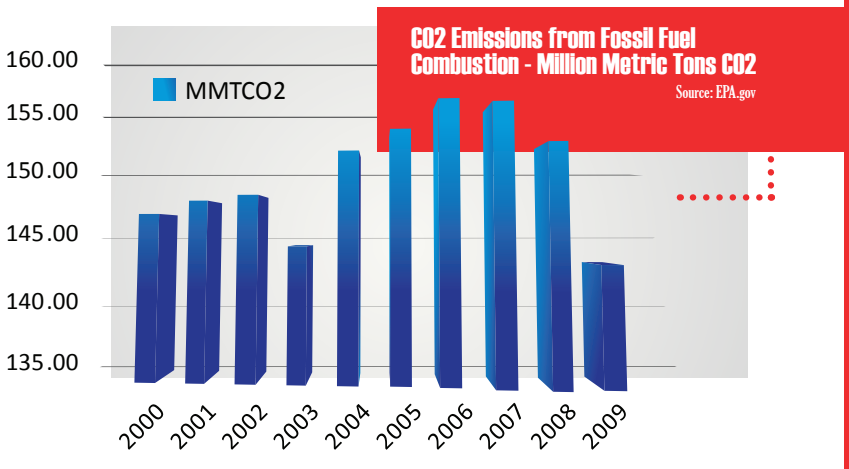
Division *of* Carbon Management

-Talina Mathews, Assistant Director (Jan. - Oct.)

The Division of Carbon Management's goal is to investigate, develop, and promote technical solutions for carbon capture, storage and reuse; and to engage with state, regional and federal agencies in the development of state policy designed to manage greenhouse gas emissions, especially carbon dioxide, in a carbon constrained environment. The Division has oversight in implementing Strategy 6 of the Governor's energy plan.

Division staff managed the Kentucky Climate Action Plan Council's development of recommendations addressing greenhouse gas emissions. The Council, a diverse stakeholder group, proposed approximately fifty recommendations that, if implemented, would reduce greenhouse gas emissions to 20 percent below 1990 levels by 2025.

During the 2011 legislative session the division, along with stakeholders from private industry, universities and public agencies, assisted with legislation which was passed with regard to the legal issues associated with the geologic storage of carbon dioxide. This legislation was necessary to put Kentucky in a position to apply for future federal funding for carbon capture and storage. For up to five demonstration projects, this legislation sets forth the regulatory framework for geologic storage, defines the ownership of pore space, provides for access to that pore space, and allocates long term liability. The General Assembly also passed a law granting eminent domain rights for the purpose of transporting carbon dioxide via pipelines.



Staff, in its partnership with the Kentucky Geological Survey (KGS), continues to support projects to investigate and demonstrate the technical feasibility of geologic storage in Kentucky. The KGS formally closed its successful carbon dioxide injection test well in western Kentucky, and has a memorandum of understanding in place to begin its demonstration of carbon storage potential in the Devonian Shale of eastern Kentucky.

Carbon Management Continued...

The division partnered with Louisville Gas and Electric/Kentucky Utilities (LG&E/KU), to evaluate the technological solutions of capturing carbon dioxide from its fleet of existing coal-fired power plants. As part of the evaluation, the KGS was asked to estimate the geologic storage capacities at or near those existing power plants.

In the area of carbon reuse, East Kentucky Power Cooperative, the Center for Applied Energy Research at the University of Kentucky, and DEDI have entered into an agreement to fund a three-year project at one of EKPC's power plants which will seek to demonstrate a multi-pollutant strategy utilizing algae to capture carbon dioxide and control criteria pollutants. The Carbon Management Research Group (a public/private partnership consisting of most of the Commonwealth's utilities, the Electric Power Research Institute, the Center for Applied Energy Research, and DEDI), was awarded $14.5 million under a competitive grant from the U.S. Department of Energy. The funding will support this research to improve the efficiency of the carbon capture process on existing power plants.

Finally, staff also assisted with the development of the department's modeling efforts, including the management of a grant to the University of Kentucky's Center for Business and Economics Research estimating the impacts of electricity prices on the industrial sector in Kentucky.

Did You Know?

In 2010 Kentucky's mining industry contributed approximately $4.4 billion to the Commonwealth's Gross Domestic Product (GDP) making mining the 12th highest contributor to our economy.

Division *of* Energy Generation, Transmission *and* Distribution *-Bob Amato, Director*

The primary responsibilities of the division are to analyze and develop policies that will facilitate the generation, transmission, and distribution of adequate, affordable, and clean energy within the Commonwealth; to understand the reliability and economic trade offs for baseload electricity generation; to develop policies that will ensure adequate transmission of energy resources; and to promote alternative and renewable sources for electricity generation. The division also has responsibility for initiating discussion and gathering information in nuclear energy in suport of Strategy 7 from the energy plan.

During 2011, staff developed an Energy Assurance Plan and Energy Profile. These documents will provide an overall picture of energy production, consumption, and delivery in Kentucky and will improve energy emergency response and staff also exercised its Energy Assurance Plan by participating in two Interstate Regional Emergency Exercises and in the extensive New Madrid Seismic Zone Emergency Exercise.

Division staff published the inaugural edition of the Kentucky Energy Profile in 2011 that is posted on the department's Web site. It is intended to serve as an impartial point of reference for data and issues regarding energy within Kentucky. A product of extensive research, database construction, and quantitative analysis, the profile is designed to help identify and explain the dynamics of energy consumption and production that are particular to the Commonwealth. The Profile is divided into four general sections: Energy Commodity Costs, Energy Consumption, Energy Production, and Electricity.

Staff is also tracking changes in environmental regulations. Pending changes will have significant impacts on the energy industries in Kentucky, particularly the electricity industry and the fuels used by it. The division is using electricity price forecasting software developed by DEDI to evaluate the potential change in price due to the regulatory changes.

Division staff represents the Governor's office on the Eastern Interconnection States Planning Council (EISPC). The EISPC is a collaboration between state utility commissions and governors' offices of the states east of the Rocky Mountains organized to direct the analysis of electricity system plans for the Eastern Electricity Interconnection. The result of this collaboration will be the identification of needed interstate transmission corridors.

While safety has always been of upmost importance in the nuclear industry, the earthquake and subsequent tsunami that crippled the Fukushima nuclear power plant in Japan redirected the focus of the nuclear power issue from cost squarely onto safety. The staff has monitored the events of Fukushima and the regulatory and technological discussions concerning nuclear power that have ensued.

DEDI Partnership Activities

Governor Steve Beshear's energy plan provided DEDI the direction and guidance to initiate and implement many programs and projects throughout the year. These activities connect with Kentucky's economic sectors to help create jobs, save energy, increase the production of alternative energy, and improve the environment.

To broaden the impact of these activities, DEDI has built partnerships with many public and private organizations across the Commonwealth. These partnerships have helped transform good ideas into highly successful projects and programs.

To accelerate implementation of the Governor's energy plan the Commonwealth was able to capitalize on resources from the American Recovery and Reinvestment Act (ARRA). DEDI managed more than $68 million of ARRA funds to help Kentucky develop and improve its clean energy resources.

Public-private partnerships across the Commonwealth are positively influencing our schools, homes, businesses, communities, and government facilities to make a difference for a better energy future. The pages that follow highlight DEDI partnership activities.

Energy *in* Education Collaborative

DEDI has provided energy efficiency and conservation programs to Kentucky's schools and offered sustainable solutions to reducing operational costs through the Energy in Education Collaborative, a partnership that includes four programs and two projects funded by the American Recovery and Reinvestment Act (ARRA). The program elements of the collaborative are designed to be a comprehensive, holistic approach to focusing on energy and sustainability issues in the design, construction and operation of energy-efficient sustainable schools as well as addressing educational curriculum opportunities presented by this focus. The next few pages highlight these programs.

The Energy in Education Collaborative includes: the School Energy Managers Project (SEMP); the Kentucky Energy Efficiency Program for Schools (KEEPS); Kentucky National Energy Education Development Project (NEED); and the Kentucky Green and Healthy Schools (KGHS) program and two Net–Zero Energy School projects: Richardsville Elementary (Warren County Public Schools) and Turkey Foot Middle School (Kenton County School District).

Kentucky Energy Efficiency Program *for* Schools

KEEPS, a partner in the Energy in Education Collaborative, provides technical consulting services to 174 Kentucky school districts and support to school energy managers. Managed by the University of Louisville's Kentucky Pollution Prevention Center (KPPC), KEEPS regional coordinators, technicians and engineers conduct energy assessments, training, and assist school districts through the process of enrolling and implementing structured energy efficiency programs.

KEEPS recognized early in 2011 that districts must be empowered with the right tools to achieve ongoing successful energy savings. In response to this need, KEEPS developed a seven-step, on-line toolkit for all technical skill levels, equipped with more than 200 resources available 24 hours a day, seven days a week. These resources are customized for schools to analyze and understand their energy consumption, and include everything from lighting usage and heating/air-conditioning issues to natural gas usage and best environmental management practices.

2011 kicked off with 100 percent of Kentucky's public school districts enrolled in an energy efficiency program and by early fall, KEEPS engineers completed on-site school energy assessments and 106 District Energy Management Reports necessary to benchmark and track a district's energy performance and cost savings.

More information may be found: http://www.ksba.org/energy-management

In the past five years school districts across the Commonwealth have come to recognize the importance that reduced energy consumption has to their bottom lines. At the time of this publication, Kentucky is now home to 125 ENERGY STAR labeled schools. By following ENERGY STAR standards, districts are able to cut energy costs, help the environment and put those cost-savings back into their school systems for teachers and curriculum.

Becoming an ENERGY STAR partner is another way districts have demonstrated their commitment to energy programs, and also serves as criteria to earn the KEEPS Stewardship Award. Today, 67 percent of Kentucky's school districts have become ENERGY STAR partners, compared to less than five percent just one year ago.

Kentucky National Energy Education Development Project

The Kentucky National Energy Education Development Project (KY NEED) provides energy workshops for teachers, grade-appropriate curriculum materials and kits for energy activities in the classroom. NEED has a program to assist schools with the formation of student-based energy teams that look at how energy is used in the school. KY NEED also works with DEDI to produce an annual High Performance School Buildings Workshop, focused on the best practices for design of new, highly energy efficient schools. The workshops target audience include architects, engineers and school officials, particularly those officials who are from districts that plan to build or renovate within the coming years.

On March 22-23, more than 130 school administrators, architects and engineers from across the Commonwealth gathered in Bowling Green to attend the two-day High Performance School Buildings Workshop. School personnel and design professionals had the opportunity to learn more about the benefits of building a high performance school and the chance to tour two high performance school buildings: T.C. Cherry Elementary (Bowling Green Independent Schools) and Richardsville Elementary (Warren County Public Schools). Richardsville Elementary School was designed to be the first "net zero" public elementary school in the nation.

Fifty three NEED teams from across the state were recognized for their outstanding energy education projects in May at the KY NEED Youth Awards Luncheon in Frankfort. Eleven teams were awarded scholarships to attend NEED's national youth awards ceremony in Washington, D.C. Scholarship funding was provided by Louisville Gas & Electric (LG&E), Kentucky Utilities (KU), Duke Energy, and DEDI.

The annual Kentucky NEED Energy Tour for Educators was held in June 2011. This five-day adventure took participants to energy sites in eastern Kentucky and Tennessee. The trip began with a tour of the Laurel Ridge Landfill Gas facility. To learn more about nuclear and wind technologies, participants traveled to the Buffalo Mountain wind farm and Watts Bar Nuclear plant, both in eastern Tennessee.

A visit to the Kentucky Coal Mining Museum and Portal 31 in Benham and Lynch, Ky., provided the educators with a look at the history of the coal mining industry in southeastern Kentucky. In Hazard, the educators were treated to a visit to eastern Kentucky's Challenger Learning Center, whose mission is to connect technologies used in space exploration with technologies used in the energy industry.

As part of October Energy Awareness Month activities, KY NEED launched the 6th annual "Change the World, Start with ENERGY STAR" campaign in partnership with DEDI and LG&E/KU. Student groups were encouraged to apply for $150 mini-grants to design and deliver a school and/or community project that educates on topics related to energy efficiency and conservation.

Grant recipients were encouraged to sign on as Change a Light pledge driver as a Kentucky NEED partner. Kentucky NEED along with other NEED participants across the U.S. continue to be the leading pledge drivers in the education sector.

The KY NEED project is part of a national non-profit organization that focuses on the scientific concepts of energy and provides objective, grade-appropriate information about conventional and emerging energy sources—their use and impact on the environment, economy and society.

Education and Workforce Development Cabinet Secretary Joseph U. Meyer gives the special address at the joint 2011 Kentucky NEED and Kentucky Green and Healthy Schools Awards Luncheon in Frankfort on May 18, 2011

"In six short years, Kentucky has gone from having zero ENERGY STAR schools to now having over one-hundred schools with this esteemed energy accolade."

- Kentucky First Lady, Jane Beshear

August 16, 2011 at the 100th ENERGY STAR school celebration,Christian County School District

First Lady Jane Beshear celebrated Millbrook Elementary's ENERGY STAR rating.

