Energy-efficient Building Design and Construction Practices

Research Memorandum No. 503

Legislative Research Commission
Frankfort, Kentucky
lrc.ky.gov

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Foreword

In 2007, the Kentucky General Assembly directed the Legislative Research Commission to report on energy-efficient building and construction practices. This was part of legislation intended to move the Commonwealth in the direction of greater energy independence and toward addressing the energy challenges facing both the state and the nation. Incentives offered by government at all levels and their effectiveness were examined as well as options available to policy-makers beyond conventional tax incentives. Methods currently employed to increase efficient use of electricity, gas, water, construction materials and other resources were reviewed with an eye to rapid changes taking place in these areas.

Staff would like to acknowledge the invaluable assistance of the building, construction and efficiency professionals who assisted in this effort.

Robert Sherman,
Director

Legislative Research Commission
Frankfort, Kentucky
August 27, 2009

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Summary

Social and environmental changes have increased focus on conservation of natural resources and sustainable living. Recent economic changes have also caused consumers to revaluate how they use energy, with new attention being given to maximizing efficiency.

Employing more efficient building methods in new construction and in renovation could reduce the amount of energy consumed, thereby saving money and reducing electric load growth and air emissions resulting from electric generation. There have been many developments in the promotion of energy efficiency in the construction sector, much of which is organized around the guidelines of the Leadership in Energy and Environmental Design Green Building Rating System.

The tax incentives established in 2008 by the passage of House Bill 2 encourage private investment in such new and efficient building methods. However, as currently structured, these incentives may not have as significant an impact on private investments in energy efficiency as similar incentives have had at the national level.

Kentucky's consistent ranking among the states with the least expensive electric energy has mitigated the urgency that has driven widespread conservation and efficiency efforts in other states. In addition, relatively inexpensive electricity means that any investment in increasing efficiency will have a much longer recoupment period than similar investments made on property in higher-cost states.

The HB 2 incentives may prove insufficient to fully compensate the average Kentucky property owner for the lengthy recoupment period necessary to recover efficiency investments. As nonrefundable credits, they will only benefit taxpayers who have a state tax liability and will neither assist nor encourage taxpayers who do not.

Possible Alternatives to Tax Incentives

Rebates and Trade-in Programs

The General Assembly could consider offering cash rebates and trade-in programs directly to consumers. The offer of a rebate for certain building improvements would reduce upfront costs and address the problem of lengthy payback periods caused by low electricity rates.

Trade-in programs could also directly increase efficiency and be available to all consumers. Consumers would realize energy cost savings immediately, while limiting the growth of energy consumption, waste, and carbon emissions.

Mandating Efficiency through the Building Code

The General Assembly could require efficiency through statutory amendments to the state building code and zoning land-use policies. The state building code could be amended to require newly constructed and renovated buildings to attain certain levels of efficiency over established

baselines. Land-use laws could require new developments, both residential and commercial, to be designed and located in ways to minimize their energy consumption.

Conditioning the Receipt of Economic Development Tax Incentives

To encourage energy efficiency in private development, the General Assembly could place conditions on building projects to be eligible for state tax incentives. Projects benefitting from public economic development funds would be required to meet the same efficiency standards as government buildings.

Consumer Education and Leading by Example

State government could adopt a much larger leadership role in advocating building efficiency and demonstrating its benefits. The General Assembly could require the appropriate executive branch cabinet to educate the public about the importance of conservation and the savings possible through greater efficiency. Legislation could require high levels of efficiency in the construction and operation of public buildings and schools.

Chapter 1

Energy-efficient Building Design and Construction Practices

Introduction

House Bill 1 of the 2007 Second Special Session directed staff of the Legislative Research Commission to study 1) the new and developing construction practices aimed at attaining more efficient energy use in buildings and 2) the structure of tax incentives aimed at promoting private investment in energy efficiency.

The field of "green building," or building design and construction that prioritizes energy efficiency and sustainability, is young but rapidly developing. This report's analysis of building construction practices includes descriptions of methods that are currently being employed by the construction industry to increase energy efficiency, methods currently available to decrease the amount of energy used in building operating systems, and methods that are currently known to improve energy efficiency but are not yet commercially viable.

In reviewing the structure of tax incentives that seek to promote private investment in more efficient use of energy in buildings, the report examines incentives offered by the federal government, states and localities, and Kentucky's incentive package that was established by 2007 House Bill 1 and 2008 House Bill 2. The likely effectiveness of Kentucky's incentives is also evaluated. Because Kentucky has a lower cost of energy when compared to surrounding states, the focus on energy efficiency has not been as great. Low-cost energy also means that investments in energy efficiency in Kentucky would require more time to recoup their costs and begin showing positive savings. As a result, the incentives established by HB 1 and HB 2 may not have a significant positive impact on private investments in greater efficiency.

The report examines other methods of encouraging the public to use energy more efficiently. Such methods include offering different types of incentives that subsidize private investments to lessen the effect that Kentucky's low energy costs have on the length of time needed to recoup the monetary investment through energy savings. Such alternative incentives include cash rebates and trade-in programs.

Also discussed are possibilities for the state to mandate greater energy efficiency in the private sector, primarily through amendments to the building code and to land use and zoning policies. Due to various current economic factors, this option may promote a state policy of energy conservation more than attempting to encourage efficiency with incentives.

Organization of This Report

Chapter 1 is an introduction that briefly outlines the development of the state energy policy through recent legislative enactments, culminating in 2008 with House Bill 2 and the efficiency incentive package. The legislation demonstrated the policy of emphasizing conservation and stewardship of natural resources through maximizing the use of energy efficiency measures in public and private buildings.

Chapter 2 analyzes tax incentives promoting greater energy efficiency. The chapter first examines past, present, and future incentives offered and proposed at the federal level. It then examines the various types of incentives offered at the local level by other states.

Chapter 3 outlines the incentives established by HB 2, comparing them with previous federal incentives.

Chapter 4 evaluates the possible effectiveness the HB 2 incentives may have, with attention given to several identified economic pressures unique to Kentucky. The chapter then explores the future of the national and global energy market and discusses the effects they may have on energy use and ways the state policy may need to adapt.

Chapter 5 identifies some alternatives for encouraging efficiency through the use of tax incentives. These include more direct approaches such as efficiency mandates in the building code.

Chapter 6 describes various methods currently employed by the building design and construction industry to increase energy efficiency and methods currently employed to decrease the energy consumed by building operating systems. The chapter concludes with an analysis of building practices by examining various methods for improving efficiency that are currently known.

Chapter 7 concludes the report with several policy options for possible changes to the way Kentucky may execute the overall energy conservation and stewardship policies.

Background

Citizens of the Commonwealth of Kentucky, despite enjoying some of the lowest electricity rates in the nation, pay some of the highest electric bills in the United States. This is due in part to the combination of little financial pressure to conserve electricity and the typically low levels of energy efficiency in the vast majority of existing buildings.

Buildings account for 40 percent of the primary energy consumed in the United States, more than any other energy-using sector of the economy, including transportation and industry (Peterson). Buildings are indirectly the source of nearly half of total U.S. carbon dioxide emissions. Yet a majority of the American public remains unaware that the building sector is the largest energy consumer in the United States.

Within the past few years building design and construction practices have improved, with the goal of achieving substantial reductions in energy and electricity consumption. Many buildings being completed or built today consume 30 percent to 50 percent less energy annually than most of the dwellings and structures representative of the existing building stock. Such energy savings can often be achieved at an additional cost which is 1 percent to 3 percent greater than that of a conventionally constructed building (Fortune).

Largely as a result of recently created financial incentives, cities and states are taking the lead in implementing various mandates and standards for so called green building design and construction practices. Many of these practices focus on ecological strategies for reducing heating and cooling loads, reducing water consumption, reusing building materials for construction and landscaping, recycling water and other resources, and siting buildings near public commons where public transportation is available to help minimize the need for personal vehicles. Such green building practices, along with the use of more efficient appliances and heating, ventilation, and air conditioning (HVAC) systems, are encouraged and highlighted by energy rating systems for buildings. Two of the most widely used rating programs are the U.S. Department of Energy and the Environmental Protection Agency's Energy Star program and the U.S. Green Building Council's Leadership in Energy Efficient Design (LEED) rating system.

Kentucky is among those states pursuing more-efficient use of energy by embracing the green building movement. The Commonwealth's energy policy has been formed by several pieces of legislation beginning with a resolution passed by the Interim Special Subcommittee on Energy in 2003. The resolution noted that, "if Kentucky is to be competitive in the energy arena, a cabinet-level energy agency and statewide energy policy are fundamental building blocks."

The resolution added, "The development of a statewide policy on energy development, use, and conservation should be a top priority for the legislative and executive branches of state government." The resolution further urged the incoming administration "to create a cabinet-level agency to craft state policy and insure that developments in the energy field take place in a planned and purposeful fashion."

In November 2004, Governor Ernie Fletcher formed the Energy Policy Task Force and directed it to produce a report that would shape the development of energy policy. The report was to focus on maintaining Kentucky's low-cost energy as well as developing Kentucky's energy resources, all while preserving the state's commitment to environmental quality. The task force published its findings and policy recommendations in February 2005, in a report titled *Kentucky's Energy—Opportunities for Our Future—A Comprehensive Energy Strategy*. A status update was published in 2007 (Commonwealth. *Commonwealth*)

That report prompted several initiatives by both the legislature and the executive branches. The 2006 General Assembly responded to the recommendations of the task force by passing House Bill 299, the Kentucky Energy Security National Leadership Act. The bill required the Kentucky Office of Energy Policy (OEP) to develop and implement a strategy to promote the production of transportation fuels and synthetic natural gas from fossil fuels and biomass resources. HB 299 also encouraged energy efficiency measures in state construction projects.

