# Kansas Energy Plan 2008

**Kansas Energy Council** 

December 21, 2007

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www.kec.kansas.gov

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Note: The 2008 version of the Kansas Energy Plan was developed during the 2007 planning cycle of the Kansas Energy Council (KEC) and contains the background information and policy recommendations approved on December 5, 2007. Additional chapters and sections will be developed in future planning cycles. See KEC web site (http://www.kec.kansas.gov/energy\_plan.htm) for full outline of Kansas Energy Plan and content developed in previous planning cycles.

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## **Chapter 5: Biomass and Biofuels**

For additional data related to biomass and biofuels, please refer to the *Kansas Energy Chart Book*, Chapter 5 (http://kec.kansas.gov/chart\_book/).

#### Overview

Biomass is defined as organic matter derived from plant and animal source. Biofuels are transportation fuels made from biomass and include ethanol, methanol, biodiesel, biocrude, and methane<sup>1</sup>. Ethanol and biodiesel are the most commonly produced and utilized biofuels, with production in the U.S. on the rise. From 2004 to 2006, annual ethanol production increased from 3.4 billion gallons to about 4.9 billion gallons, and annual biodiesel production rose from 28 million gallons to roughly 287 million gallons. Taken together, these two biofuels accounted for about 3 percent of gasoline and diesel motor fuel used on a volumetric basis.<sup>2</sup>

### Section 5.1: Ethanol

#### **Topic / Issue Description**

Ethanol, or ethyl alcohol, is a clear, flammable liquid, which is familiar to many as an ingredient in alcoholic beverages. Most U.S. ethanol is made from corn, but it can also be produced from other feedstocks such as grain sorghum, wheat, barley, or potatoes. In Kansas, more than half of the ethanol produced comes from grain sorghum, with most facilities using corn and sorghum interchangeably.

As of August 2007, U.S. ethanol production capacity was at 6.8 billion gallons, with another 6.7 billion gallons of capacity under construction.<sup>3</sup> Since 2003, U.S. annual consumption has outpaced production (by 300 million gallons in 2005, the date of the most recent data).<sup>4</sup> Most of the imported ethanol comes from Brazil, with a smaller portion coming from Central American countries.

Ethanol an be produced using a wet or dry mill process; however, 82 percent of U.S. production uses the dry mill process. In both processes, the starch in the feedstock is fermented into sugar and then distilled into alcohol. Dry milling involves grinding the corn or sorghum feedstock into flour before fermentation, while wet milling uses soaking to separate the corn or sorghum kernel components. Co-products of dry milling corn or sorghum are distillers grains with solubles, a highly nutritious livestock feed, and carbon dioxide, which

<sup>&</sup>lt;sup>1</sup> U.S. Dept. of Energy, Energy Efficiency and Renewable Energy, 2007, Biomass Program, Technologies, Biomass FAQs: http://www1.eere.energy.gov/biomass/biomass\_basics\_faqs.html (accessed December 12, 2007).

<sup>&</sup>lt;sup>2</sup> U.S. Government Accountability Office (GAO), 2007, Biofuels: DOE Lacks a Strategic Approach to Coordinate Increasing Production with Infrastructure Development and Vehicle Needs (GAO-07-713), p. 5.

<sup>&</sup>lt;sup>3</sup> U.S. Dept. of Energy, Energy Efficiency and Renewable Energy, 2007, Biomass Program, Technologies, Biomass FAQs: http://www1.eere.energy.gov/biomass/biomass\_basics\_faqs.html (accessed December 12, 2007).

<sup>&</sup>lt;sup>4</sup> U.S. Dept. of Energy, Energy Information Administration, 2007, Biofuels in the Transportation Sector, Figure 22: http://www.eia.doe.gov/oiaf/analysispaper/biomass.html (accessed December 2007).

can be collected and compressed for sale to other industries. Sorghum distillers grains have a higher protein content and less fat and ash than the corn equivalent.<sup>5</sup> Co-products of wet milling are corn or sorghum oil (a potential biodiesel feedstock) and corn or sorghum gluten meal (protein).

Cellulosic ethanol uses lignocellulose, the main structural material in any plant, as a feedstock. Cellulosic feedstocks require an extra step to break down the lignocellulose into fermentable starch, thus increasing production costs. The bulkier cellulosic feedstocks are also more costly to harvest, transport, and store. Research on cellulosic feedstocks (such as switchgrass, wood chips, and corn stover) is ongoing. The U.S. Department of Energy (DOE) has set 2012 as a target to achieve technological advances to make cellulosic ethanol cost competitive with corn ethanol.<sup>6</sup> In conjunction with cellulosic ethanol research, some researchers are investigating the use of perennial polyculture crop systems for cellulosic feedstocks.