Kentucky Green & Healthy Schools Program

The Kentucky Green and Healthy Schools (KGHS) program is an inquiry-based program that uses the entire school grounds as a learning laboratory for students. Students conduct inventories in nine different areas, including energy, solid waste and water. They then develop and implement improvement projects in each area, receiving awards and recognition as certain milestones are reached.

KGHS is an initiative of the Kentucky Environmental Education Council (KEEC) and the Kentucky Department of Education. Last year, through a partnership with DEDI, KGHS was expanded with the help of ARRA funds from the U. S. Department of Energy.

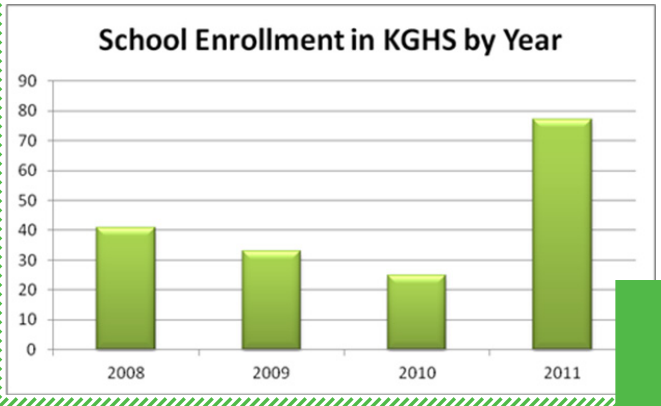
KEEC reports there was a 196 percent increase in enrollment in the KGHS program in 2011. KGHS awarded $19,325 in grant funds to 28 Kentucky schools in 15 counties. Students and teachers at these schools used ARRA funds to implement 38 energy-saving improvement projects at their schools, while learning about energy and ways to conserve it. Success is not always measured in numbers. The real rewards of the KGHS program come from the students' feeling of accomplishment from creating a more sustainable environment, a healthier school and from the real-world learning that takes place.

As part of the Green and Healthy Schools program Model Lab freshman Liza Krein and Kaylin Burchell collect recyclables at the school in Richmond, Ky.

Photo by Amy Wallot

KGHS program experienced a 196 percent increase in enrollment in 2011.
More information can be found: http://greenschools.ky.gov

The increase in enrollment in the Kentucky Green and Healthy Schools program can be attributed to the availability of small grants for schools, as well as an increase in support for teachers. This increased support is found in the form of the Energy in Education Collaborative, which includes programming and technical support from energy education organizations and district energy managers hired by the Kentucky School Boards Association.



School Energy Managers Project

In 2010, in support of the state's energy plan to increase energy efficiency in Kentucky's public schools, Governor Steve Beshear authorized $5.2 million in Recovery funds from the U.S. Department of Energy to create the Kentucky School Energy Managers Project (SEMP).

DEDI coordinated a partnership with the Kentucky School Boards Association (KSBA) to bring increased energy efficiency management to school districts throughout the state. As administrator of the project, KSBA hired 35 energy managers to serve 130 Kentucky school districts. These energy managers are the front-line managers responsible for coordinating energy efficiency and sustainability programs in the district. Four curriculum coordinators also joined this team of professionals to provide assistance to those districts with energy managers already on board. As a result, 144 school districts receive benefits of SEMP.

The School Energy Managers Project came about during a time of cost cutting measures when even justifying a new position was difficult at best. Nonetheless, districts entered into SEMP believing they could achieve savings. By the end of September 2011 the return on investment was greater than expected. School energy managers unleashed $3.3 million of annual avoided costs found through rate and utility analysis, lighting retrofit and holiday shutdowns and one-time receipts from utility rebates or tax refunds totaling $787,000. Under the direction of the energy managers, 144 local boards of education adopted energy policies; formed 121 district energy advisory teams and implemented energy management plans. Within the first year, energy managers have completed utility bill audits and worked with utility suppliers to correct numerous tariff misapplications. Many districts have implemented HVAC and computer setback procedures and are beginning to make investments in energy efficient technologies to facilitate future savings. The ARRA funded school energy managers were evaluated by their lead district pursuant to individual board policy, and on the implementation of the ENERGY STAR Seven-Step Process.

With the demand for more energy savings growing during 2011, KSBA formed partnerships to give districts new ways to maximize resources and reduce costs. Through a partnership with Fellon McCord, districts can join the Kentucky Gas Aggregation Program to lock in natural gas prices. KSBA and the Kentucky Interlocal School Transportation Association (KISTA) formed an affiliation to provide a funding alternative to implement energy improvement projects. The new program will allow districts with smaller energy improvement-related projects to participate in a combined tax-exempt financing and be able to take advantage of lower interest costs, flexibility in term's of repayment (2-20 years), and repayment fund type (unrestricted, restricted or guaranteed savings). Qualifying projects include HVAC upgrades or replacements, lighting, building controls, commissioning, kitchen equipment and building envelope improvements (windows, doors, insulation.) Seven districts participated in the first bond sale totaling $1.5 million in October. KSBA and Kentucky School Plant Management Association's partnership ensures energy managers receive on-going training to meet school districts' growing facilities needs. The first joint conference was conducted in October.

Energy Managers hired by the Kentucky School Boards Association's School Energy Managers Project.

Net-Zero Energy Schools

On May 19, 2010, First Lady Jane Beshear announced the award of a $1.374 million grant to Warren County Public Schools for the installation of solar panels on the Richardsville Elementary School, putting it one step closer to becoming an energy-neutral facility. Simultaneously, during a press conference in Kenton County, Energy and Environment Cabinet Secretary Len Peters announced a $2 million grant to Kenton County School District for the installation of solar panels on the Turkey Foot Middle School. Both grants, funded by the ARRA, were designed to help these highly efficient schools generate as much energy as they use, allowing them to achieve net-zero energy usage over the course of a year.

Following years of improvements in building designs, enabling new schools to progressively be more and more efficient, solar becomes more affordable as a means to offset the energy demands of the building. In both districts, the renewable energy the school is able to produce will be fed back into the power grid and then sold back to their respective utility providers—resulting in energy- and operating cost-neutral facilities.

Richardsville Elementary opened its doors in October 2010. Four months later, the 208 kW thin film photovoltaic (PV) system became operational, ushering in a new era of energy-efficient school facilities in Kentucky. Some of the unique features of this high-performance school include hands-on learning areas throughout the building, big-screen televisions to show students the real-time energy production/consumption of the school; and hallways that feature educational energy themes like geothermal, solar, recycling and water conservation. With more than 2,000 solar panels on the roof, and an additional 700 installed on top of a parking shade structure by the end of 2011, Richardsville Elementary is capable of producing 2,500 kilowatt hours of energy per hour on a sunny day -- enough to energize 50 Richardsville homes. It is estimated the school's PV system will generate 245 MWh of electricity per year and its usage per square foot per year will be 18 kBtus, compared to the national average of 76 kBtus. The cost of the 77,466 square foot elementary school is $14.8 million with the grant-funded solar PV system; without solar, the cost is $13 million, or $199 per square foot.

The Kenton County Net-Zero Energy Project is also testament to the district's commitment to energy management, believing school buildings should use less energy, demonstrate sound environmental practices, and serve as fundamental tools for learning. During a "Flip the Switch" event in May, Turkey Foot Middle School connected its solar power system. The first phase of this project was a 385 kW solar array comprised of over 60,000 square feet of thin film and crystalline panel solar technology. The second phase will provide a student walkway covered by a structural column canopy with solar panels.

By mid-October 2011 monitoring of Turkey Foot Middle School showed the PV system generated 255 MWh, and sold $10,230 worth of electricity back to their utility provider. Projections of the annual PV production are estimated to be 428 MWh, representing an annual value of $24,140. The 133,000 square foot middle school opened to students in August last year. The cost of construction with the solar array is $192 per square foot, well within Kentucky Department of Education guidelines; without the solar system, the cost of this highly efficient facility is only $172 per square foot.

Arial view of Turkey Foot Middle School rooftop solar array after completion.

Kentucky Energy Club

The Kentucky Energy Club launched in the fall of 2010 and is directed at students within the state's higher education system. To engage the next generation of energy technologists and policy leaders, DEDI funded the University of Kentucky's Center for Applied Energy Research (CAER) to facilitate the formation of the Kentucky Energy Club, a student-directed organization modeled after the very successful program at the Massachusetts Institute of Technology. While CAER serves as a host organization, the stated goal is to develop individual club chapters at each of the state-supported institutions of higher education in the Commonwealth. Currently, chapters exist at the University of Kentucky, Eastern Kentucky University, Morehead State University, and Ashland Community and Technical College. The clubs are structured as formally registered student organizations with appointed executive members, a state-wide club coordinator, faculty advisors, constitution and bylaws. The clubs maintain a policy of open membership, requiring no dues or fees; in addition, community participation and support are encouraged through the development of educational outreach and mentoring programs. Importantly, the clubs' membership represents a broadly diverse cross-section of student interests and backgrounds, including engineering, natural sciences, design, agriculture, public policy, business and law.

As part of the inaugural year activities, the Kentucky Energy Club has held a series of lectures entitled KY Energy 101 at each of the member campuses. The series is designed to bring energy experts in their field directly to the student body, facilitating networking opportunities. To expand student awareness, the club also offers opportunities to partake in the site tours series and travel to energy-related facilities within Kentucky.

University of Kentucky CAER Lab

The University of Kentucky Center for Applied Energy Research (CAER) broke ground in October 2010 on what will become the University's first LEED-certified laboratory. LEED stands for Leadership in Energy and Environmental Design and consists of a rating system for high performance green buildings, homes, and neighborhoods. The $19.8 million renewable energy laboratory will allow the Center to expand research devoted to Kentucky's growing renewable energy industries, including biomass and biofuels, electrochemical power sources (like capacitors and batteries), and distributed solar energy technologies. The laboratory will open in 2012.

The facility will be a living laboratory with interpretive displays and activities for school children, visitors and the general public related to the building's energy consumption and the technologies and research that will be conducted at the Kentucky Argonne Battery Manufacturing Reseach and Devlopment Center.

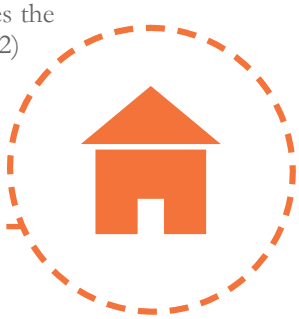
The facility is being funding by an $11.8 million competitive grant awarded to the UK CAER last year from the U.S. Department of Commerce's National Institute of Standards and Technology (NIST) under the ARRA NIST Construction Grant Program. An additional award of $3.5 million in state ARRA funds has also been provided by DEDI to achieve LEED-Gold certification and ensure this new laboratory is a model for energy-efficiency and renewable energy technologies.

"I see this as a major boost to augment and supplement the state's initiative in the area of advanced battery research and development. The funding supports our efforts to become a leader in the production and use of biomass for biofuels and electricity generation."

- Kentucky Governor, Steve Beshear

Residential

Throughout 2011, DEDI managed energy efficient resdential programs that helped Kentucky homewoners save energy and lower the cost of their utillity bills. The Kentucky Energy Efficient Appliance Rebate Program offered residents the opportunity to obtain rebates on a range of qualified energy-efficient appliances. The intent of the Appliance Rebate program was to educate consumers on the ENERGY STAR brand and help stimulate the efficient appliance market. The Kentucky Home Performance (KHP) program continues to provide incentives to homeowners to improve the energy efficiency of their residences in a cost-effective manner and to ensure homeowners that their investment was installed correctly. KHP addresses the four biggest barriers to energy-efficient home improvements: Homeowners don't know (1) what to do; (2) who to contact to perform the improvements; (3) how to finance without going to a bank; or (4) how to verify that the work was done correctly. KHP is administered by DEDI's partner, the Kentucky Housing Corporation, an agency that is part of the Kentucky Finance and Administration Cabinet.