During the second special session of 2007, the General Assembly passed HB 1, that established several incentives directed at the production and generation of renewable energy. HB 1 included provisions to further promote energy efficiency in the construction and operation of state government buildings, by establishing procurement and design preferences for greater energy efficiency. The bill also mandated this study of more energy efficient design and construction methods, and possible state tax incentives that might encourage increased efficiencies in the private sector.

HB 1 also restructured the OEP by attaching it to the Office of the Governor and formally granting it general oversight of the development and implementation of Kentucky's comprehensive energy strategy. Regarding efficiency, the OEP was mandated to provide leadership in the field of energy efficiency by supporting awareness, technology development, energy preparedness, partnerships, and resource development. OEP also was mandated to develop and implement major energy conservation programs involving all sectors of the Kentucky economy, including energy audits of educational facilities and state-owned buildings.

Aside from these legislative developments, the Department of Public Protection also responded to the *Kentucky's Energy* report by forming the Energy Efficient Housing and Construction Task Force in June 2006. The task force recommended to the Governor that

- state government should continue to improve the energy efficiency of state buildings;
- energy efficiency should be promoted in the construction of new homes and other buildings; and
- incentives should be created to encourage property owners to improve the efficiency of existing homes and other buildings.

The task force's March 2007 report outlined several strategies for achieving those goals, including

- making energy efficiency a key design feature for building and renovating state buildings;
- providing a means of inspecting new home construction in areas where no local building inspectors operate;
- adopting the 2006 International Residential Building Code's energy standards;
- providing a tax credit for construction of Energy Star homes; and
- increasing weatherization efforts across Kentucky.

In its recommendations, the task force noted that

> more than half of Kentucky's local jurisdictions have no local residential building inspector. Therefore, many new homes are not inspected for compliance with the Kentucky Residential Code, including provisions related to energy efficiency. While the current code is applicable to the entire state, the state inspectors do not have jurisdiction over detached, single family dwellings (Commonwealth. Kentucky. "Energy").

The task force also recommended providing homeowners incentives that would encourage the installation of renewable energy technology, such as solar electric (photovoltaic) systems and solar water heating systems. The panel suggested that Kentucky consider augmenting the federal solar power tax credits created by the Energy Policy Act of 2005 with a state tax credit of 30 percent of the cost of the system, up to a $1,000 maximum.

During the 2008 Regular Session, the General Assembly followed up by passing HB 2 that created Kentucky's current demand-side energy incentive package. The bill established four tax credits aimed at encouraging investment in energy-efficient buildings and building improvements by both individual and business taxpayers.

Current Developments in Energy Efficiency

There have been developments in the promotion of energy efficiency in the private building-construction sector, largely organized around the guidelines of the Leadership in Energy and Environmental Design Green Building Rating System (LEED). First developed by the nonprofit U.S. Green Building Council (USGBC) in 1998, LEED is described by its creators as a voluntary, consensus-based national system of ratings standards for developing high-performance, sustainable buildings of all types. LEED emphasizes strategies in five areas: sustainable site development, water savings, energy efficiency, materials and resources selection, and indoor environmental quality (U.S. Green Building Council. "An Introduction").These standards and ratings criteria are continually refined.

The LEED system works by granting points for various energy efficient or environmentally sustainable building design aspects. These points are then tabulated and measured on a set scale of certification levels. The system has become a primary model for green building standards enacted in the United States. As of May 1, 2008, the U.S. Green Building Council reported that developers of more than 3.5 billion square feet of building projects (representing more than 10,000 individual projects) have registered their intent to seek LEED certification ("LEED 2009 Vision").

There are other similar rating systems, including Green Globes, a project of the nonprofit Green Building Initiative. The Green Globes software system is an online, user-based assessment tool. A 2006 study conducted by the University of Minnesota comparing the LEED and Green Globes systems found that while LEED was more "rigid, time-intensive, and expensive to administer" than Green Globes, the two systems were nonetheless "quite similar" in that more than 85 percent of available points in the LEED ratings are also addressed by Green Globes (Smith).

In April 2008, the Home Builders Association of Kentucky established a voluntary program called Green Build Kentucky, a building rating and guidance system incorporating the green building guidelines of the National Association of Home Builders. Green Build Kentucky meets Energy Star standards for windows, insulation, and heating and cooling ductwork. The guidelines include such features as low-flush toilets to conserve water and flooring made from renewable, fast-growing bamboo.

Similar to the LEED rating system, homes rated by the Green Build Kentucky program receive points based on energy efficiency and conservation. Long-term sustainability is taken into account with points being assigned for building on a previously used lot rather than on an undeveloped (greenfield) site that may contribute to urban sprawl and result in increased energy use by the homeowner for future transportation.

Kentucky's largest home builder, Ball Homes, plans to build Energy Star homes exclusively (Fortune). In helping to launch Green Build Kentucky, Governor Steve Beshear noted that Kentucky has 1,600 Energy Star homes, which accounted for about 6 percent of new residential construction in 2007 and which, on average, saved $447 per year in energy costs. The national average for Energy Star home construction is 11 percent of total new residential units. In addition, there are 23 commercial Energy Star buildings in the Commonwealth, including 16 schools (Fortune).

While it was initially focused on new residential construction, Green Build Kentucky is now also planning a remodeling program for existing homes. Such homes account for more than 98 percent of all housing nationwide (Green. "Kentucky initiatives").

Moreover, green, or energy efficient, building design and construction practices are becoming increasingly popular as a low-cost route to reducing carbon dioxide emissions associated with the generation of electricity to power the buildings. Some 600 members of the U.S. Conference of Mayors have pledged efforts to shrink their municipalities' carbon footprints to meet the carbon emission reduction targets established under the 1997 Kyoto Protocol. Their efforts include improving the energy efficiency of new and existing buildings. (Green. "Ky. cities").

Energy-efficient technologies have already cut U.S. greenhouse gas emissions and dependence on nonrenewable energy sources during the past half-century, but they remain a largely invisible and underappreciated resource, according to a report by the American Council for an Energy-Efficient Economy. The council said investments in energy-efficient technologies since 1970 will have saved more than $74 billion by the end of 2008 and supported 1.6 million U.S. jobs. Energy-efficiency investments are estimated to have generated approximately 1.7 quadrillion British thermal units (Btus) of energy savings in 2004 alone, the council found. That equated to the energy produced by approximately 40 mid-size coal-fired or nuclear power plants.

> In short, the evidence suggests that efficiency can make an even larger contribution towards stabilizing energy prices and reducing greenhouse gas emissions—should we choose to fully develop it (American Council).

In 2006, biosystems and agricultural engineers at the University of Kentucky College of Agriculture demonstrated how Kentucky could obtain 25 percent of its projected energy requirements by the year 2025 through the maximum application of energy-efficiency measures and the maximum development of solar, wind, biofuel, and biomass resources (Colliver).

It is possible for green building standards to become realistic common practice. Technology and design advances have produced cost-effective strategies that can move new construction and, to a lesser extent, renovation, toward an energy-use benchmark that is 30 percent lower than the ASHRAE-90.1-2004 standard. [1] Getting the owners and building professionals to use those technologies and designs is the challenge.

Because resources and money could be saved if energy were consumed more efficiently in public and private buildings, investing in the materials and methods that can attain such efficiencies is

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[1] American Society of Heating, Refrigerating and Air Conditioning Engineers Standard 90.1: Energy Standard for Buildings Except Low-Rise Residential Buildings.

important. In public buildings, the state may construct and renovate to achieve such efficiencies. In the private sector, the state may encourage such investments through the grant of tax incentives. Alternatively, the state may mandate higher efficiency levels in the building code or amend the land-use policies and zoning laws to take into account certain collateral effects that buildings have on total energy consumption, such as forcing occupants to commute long distances.

What is not clear, and what this report will discuss, is how effective these two approaches would be at significantly increasing the efficiency of buildings in Kentucky. Further, the report will introduce the various methods currently being used to maximize energy efficiency in buildings and will evaluate the impact such methods could have on efficiency in Kentucky.

Chapter 2

Federal, State, and Local Incentives Offered

Past Federal Tax Incentives Aimed at Alternative Energy, Conservation, and Efficiency
Since 1970, the peak year for domestic oil production, many pressures have plagued the oil industry, both financially and politically. Following the embargo crisis of the late 1970s, Congress began to experiment with a new policy of conservation and alternative fuel production. This was first statutorily reflected in the Energy Tax Act of 1978 (Hymel).

That Act provided federal income tax credits for conservation investments made by individual homeowners and business owners, such as installing better insulation, as well as solar, wind, and geothermal energy generating systems. Most of these credits were phased out by 1992. However, the "gas guzzler" excise tax imposed on sales of vehicles with poor fuel efficiency remains in effect (Hymel).

The prosperity of the 1990s had a negative effect on such conservation polices. However, beginning around the year 2000, downturns in the national economy, the terrorist attacks of September 11, 2001, supply worries, and a steep rise in energy prices resulted in a new interest in energy conservation and efficiency.

Congress responded with the Energy Tax Incentives Act of 2005 (Public Law 109-58). This Act formed a comprehensive energy policy and created several new tax credits and deductions that, for the first time since the Energy Tax Act of 1978, were focused on efficiency and were available to individual taxpayers.

Energy Tax Incentives Act of 2005
The Energy Tax Incentives Act of 2005 (ETIA) established two credits and one deduction that were available to businesses. These included

1. a nonrefundable credit of 30 percent for purchase and installation of fuel cell power plants.[1]
2. a nonrefundable credit of 10 percent for purchase and installation of stationary micro-turbine power plants.[2]
3. a deduction of up to $1.80 per square foot of property on which are installed items that qualify as "energy-efficient commercial building property," defined by the Act to include items such as efficient interior lighting; heating, cooling, and ventilation systems; or water heating systems.