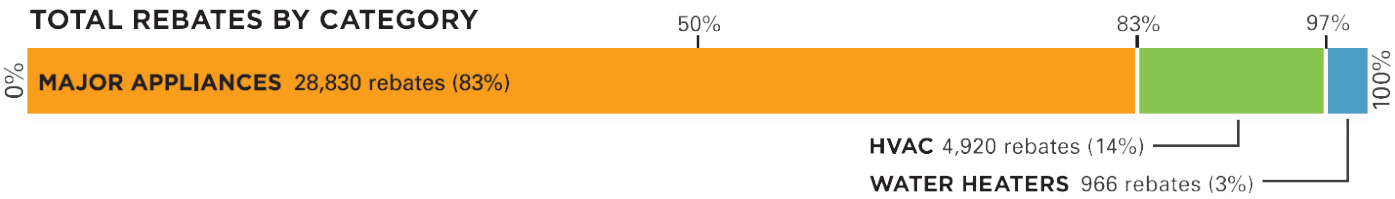
Kentucky Energy Efficient Appliance Rebate Program

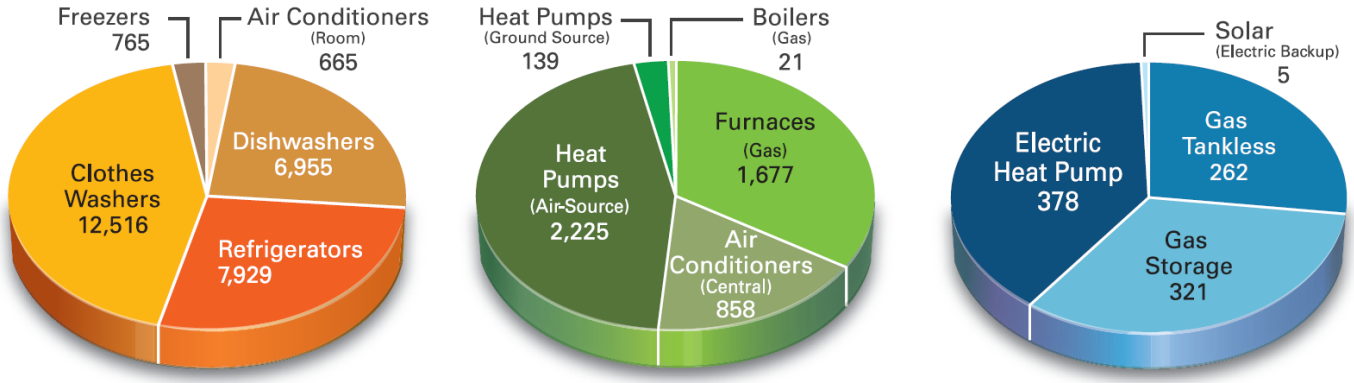
Thanks to the Appliance Rebate Program, Kentuckians received $4 million this past year to help replace inefficient appliances, while simultaneously stimulating our economy and investing in long-term energy savings for their homes. DEDI administered the appliance rebate program through ARRA funding from the U.S. Department of Energy. Kentucky residents filed for rebates after purchasing one of 16 qualified ENERGY STAR appliances, which account for 70 percent of typical household energy costs.

Not only did the program assist consumers as they purchased new, energy-efficient appliances, but the funds fed directly into Kentucky's economy through local retailers and helped to lessen the demand on Kentucky's power plants through energy conservation.

With the success and closeout of the Kentucky Energy Efficient Appliance Rebate Program, DEDI applauds Kentuckians for their enthusiasm in replacing inefficient appliances and helping the Commonwealth invest in energy efficiency and conservation.

> "What better way to acknowledge 40 years of Earth Day celebrations than to give Kentuckians the opportunity to be environmentally responsible by purchasing energy efficient appliances while at the same time receiving rebates for making our planet a better place to live. Beyond energy efficiencies, they are helping stimulate Kentucky's economy as well. I call that a great deal for everyone."
>
> – Kentucky Governor, Steve Beshear





MAJOR APPLIANCES **HVAC** **WATER HEATERS**

	Major Appliances	HVAC	Water Heaters	All Products
Rebate Payments to Customers (Thousands)	$2,061	$1,539	$248	$3,848
Consumer Spending (Thousands) and Leveraging Ratio	$20,962 (10.2:1)	$28,958 (18.8:1)	$1,189 (4.8:1)	$51,108 (13.3:1)
Sales Tax Leveraged* (Thousands) and Leveraging Ratio	$1,258 (0.6:1)	$1,737 (1.1:1)	$71 (0.3:1)	$3,067 (0.8:1)
Annual Cost Savings* (Thousands)	$967	$433	$119	$1,519
Annual Energy Savings* (Billions of Btu)	14	25	6	45

* Estimated

Note: Due to rounding, the sum of the first three columns may not equal the "All Products" total.

Kentucky at a glance

Kentucky received $4,096,000 from the federal government to implement the program; nearly 94 percent of this funding went directly to rebates.

Fourteen types of products received rebates ranging from $40 to $400.

Clothes washers were the most popular product; combined with dishwashers, these rebated products will reduce Kentucky's annual water consumption by nearly 86 million gallons.

The state covered administrative costs with $16,592 of its own funds; retailers and manufacturers also provided $393,414 of in-kind support.

KY Home Performance

The Kentucky Home Performance (KHP) program was launched in December 2010 to generate more energy-efficient homes across the Commonwealth and create jobs in the 'green' building industry. Teams of certified industry professionals identified affordable green strategies that provide long-term value to homeowners across the state. As a result, more than 327 home energy improvement projects have been completed to date with another 100 in the pipeline, and the pipeline continues to grow on a weekly basis. The total development cost of the jobs completed under KHP already exceeds $2.8 million.

More than 120 participating contractors received training, marketing and sales assistance, gained new customers through a wider spectrum of services, and improved sales closing rates, even during the typical "off" season. KHP provided certified training according to the Building Performance Institute's Building Analyst I Technical (BPI) Standards, and the national ENERGY STAR program for professionals in the commercial and residential sector at education institutions including the Kentucky Community and Technical College System. Training and presentations were also held at several professional conferences including the Midwest Regional Energy Star Conference and the State Housing Conference in Louisville.

Certified industry professionals performed more than 1,038 comprehensive energy evaluations resulting in 485 home energy-efficiency improvement projects in 49 counties; this represents a 69 percent conversion rate – an extremely impressive rate by national standards! Completed retrofits have resulted in energy savings totaling 39,319 MMBTUs per year, or 26 percent reduction in average household energy usage. Home energy audits were performed on 2,899,203 square feet of floor space, with a total of 1,437,747 square feet being retrofit. To accomplish this, the program has delivered $842,000 in rebates to homeowners and leveraged $5.39 million in homeowner investments in energy efficiency measures. Homeowners requested evaluations through the KHP Web site, www.KYHomePerformance.org. Well over one million visits were made to the web site in the past year. During the same time, residential energy savings reported include:

- 2,939 MWh and $231,915 annual reduction in electricity
- 16.3 mmcf and $299,958 annual reduction in natural gas
- 41,217 gallons and $86,638 annual reduction in propane
- 17,773 gallons and $45,924 annual reduction in fuel oil

This is equivalent to the reduction of 10,573 metric tons of greenhouse gases.

To assist with the costs of improvements, KHP offered cash rebates or below-market-rate financing to contractors and consumers to complete energy-efficient improvements and retrofits to single-family residences. Homeowners chose to either receive a rebate up to $2,000 or qualified homeowners received financing up to $20,000 at low 4.99 percent rate (rate was for a limited time.)

In the spring of 2011, Governor Steve Beshear and First Lady Jane Beshear participated in KY Home Performance. Their personal home underwent an energy evaluation resulting in implementation of significant energy-efficient improvements including air sealing, insulation and the installation of a geo-thermal unit by a participating KY Home Performance contractor.

KY Home Performance was the first program to develop and implement a software system to provide all the tools needed for contractors to conduct and manage whole house energy evaluations, free of charge. The on-line system monitors home improvement projects, provides interface for funding, and monitors quality assurance. The software systems will ultimately be customized and offered in more than 15 cities across the U.S.

KHP is a partnership between Kentucky Housing Corporation (KHC), Kentucky Finance Administration Cabinet. and DEDI.

Cooperative Extension

The University of Kentucky Cooperative Extension Service (UKCES) and DEDI began a partnership in 2002 to provide energy efficiency and renewable energy education to Kentucky's consumers. Through a grant provided by DEDI, the UKCES provides ENERGY STAR information statewide through its network of county extension agents. DEDI funding also helps UKCES support the Kentucky State Fair ENERGY STAR exhibit, training Cooperative Extension staff about the display and taking the display to other events across the state throughout the year.

The Kentucky State Fair is the highlight of the UKCES annual exhibit schedule. The exhibit included 3,000 sq. ft. of hands-on materials and it played center stage in the South Wing "Main Street" pavilion. This year's exhibit showcased the Kentucky Housing Corporation (KHC) with their KY Home Performance Program, which offers state funded incentives to those wishing to improve energy efficiency. Extension and KHC staff designed the exhibit as a self-guided tour for visitors. Eighteen hands-on stations took people from envelope infiltration reduction to insulation upgrade to HVAC options. The floor show was presented as a very open and inviting floor plan surrounded by major traffic walkways [see picture]. Each year a library of fact sheets and publications are available to the public; this year, the assortment of references was updated and vastly expanded. Extension agents, on site at the fair exhibit, are also able to provide hundreds of private consultations with homeowners and contractors. After years of interaction with the Extension resources, many homeowners have developed an allegiance to this nonprofit, non-marketing, unbiased clearinghouse of information and quality coaching.

During the fair, the ENERGY STAR exhibit was viewed by more than 85 percent, or about 320,000 of the 378,735, state fair attendees. In 2011, the exhibit was taken to nearly 40 events across the state, such as home shows, conferences and area fairs. An estimated 33,000 technical assistance contacts were made throughout the year with homeowners, contractors, and others about specific issues of home energy efficiency.

Energy Efficiency Awareness and Action

The Energy Efficiency Awareness and Action (EEAA) program is a newly funded project with $242,905 in U.S. Department of Energy grant dollars. EEAA is an out-growth of a long-standing, successful partnership between DEDI and the UK Cooperative Extension Service (UKCES). Since 2002 DEDI and UKCES have enjoyed a partnership that helps educate Kentuckians about energy efficiency and renewable energy throughout the state.

The primary objective of this project is to train Extension agents to deliver energy efficiency information and solutions. The focus is on fostering the adoption of energy efficiency in the residential and commercial building sectors.

Through a four-phase approach, EEAA will expand the network of Extension agents engaged in energy-efficiency actions within the Commonwealth. It will also deepen their technical expertise to meet what is expected to be a rising demand for information on managing energy bills in both the residential and commercial sectors. Further it will introduce to a significant number of 4-H youth the tools they can use to assist their own households to become more energy efficient.

The project will begin by detailing a strategic plan, developing or adapting energy-efficiency training curriculum; and conducting outreach and education to foster participation in the program by UKCES agents, 4-H youth, and other community members.

Next, Extension agents, as well as 4-H youth in all 120 counties in the state, will be trained to use an energy-consumption analysis tool on their home. Extension agents will be trained to use the KY Home Performance Self-Evaluation tool and the ENERGY STAR Portfolio Manager to assess the energy efficiency of their homes and offices, respectively. Opportunities for friendly competition and recognition among the Extension offices will be provided. Integral to these trainings, agents and 4-H youth will also be directed to additional technical expertise and incentives to assist in making energy-efficiency improvements.

Extension agents and 4-H members will then use the knowledge gained from their own experiences to disseminate the EEAA services within their local community. This will include both marketing presentations to the general public, homeowners, youth, landowners, small business, agricultural producers, local government, communities, schools, and community leaders on the benefits of energy efficiency; and trainings offered to these groups on the use of energy consumption analysis tools.

Finally, UKCES will compile the lessons learned from EEAA program implementation and articulate this model program to a national audience with the assistance of and coordination by DOE.

Once this project is completed, there will be a statewide network of Extension agents with the capacity to help people answer basic energy questions, evaluate their energy efficiency, access energy management tools and incentives, and locate additional resources within the state, as well as a national model that can be replicated locally.

Kentucky Department of Housing, Buildings, and Construction

The Kentucky Department for Housing, Buildings, and Construction (KDHBC) received ARRA funding to provide education and training to local and sate code enforcement officials responsible for residential and commercial building energy codes as well as funding for inspectors statewide to achieve 90 percent compliance with new energy-efficient building codes within six years. The Commonwealth now requires permits and inspections for all new construction projects and heating, ventilating and air conditioning (HVAC) installations statewide, making it the first state in the nation to do so.

In 2011, Senate Bill 10's statewide HVAC permitting and inspections program was well underway. As of Oct. 30, KDHBC issued more than 4,200 residential and commercial HVAC installation permits and totals continue to climb. Those numbers, along with the permits themselves, and all other HVAC-related processes are now more accessible thanks to a program called Jurisdiction Online (JO). With help from federal funding, KDHBC was able to launch this web-based information management program in 2011. JO enables all divisions (licensing, permitting, inspections, violations or consumer complaints) to conduct work through one central program while maximizing efficiency and accuracy.

KDHBC Training

Throughout 2011, a series of training opportunities were provided to residential and commercial construction and design professionals across the state to bring together code officials, architects and engineers to create more efficient buildings.

Residential curriculum development was provided by the Alliance to Save Energy. KDHBC will be utilizing this material for future trainings using classroom and web-driven delivery methods.

Commercial training and delivery were provided by the University of Kentucky in conjunction with Pacific Northwest National Laboratory. Fourteen sessions were held across the state with 133 code officials and 406 architects/engineers attending. Continuing Education Credits (CEUs) were awarded.

Training programs for local and state building code officials and building professionals are scheduled to be launched in early 2012:

- One-day workshops on the International Energy Conservation Code (IECC)for residential construction
- Two-day workshops on Building Plan Review focusing on energy codes
- Manual J training for Master HVAC Contractors to be held at Kentucky Community and Technical College System (KCTCS) campuses across the state
- IECC Certification exams

KDHBC Inspections

In compliance with 815 KAR 8:070 passed in 2007, KDHBC was required to establish a fee schedule, issue permits and perform inspections of all new HVAC installations in Kentucky, starting Jan. 1, 2011. There were no funds appropriated by the Kentucky General Assembly at that time. This federal grant allowed KDHBC to hire and train 16 certified HVAC inspectors on a time-limited basis before the Jan. 1 deadline to assist with the roll-out of the permitting program. The permit fees being collected are allowing the migration of the time-limited inspectors to full-time status. All 16 were permanent state employees by December 2011.