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[1] "Fuel cells" are defined in the Act as integrated systems composed of a fuel cell stack assembly and associated balance of plant components that convert a fuel into electricity using electrochemical means.

[2] "Stationary microturbine power plants" were defined in the Act as integrated systems composed of a gas turbine engine, a combustor, a recuperator or regenerator, a generator or alternator, and associated balance of plant components that convert a fuel into electricity and thermal energy.

ETIA also created a credit for the construction of homes that were certified as new energy efficient homes, as defined in the statute.[3] The credit is applied according to distinctions between manufactured homes and homes built on site.

- For manufactured homes that achieve an energy reduction amount of 30 percent over comparable structures, the credit amount is equal to $1,000.
- For all homes that achieve an energy reduction amount of 50 percent over comparable structures, the credit amount is equal to $2,000.
  This credit only applied to qualified new energy efficient homes acquired after December 31, 2005, and before December 31, 2007.

For individual taxpayers, ETIA included credits for investing in efficient property or improvements in existing homes. Below is a summary of the credits.

- A 10 percent credit for the purchase and installation costs of improvements such as qualifying insulation, windows, and efficient air and hot water systems. The maximum amount allowed under this credit across all tax years was $500, and it did not apply to property installed after December 31, 2007.
- A 30 percent credit for the purchase and installation costs of certain photovoltaic systems[4], solar water heating systems, and fuel cell property. The maximum amount allowed under this credit was $2,000 for each of the photovoltaic and solar systems, and $500 per 0.5 kilowatt of capacity in the fuel cell power system. This credit did not apply to such systems installed after December 31, 2007.

Originally, ETIA incentives were set to expire on December 31, 2007. However, the Tax Relief and Health Care Act of 2006 (public law 109-432) extended the incentives for an additional year, through December 31, 2008.

Energy Independence and Security Act of 2007
Near the end of 2007, Congress passed a new statement of comprehensive energy policy in the form of the Energy Independence and Security Act of 2007 (Public Law 110-140). This law addressed national energy policy issues such as environmental protection, conservation, vehicle mileage-emissions standards, and oil supply security.

In all, the Act is projected to save consumers and businesses more than $400 billion and reduce energy consumption by 7 percent through 2030, according to the American Council for an Energy-Efficient Economy. However, the final version of this bill did not include long-term extensions of the tax incentives established by the 2005 ETIA.

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[3] A "qualified new energy efficient home" was defined by the Act as one that satisfied the following energy reductions: 1) a level of annual heating and cooling energy consumption which is at least 50% below the annual level of heating and cooling energy consumption of a comparable dwelling unit; built in accordance with the standards of the 2003 International Energy Conservation Code; and having building envelope—the exterior walls of the home—component improvements accounting for at least 1/5 of such 50%; or 2) a manufactured home meeting those requirements; or 3) a manufactured home meeting those requirements up to a 30% reduction level, or certified to have received the Environmental Protection agency's Energy STAR-labeled homes program.

[4] A qualifying "photovoltaic property" is defined by the Act as property which uses solar energy to generate electricity for use in a dwelling unit used as a residence by the taxpayer.

American Recovery and Reinvestment Act of 2009

The various federal incentives were extended as part of the American Recovery and Reinvestment Act of 2009 (Public Law 111-5), commonly referred to as the federal economic stimulus package. This Act extended the incentives for efficiency improvements made to existing homes to include improvements put in place before December 31, 2010. For efficient systems used in new home construction, the incentives were extended through 2016.

Incentives Offered by the States

At the federal level, tax incentives for the oil and gas industry date back nearly a century, and credits for efficiency and conservation measures began in the late 1970s. At the state level however, such tax incentives are a relatively recent development.

Beginning around 2000, several states began offering various tax incentives for investments in energy efficiency. According to the North Carolina Solar Center's Database of State Incentives, as of 2008 there are 10 states, including Kentucky, offering some form of personal tax credit or incentive for individuals making efficiency investments, and 7 states offering some form of incentive for business and corporate taxpayers. Nearly all of the current state incentives have been enacted since 2000. As demonstrated in Table 2.1 and Table 2.2, the state programs vary widely. Kentucky's energy efficiency tax incentives will be discussed in detail in the following chapter and are omitted from the following tables.

Table 2.1
Incentives Available to Individual Taxpayers by State
As of 2008

State	Nature of the Incentive Offered	Dates of Availability
Arizona	Deduction equal to 5% of home sale price; excluding commissions, taxes, interest; points, and other brokerage, finance and escrow charges for the original owner of a new home certified as efficient by a certified home energy rating program; maximum amount is $5,000.	Deduction is available for taxable years beginning after December 31, 2001, and ending before December 31, 2010
California	Deduction equal to 100% of interest paid on loans offered by publicly owned utilities and used to purchase efficient heating, cooling, lighting, solar, or insulation systems	Deduction allowed for loans taken after October 1, 2001
Idaho	Deduction equal to 100% of installed cost of additional, but not replacement, insulation for residences existing or under construction at time of enactment	Deduction allowed for taxable years beginning on or after January 1, 1976; remains operative
Maryland	Credit for nonresidential and residential multifamily buildings owned by the individual taxpayer that meet efficiency criteria of the U.S. Green Building Council or other similar criteria; credits apply toward 20-25% of photovoltaic, 25% of wind turbines, and 30% of fuel cells installed cost	Credits allowed for amounts spent on or after July 1, 2001, and are available for tax years beginning after December 31, 2002, with an annual cap on the total number of credits allowed

Continued on next page.

Table 2.1 (continued)

State	Nature of the Incentive Offered	Dates of Availability
Montana	Credit equal to 25% of installed costs of efficient water, heating, or cooling system; Maximum amount is $500	Enacted 1981; amended 2003; no statutorily specified expiration date
New Mexico	Credit for both commercial and residential buildings. Buildings certified as sustainable by LEED ratings qualify for credits based on level of LEED certification attained	Available for structures awarded LEED certification on or after January 1, 2007
New York	Credit available to owners and tenants of eligible buildings and tenant spaces that meet certain green standards; amount is site/project specific; maximum amount of $2 million per building.	Credit certificates granted between January 1, 2001, and December 31, 2009
Oklahoma	Credit available to builder of an energy-efficient home or manufactured home completed after December 31, 2005; credit amount equal to the eligible expenditures not to exceed $2,000 for a home between 20% and 39% above the International Energy Conservation Code 2003 or $4,000 for a home that is 40% or above of the code.	Available for tax years beginning after December 31, 2005
Oregon	Credit available to homeowners and renters applied to cost of purchasing efficient appliances and operation systems; amount of credit equals the lesser of: 25% of the net cost of the appliance, or the state-mandated price; efficient duct systems qualify for a credit equaling 25% of the cost of the work, not to exceed $250; qualifying heat pump systems qualify for a tax credit of $300 to $500	Available for tax years beginning on or after July 1, 2005

Source: North Carolina.

Table 2.2
Incentives Available to Corporate/Business Entity Taxpayers by State
As of 2008

State	Nature of the Incentive Offered	Availability
Georgia	Credit for installed costs of renewable-energy and efficient systems. Amount equals 35% of renewable systems; 60 cents per square foot of space covered by lighting systems; and $1.80/square foot of space covered by efficient operations systems. Maximum amounts are $100,000 for lighting and other efficient products, and $500,000 for renewable-energy systems.	Available for projects completed on or after July 1, 2008, and on or before December 31, 2012
Maryland	See above description for individual taxpayer incentives, as corporate and individual taxpayers receive the same incentive.	
Montana	Deduction for capital investments that promote efficiency; credit amount capped at $1,800 for single or multifamily residences; credit amount capped at $3,600 for nonresidential buildings	Enacted 1975; amended 1989; no statutorily specified expiration date
New Mexico	See above description for individual taxpayer incentives, as corporate and individual taxpayers receive the same incentive.	
New York	See above description for individual taxpayer incentives, as corporate and individual taxpayers receive the same incentive.	
Oregon	Credit for investments in conservation, recycling, renewable energy resources, and sustainable buildings; credit equals up to 50% of costs including engineering and design fees, equipment purchase, and installation; full credit amount taken over 5 years at 10% per year; total available credit capped at $20 million for renewable energy equipment manufacturing facilities and $10 million for all other projects	Various portions of the program available for tax years beginning on or after January 1, 2007, and others on or after January 1, 2008; no statutorily specified expiration date

Source: North Carolina.

Market pressures help explain this sudden interest in the states offering their own tax incentives for private investments in efficiency and conservation. Six of the 10 states offering personal tax incentives are western states that have been experiencing high rates of population growth in recent years, coupled with supply and demand pressures in their energy markets. Perhaps the most well documented of these energy market situations was the California electricity crisis of 2000 and 2001, in which electricity customers experienced sudden and dramatic price spikes, along with rolling blackouts in service.

It became necessary for consumers in those markets to conserve and invest in greater efficiency, both to save money and also to ensure availability of electricity. Such investments would quickly pay off through the energy cost savings. The higher the electric rates, the faster the investments in efficiency would yield returns.

In this context, Kentucky's offering of tax incentives for efficiency investments is all the more striking, in that Kentucky has not experienced any such problems with its electricity market and continues to enjoy some of the lowest electric rates in the nation.

Incentives Available at the Local Level: Utilities

At the local level, incentives are usually offered by utilities and often take the form of cash rebates for efficiency improvements in the customer's property, low-interest loans to help pay for such improvements, or for installation of demand management tools such as air conditioning systems that switch off during periods of peak demand.