Midwest Regional ENERGY STAR Conference 2011

Building on the momentum and success of last year's event, the third annual Midwest Regional ENERGY STAR Conference returned to the Lexington Convention Center March 24 and 25 with a packed house. More than 450 energy evaluators, contractors and utility providers from Kentucky, Tennessee, Ohio, Indiana and Georgia were educated and exchanged information on the energy efficiency home industry. The Home Builders Association of Lexington (HBAL) was once again a gracious host to national energy efficiency experts, offering courses for home builders, engineers, architects and all who had an interest in efficient home design. The conference showcased cutting-edge energy-efficiency innovations through a vendor trade show and offered participants in-service credits for various certifications.

Residential Building Energy Code

Curriculum Development and Training

The Alliance to Save Energy (ASE) and the Building Codes Assistance Project (BCAP) in partnership with DEDI and the Department for Housing, Buildings, and Construction (DHBC) are helping develop consumer guides aimed at homeowners. In order to reach consumers, this partnership coordinated an outreach strategy relative to residential building codes; conducted a training assessment; developed curriculum; delivered a pilot training; and developed energy code training enhancements with videos and online training for the residential training and compliance sector.

An ARRA grant from the U.S. Department of Energy provided $350,000 to help Kentucky achieve substantial compliance with the new 2009 International Energy Conservation Code. As a condition of accepting ARRA funding, Kentucky was required to provide assurances that these codes would be adopted and would achieve 90 percent compliance by 2017 for residential and commercial construction

Because of the DHBC role as the primary code enforcement agency in the Commonwealth, their role was to coordinate the consumer awareness and curriculum advisory committee. For the duration of project the DHBC was intimately involved in the coordination, review, and implementation of all aspects of this project. They helped by scheduling and participating in conference calls, and reviewing and commenting on all materials. This added greatly to the quality and function of all consumer materials products and ensured they were technically correct.

Various consumer guides and checklists were developed, with the assistance of BCAP and DHBC. The guides are intended to provide an illustrated overview of the major components of the residential energy code and key elements for compliance for different audiences: design professionals, home buyers, and homeowners. Additionally, consumer checklists targeted to the same three audiences were produced that guide them through issues to look for in a home to ensure compliance. The checklists provide an example certificate and links for additional information. All of these materials will be made available as pdf download files through the DHBC's web site and printed and used at appropriate forums.

In addition to the printed materials, an eight-hour PowerPoint curriculum was developed by BCAP. Development included a pilot training session with professional code inspectors to vet the curriculum. The curriculum was organized around the IECC 2009 code books, complete with illustrations, and speaker notes. BCAP, working with their sub-contractor, video-taped a trainer doing the eight-hour residential energy code training, and superimposed the instructor over the PowerPoint slides. The user can select to take the online instruction course and complete modules at their own pace. The user is then asked a set of brief questions at the end to measure information retention. One advantage of this system is that the DHBC can allow users to take classes at their own pace, but the agency can also use the PowerPoint for live workshops, or supplement the live sessions with videos. All instruction is augmented by a set of videos, shot on-site, in the field, that focus on specific code details.

The Houseboats to Energy Efficient Residences Project

The "Houseboat Capital of the World", Monticello, Ky., is now becoming known for building energy-efficient homes. The area that surrounds Lake Cumberland was once a thriving industrial community in Wayne, Pulaski, Clinton, Russell and Adair counties that employed an estimated 1,000 people in the houseboat industry, many of them skilled electricians and carpenters . Under a new program, Houseboats to Energy Efficient Residences (HBEER), Stardust Cruisers is using their construction skills to build modular homes that are energy-efficient in addition to houseboats.

This multiyear project started in 2009 when Monticello (Wayne County) and Whitley County applied for funding under Energy Efficiency & Conservation Block Grant (EECBG) to build prototypes that would be placed in their communities. Both communities received $125,000 to establish a revolving loan program to manufacture these energy-efficient modular homes.

This project was initiated by Jerry Rickett, president and chief executive officer of the Kentucky Highlands Investment Corporation (KHIC) whose mission is to increase economic development in a 22 county area in southeastern Kentucky. HBEER is collaboration between KHIC and the University of Kentucky College of Design with assistance from the University of Kentucky's Center for Applied Energy Research (CAER). HBEER was designed not only to create jobs for the area and to utilize materials made in Kentucky, but also to promote energy-efficient homes that would replace energy-inefficient mobile homes in southeastern Kentucky.

The goal of each home is to keep the total cost less than $100,000 and for the home to operate on an average of $1 per day for heating and cooling costs. The prototype home in Monticello was placed in August 2011 and features two bedrooms, one bathroom, laundry, living space and a kitchen [see picture]. Additional features of these homes are built-in cabinetry that provides homeowners an opportunity to spend less on dressers and other storage furniture. They will also include GE ENERGY STAR appliances and have ENERGY STAR windows.

"The HBEER project is unique in that it has allowed us to share leading edge techniques in design, energy performance and construction with a region of our state that is well positioned to implement them in a way that will have a very positive and immediate impact on southeastern Kentucky."

- HBEER Project Manager, Josh Ayoroa

Industrial & Commercial

Starting in 2010, DEDI began working with its partners no create three programs to help companies cut energy consumption and reduce greenhouse gas emissions in the industrial and commercial sectors. Two of these programs are operated by the University of Louisville's Kentucky Pollution Prevention Center (KPPC): Kentucky Save Energy Now (KY SEN) and the Kentucky Industrial Commercial Sustainability Program (KICSP). Although funded from two different federal grants, both programs support services that promote, implement, and enhance environmental sustainability efforts. The third program, the Kentucky Industrial Facility Retrofit Program, is implemented by the Kentucky Cabinet for Economic Development and provides competitive grant funds for energy-efficiency upgrades in existing industrial plants. Grant funds will be available through April 2012.

Save Energy Now & Industrial/Commercial Sustainability Program

Kentucky Save Energy Now (KY SEN) helps energy-intensive facilities build self-sustaining energy-savings programs using ENERGY STAR's Seven-Step Energy Management Process. Companies that enrolled in the KY SEN initiative in 2009 pledged to adopt a goal to reduce energy intensity by 25 percent or more over 10 years (2.5 percent per year). To accomplish its goal, companies pledged to complete their activities within 12 months of enrollment; establish an energy use baseline; develop an energy management plan; designate an energy leader or energy manager; take steps to reduce energy intensity and associated carbon emissions; and report energy intensity, energy use data, and achievements annually to KPPC.

Participation in KY SEN grew in 2011, thanks to industrial and commercial leaders demonstrating their commitment to creating efficient, energy-saving work environments.

One of the most important components to the Seven-Step Process is education. Through KY SEN, workshops were held across the state representing more than 77 unique organizations.

Modeled after the U.S. Department of Energy's Industrial Assessment Centers, the Industrial/Commercial Sustainability Program increased support for KPPC to perform energy analyses at industrial, commercial and institutional firms or organizations. The program also conducted energy efficiency workshops for target groups.

By August of 2011, KPPC's team of engineers evaluated more than 7.7 million square feet of space in 103 Kentucky industrial, commercial and institutional facilities, and conducted 32 on-site energy assessments, making great strides toward optimizing energy performance. Those assessments identified potential energy savings of 473,065 MMBtu's per year, KPPC also participated in other training opportunities throughout the year to provide venues for manufacturers and vendors of energy-efficient technology to network and demonstrate successes. "Energy Today and Tomorrow" was the theme of the Kentucky Association of Manufacturers Energy Conference in April. KPPC presented to more than 40 participants outlining the steps to take in starting an industry-wide energy initiative. KPPC also hosted the second Kentucky Energy Alliance meeting, held at the LG&E/KU Power Plant in Trimble County in May. Thirty-five participants attended, representing various businesses and industries from across the state. General Cable, of Lawrenceburg is one of the many Kentucky companies that has utilized KPPC's services. Jeff Hosp, Maintenance Manager for General Cable, presented a case study of their successes throughout the past three years which included establishing a baseline of energy usage by KPPC facility assessments, modernizing some of its equipment, and encouraging behavior changes among its employees.

Through an ITP Grant (Industrial Technologies Program, of the U.S. Department of Energy), KPPC was able to hire seven new engineers and purchase equipment, such as infrared cameras, temperature and humidity meters, and combustion analyzers, to conduct energy audits and collect data on-site.

In October 2011, the Kentucky Save Energy Now (KY SEN) initiative recognized companies from across the state for their commitment to reducing energy usage.

Topy America and Cardinal Aluminum achieved first-star level recognition for signing the KY SEN pledge and establishing energy use baselines. Hausner Hard Chrome and General Cable achieved the second-star level for instituting energy management policies, establishing cross-functional energy teams and attending energy management training. Republic Conduit received the third star level of recognition by assessing operations for energy saving opportunities and developing an energy action plan which included a 2.5 percent per year minimum goal for energy savings.

Stimulating Energy Efficiency in Kentucky

Through a cooperative agreement with the U.S. Department of Energy, DEDI, along with the Midwest Energy Efficiency Alliance (MEEA), has undertaken an initiative that supports the Governor's energy plan that aims to improve the energy efficiency of Kentucky's homes, buildings, industries, and transportation fleet by at least 18 percent of Kentucky's projected 2025 energy demand.

DEDI announced in March 2011 the Stimulating Energy Efficiency in Kentucky (SEE KY) initiative to help integrate energy efficiency into Kentucky's economy to achieve an eventual one percent annual energy savings goal. SEE KY is funded by a $500,000 federal grant from US DOE.

A critical component of SEE KY is an inclusive stakeholder process to allow Kentucky's energy experts to share ideas about how the benefits of energy efficiency can be realized by Kentuckians and to develop a strategy for reaching the one percent annual energy savings goal across the Commonwealth. The stakeholder process combines rigorous data analysis with discussions to identify what is and is not working in Kentucky to deliver the benefits of energy efficiency to Kentuckians.

To date, the SEE KY project team has met with individuals from more than 36 organizations representing utilities, government agencies, manufacturers, professional associations and nonprofit organizations from housing, economic development, environment and low income community sectors. The result of these meetings is a summary of issues that key stakeholders have identified as critical to Kentucky's ability to achieve its annual energy savings goal.

Research of Kentucky's existing energy efficiency programs and policies is being conducted by the American Council for an Energy-Efficient Economy (ACEEE). This research will assess the cost effectiveness of a variety of programs in Kentucky and will be used as the basis for discussions with stakeholders. Additionally, a comparison of Kentucky's policies and programs with that of similarly situated states will produce a catalogue of best practices that can provide valuable options for the Commonwealth.

Kentucky Industrial Facility Retrofit Program

The Kentucky Industrial Facility Retrofit Program, was developed through a partnership between DEDI and the Cabinet for Economic Development (CED). This program provides competitive grant funds for energy-efficiency upgrades to existing industrial plants. Preference in the award process went to industries that produce 'green' products and create or retain the most jobs. The 2010 ARRA grant recipients included General Electric Company (GE), in Madisonville, Arch Chemicals Inc., in Brandenburg, and International Paper Company, in Henderson, Ky.

By the end of 2011, three companies had completed lighting retrofits covering 1,584,429 square feet of industrial building space. Florida Tile performed a retrofit of two buildings for a total of 636,179 sq. ft.; Montaplast of NA completed a retrofit of buildings for a total of 572,250 sq. ft.; and GE Aviation retrofit one building for a total of 376,000 sq. ft.

Grant Recipients' Projects

floridatile

- 1,400 old HID lights replaced with 1,089 fluorescent fixtures (~5,000 bulbs)
- 4,000,000 kWh reduced annually
- 6,600,000 pounds of CO_2 reduced annually with reduced energy demand
- 685 equiv. acres of trees that would have the same impact
- 74% reduction in electricity consumption for lighting
- 1.4 years payback of the entire costs from energy savings

- In 2010, Florida Tile teamed up with CED to retrofit 40 year old lighting at its Lawrenceburg campus. The original lighting was dim and expensive. Timers and switches were installed so the lights could be cycled on and off only when needed. Florida Tile invested $162,500, and this was matched with stimulus funds. The operational cost for lighting at the campus has dropped by 74 percent.

- 14,000 fixtures replaced and 137 LED exit signs installed
- 894 occupancy sensors installed
- Lighting retrofits was across 7 buildings with 851,620 sq. ft.
- Annual electricity reduction of 4.3 million kWh; approx. $225,000
- 9 month payback on GE's $194,000 investment

- GE Aviation received ARRA funding to retrofit the Madisonville facility with energy-efficient T-8 lights. This project was completed by a local electrical contractor, and the primary goal of the project was to reduce energy costs while also reducing carbon dioxide emissions. The T-8 lights produce 40 percent more light, yet cost $22,000 less per month to operate. The reduction in costs for lighting is exceeding original estimates, and production workers at the Madisonville plant are enjoying the improved light quality at their work stations.

montaplast

- 1,096 400-watt halide fixtures replaced with T54 high output fluorescent fixtures
- 2,600 hours to complete the project
- 6,224,894 pounds of carbon dioxide reduced annually
- 320,495 equivalent gallons of gasoline saved annually
- 3.5 years to pay back total project cost

- Montaplast of North America, Inc. was selected to receive ARRA funding for a lighting retrofit project at its Frankfort plant complex. The lighting to be retrofitted was originally installed during Montaplast's 1992 construction and 1997 plant expansion. The project began in the summer of 2010 to replace the existing dim and high cost metal halide lighting with nearly 1,100 new energy-efficient 54 watt fluorescent fixtures in three different warehouse areas and two production plant buildings.