In Kentucky, there are at least 10 such utility rebate programs, and at least five loan programs (North Carolina). One example is a program offered by the Louisville Gas and Electric Company (LGE). The Demand Conservation program allows residential customers to choose either a "switch option" or a "programmable thermostat" option. In the first option, a customer allows LGE to install a switch on his or her air conditioning system, which reduces energy consumption during peak demand hours by switching the air conditioning system off for brief periods of time. In return, LGE gives the customer a credit of $5 per month during the 4 summer months of June through September, totaling $20 per year for each air conditioning unit on which a switch is installed (Louisville. "Demand").

The programmable thermostat option does not provide a rebate to the consumer. However, using the more efficient thermostat on the heating and cooling system reduces the customer's utility costs by 10 percent to 20 percent each year (Louisville. "Demand").

LGE, and its sister company Kentucky Utilities, also offers customers the opportunity to invest in renewable energy resources such as wind, solar, and hydroelectric energy. Through the Green Energy program, customers pay $5 for 300 kilowatt hours of pure renewable energy, which is delivered to the Kentucky transmission grid from its generation point at the Mother Ann Lee hydroelectric plant on the Kentucky River near Harrodsburg. Proceeds from customer contributions to this program go to further development of the Mother Ann Lee plant (Louisville. "Green"). In 2007, 920 new LGE and Kentucky Utilities customers signed up for this program (Green. "Ky. cities").

Many smaller utility providers, most of which are municipally owned or rural energy cooperatives, offer multiple programs. Wholesale energy suppliers and associations such as the Tennessee Valley Authority (TVA) and the Touchstone Energy Cooperative alliance encourage their member distributors to offer such programs emphasizing efficiency. Kentucky has 27 cooperative utility distributors that are members of the Touchstone Energy Cooperative network, and most of them offer efficiency rebates, low-interest loans, or other cash incentives to customers.

One typical example is the Pennyrile Rural Electric Cooperative (PREC), a member of the Touchstone network that purchases its wholesale electricity from the TVA, and which serves more than 46,000 customers in the Pennyrile region of western Kentucky. PREC offers its customers the incentives of the TVA's Energy Right program. These include cash incentives of $200 for installation of efficient heat pumps; $400 for installation of geothermal systems; and

$100 for installation of new efficient electric water heaters. PREC also offers customers in existing homes a low 8 percent simple interest loan of up to $10,000 for new heat pump systems, or $12,500 for geothermal systems. The loans may also be used for items such as added insulation and new more-efficient windows (Pennyrile).

PREC also gives its customers the option of investing in renewable energy through the TVA's Green Power Switch program. This is similar to LGE's Green Energy program, in that it allows Kentucky customers to purchase solar energy in blocks of 150 kilowatt hours at $4 per block, added to their regular bill. This solar energy is then added to the TVA's energy mix. Eight utility distributors in Kentucky currently take part in this program (Pennyrile).

As a distributor of TVA-generated energy, PREC also offers its customers a free home energy audit that demonstrates where energy is being wasted and could be used more efficiently. Along with this audit, the customer receives a free energy conservation kit that includes two compact fluorescent light bulbs, outlet and light switch gaskets, two faucet aerators, a hot water temperature gauge, and a home thermometer (Pennyrile).

Another example of a small Kentucky utility distributor offering efficiency incentives is the Paducah Power System. This utility is municipally owned, serves 22,500 customers, and distributes TVA-generated electricity. It offers cash incentives for efficiency improvements and low-interest loans for new electric water heaters and added insulation, similar to those offered by PREC (Paducah).

Chapter 3

Energy-efficiency Incentives in Kentucky

In 2008, HB 2 created the Commonwealth's current incentive package, focusing on promotion of demand-side conservation and efficiency. The bill established four tax credits aimed at encouraging investment in energy-efficient buildings and building improvements by both individual and business taxpayers. These incentives, codified at KRS 141.436 and 141.437, are summarized below.

Residential Energy Efficiency Income Tax Credit
This is a nonrefundable credit against the individual, corporate, and limited liability entity income taxes in the amount of 30 percent of the installed costs of

- Upgraded insulation, not to exceed $100,
- Efficient windows and doors, not to exceed $250, and
- Qualified energy property, not to exceed $250. [1]

These improvements must be installed in the taxpayer's principal place of residence, or a single-family or multi-family residential unit, and cannot exceed a total of $500 per taxpayer. A carry-forward of up to 1 year is allowed.

Solar/Wind Energy Efficiency Income Tax Credit
This credit applies to either the individual or corporate and limited liability entity income taxes and is nonrefundable. The credit is in the amount of 30percent of the installed costs of

- active solar space-heating system,
- passive solar space-heating system,
- combined active solar space-heating and water-heating system,
- solar water-heating system, and
- wind turbine or wind machine power system.

The various efficiency systems may be installed in either a personal residence, single-family or multifamily residential units, or on property owned and used by the taxpayer as commercial property. The total amount of the credit cannot exceed $500 if installed on personal or single-family residential units, or $1,000 if installed on multifamily residential units or commercial property. It may be carried forward up to 1 year.

[1] "Qualified energy property" is defined as property that meets the performance, quality, and certification standards of, and that would have been eligible for, the federal tax credit for residential energy property expenditures under 26 U.S.C. sec. 25C, as it existed on December 31, 2007. Such property includes electric heat pump water heaters, electric heat pumps, various geothermal heat pumps, central air conditioners, natural gas, propane, or oil furnaces or water heaters, hot water boilers, or advanced main air circulation fans.

Commercial Property Energy Efficiency Income Tax Credit
This credit applies to the corporate and limited liability entity income taxes only and is also nonrefundable. It may not exceed 30 percent of the installed costs of

- efficient interior lighting systems, not to exceed $500, and
- efficient heating, cooling, ventilation, or water heating system, not to exceed $500.

This credit may only be taken if the systems are installed on commercial property. The maximum amount allowed per taxpayer is $1,000. It may be carried forward for 1 year.

Energy Star Home and Energy Star Manufactured Home Tax Credit
This credit applies only to the corporate and limited liability entity income taxes. It is nonrefundable, with no carry forward. The maximum credit available is $800 for a taxpayer who builds an Energy Star home in Kentucky to be used only as a principal residence or $400 if the taxpayer sells a newly manufactured Energy Star home.

All of these credits are effective for taxable years beginning after December 31, 2008, and beginning before January 1, 2016.

Kentucky Bluegrass Turns Green Program
In addition to these tax incentives, 2008 HB 2 also established the Kentucky Bluegrass Turns Green Program. This program concentrates on demand-side management and conservation by offering funding assistance for efficiency projects in both public and private-sector buildings. The program consists of a grant fund for public building projects and a low-interest loan fund for private building projects. Disbursements from the funds are to be used for engineered demand-side management projects.

The private-sector loan fund provides loans at the prime interest rate, minus 1 percent, with simple payback periods of no more than 5 years for projects ending on or before June 30, 2013, and no more than 12 years for projects beginning on July 1, 2013.

HB 2 authorized $50 million in bond funds in fiscal year 2009 for the Bluegrass Turns Green public grant fund and $30 million in bond funds in the same fiscal year for the private-sector low-interest loan fund.

Comparison of Federal Incentives to Those Established by HB 2
Table 3.1 shows the efficiency incentives created by HB 2 that are based on those offered by the federal government in the 2005 ETIA, as extended through later legislation.

Table 3.1
Comparison of State and Federal Tax Incentives

Incentive Created by 2008 HB 2	Incentive Created by 2005 ETIA
Residential Energy Efficiency • 30% of insulation, windows, other similar property costs • residential property only • $500 cap per taxpayer	Residential Energy Efficiency • 10% of insulation, windows, air and hot water system costs • existing residential property only • $500 cap per taxpayer
Solar/Wind Energy • 30% of solar space and/or water heating system, wind turbine system costs • residential or commercial property • Single residential cap of $500; Multifamily or commercial cap of $1,000	Solar/Fuel Cell Energy • 30% of solar water heating systems, photovoltaic systems, and fuel cell energy system costs • residential property only • $2,000 cap for each of the solar and photovoltaic systems
Commercial Energy Efficiency • 30% of lighting, hot water system, and heating-cooling-ventilation system costs. • commercial property only • $1,000 cap per taxpayer	Commercial Energy Efficiency • $1.80/sq. ft. deduction on property with efficient lighting, hot water, and heating-cooling-ventilation systems installed. • commercial property only
Energy Star Home Construction • $800 for building a certified home • $400 for selling a certified manufactured home	Efficient Home Construction • $2,000 for homes with 50% reduced consumption • $1,000 for manufactured homes with 30% reduced consumption

Chapter 4

Effectiveness of Incentive Programs

Federal Incentives

Tax incentives can be effective at spurring private investment in energy efficiency generally and in developing a more efficient energy market based on renewable sources, if carefully crafted and given a stable, reliable, and long-term availability.

Federal incentive programs aimed at energy efficiency date only to 1978, and the various state programs are even more recent. This makes it somewhat difficult to accurately evaluate their actual successes and failures.

However, one report conducted in September 2004 reexamined earlier studies and adjusted for certain external factors and found that tax incentive programs had a positive and significant impact on conservation. The report stated that a 10 percent incentive on the price of an energy conservation investment led to a 24 percent increase in the probability of making the investment (Gillingham).

Another study compared national incentives with those granted to the oil and gas sectors of the national energy industry. The study found that such tax incentives are not only successful but are critical to the development of the efficiency, conservation, and renewable-energy industries. Incentives are needed to help reduce the risk involved with investing in this industry that currently lacks a strong, dedicated market (Hymel 75).

Early in the twentieth century there was little domestic petroleum production and not a large consumer market for it. The development of the industry since that time is due in large part to federal tax incentives that greatly reduced the risk involved in oil exploration and production and that made the business virtually free from income tax (Hymel 66). Such tax policies encouraged production, which led to consistently low prices for oil and gas, which in turn encouraged the consumer market for oil. The resulting national economy based on plentiful and inexpensive oil helped encourage the American car culture.

Those federal tax incentives greatly benefited the new and developing fossil fuel industry by reducing risks and increasing profits. Today, similar tax incentives directed at energy efficiency measures, and also to renewable and alternative energy sources, could have similar results in developing those sectors of the overall energy industry. This means incentives must be substantial enough to reduce the risks inherent in developing a new industry that lacks a firm consumer market.

Availability of incentives must also be stable and reliable over the long term. The oil and gas industry has relied on the percentage depreciation and intangible drilling costs deductions' consistent availability for nearly a century. The various incentives for conservation and renewables, on the other hand, have been offered only on an intermittent basis at the federal level and completely unavailable at the state level until recently. For example, the 2005 ETIA incentives were initially only available for 2 tax years, and the incentives created by HB 2 are only available for 7 tax years. Studies suggest that to be most effective, these incentives should be available for at least 10-year periods (Hymel 78).

The limited and unpredictable availability of these incentives impacts their success, which has been demonstrated by developments in U.S. wind-energy industry. Congress included wind energy development in its 1978 incentive scheme. In 1992, it went further by enacting the production tax credit for wind energy (Hymel 75). Taking advantage of the production tax credit, the domestic wind energy generation industry became the world leader, with annual electricity production from wind quadrupling (U.S. Joint).

However, the production tax credit was not permanent and has at various times expired and then been extended (American Wind. "The Economics"). During times when the tax credit was not available, the U.S. fell behind other countries in developing new wind technologies (Hymel 76).

The American Wind Energy Association noted that even a 5-year extension of the tax credit "would provide enough long-term certainty" to lower vendor costs an additional 25 percent. During 2007, the domestic wind energy generating capacity increased by 45 percent, a new record, with over $9 billion in investments. This was due largely to the production tax credit, which was available during that year (American Wind. "The Economics").

Summary of Incentive Effectiveness Generally

The federal incentive programs that encourage private investment in the energy industry have been successful when offered at levels sufficient to overcome financial risks and for terms long enough to allow investors to rely on their availability. New and expanded incentives aimed at the efficient use of energy and at producing energy from alternative and renewable sources could further benefit these industries at the state and national levels.

Kentucky Incentives

It is impossible to accurately predict the number of Kentucky taxpayers who would be interested, willing, and financially able to invest in the energy efficient home or business improvements that qualify for HB 2 tax credits. Therefore, it is not possible to predict the number of taxpayers who would take advantage of the credits and what impact the credits would have on the efficient use of energy.

Effect of Kentucky's Low Electricity Rates and Long-term Recoupment

There are many noneconomic factors that motivate some people to invest in energy efficiency, such as the environmental benefits of decreasing energy consumption and decreasing carbon emissions. However, because the HB 2 incentives are designed to appeal to the financial aspects of investing in greater energy efficiency by mitigating upfront costs, these factors must be examined closely when judging the incentives' probable effectiveness.

In this respect, HB 2 incentives will likely be less effective than similar incentives offered in other states or on a national level, due to the current and historical low cost of electricity in the state. Kentucky has long had some of the lowest electricity rates in the nation because of the abundance of coal. In 2006, Kentucky's average retail price for electricity was lower than that of six of the seven surrounding states. Only West Virginia had a lower rate. Kentucky's average price was

- 14% lower than Missouri,
- 16% lower than Indiana,
- 21% lower than Virginia,
- 22% lower than Tennessee,
- 23% lower than Illinois,
- 30% lower than Ohio, and
- 39% lower than the national average (U.S. Dept. of Energy. Energy Information. State retail).

The state's low price of electricity makes efficiency investments less attractive for Kentucky consumers because it would take longer for the consumer to recoup the cost of the improvement though energy savings than for consumers in markets with higher electric rates. In recent years, some states have seen dramatic price increases, and even supply disruptions, in their electricity markets. Such events have created an urgent need for consumers in those states to conserve energy, both to save money and to ensure supply. In Kentucky, no such urgency exists because the state has not experienced high prices or supply disruptions.

To illustrate this situation, consider a hypothetical home owner in Kentucky and one in California. Each purchases and installs a $500 solar water heating system, which is estimated to save 500 kilowatt hours (kWh) per year. The Kentucky homeowner, purchasing electricity at the 2006 average rate of 5.43 cents/kWh, the homeowner would recoup the cost of the system in just over 18 years. The California homeowner, purchasing electricity at the 2006 average rate of 12.82 cents/kWh, would recoup the cost of the same solar system in less than 8 years.

In this hypothetical example, the recoupment period is approximately 10 years longer in Kentucky than in California. This helps illustrate why incentives to mitigate the upfront costs of efficiency investments may be more successful in states with higher electricity rates than in states with lower electricity rates. Even if a taxpayer is able to take advantage of a credit for the cost of efficiency improvements, the financial considerations of this long recoupment period would often make it undesirable to invest large amounts of money in more efficient operating systems.

Effect of the Credits' Nonrefundability

Because the credits in HB 2 are non-refundable, only taxpayers with a tax liability can take advantage of them. Therefore, many people with small incomes are not eligible for the assistance of the credit. These segments of the population are often those living in the least energy-efficient structures: older homes with poor insulation or with older appliances and heating/air conditioning systems. As established, HB 2 may provide an incentive more available to the generally financially affluent but less available to those of more modest means. A system that is available on a more equal and universal basis to all home and business owners, such as cash rebates for efficiency investments, would help solve this problem and increase overall energy efficiency.

Effects of Various Other Economic Factors on Incentive Programs
The HB 2 incentives are primarily directly to three groups of taxpayers: home builders, home owners, and business owners, all of whom have a tax liability enabling them to take the credits and who have not already made such efficiency investments in their properties. These groups are being affected financially by gasoline and home prices.

Gasoline Price Increases. According to the Energy Information Administration's Short-Term Energy Outlook, during the summer of 2008 the price for crude oil was still increasing to new records, roughly doubling since 2006 (U.S. Dept. of Energy. Energy Information. "Short-term").

The Energy Information Administration has projected that prices that averaged $72 per barrel in 2007 will average $122 in 2008, resulting in higher prices for all petroleum products globally. Although prices have dropped in 2009, it is unlikely that they will remain low as world oil consumption is projected to increase by 1.2 million barrels per day in 2008 (U.S. Dept. of Energy. Energy Information. "Short-term").

Home Price Decreases and Foreclosures. The home foreclosure rate is rising to levels not seen since the Great Depression, as many homeowners owe more than their homes are worth and have no recourse but to abandon their investments. According to the U.S. Office of Federal Housing Enterprise Oversight, home prices fell 3.1 percent between the first quarter of 2007 and the first quarter of 2008, marking the largest decline in the home purchase price index in its 17-year history ("News Release").

In Kentucky, while the home price index rose 2.81 percent in the first quarter of 2008, that was the smallest such increase since 1991. Twenty-two states experienced declines in the home price index during this quarter (U.S. Office of Federal Housing. "State HPI").

New Home Sales Decrease. New home sales are also on the decline. According to U.S. Census Bureau quarterly reports, sales of new one-family homes in March of 2008 were 36.6 percent below the number of sales for March 2007 (U.S. Census Bureau. "News Release").

All of these factors affect the possible effectiveness of the HB 2 incentives. In an economy where families are earning less while paying more for items such as gasoline, investing in energy-efficiency improvements may be difficult to manage, with or without state income tax incentives, and even if they will save money over time.

Similarly, for new home builders who are experiencing sales declines, the offer of tax credits that offset up to 30 percent of the cost of energy-efficient investments that may not impact sales, may not be enough to justify the expense.

Future Trends in the National and Global Energy Market and Corresponding Effects on Kentucky's Energy Consumption and Incentive Policies

Evolving trends in the energy market may also affect the success of Kentucky's incentive package, and the policy may need to be changed as a result. The long-term global market for energy from all sources will see rising demand, with supplies holding steady or decreasing, which will cause prices to rise.

The U.S. Department of Energy projects that the trend of higher production prices and delivered prices for crude oil and natural gas will continue until at least 2030 (Energy Information. Annual. "Energy Trends"). In the short term, consumer response to price increases is expected to cause a brief decrease in demand and, therefore, price, until 2016, when prices are expected to rise again. Coal prices are projected to fall from $1.21 per million Btu in 2006 to $1.14 per million Btu in 2018, in response to fluctuations in demand and the market response to substantial price run-up in recent years. However, after 2020, coal prices are projected to increase again, along with all energy prices generally, as global demand increases (U.S. Dept. of Energy. Energy Information. Annual. "Energy Prices").

Beyond production prices, the department also projects that the delivered price of most energy fuels will increase between 2008 and 2030. To illustrate, increased diesel fuel prices have caused railroads to pass the transportation costs along to consumers via fuel adjustment surcharges on coal shipments. These surcharges will cause the average delivered price of coal to power plants to increase from $1.69 per million Btu in 2006 to an estimated $1.78 per million Btu in 2030 (U.S. Dept. of Energy. Energy Information. Annual. "Energy Prices").

Electricity prices also follow this trend. The department projects that delivered electricity prices will peak at 9.3 cents per kilowatt hour in 2009, decline until 2015, and then begin to increase again, reaching 8.8 cents per kilowatt hour in 2030 (U.S. Dept. of Energy. Energy Information. Annual. "Energy Prices").