Facility Retrofits

- **Arch Chemicals** ($450,000 ARRA) The company installed a condensing economizer to recover latent heat from the plant's exhaust system. The latent heat is now used to pre-heat the feed water that increases feed water temperature from 140°F to 180°F. The economizer is expected to save approximately $275,000 per year through reduced natural gas consumption used to heat process water.
- **International Paper** ($400,000 ARRA) The International Paper facility in Henderson is a 100 percent recycled containerboard mill that opened in 1995. The company used an ARRA grant to install a Kadant Petax disk filtration system. The "whitewater" filtration unit recycles processed water within the mill and this reduces the energy used to heat fresh water while lowering the cost to purify the wastewater-containing paper fibers. This project helped International Paper to become a recipient of the Governor's 2011 Environmental Excellence Pacesetter Award for Medium to Large Businesses.
- **GE Appliance Park** ($2,500,000 ARRA) GE used ARRA funds to improve facility lighting and steam heating. Together these projects will save the company over 4,800 kWh in electricity, annually. Upon project completion in 2012, GE will set up a demonstration center to showcase the park's energy efficiency improvements along with the new GE hybrid electric hot water heater that is now manufactured at the park.
- **Perdue Farms** ($240,000 ARRA) Perdue Farms installed a 1.5 MW bio-gas engine generator that runs off methane captured from a process water holding pond. The waste heat from the generator is then used to heat water used in the production processes. The generator produces 999 kW of power 24 hours a day, seven days a week, and is available for on-site use or can be exported to the local grid. Tennessee Valley Authority will pay Perdue Farms for the renewable energy credits.
- **Sekisui Specialty Chemicals** ($144,170 ARRA) Sekisui installed 145 energy efficient LED lighting fixtures in their Calvert City manufacturing facility. The new lamps are projected to save 153,300 kWh per year. The company estimates combined maintenance and energy savings will be over $46,000 per year. Better light quality and improved employee safety are additional benefits enjoyed by the company.

Commercial Energy Code Training

Commercial and industrial facilities account for half of all energy consumption in the U.S. at a cost of more than $200 billion per year, more than any other sector of the economy. These facilities are also responsible for nearly half of U.S. greenhouse gas emissions.

A grant from the U.S. Department of Energy, under ARRA, provided $350,000 to develop curriculum and provide training to help Kentucky achieve substantial compliance with the new 2009 International Energy Conservation Code. As a condition of accepting ARRA funding, Kentucky was required to provide assurances that these codes would be adopted and would achieve 90 percent compliance by 2017 for residential and commercial construction. The project was implemented as a four-way partnership with DEDI, the University of Kentucky (UK), the Kentucky Department for Housing, Buildings and Construction (DHBC), and the Alliance to Save Energy Building Code Assistance Project (BCAP).

The commercial energy code project was completed by the University of Kentucky Biosystems and Agricultural Engineering Department. They surveyed the commercial design community to determine training needs and developed a two-day curriculum that was reviewed and revised by the DHBC. Workshops were attended by design professionals and DHBC code officials. Fourteen workshops were held throughout the state with a total attendance of nearly 600.

Energy Assurance Planning

ARRA provided funds for DEDI to develop an Energy Assurance Plan to strengthen and enhance energy emergency response efforts in the state.

In 2011 Kentucky's Energy Assurance Plan received preliminary approval from the U. S. Department of Energy. Updates are currently being compiled with final approval expected by the summer of 2012. The department also revised the Emergency Support Function guidelines to more closely align with the federal system of emergency management.

Staff has participated is several large-scale exercises during the year, the largest being the National Level Exercise (New Madrid Earthquake). This exercise provided an opportunity to test the effectiveness of response efforts during the first 72 hours of a major earthquake.

Division staff also participated in two multi-state national level exercises aimed specifically at energy assurance. One in Raleigh, involving the southern states focused on response efforts mainly centered around a major hurricane. The other in Chicago attended mainly by midwestern states, examined a variety of issues including cyber security, terrorism, and severe weather.

Other energy assurance activities DEDI supported includeded assisting Louisville Metro Government in developing a local energy assurance plan; conducting a meeting of the Energy Resources Management Board; monitoring energy commodity price fluctuations and other national trends that may affect state energy systems; closely exploring natural gas trends to determine how natural gas may aide in adding resilience to statewide electric systems; and continually working to strengthen relationships with other public and private agencies involved in producing, transporting, distributing and managing energy commodities or systems.

Louisville Energy Alliance

The Louisville Energy Alliance is an excellent example of a public-private partnership. It is an alliance of the Louisville Metro Government with leadership from many local businesses. The Louisville Energy Alliance is a 501(c)3 nonprofit corporation promoting energy efficiency, through ENERGY STAR, in commercial buildings in Louisville. They assist commercial building owners and managers by providing important resources in energy efficiency. The members of this public-private partnership are:

- BOMA (Building Owners and Managers Association)
- Louisville Metro Government
- CCIM (Certified Commercial Investment Member)
- DEDI (Kentucky Department for Energy Development and Independence)

The group sponsors three premier activities each year. The Kilowatt Crackdown is an annual competition between building owners and operators to promote energy efficiency awareness and rewards businesses with the most efficient buildings and businesses with the greatest energy improvements. To compete, participants must benchmark their facilities for a 12-month period, make improvements, and then track their progress over the following year. More than 200 buildings competed this past year with winners being recognized in many categories: Kilowatt Cup, Greatest Improvement in Efficiency, General Recognition, and most Efficient Building or Plant.

The Louisville Energy Alliance sponsors the Commercial Energy Efficiency Expo to help businesses learn more about the practices and products that are available to help them improve energy efficiency. This year's expo took place in October at the Louisville Convention Center.

The Louisville Energy Alliance is also a partner with the federal government's ENERGY STAR program, which provides an abundance of tools and information to help businesses drive down their energy usage. ENERGY STAR's Portfolio Manager Tool, for example, is extremely helpful in evaluating a property's current efficiency and in tracking the property's efficiency improvement progress. It is also used extensively in the Kilowatt Crackdown.

Finally, the Louisville Energy Alliance has served as a mentor with the Lexington-Fayette Urban County Government (LFUCG). Facilitated by DEDI, the Alliance met with LFUCG to share their experience and lessons learned through the Kilowatt Crackdown. Because of this mentoring process, LFUCG is conducting its own competition, administered by the Bluegrass PRIDE.

State & Local Government

Small Cities & Counties Initiative

To bring energy efficiency and conservation to local communities, DEDI partnered with the Department for Local Government (DLG) to implement projects funded through the Energy Efficiency and Conservation Block Grant Program (EECBG). Designed to invest the cheapest, cleanest, most reliable energy technologies – energy efficiency and conservation – which can be deployed immediately, the EECBG was passed by Congress in 2007 but was not funded until the passage of ARRA in 2009.

The Kentucky EECBG Small Cities and Counties Initiative provides $6.25 million to assist local governments in implementing strategies to reduce fossil fuel emissions, reduce total energy usage, improve energy efficiency in transportation, buildings and other sectors, or to implement renewable energy activities at the local level. The program also spurs economic growth through creation and retention of jobs funded under ARRA. The program provided grants up to $125,000 per community. Only city and county governments were eligible to apply for the EECBG funding; however, local governments could apply on behalf of non-profit agencies in their communities. Some local communities also submitted applications for multi-jurisdictional projects; recognizing that pooling resources at the local level had advantages for those areas.

Local	Amount ($)		Amount ($)
Berea	125,000	Jackson	125,000
Livingston	125,000	Paducah	50,000
Jeffersontown	125,000	Elizabethtown	125,000
Rowan County	125,000	Estill County	125,000
Madisonville	125,000	Mount Washington	125,000
Monticello	125,000	Calvert City	125,000
Whitley County	125,000	Clark County	125,000
Madison County	125,000	Daviess County	58,800
Ballard County	125,000	Fulton	99,044
Bardwell	35,000	Fulton County	65,155
Burler County	108,688	Greenville	125,000
Henderson County	125,000	Murray	125,000
LaRue	68,000	Olive Hill	125,000
Marshall County	68,000	Pendleton County	125,000
Mayfield	125,000	Winchester	56,802
Franklin County	125,000	Whitesville	75,600
Wayne County	35,200	Cynthiana	125,000
Caldwell County	125,000	Lincoln County	125,000
Hart County	125,000	Guthrie	65,650
McLean County	125,000	Central City	72,126
Garrard County	11,769	Greenup County	125,000
Hickman County	125,000	Carlisle County	101,210
Warren County	41,494	Crofton	47,450
Danville	125,000	Hickman City	50,000
Carroll County	75,000	Calloway County	45,675
Trigg County	125,000	Boyle County	125,000
Knott County/Pippa Passes/Hindman	375,000	Leitchfield/Grayson County	250,000
Warsaw/Gallatin County	250,000		

Funding was provided for approximately 60 projects to implement energy efficiency, energy conservation and renewable energy projects. While the first projects were announced in April of 2010, the bulk of the work on many of the projects took place in 2011. In many instances, the communities found that the original estimates of the projects were high and funds were available to perform more energy-savings activities than originally anticipated. The projects varied widely from community to community. Local hospitals in Trigg and Madison counties received funds to make energy-efficient upgrades in order to help reduce utility costs. Berea received funds to reduce city-wide energy consumption and create the state's first cooperative solar farm. The first phase of the Berea Solar Farm initiative was a success – with sixty (60) lease contracts received in the first week. The city of Crofton received $47,450 to help implement energy conservation activities at the local community center.

Drinking and Waste Water Energy Efficiency

The Drinking Water and Wastewater Energy Efficiency Workshops were held throughout the state to educate local officials about the opportunity that energy efficiency provides as a means to save on operating costs, to inform local officials of energy savings performance contracting as a mechanism for financing facility-improvement projects.. The definition of energy savings performance contracting is the use of guaranteed savings from the maintenance and operations budget as capital to make needed upgrades and modernizations to building or infrastructure systems, financed over a specified period of time. The workshops also educated utilities about nontraditional financial options that they might be able to use to fund future energy-efficiency projects. These non-traditional financing options include use of bonds and revolving loan funds.

Other topics covered at the workshops were fundamentals of energy savings performance contracting; how performance contracting has benefitted the Commonwealth of Kentucky; energy saving strategies in water and wastewater; financing; and a panel discussion of all topics. Performance contracting was discussed as a way to enhance facilities without having to increase rates. The workshop was designed to give an introductory view of performance contracting and also facilitate networking opportunities.

A pilot Water and Wastewater Energy Efficiency Workshop was held at the Bluegrass Area Development District in Lexington April 7, 2011. Subsequent workshops were held at the Cumberland Valley Area Development District, in London, Pennyrile Area Development District in Hopkinsville, Northern Kentucky Area Development District in Florence, and the FIVCO ADD in Grayson. The primary presenters at these workshops were members of the Kentucky Energy Services Coalition (ESC), a representative of the Kentucky Infrastructure Authority and a case study from the Finance and Administration Cabinet. ESC is a national non-profit organization composed of a network of experts from a wide range of organizations working together at the state and local level to increase energy efficiency and building upgrades through energy savings performance contracting.

Green Bank of Kentucky

The Green Bank of Kentucky was created by an administrative order of the Finance and Administration Cabinet (FAC) in July 2009 and is funded by $14.17 million in ARRA funds. Green Bank is administered by FAC through a partnership with DEDI.

One of the primary purposes of the Green Bank is to offer supplementary financing to traditional sources to make a project economically viable. Initially, the minimum amount that may be borrowed is $50,000.

Energy loans, including secondary loans, may be used for construction, upgrades or retrofits that are intended to result in reduced energy usage and costs. Loans may also be used to pay for certain administrative costs associated with an energy project. Projects may involve one or more measures for individual or multiple sites.

The Green Bank is a revolving loan fund for energy savings performance contracts (ESPC) on state-owned facilities. Since its creation, Green Bank has financed nine projects for a total of $14.4 million. With the initial balance of funds loaned out, hereafter funds repaid into the Green Bank will be 'rolled over' to finance future energy-efficient improvements in other state buildings on an on-going basis.

Kentucky Green Bank loans given to date:

KY Department of Education - $1.3M ESPC loan at 3.25% for 14 years

- Kentucky School for the Blind, Louisville
- Kentucky School for the Deaf, Danville
- Future Farmers of America Training Camp, Hardinsburg

Kentucky Educational Television – $1.8M ESPC loan at 3.25% for 14 years

- Kentucky Educational Television Network Center, Lexington

Department for Veterans' Affairs - $2.2million ESPC loan at 2.25% for 15 years

- East Kentucky Veterans Center, Hazard
- Western Kentucky Veterans Center, Hanson
- Thomson-Hood Veterans Center, Wilmore

Kentucky Office of the Blind – $599,785 ESPC loan at 1.5% for 14 years

- Charles W. McDowell Rehabilitation Center, Louisville

Cabinet for Health and Family Services – $1.16 million loan at 1.5% fixed for 14 years

- Outwood and Caney Creek Hospitals

Kentucky Department of Corrections – $4.4 million ESPC loan at 1.5% for 14 years

- Big Sandy, Bell County, and Eastern Kentucky correction facilities

KY Finance and Administration Cabinet - $2.8M

- $171,000 eSELF at 3.25% for 10 years
701 Holmes Street paint shop and office
Fleet Administration and Garage, Frankfort

- $114,000 eSELF loan at 3.25% for 3 years
Old Capitol Campus, Frankfort

- $2.6M loan at 2.25% for 14 years
Capital Plaza Hotel Parking Garage
Capital Tower Parking Garage
Frankfort Convention Center
Kentucky History Center
Bush Building
Library and Archives
Public Service Commission
Surplus Property

* *For more information regarding the Kentucky Green Bank program visit http://finance.ky.gov/greenbank/*

Commonwealth Energy Management and Control System

The Governor's energy plan has established a goal of reducing energy consumption in state buildings 15 percent by the year 2015 and 25 percent by the year 2025 with the goal of "leading by example."