Beyond price increases related to the supply and demand market pressures, energy prices will likely increase due to environmental protection policies as well. The Carbon Management Report, released in December 2007 by the Governor's Office of Energy Policy, along with the University of Kentucky's Center for Applied Energy Research, the Kentucky Geological Survey, the Public Service Commission, and the Environmental and Public Protection Cabinet, concluded that future federal legislation will likely raise the price of coal significantly (Commonwealth. Governor's. "Carbon").

The report stated that while such legislation may take the form of carbon taxes or carbon cap and trade programs, any such legislation would significantly raise the price of coal and, therefore, the price of electricity generated from coal. The report estimated that the cost of installing carbon emission capture and sequestration facilities at existing coal-fired power plants would be passed on to customers, resulting in rate increases ranging from 50 percent to 300 percent (Commonwealth. Governor's. "Carbon" 3).

Summary of the Effects Market Trends Will Have on Energy Consumption and Policy
Global demand increases and supply decreases, along with a national policy favoring reductions in carbon emissions and greater investment in energy alternatives and conservation, will likely cause Kentucky consumers to reevaluate the way they use energy.

The current low cost of electricity in Kentucky is not expected to rise dramatically in the short term. To the contrary, it is projected to fall along with the national average until at least 2015, which is when the credits of HB 2 are set to expire. For the average home or business owner, declining electricity costs will not encourage spending on energy-efficient systems, despite the offer of a tax credit covering 30 percent of the cost.

As studies indicate, incentives can work but only if they are substantial enough to mitigate the real costs of private investments; offered for a substantial, reliable term of years; and if the investments made result in energy savings for the customer. In Kentucky, with its relatively low energy costs, the immediate need for such investments is not as great for the average consumer as it is in other states with higher energy costs.

Alternative Forms of Incentives: Rebate and Trade-in Programs
State and local governments can offer a wide variety of incentives to encourage private development of more efficient buildings, such as low-interest loans, cash rebates, and trade-in and leasing programs. The American Institute of Architects (AIA) maintains an up-to-date listing of the available options for federal, state, and local building incentives.

The AIA database includes information on the following types of alternative green building incentives:

- Discounts or cash rebates for energy-efficient appliances and operating systems
- Grants and low-interest loans that can offset some of the increased development costs that arise from a green building project
- Technical guidance for efficient and sustainable designs
- Reduction of permit and zone fees in return for achieving specific levels of efficiency certification by LEED or similar rating systems
- Trade-in or lease programs in which government entities provide efficient equipment to businesses and residents to help defray the initial cost of purchase and installation, making greater efficiency attainable where it might not be affordable otherwise
- Expedited and streamlined permitting for green buildings/developments

The cash rebate option is one of the most direct and substantial alternatives to income tax credits. Rebates would serve to mitigate the initial cost of the investment just as tax credits do; however, the consumer would realize the benefit of a rebate immediately and over the long term as energy savings accumulate, thus addressing the long recoupment period of other options.

A cash rebate program would also solve the universal availability issue resulting from nonrefundable credits. Not only could all taxpayers receive a rebate for efficiency improvements, regardless of their tax liability, but tenants could also receive them for improvements made in their leased or rented property.

One problem with offering such a rebate program would be how to fund it. However, various sources of funding are available to assist state rebate programs. Among its many provisions, the 2005 ETIA appropriated $50 million for each of the fiscal years 2006 through 2010 to a grant program that would give states funds to supplement, but not supplant, state funds already appropriated to programs providing cash rebates to residential consumers who replaced appliances with new Energy Star appliances. The federal funds could supply up to 50 percent of the cost of the state rebate program.

Trade-in programs would similarly be available to all taxpayers on a more equal basis than nonrefundable tax credits would be. Various state agencies could purchase efficient property in mass quantities, such as fluorescent light bulbs, and then allow consumers to trade in their old incandescent light bulbs. This alternative would essentially shift the cost of the initial investment away from the individual and onto the state.

Incorporating Efficiency Goals Into All State Tax Incentive Programs
Another option for the state to increase demand-side conservation and efficiency beyond the HB 2 incentives would be to link these goals to all the state's economic development tax incentive packages, including the various tax increment financing projects, offered to localities and private-sector entities. As an added requirement for receiving any state tax incentive for building, expanding, renovating, or locating a business or other structure in Kentucky, the state could require the project to attain a specified level of efficiency.

Any such requirement could be crafted for each project, according to specific needs and resources, or could be tied to established building rating systems such as the LEED Green Building Rating System. Further, the incentive could be tiered so that the recipient would receive a benefit according to the level of efficiency or certification achieved by the project. By incorporating efficiency into all state tax incentive projects, the state would be advancing the goals of the incentive programs such as new employment and economic development, while also advancing the goals of the demand-side energy conservation and efficiency policy.

Such a requirement would be similar to the one on the federal level that all construction projects using federal tax dollars must first conduct an environmental impact study to discover any possible environmental detriments that the project may cause. This option could apply in Kentucky to public or private projects receiving state funding or tax incentives.

Conclusion

For a variety of reasons, tax incentives for efficiency may be unlikely to have a significant impact on private investments in Kentucky, at least in their current form under HB 2. As the credits created in HB 2 expire, the projected price reductions caused by temporary demand decreases will just be beginning to reverse, beginning a trend of price increases that will continue nationally and globally until at least 2030. At that time, if prices increase at the currently projected levels, consumers would likely begin to conserve energy and use it to maximum efficiency regardless of any tax incentives encouraging them to do so, as the rising prices will leave them little alternative. In this regard, the incentives of HB 2 may actually prove to be unnecessary over the long term.

With so few examples of previous state incentive programs to follow, it is difficult to know with certainty what impact Kentucky's incentives will have. Therefore, it is difficult to evaluate whether more incentives are needed or whether Kentucky taxpayers would eventually invest in efficiency regardless of any incentives offered by the state.

The incentives of HB 2 serve as a good starting point in the development of a comprehensive state energy policy. However, it is unclear if they could cause any substantial change in short- and long-term energy use in Kentucky.

Chapter 5

Alternatives to Incentives

Tax incentives and rebate programs are popular tools but they are not the only options available to state government. In Kentucky, the General Assembly has power over state and local government procurement and building practices, as well as over private building and land-use practices via zoning laws and the building code. Using such methods may be more effective at creating the direct changes in energy use.

Circumstances such as the low cost of electricity in Kentucky and the current downturn in the state and national economies make it less likely that tax incentives alone will motivate many taxpayers to invest in greater energy efficiency in their homes and businesses. That does not change the fact that over the long term, energy prices will increase with increasing global demand for limited fossil fuel resources. Also, pressure to decrease air emissions and other pollution resulting from the use of fossil fuels may reduce the acceptability of these fuel sources and will likely make them more expensive.

Therefore, despite current prices and abundant supplies, it is in the public interest, both economically and environmentally, for the state to lessen its dependence on fossil fuels for energy and to increase the efficiency with which the state uses its energy resources. Looking beyond incentives to motivate voluntary private efficiency investments, the state may force increased efficiency in the private sector in a number of ways.

Kentucky law governing land use and zoning is codified in Chapter 100 of the Kentucky Revised Statutes. The building code is at KRS 198B.050. These statutes grant the ultimate authority over zoning, land use, and the building code to the General Assembly. By incorporating design standards and practices that are already well established by environmental design systems such as LEED and Green Globes, the General Assembly could mandate the changes it has sought to encourage though tax incentives.

State Building Code

The Kentucky Building Code is largely based on the International Building Code and the International Energy Conservation Code, as well as other specific codes. The energy code sets a minimum standard for efficiency. Some advocates of improving building energy efficiency have suggested that state building codes be amended to mandate more stringent efficiency standards that would apply to all new residential and commercial construction.

Twenty-two states approved new energy and energy-efficiency policies in 2007 and 2008; many have incorporated some form of building code mandates for greater efficiency. So far these policies have largely focused on state government buildings in an effort to both save on state energy costs and lead by example. The movement to increase efficiency standards for all new buildings through building code mandates is gaining support (Koch).

Officials of the Kentucky Department of Housing, Buildings and Construction argued that such blanket mandates could result in increasing the cost of construction for new, entry-level starter homes, potentially making such homes beyond financial reach for many residents (Mann). They also noted that budget constraints for hiring state building inspectors leave approximately half of the counties without a local building inspector to properly enforce compliance with any new efficiency mandates.

The statute that grants to the Board of Housing, Buildings and Construction the authority to promulgate the building code already mandates that the code “shall be comprehensive and shall include but not be limited to provisions for general construction; structural quality…and life safety….” The statute further mandates that this code shall “[t]o the extent practicable, set forth standards, specifications and requirements in terms of performance objectives, so as to facilitate the use of new technologies, techniques, and materials” in order to “[p]rotect the public health, safety, and welfare” (KRS 198B.050). Issues surrounding energy use, efficiency, and the environmental impact of buildings certainly fall under this broad authority.

The code is based, in most part, on uniform building codes promulgated by national, nongovernmental entities. It is common for local governmental units to amend the model code. Performance standards set out in a uniform system such as LEED could be added in such an amendment. The code could, for example, be amended to mandate higher building performance objectives for electricity efficiency in new construction by increasing the minimum amount of insulation required or by prohibiting use of incandescent lighting in favor of fluorescent. These would be simple changes that might increase construction costs but would also increase efficiency and advance the state’s energy-efficiency policy.

Some of the LEED standards that could be inserted into the code do not involve installation of costly operation systems but instead call for changes in the design of the building. One such example is the emphasis on use of natural light for interior spaces. The more exposure to natural light a building has for its interior working space, the higher the LEED rating for light efficiency.

Many LEED-certified buildings have achieved high values for this criterion by locating all the mechanical operating systems at the inner core of each floor, with the human working spaces arranged along exterior walls made largely of glass, thus maximizing the use of natural light during daytime working hours. The building code could be amended to mandate such design techniques in new construction wherever possible. This is an example of an amendment to the code that may increase design and construction costs incrementally while yielding significant gains in efficiency.

Overall, the building code is complex and provides many opportunities for mitigating the higher initial construction costs that result from some of the efficiency standards. For instance, the code could distinguish between buildings by size or class and mandate higher efficiency standards only for larger projects that would be better able to absorb the initial costs, while taking into account the long-term energy savings.

A good example of such a requirement is a recent development in Hawaii. In June 2008, Hawaii became the first state to require solar water heaters in almost all newly constructed homes. These water heaters cost approximately $6,000, while regular electric models of similar capacity cost approximately $700. This cost disparity seems drastic, until the price of energy is taken into account. Hawaii currently has the highest average retail electric rate in the nation. One estimate noted that average electric bills for residential consumers could be reduced $50 per month ("Hawaii").

Exceptions could be made for homes that will be built in specified areas of low light that would impact a solar system's effectiveness ("Hawaii"). This demonstrates how new requirements in a state building code could be carefully drafted to accommodate for different building types, sizes, locations, and uses.

Land-use Policies

Changing the zoning and land use policies could reap benefits in efficiency. In a recent Brookings Institution study, Kentucky's two largest cities, Lexington and Louisville Metro, rated among the worst in the nation for atmospheric carbon footprints. Lexington was rated the worst city in the nation, among the largest 100 metropolitan areas, and Louisville was rated fifth worst overall. When looking only at residential electricity use per capita, Louisville rated third worst behind Lexington and Washington, D.C. Several leading factors for these ratings included these cities' reliance on cheap electricity generated largely from fossil fuels and urban sprawl that encourages driving rather than walking, biking, or use of mass transit (Brown).

By amending land-use policies to discourage sprawling development in favor of building within the urban core, state and local governments could increase efficiencies among the private sector. A focus would be on encouraging people to live near their places of work and school, walking, and increased development and use of mass transit. Such a policy could take many forms, such as property tax rebates or exemptions for new development within the urban core, tax incentives for locating a new business or residential development along bus lines, or mandates for developers to provide for sufficient pedestrian access to sidewalks.

LEED awards points for these design elements, recognizing that by making it possible for employees or residents of new developments to walk, bike, or use mass transit to reach their destinations, the energy use and total environmental impact of a building development would decrease.

Leading and Educating by Example: Public School Construction

Many people do not understand what is involved in building or renovating for energy efficiency and often assume it will be difficult or expensive. To encourage energy efficiency in building design and use in the private sector, apart from incentives or mandates, Kentucky should first address these areas of confusion through more public awareness, and in leading by example.

One area in which Kentucky has already made strides in raising public awareness and leading by example is through its Energy Star school construction effort. According to a recent report of the Office of Energy Policy, as of March 2008, Kentucky had more public school facilities qualifying as Energy Star buildings than any surrounding state. At the end of January 2008, of the 22 Energy Star labeled buildings in the state, 12 were primary or secondary public schools (Commonwealth. Governor's. "Building Energy").

The report found that annually, these 12 schools saved an estimated $474,000 in energy costs and reduced related carbon emissions by 6 to 7 tons. In existing facilities that have been renovated to achieve the Energy Star certification, energy savings have been measured as high as 25 percent.

One example of such an effort is the John L. Ramsey Middle School constructed in 2008 in Jefferson County. The school cost approximately $16.4 million to construct and features 130,000 square feet on two levels. It uses high-tech glazed windows that allow heat to pass through during the winter but not in the summer. Solar panels heat the school's water, and classroom lighting is controlled by motion sensors to reduce electricity consumption (Konz).

By focusing these efficiency efforts in neighborhood schools throughout the state, communities will be better informed about possible savings through technologies and design practices. Another benefit of the Energy Star school effort is that the school building itself becomes a teaching tool. Students will learn firsthand about energy efficiency by observing and examining their own schoolhouses.

Kentucky should expand efforts such as this to all public buildings, both to save tax dollars, to encourage Kentuckians to take similar steps, and to better inform the public of the importance and possibilities of prioritizing energy efficiency. To assist in this effort, Kentucky should seek out and take advantage of all possible funding sources, including federal funding that is currently available and new federal funding that may be appropriated in the near future.

The 2005 ETIA appropriated $30 million for each of the fiscal years 2006 through 2010 to a grant program that assists states in the construction or renovation of public buildings that achieve at least a 30 percent reduction in energy consumption.

In June 2008, the U.S House passed H.R. 3021, the "21st Century Green High-Performing Public Schools Facilities Act." The bill would authorize $6.4 billion in annual grants to states for renovation of public school buildings. Ninety percent of the funds would be required to be used for efficiency projects certified by LEED, Energy Star, or a similar rating system. Grants under this proposed legislation would be provided to states according to the percentage of funding they receive under Title I, which means Kentucky could receive federal grants of approximately $93 million. This money could be used to further expand efficient school construction and renovation.

Chapter 6

Current Methods To Increase Energy Efficiency

Building Design and Construction

In general, highly energy-efficient buildings use less energy, cost less to operate, use less in the way of natural resources, and produce less environmental impact than conventional buildings. But the process of designing, constructing, or renovating a high-performance building is different from traditional design/build methods. The whole-building design approach integrates building design and siting, including the use of components that feature the latest in energy-efficient technologies and practices, evaluation of all building materials for environmental preference, and completion of a base-case analysis to understand design strategies that will have the greatest impact on the design for a particular building function.

In the whole-build approach, a building's architectural design is considered with its energy design. The capacity of mechanical and electrical systems can be minimized by incorporating passive solar technologies to help meet indoor space-conditioning requirements and lighting loads. Building simulation software can guide decisions to achieve this strategy. All suggested design changes should be re-evaluated through simulation before implementation to ensure they will not detract from meeting building design goals.

Over the course of the last 10 years, this field of efficient, high-performance green building has developed rapidly. Many green design and construction techniques have moved beyond the planning stages and are commonly used in the construction industry. Today, many builders, developers, and urban planners rely on the LEED ratings standards as the primary guideline for all green building, in terms of energy efficiency and cost-savings and for environmental sustainability and stewardship.

Currently employed methods of increasing energy efficiency in building design and construction include a variety of measures. They range from proper site selection and building orientation that allows newly constructed buildings to take greater advantage of passive solar heat gain, to simple steps such as sealing air leaks around doors and windows. Renewable energy systems, such as solar water pre-heaters, active solar space heating systems, and solar electric (photovoltaic) panels used to offset some of a building's electric usage through self-generation and net metering, are also becoming more popular.

Most methods currently used for increasing building energy efficiency are focused on minimizing unwanted solar heat gain, maximizing usable natural light and heat, and minimizing building heat loss through air leaks around windows and ductwork. Some of the most common measures currently employed to achieve these goals are detailed below.

Passive Solar Design Techniques
In building planning and design, passive solar techniques are those that take advantage of solar heat and light to offset the need for gas or electric heating, air conditioning, and lighting. They are different from active solar systems, such as photovoltaic solar panels, which transform solar rays into electricity for home use.

Common passive solar tactics include south-facing building orientations that absorb and store solar heat during the winter and deflect solar heat during the summer, and "daylighting," or maximizing the use of windows and full-glass exterior walls, often covered in a heat-deflecting glaze, to allow natural lighting into the building's interior work spaces, while minimizing the heat gain that might normally result.

According to the U.S. Department of Energy's Building Technologies Program, new construction offers the greatest opportunity for incorporating passive solar design features. New construction and retrofit projects may also incorporate daylighting strategies that include skylights and light-sensing controls that reduce artificial lighting in response to changing levels of daylight, heat control techniques such as exterior shades or overhangs, and passive solar heating strategies to allow for reduced use of HVAC systems. Passive solar design provides the opportunity to integrate various building components such as exterior walls, windows, and building materials to collect, store, and distribute solar energy (U.S. Dept. of Energy. Building. "Passive").

Thermal Storage
Thermal storage may be implemented in individual building projects in numerous ways. Some of the most common strategies include strategic window placement and daylighting design, selection of appropriate glazing for windows and skylights, appropriate shading of glass to prevent undesirable heat gain, use of light-colored materials or paint for building envelopes and roofs, careful siting and orientation, and appropriate landscaping. Shading strategies may include overhangs and porches, trees and other vegetation, removable awnings, exterior roll-down shades, or shutters.

Passive solar heating systems in a building with south-facing orientation can be combined with solar heat-storing trombe walls or floors made with concrete, tile, brick, stone, or masonry that absorb solar heat, store it, and then slowly release the heat into the building.[1] Due to the angle at which solar rays reach the earth's surface during winter, a south-facing building with a large overhang will be able to absorb the heat of the sun, lessening the need for energy-consuming heating systems. During summer months when solar rays arrive at a much higher angle, the overhang shades the building, eliminating much of the heat gain that would otherwise result and reducing air conditioning use.

According to the Department of Energy, energy cost reductions of 30 percent to 50 percent below national averages are possible with 45 cents to 75 cents per square foot annual savings in

[1] A "trombe wall" is an exterior wall located to face solar rays. During daylight hours, heavy material in the wall, such as concrete or stone, stores heat from the sun (thermal storage). On the interior side of this material, a small air space is vented into the interior space of the structure. As the solar heat stored within the wall is slowly released, it heats this interior air, decreasing the need for active, energy consuming heat systems.

new office building designs if an optimum mix of energy conservation and thermal storage design strategies are applied (Building. “Thermal”). However, the department noted that it is rarely feasible to meet 100 percent of a building heating or cooling load with passive solar, where an optimum design is based on minimizing life-cycle cost.