In order to meet the goals set forth in the plan, a pilot project, Commonwealth Energy Management and Control System (CEMCS), was introduced by the Kentucky Finance and Administration Cabinet through their Department for Facilities and Support Services and it was created using a $3.65 million energy management grant from ARRA. The goal of this project is to gain a complete understanding of the energy consumed to operate state facilities each day and the means to manage energy consumption.

Using groundbreaking software that creates data-driven analysis and implementing low-cost building operation adjustments, more than $600,000 in annual savings is expected from the pilot of 43 buildings at 23 sites across the state. This software tracks energy usage in state buildings, maintains and monitors building systems, provides electronic audits of current and historical utility bills and generates alerts if usage exceeds parameters for determined energy usage.

CEMCS will provide an opportunity to look at utility usage and billing for each facility and set a baseline for normal use and operating costs. It also provides the means to rank all buildings based on energy use per square foot and to allow for further investigation of facilities that are deemed energy inefficient, thus helping prioritize energy-efficiency retrofit projects and expenditures. It will also allow facility managers to make informed decisions about HVAC and light operations, providing the ability to turn off systems when appropriate.

Upon completion of the pilot project, it is expected to be integrated into all state government facilities.

http://kyenergydashboard.ky.gov

- A public website is available where visitors can learn about each of the buildings involved in the pilot and view the energy unit and dollar savings in real time.

"This advanced, high-tech system is truly forging the way for how our government will view and conserve energy now and in the future. CEMCS is yet another big boost toward Kentucky's reputation as a national leader in green innovation and efficiency. The pilot is already saving taxpayer dollars in utility costs and reducing energy consumption."

- Kentucky Governor, Steve Beshear

Energy Efficiency & Conservation Block Grants

The Energy Efficiency and Conservation Block Grant (EECBG) program, funded by ARRA, offered a major investment in our local communities. Local and state governments received assistance in developing, promoting, and implementing renewable energy and energy efficiency and conservation programs.

Direct Formula Grants

In Kentucky, 20 of the state's most populous cities and counties received awards directly from the US DOE. These local communities were required to submit a proposed Energy Efficiency and Conservation Strategy, which included a plan for the use of the funds, as well as the goals to be accomplished. The proposed strategies had to be approved by DOE and had to follow DOE's list of 14 eligible activities for the EECBG program. The following local governments received direct EECBG awards totaling $14,955.500.

Direct formula grants are listed below. DEDI did not administer or manage these grants, they were managed by U.S.DOE.

City	Amount ($)	County	Amount ($)
Bowling Green	585,600	Boone	368,100
Covington	188,500	Bullitt	289,900
Florence	126,400	Campbell	351,600
Frankfort	132,100	Hardin	426,500
Henderson	123,100	Kenton	465,200
Hopkinsville	143,600	Laurel	246,000
Lexington-Fayette	2,753,800	McCracken	289,900
Louisville-Jefferson	7,000,400	Oldham	222,200
Owensboro	557,200	Pike	282,800
Richmond	145,600	Pulaski	257,000

Department of Local Government (DLG) *(see pg. 36)*

Along with direct awards to local communities, states also received EECBG awards with the requirement that at least 60 percent of the state's award be made available to the smaller cities and counties that did not receive a direct allocation from DOE.

Funding was provided for 57 projects throughout the Commonwealth to implement energy efficiency, energy conservation, and renewable energy projects. The most any one community could receive was $125,000, although some communities working together could ask for proposed funding to be combined and go toward a specific project. More than $6 million was provided to Kentucky's smaller cities and counties.

DEDI partnered with DLG to administer these funds.

- **Net Zero** *(see pg. 19)*

  Warren County School District received $1,422,588 from EECBG funds to partially match existing school funding to bring Richardsville Elementary School to net-zero or near net-zero energy use. Detailed information is provided in the Energy in Education Collaborative section of this report.

- **Kentucky Department for Housing, Buildings and Countruction (KDHBC): Training & Inspections** *(see pg. 26)*

  The Kentucky Department for Housing, Buildings and Construction received ARRA funding to provide education and training to local and state code enforcement officials responsible for residential and commercial building energy codes as well as funding for inspectors statewide to achieve 90 percent compliance with new energy-efficient building codes within six years. The Commonwealth now requires permits and inspections for all new construction projects and heating, ventilating and air conditioning (HVAC) installations statewide, making it the first state in the nation to do so.

First steps of laying solar panels on Richardsville Elementary School's roof.

Agriculture

On-Farm Energy Efficiency Initiative

In October 2009, Gov. Beshear announced the availability of ARRA funds for on-farm energy efficiency improvements in Kentucky. On-Farm Energy Efficiency & Production incentive grants were created as a result of the partnership between the Governor's Office of Agricultural Policy (GOAP) and DEDI, with ARRA funding. Recipients of these energy stimulus incentives have received 25 percent reimbursement of the actual cost of a federally qualified energy savings project up to $10,000. The grants have provided enormous benefit to Kentucky's farm families and positioned Kentucky agriculture as a leader in on-farm energy efficiency.

There have been three funding cycles with awards totaling more than $1.4 million. The types of producers that have taken advantage of this program are primarily poultry, grain, and dairy. Horticulture and farm shops have also received funding for energy-efficient upgrades.

> "The energy efficiency investments on farms all across Kentucky made possible by this program have increased net farm income as a result of energy costs being reduced, now and in the future"
>
> **- Executive Director of the Governor's Office of Agricultural Policy, Roger Thomas**

Though the number of grain applications has steadily increased over the course of the three-year cycle, poultry applications have surpassed all other enterprises. In 2009, only six poultry applications were funded. That number dramatically increased to 43 applicants in the 2011. Dairy applications have also increased with each funding cycle, as have farm shop and horticulture upgrades.

With the prices of fuel and utility costs continually escalating, more farmers are seeking alternate ways to save energy and money. There are many energy efficiency options that make farming operations less energy exhaustive and more profitable. By controlling energy costs, our farmers can start saving significant revenue, and can reinvest resources in their families and operations. Farmers can have energy audits conducted to help determine how much energy and savings are possible with upgrades to specific equipment, usage patterns, and costs.

Dairies are one of the most energy-intensive farm industries. An average dairy uses between 800-1,200 kWh's of electricity per cow annually. William Crist operates Crist Dairy in Metcalfe County. Mr. Crist is one of many dairy producers who, after making energy efficient upgrades, can testify to dramatic energy savings. Mr. Crist said, "I am already seeing a $1,500 reduction in our electric bill each month."

Crist Dairy has 500 lactating cows that are milked 3 times a day. He received funding($10,000) that helped him purchase and install automatic take-off's which preset the flow level at which milking claws are removed, preventing over-milking and reducing the run-time of the vacuum system.

Energy Efficiency in Poultry Operations

As little as 50 years ago, birds were heartier and could withstand temperature fluctuations more easily. Today's birds are unable to cope with temperature swings, thus a bird's environment must be carefully monitored at all times. The $900 million poultry industry ranks as Kentucky's No. 1 agricultural commodity and is the No. 1 food commodity.

Poultry growers generally use a lot of energy, often second only to dairy, and have ample opportunities to reduce their energy use. Often, upgrades can have a payback period of just a few years. The installation of fans improves ventilation, especially during warm months when the right mix of air is critical.

The net result is reduced heat stress, increased animal comfort, and the ability to maintain productivity in hot weather.

Allen Creek Poultry's project was completed in August, 2011. An energy audit conducted by George Stamper, Certified Energy Manager, indicates an estimated annual energy savings of $10,647. They have already seen an 80 percent reduction in the energy bill and are saving 575,240,000 BTU's of energy.

Efficient Grain Drying

Many of Kentucky's grain producers are incorporating energy efficiency by purchasing and installing energy-efficient grain drying systems on their farm.

"With prices for most energy sources up significantly, grain producers are looking for ways to reduce the cost of drying grain on the farm," said Angie Justice, Governor's Office of Agricultural Policy.

Phillip and Marsha Garnett of Garnett Farm in Christian County replaced their dryer, which was inefficient by today's standards. The old drying system, although it used low temperatures, dried grain over a period of "weeks" instead" hours" like the new system does.

Mr. Garnett's project total cost was $199,994. An energy audit performed by Bruce Everly, Certified Energy Manager, estimates a projected annual natural gas energy savings of $110,629. His farm operation will be saving almost 6 billion BTU's each year.

All heat from the cooling grain is recycled resulting in a very efficient dryer operation. Computerized controls greatly reduce over drying of corn and the tower system also promotes more even drying, higher test weights, and also helps reduce operating costs by up to 30 percent. More efficient burners make the actual combustion of fuel more efficient.

Greenhouse Energy Efficiency Improvements

Greenhouse gardeners are just as concerned about using less energy as the dairy, poultry, and grain producer. Energy efficiency upgrades to greenhouses are essential to keep operating costs at a minimum. Heating and cooling system upgrades are very common. Also, irrigation system improvements and insulation are common upgrades. Converting to a drip irrigation or linear/pivot system can help save both water and energy by applying water to field crops more efficiently and reducing the amount of evaporation.

Proper insulation is an essential part of the energy-efficiency formula as it stops air leakage and improves thermal barriers. This allows for more accurate control of indoor temperatures and helps save energy and reduce heating and cooling costs. Greenhouses can also be made more efficient by using fuel-efficient heaters. The owner of Cook's Greenhouse in Daviess County can attest to this fact.

James Cook replaced two outdated natural gas furnaces with high-efficiency models. To help him accomplish this he received funding during the 2011 cycle of the On-Farm Energy & Production Program. When asked why he decided to upgrade, Mr. Cook reported "The older furnaces had a lot of normal wear and degradation which was decreasing efficiency."

The new furnaces that Mr. Cook installed are equipped with a power exhauster feature and the exhaust routing is expected to vent inside the greenhouse (versus outside for the older model). This feature raises the furnace efficiency to 93%. Mr. Cook's total project cost was $1,740. Cook's Greenhouse is saving 1,012 mmBTU's each year due to this upgrade.

Commonwealth Agri-Energy

Commonwealth Agri-Energy, LLC is wholly owned by the 2,300 members of the Hopkinsville Elevator Company Cooperative. Being 100 percent farmer owned gives the ethanol plant the unique ability to provide value-added income to the patrons of the elevator based on the bushels delivered. The facility is one of 204 ethanol plants in 29 states across the United States.

The plant produces approximately 33 million gallons of ethanol, utilizing 33,000 bushels of corn per day, and 12 million bushels per year. The business also produces about 97,000 tons of DDGS (Distillers Dried Grain & Solubles), 75,000 tons of CO_2 (captured and sold), and 3,000 tons per year of animal feed grade corn oil.

The Quarry Lake Water project was conceived as a way for Commonwealth Agri-Energy, LLC to reduce energy consumption and be more competitive by reducing its costs per gallon of ethanol produced.

Commonwealth Agri-Energy applied for funding under the "Multi-County Agricultural Energy Initiative" as a way to help finance the project. The multi-county initiative is a partnership between the Governor's Office of Agricultural Policy and DEDI that encouraged regional collaboration by providing a 1:1 match with ARRA funds and state Agricultural Development Funds for agriculturally related renewable energy projects.

The Quarry Lake Project was designed to use the cold water from the onsite quarry lake to replace water from the cooling tower previously used in the production process. *[see left]* A new 5,000 gpm pump was installed, with sufficient pipeline to bring the 50 degree water from the lake into the ethanol production facility.

The costs in equipment and installation for the project exceeded $500,000. Total outside funding, including the ARRA, state, and local funds from Christian, Trigg, and Todd counties totaled $220,000. The annual savings after project completion is calculated to be over $100,000 per year as electricity savings, mostly in the summer months.

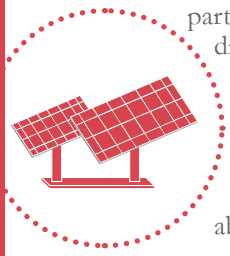
"The Quarry Lake Project was a valuable addition to our plant this long, hot summer," stated Mick Henderson. "We were able to lower our electricity costs in the highest priced season of the year." After seeing the results of this energy efficiency project, the facility is considering additional projects in the future. Potential modifications for yield and efficiency improvements in fermentation, heat recovery, and evaporation are being researched, as well as a new boiler and electric generator to reduce electricity requirements. Thanks to this funding, the facility was able to achieve the goal of lowering energy and therefore production costs to produce ethanol in a highly competitive marketplace.

Utilities

Smart Grid

As energy demand is increased by our industry, homes and devices, state and national policy makers are working with utility companies to invest in what is referred to as smart grid technologies. The goal of both public servants and utility distributors is to create a smarter, more efficient power grid that has the capability to keep up with our ever-rising energy needs.

Six electric cooperatives: Warren RECC, Jackson Energy Cooperative, Owen Electric Cooperative, Blue Grass Energy, Nolin Rural Electric and Hickman-Fulton Counties Rural Electric, have accelerated the modernization of electricity delivery in Kentucky as part of the DEDI Utility Smart Grid Initiative. These cooperatives received smart-grid grants funded by ARRA, and distributed through the U. S. Department of Energy.



The ultimate goal of the smart grid initiative has been to promote the modernization of the grid, thereby providing long-term, significant energy and cost savings for Kentucky rate-payers. Throughout the past year, these companies have installed advanced meter infrastructure allowing customers to see and control their own real-time energy usage from an in-home display, and distributed automation equipment to reduce system energy losses and improve reliability.

Specific programs and energy savings are discussed below.

Smart Grid Project Descriptions

Warren REEC

Warren County RECC installed and upgraded communications equipment, including 14 miles of fiber optic cable throughout its distribution system, to enable the operation of advanced meter infrastructure. This has allowed customers to see their own real-time energy usage from an in-home display and reduced the number of times utility staff had to visit customer homes.

Blue Grass Energy

Blue Grass Energy installed distribution automation and in-home displays on a pilot basis. The system has cut electric losses and improved reliability through adaptive recloser controls, optimized feeder voltage profiles during normal operation conditions, and reduced load demand through voltage optimization. The project has increased customer awareness of energy usage and enabled them to monitor and control their total energy consumption.

Hickman-Fulton RECC

Hickman-Fulton installed 200 smart meters capable of recording and transferring demand side end-use data back to a central office server. The information allowed the utility to be better prepared for more efficient retail rate and pricing designs as wholesale power providers move toward more time-dependent demand and charge structure. Fifty prepay meters have been installed allowing customers to monitor and control their own energy consumption, reduce security deposits, eliminate reconnection charges and reduce energy consumption.

Owen Electric Cooperative

Owen Electric Cooperative created the Penn Station Self-healing Project in Scott County, by installing voltage regulators, switches, controllers, monitors, and communications equipment. The Co-op also established a voluntary peak load-reduction program called, 'Beat the Peak' that alerts customers when systems are operating at 'peak' conditions.

Nolin RECC

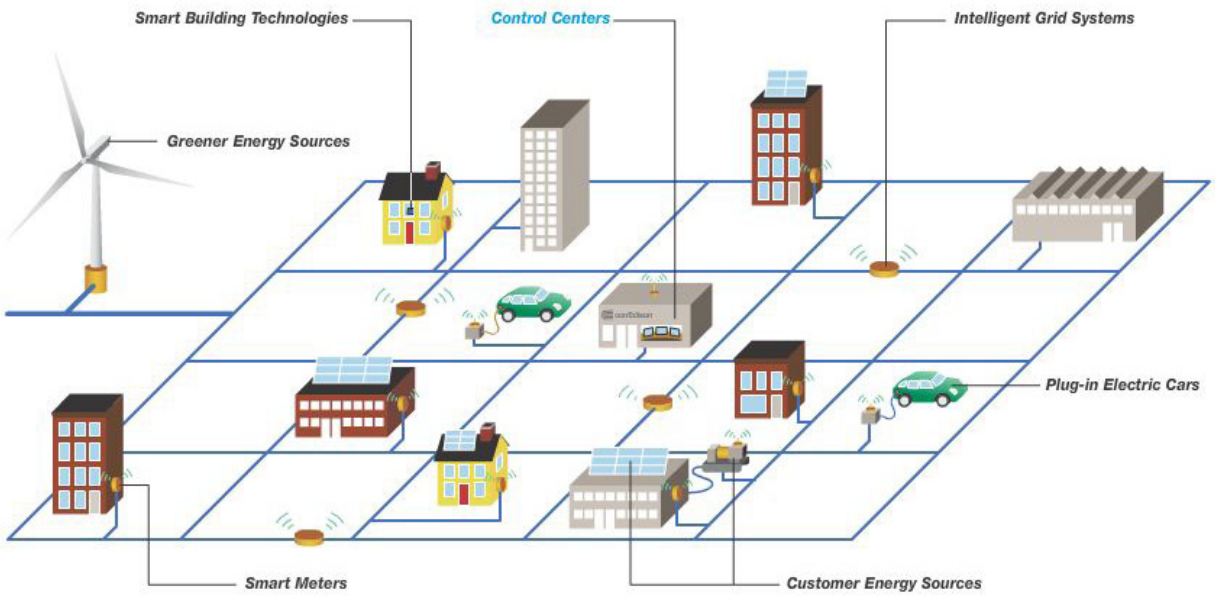
Nolin RECC implemented a prepaid electric meter program to give customers control of their energy usage, reduce security deposits, eliminate reconnection charges and reduce energy consumption.

Jackson Energy Cooperative

Jackson Energy Cooperative also implemented a pre-pay electric meter program to give customers control of their energy usage, reduce security deposits, eliminate reconnection charges, and reduce energy consumption.

Smart Grid

Smart grid puts information and communication technology into electricity generation, delivery, and consumption, making systems cleaner, safer, and more reliable and efficient.



Education/Research Funding

Public Education on Coal Issues

Kentucky Revised Statute 132.020(5) authorizes funding to the Energy and Environment Cabinet from the un-mined minerals tax collected each year for the purpose of public education of coal related issues. DEDI has the responsibility to solicit proposals each year from non-profit agencies having the experience and expertise to successfully conduct programs or activities. The department selected seven projects for 2011, which are highlighted in the table below.

Coal Education Grants

Awardees	Amount	Project Description	Start Date	End Date
Southeast Education Foundation	$115,000	The SE Education Foundation will enhance the visitors' experience and advance the educational benefit of the Coal Museum and Portal 31 in eastern Kentucky.	7/1/2011	6/30/2012
Coal Education Development and Resource (CEDAR)-East	$85,000	CEDAR will use its grant to develop coal educational materials and sponsor a coal fair for K-12 students in 12 eastern Kentucky counties.	7/1/2011	6/30/2012
Coal Education Development and Resource (CEDAR)-West	$50,000	CEDAR will use its grant to develop coal educational materials and sponsor a coal fair for K-12 students in 6 western Kentucky counties.	7/1/2011	6/30/2012
University of Kentucky Center for Applied Energy Research and the Visualization Center	$120,000	Two University of Kentucky Centers will collaborate to produce 7 coal education videos for students in K-12 to expand their awareness and knowledge of coal issues.	7/1/2011	6/30/2012
Kentucky Mining Institute	$30,000	KMI will continue the project of updating and revising the Coal Mining Reference Book. This is an essential text for mining foremen and supervisors.	7/1/2011	6/30/2012

Kentucky Grants

Awardees	Amount	Project Description	Start Date	End Date
University of Kentucky Center for Applied Energy Research (CAER)	$172,000	CAER will continue the development of the energy education club at the University of Kentucky and charter clubs at other interested Kentucky colleges and universities. The clubs' goal is to attract and motivate students about energy careers.	8/1/2010	6/30/2012
University of Kentucky Gatton School of Economics	$150,000	The Gatton School of Economics will continue the economic analysis at the potential impact of electrical energy cost increases (resulting from national legislation or regulation) on Kentucky's manufacturing economic segment.	11/1/2010	12/31/2011

Energy Research Grants

Under the enacted biennial budget, DEDI received appropriated funding from the General Assembly to support research projects relating to clean coal, new combustion technologies; thin-seam coal extraction; safety, tracking and communication devices, coal slurry disposal and synthetic natural gas produced from coal through gasification processes, and the development of alternative fuels produced by processes that convert coal or biomass resources or extract oil from oil shale and other coal research. These research dollars are used to provide benefits to Kentucky's Local Government Development Fund eligible counties. The supported projects are explained in the table below.

Awardees	Amount	Project Description	Start Date	End Date
ecoPower Generation	$350,000	ecoPower Generation is completing engineering design and procurement of a 50-megawatt biomass-to-electricity plant in Perry County. The total value of the plant will be over $150 million and it is projected to create 40 new full-time positions.	7/1/2011	6/30/2012
University of Kentucky Center for Applied Energy Research (CAER)	$1,000,000	The Carbon Management Research Group is an industry-university-government consortium dedicated to developing a cost-effective and efficient flue gas CO_2 capture process for coal-fired utility plants. This grant is matched with $1,200,000 from industry. In 2011 the group received a $14 million grant from U.S. DOE for a demonstration facility.	7/1/2011	6/30/2012
University of Kentucky Center for Applied Energy Research	$200,000	CAER is developing a coal-to-liquid research and demonstration facility that is matched with $1.9 million in federal grant funds.	8/1/2011	6/30/2012
University of Kentucky Center for Applied Energy Research	$762,000	CAER is developing an algae-based process for CO_2 mitigation from coal-fired power plants. The project will move into a slip-stream demonstration phase at a working power plant.	7/1/2011	6/30/2012
Ecopower Solutions, Inc.	$200,000	Ecopower Solutions will use the grant funds to enhance the operation and monitoring of its COMPLY 2000 demonstration units. These units effectively remove pollutants from flue gas to improve coal-fired utilities' compliance capability and economics.	7/1/2011	6/30/2012

Kentucky Grants

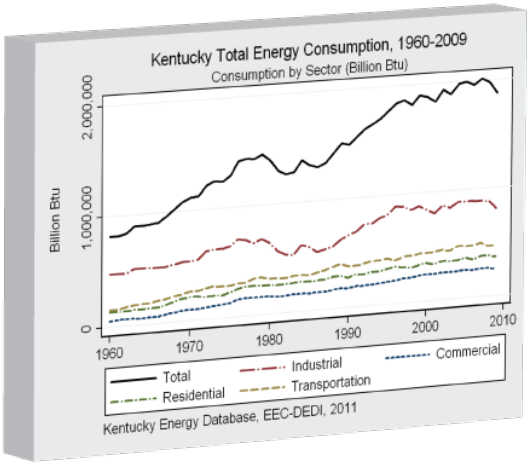
Awardees	Amount	Project Description	Start Date	End Date
University of Kentucky Department for Mining Engineering	$200,000	The department will conduct an in-depth study of coal mine respirable dust, including a statistical analysis, to determine the impact of a proposed respirable dust rule on coal mine operations and miner safety.	7/1/2010	6/30/2012
University of Kentucky Department for Mining Engineering	$210,000	The department will design and test the use of polycarbonate materials for the construction of coal mine safe havens that are safer and more effective during coal mine emergencies.	7/1/2011	6/30/2012
Kentucky Geological Survey	$53,000	KGS will study and map Kentucky's resources of metallugical coal. This material, prevalent in eastern Kentucky, is used in steel production and has a high value and demand.	7/1/2011	6/30/2012

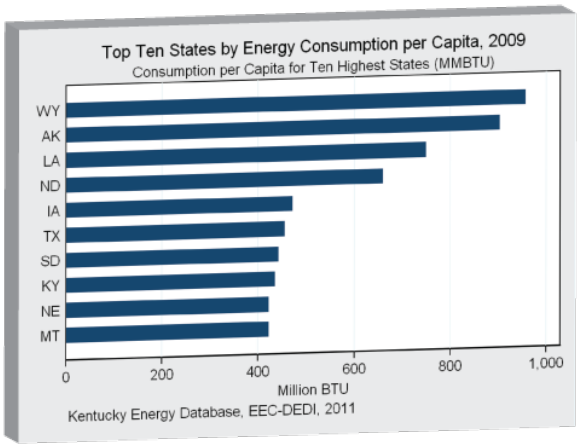
State Representative Rocky Adkins, Energy and Environment Cabinet representatives and the University of Kentucky announce funding for research that uses algae to capture carbon dioxide from coal-burning power plants.

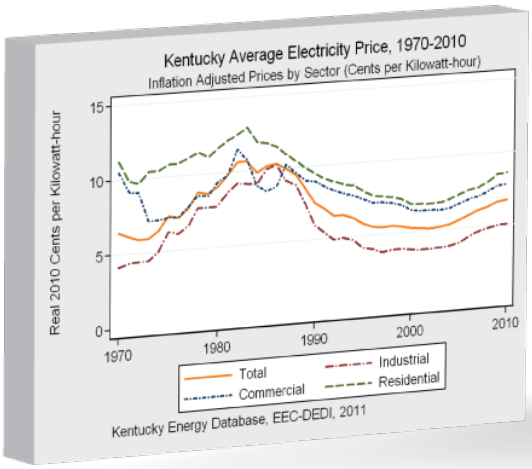
Did You Know?