With a thermal storage capacity nearly twice that of common masonry materials, water has an advantage as a thermal storage medium because convection currents distribute the heat evenly. Passive solar system designers have created solutions for water storage containers built in to walls, seating boxes under south-facing windows, or ponds, or pools.

Cooling Strategies

During the summer months, air conditioning systems consume much electricity. Alternative passive cooling strategies, especially when used in conjunction with thermal storage techniques that prevent heat absorption, may reduce the need for heavy air conditioning. Such cooling techniques include the use of natural ventilation, ceiling fans, atria and stairwell towers, evaporative cooling systems for dry climates, dehumidification systems, and geothermal cooling and heat pump systems. These methods can effectively remove heat from the interior of a building without the use of energy-intensive conventional air conditioning systems.

Daylighting

Daylighting techniques involve the incorporation of natural daylight into the mix of a building’s interior illumination. When properly designed and integrated with electric lighting, daylighting can offer significant energy savings by offsetting a portion of the electric lighting needed. A side benefit of daylighting is that it also reduces the internal heat gain from electric lighting, thereby reducing required cooling capacity. Results of recent studies imply improved productivity and health in daylighted schools and offices. Windows—the principal source of daylight—also provide visual relief, a visual portal on the world outside the building, time orientation, and a possible source of ventilation and emergency egress (U.S. Dept. of Energy. Building. “Daylighting”). Other sources of daylight include light pipes with mirrored inner surfaces that bring natural light deep into a building interior, skylights, skydomes, and reflective devices and surfaces that spread daylight more evenly in occupied interior spaces.

A light shelf is a reflecting overhang set above eye-level with a transom window above it. View windows can be glazed to minimize glare ultraviolet rays while more intense light can be permitted through the transom windows and reflected farther into the building’s interior spaces.

If not integrated with electric lighting systems, a building designed for daylighting will be a net energy loser because of increased heat absorption. The electric lighting load must be reduced to realize savings in electrical and cooling loads. The benefits of daylighting are the greatest when occupancy and lighting sensors along with electronic dimmers are used to control the electric lighting system, adjusting it as the needs of the occupants and the available light outdoors changes.

Occupancy sensors use passive infrared, ultrasonic, or a combination of the two. Sensors detect body heat or movement. If neither is detected after a preset delay, the sensor will signal the room lights to turn off. Used alone, occupancy sensors are ideal for low- or intermittent-use areas such as storage rooms, restrooms, and some corridors.

Light sensors have a photoelectric sensor that measures room illumination and can be set to respond to specific lighting conditions. The sensors can turn individual lights on or off and can also operate a continuous dimming system that makes changes in lighting levels less noticeable to occupants.

The coordination of daylighting with an electrical lighting system requires careful planning for a successful system. The layout and circuiting should correspond to the available daylight.

High-performance Insulation

A type of super-insulating material increasingly used for residential and light commercial buildings is structural insulated panels used in floors, walls, and roofs. The panels are manufactured by forming a sandwich of rigid foam plastic insulation between two panels of plywood. The panels generally cost about the same as building with wood-frame construction, but labor costs and job-site waste are reduced (Structural).

The private sector is working to put many of these various design methods into greater practice. Many key institutions in the U.S. building industry are forging ahead with an alliance known as Architecture 2030, formed in 2006. The group promotes the 2030 Challenge, a global initiative urging all new buildings and major renovations to reduce their fossil fuel use and greenhouse gas emissions by half by 2010. Its goal is that all new buildings should be carbon neutral by 2030 (Architecture 2030).

In early 2007, the American Institute of Architects; the American Society of Heating, Refrigerating and Air Conditioning Engineers; Architecture 2030; the Illuminating Engineering Society of North America; and the U.S. Green Building Council, with the support of the U.S. Department of Energy, finalized an agreement of understanding establishing a common benchmark and the goal of net zero energy buildings. The ultimate goal is carbon-neutral buildings by 2030. To reach that goal, the alliance partners agreed to define the baseline for their common target goals.

New building energy standards and rating systems that meet the 2030 Challenge when measured against the baselines are currently in development. In the meantime, according to Architecture 2030, there is an immediate need for an interim system that enables cities, counties, and states to meet the 2030 Challenge targets using existing building energy codes and standards as the baselines.

Architecture 2030 has developed an interim system based on code equivalents, which are the additional reductions needed beyond the requirements of a particular code, standard, or rating system to meet or exceed the initial 50 percent target of the 2030 Challenge. Architecture 2030 also provides suggestions for ordinances that can be used to aid government agencies in amending existing building codes to incorporate the code equivalents and includes the building energy codes recently adopted by California, Oregon, and Washington. The 2030 Challenge

Interim Code Equivalents are a set of guidelines that entities can use to assess building energy consumption patterns and adjust the code equivalents as appropriate (Mazria).

Methods To Decrease Energy Use by Building Operating Systems

Most large, multistory buildings employ sophisticated, computer-based building control systems that integrate key subsystems such as lighting, security, fire protection, heating and air conditioning, occupancy sensors, and large networks of programmable thermostats. Such operating and control systems afford a high degree of fine-tuning capability and operating flexibility for differential environmental control in various locations of a building, depending on their exposure to daylight and weather conditions. Other methods include rooftop wind turbines and geothermal heat pumps.

Commercially Viable Options

There are emerging technologies being developed to increase energy efficiency. One such technology is electrochromic windows that can instantly switch from transparent to varying shades of grey in response to a small, applied current. A large view window made with electrochromic materials could be programmed to respond to incoming natural light by stepping down its setting to minimize light transmittance. When integrated with daylight and occupancy sensors and programmable controls, electrochromic windows could be set to automatically and incrementally shade indoor environments in synch with the sun's arc across the sky.

Computer-simulation programs may impact and improve building energy efficiency. Today's building energy calculation software is growing in sophistication and could eventually lead to whole-building energy simulation analytical tools that could evaluate low-energy use design factors and optimize incorporation of renewable energy systems.

Chapter 7

Conclusion and Policy Options

Conclusion

Social and environmental changes have increased focus on conservation of natural resources and sustainable living. Recent economic changes have also caused consumers to revaluate how they use energy, with new attention being given to maximizing efficiency.

As a result, more builders and consumers are turning to green building design and construction. Research is leading to new ways to conserve energy in the construction and daily use of buildings.

Developing building methods and financial incentives employed in new construction and in renovation could reduce the amount of energy consumed, save money, and reduce air emissions resulting from generating electricity.

On the national level, energy-efficiency tax incentives have demonstrated a positive effect in spurring private investments in greater efficiency; however, the situation in Kentucky is different. Alternatives to tax incentives may yield better results.

Primarily due to the low cost of energy in Kentucky, the urgency that has driven widespread conservation and efficiency efforts in other states is lacking here. In addition, Kentucky's low cost of electricity means that any investment in increasing efficiency will have a much longer recoupment period than similar investments made on property in other states with higher energy rates.

The HB 2 incentives are not substantial enough to fully and significantly compensate the average Kentucky property owner for the lengthy recoupment period for efficiency investments. The incentives are also not targeted at any one group of taxpayers. As nonrefundable credits, they will only benefit taxpayers who have a tax liability and will neither assist nor influence taxpayers who do not have a state tax liability.

Policy Options

Rebate and Trade Programs

The General Assembly could consider other more effective methods of providing incentives to encourage energy efficiency, such as offering cash rebates and trade-in programs directly to consumers. The offer of a rebate for certain building improvements would make such investments less expensive and address the problem of long recoupment periods caused by low electricity rates. Rebates could be made available on an equal basis to all home or business owners, regardless of their tax liabilities or income levels.

Trade-in programs could also directly increase efficiency and be available to all consumers. Consumers would realize energy cost savings immediately, while overall state energy consumption, waste, and carbon emissions would be reduced.

Mandating Efficiency Through Statutory Changes
The General Assembly could require efficiency through statutory amendments to the state building code and the zoning land-use policies. The state building code could be amended to require newly constructed and renovated buildings to attain certain levels of efficiency over established baselines. Land-use laws could require new developments, both residential and commercial, to be designed and located in ways to minimize their energy consumption.

Kentucky could follow the District of Columbia and require an energy label on every building. The Clean and Affordable Energy Act of 2008 mandates that all buildings must be benchmarked annually using the Energy Star Portfolio Manager. Commercial and industrial building owners can use the EPA’s Portfolio Manager program to obtain a rating of their energy performance relative to similar buildings nationwide. These labels specify the energy use of the building so that buyers can readily compare one building to another. This would make greater efficiency into a selling point, enabling owners to recoup investments in energy features. Broad-scale energy benchmarking of buildings would also make it possible to quantify how much improvement in performance was the result of renovations and would enable targeting of efficiency efforts to buildings that significantly underperform.

While mandating greater efficiencies via statute will in some cases increase the costs of building construction, such requirements are more likely to increase the efficient use of energy in the state more broadly and more directly than encouraging efficiency through incentives.

Placing Conditions on Receipt of Economic Development Tax Incentives
To encourage energy efficiency, the General Assembly could place conditions on building projects to be eligible for state tax incentives. Such a condition would treat buildings constructed with the benefit of public economic development funds in the same way in which government buildings are constructed under the state policy emphasizing greater efficiency.

Consumer Education and Leading by Example
Finally, the General Assembly could encourage state government to be an advocate for conservation. The General Assembly could require the appropriate executive branch cabinet to educate the public about the importance of conservation and the savings possible through greater efficiency. The General Assembly could enact statutes to ensure efficiency in the construction and operation of public buildings and public schools.

Such consumer education efforts would publicize the techniques employed, the energy cost savings that could result, and the ways individuals could make energy-efficient improvements in their own homes and businesses.

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