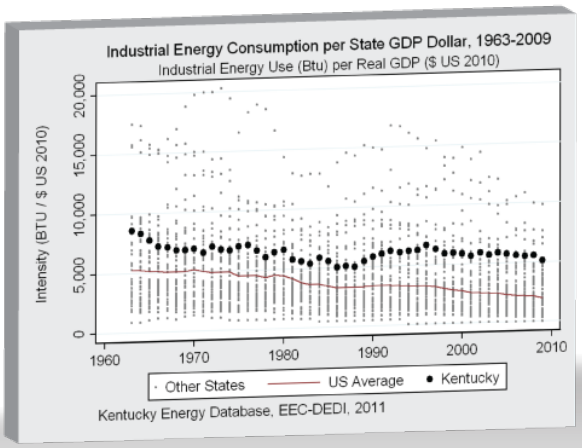
Kentucky's total 2009 energy expenditures were over $17.4 Billion and were focused most heavily in the transportation sector through the purchase of gasoline, diesel, and jet fuel. Total energy expenditures fell by 24% from the previous year as a result of falling prices for crude oil and natural gas during this time.

Kentucky Energy Profile





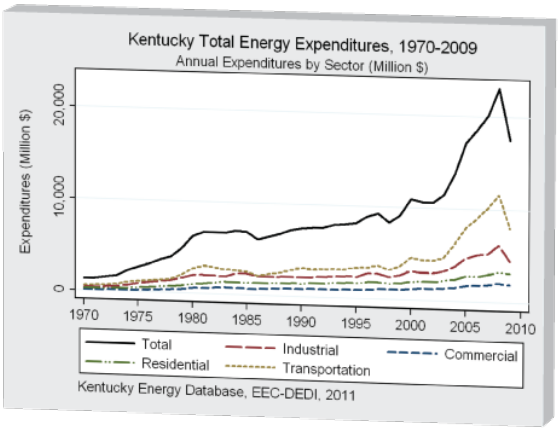


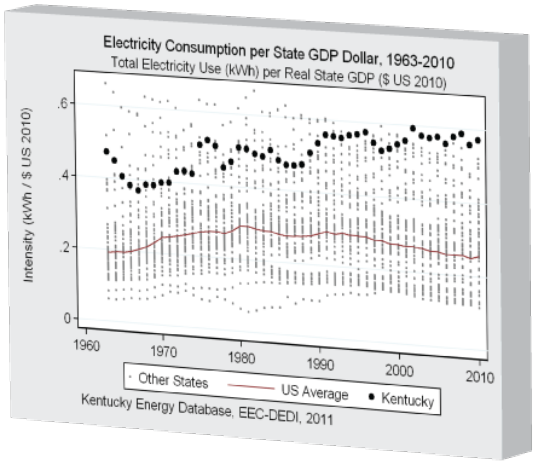


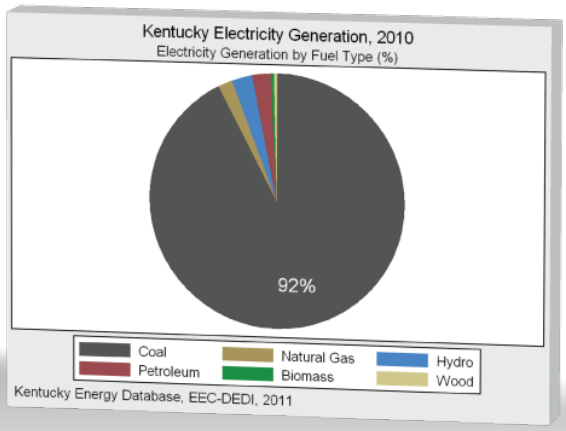
In 2011, DEDI released its second edition of the Kentucky Energy Profile to provide Kentuckians with a snapshot of energy production and consumption within the Commonwealth, as well as a foundation for discussing Kentucky's energy future. All of the information summarized in profile was obtained from public sources, including a variety of state and federal government agencies. As federal government data collection lags the current year by as much as two years, the profile presents the most current information available. The charts reflected on these two pages are only a sample of the more than 100 charts and tables provided in the profile.

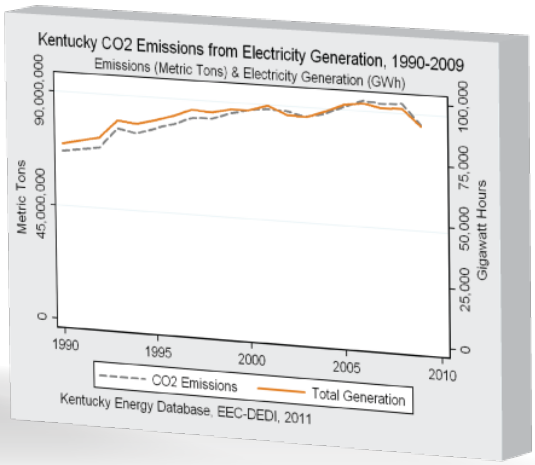
Kentucky continues to be a national leader in energy production. Kentucky is the nation's third largest producer of coal, with rich deposits of low-sulfur coal in the Appalachian mountains of eastern Kentucky and deposits of Illinois Basin coal in western Kentucky. The Commonwealth also produces natural gas, a limited amount of crude oil, and is home to a 212,000 barrel per day petroleum refinery and two ethanol production facilities.

Our energy consumption in Kentucky totaled just over 1.8 Quadrillion Btu in 2009 and placed Kentucky 8th highest for total energy consumption per capita. This amount reflected a 5 percent drop in statewide energy consumption compared with 2008 resulting from the national economic slowdown. Kentucky's total 2009 energy expenditures were over $17.4 Billion and were focused most heavily in the transportation sector through the purchase of gasoline, diesel, and jet fuel.









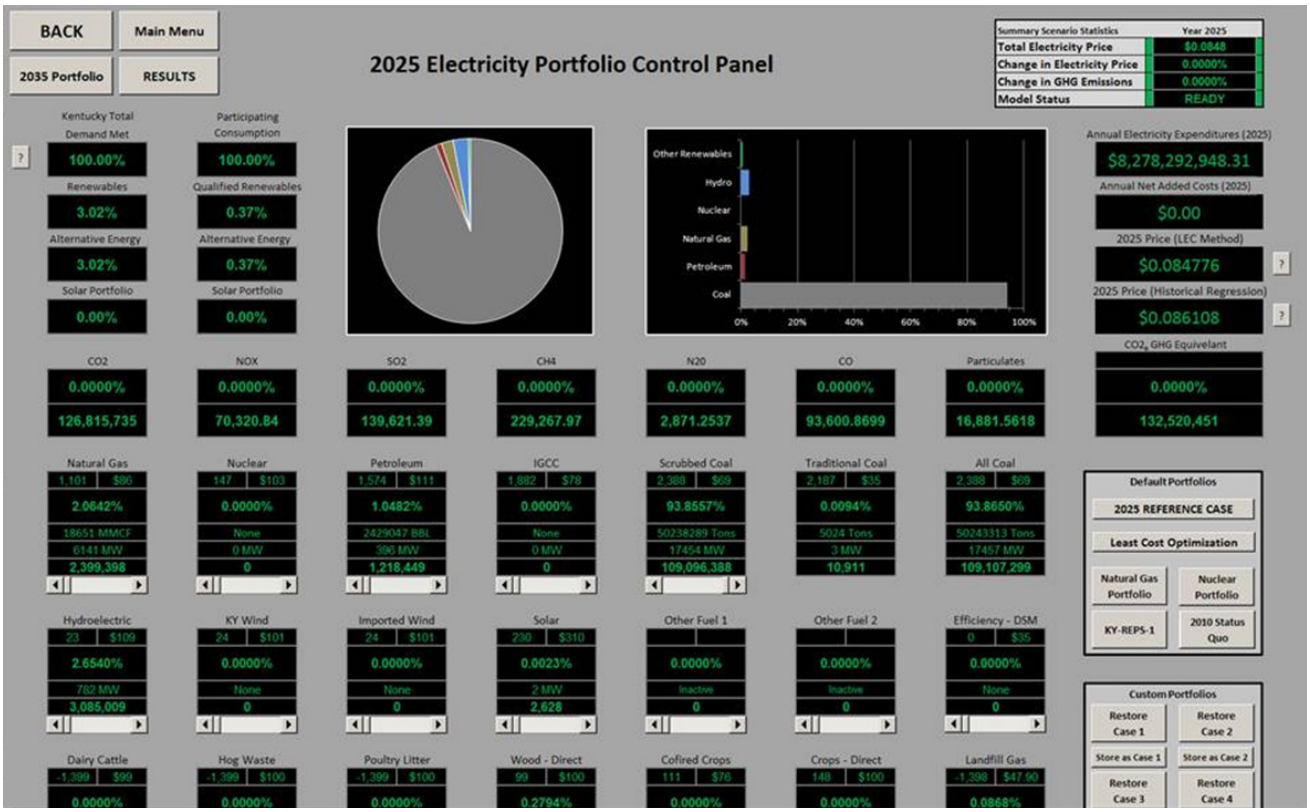
Kentucky enjoyed the 3rd lowest average price of electricity in the country. This inexpensive electricity led residential consumers to have the 6th highest electricity consumption per capita, while Kentucky maintained the single most electricity-intensive economy in the United States [electricity per GDP dollar]. Additionally, the generation of electricity in Kentucky was fueled almost entirely (93 percent) by the combustion of coal, while total electricity generation and electric power carbon dioxide emissions fell by 7 percent and 8 percent, respectively, for the year .

Did You Know?

In 2010, mining accounted for 2.7 percent of the Commonwealth's GDP while manufacturing represented 17.1 percent of total GDP.

The Kentucky Electricity Portfolio Model

The Kentucky Electricity Portfolio Model is an interactive computer model developed by the Kentucky Department for Energy Development and Independence to analyze macro level implications of changing the Commonwealth's electricity generating portfolio under a variety of conditions.

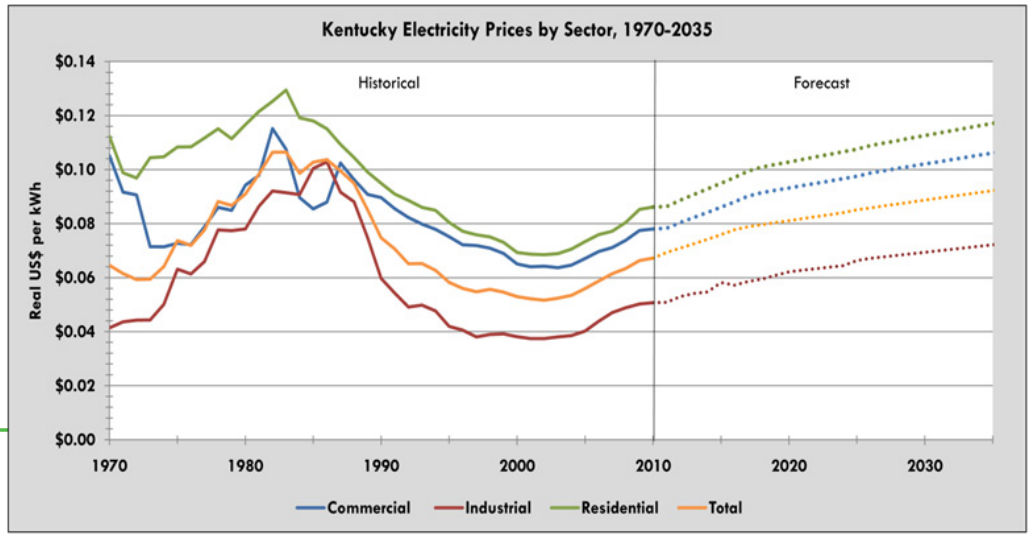


From the model's control panel, users can interact with Kentucky's 2025 electricity generating portfolio by moving toggles that reallocate the proportion of electricity being produced from each energy resource. For example, while Kentucky has historically met electricity demand using Kentucky coal, users can change the energy mix for electricity generation to other energy resources (natural gas, renewable energy, efficiency, etc.). The model provides the user with instant visual feedback on the costs, air emissions, and fuel consumption requirements associated with the changes the user has made. The user can also see the potential impact that a portfolio standard requirement, like a renewable portfolio standard, might have on electricity price and demand. The model is also capable of optimizing the generating portfolio to identify the least-cost means of meeting electricity demand under a given set of parameters.

The model's dashboard is designed to be quick, flexible, and educational. To this end, department staff have pre-loaded the model with default values for all relevant variables; however, users can themselves view and modify all underlying assumptions including future electricity demand by economic sector, consumer sensitivity to changes in price by sector, environmental regulations, generating costs, fuel prices, carbon penalties, and emissions factors.

The model processes user changes to the generating portfolio and other assumptions to forecast long-term electricity demand, price, price volatility, as well as generation capacity requirements, fuel consumption, and air emissions — including greenhouse gas emissions — from the year 2011 to 2050 for the Commonwealth as a whole. The model relies upon the Kentucky Energy Database, which was developed to supply the historical time series necessary to build and calibrate the algorithms in this model.

Kentucky Electricity Portfolio Model, like all models, cannot predict the future; however, it does provide the capability to analyze trends and potential outcomes that result from changes in our electric generation energy mix. It is designed to help Kentucky's leaders make informed decisions about our future.



Source: EIA.gov
KY DEDI Database

"We have developed a unique capability to help us analyze the economic and environmental impacts that may result from changes in our electric power generation profile… [this model] will serve us well as we address the new challenges and opportunities that lie ahead."

- Secretary Len Peters, EEC

Kentucky Energy & Environment Cabinet

500 Mero Street
Capital Plaza Tower, 12th Floor
Frankfort, Kentucky 40601
www.energy.ky.gov