As an agricultural state, Kansas has great potential for biofuel production and has seen rapid growth in the ethanol industry. As of December 2007, Kansas had ten grain-ethanol plants in operation, representing 370 million gallon/year (MGY) in capacity (with six more under construction), and pre-permit application meetings and preparations are underway for one proposed cellulosic ethanol plant in Hugoton.

*Economic Impacts*—There is no doubt that the growth in the ethanol industry has provided economic benefits to the state, both in terms of the jobs associated with each of the state's ten ethanol facilities (with the newest plants providing approximately 35 jobs each) and the additional market for the state's corn and grain sorghum producers. Given the federal and state incentives in place to support biofuels (see list of existing policies and programs below), it is likely that demand for corn and other food crops for fuel feedstocks will remain high and continue to impact prices.

The impact of higher corn prices on the cost of food has been widely discussed in recent months. According to a recent report from the U.S. Bureau of Labor Statistics, prices for chicken, milk, and eggs (foods strongly affected by the price of corn) were 8.4 percent, 21.1 percent, and 33.7 percent higher in July 2007 than in July 2006,<sup>7</sup> though other inputs such as fuel costs are also driving the higher food prices.<sup>8</sup>

http://www.ers.usda.gov/publications/TB1862/tb1862.pdf (accessed December 2007).

<sup>&</sup>lt;sup>5</sup> Shurson, Jerry, 2006, Quality Characteristics and Nutritional Profiles of DGS, University of Minnesota, Dept. of Animal Science, powerpoint presentation: http://www.ddgs.umn.edu/ppt-swine/2006-Shurson-%20Quality%20characteristics%20(NGFA).pdf (accessed December 2007).

 <sup>&</sup>lt;sup>6</sup> U.S. Government Accountability Office (GAO), 2007, Biofuels: DOE Lacks a Strategic Approach to Coordinate Increasing Production with Infrastructure Development and Vehicle Needs (GAO-07-713), p. 5.
<sup>7</sup> U.S. Dept. of Labor, 2007, Bureau of Labor Statistics, Consumer Price Indexes (CPI), CPI Detailed Report Data for July 2007: http://www.bls.gov/cpi/cpid0707.pdf (accessed December 2007).

<sup>&</sup>lt;sup>8</sup> U.S. Dept. of Agriculture, Economic Research Service, 2007, Changing Consumer Food Prices, by A. J. Reed, Kenneth Hanson, Howard Elitzak, and Gerald Schluter, Technical Bulletin Number 1862Reed, A.J., et al., 1997, Changing Consumer Food Prices: A User's Guide to ERS Analysis:

*Environmental Impacts*—Ethanol production, like many industrial and agricultural practices, involves a consumptive use of water. A 50-MGY ethanol plant uses about 200 MGY of water (or about 550,000 gallons per day), primarily from evaporation during cooling and wastewater discharge. Ethanol production technology has improved to use water more efficiently: plants today use about 50 percent less water than 10 to 15 years ago.<sup>9</sup> It currently takes roughly three to four gallons of water to produce one gallon of ethanol. Under Kansas' established system for appropriating water resources, all ethanol plants must purchase water from a rural water district or municipality or acquire a water right. In parts of the state closed to new water appropriations, any new venture must purchase existing water rights, and any new use of that appropriation must be approved by the Chief Engineer to ensure that the net consumptive impact does not increase. Nonetheless, some have raised concerns that increased corn production statewide may cause additional declines over time, as a result of diminished recharge (less irrigation water replenishing aquifers).<sup>10</sup>

Wastewater from ethanol plants is regulated by the Kansas Department of Health and Environment (KDHE), which administers both the federal National Pollution Discharge Elimination System (NPDES) permits and Kansas Water Pollution Control permits. In most instances, KDHE issues the state-level permit, which requires ethanol plants to use the wastewater for beneficial land applications rather than simply discharging into streams and rivers.<sup>11</sup>

Ethanol's impact on air quality varies depending on the fuel blend and use. Up through 2005, most ethanol was used in blends up to 10 percent as an oxygenate in reformulated gasoline to reduce vehicle emissions in targeted metropolitan areas with high ground-level ozone readings.<sup>12</sup> Combusting pure ethanol or ethanol blends releases less of certain ozone-causing pollutants than gasoline combustion—particularly hydrocarbons, carbon monoxide, and nitrous oxide, although ethanol blends around E24 are shown to release more nitrous oxide.<sup>13</sup>

With respect to carbon dioxide, biofuels are often considered carbon neutral because the amount of carbon sequestered by replanting the biofuel feedstock is roughly equivalent to the amount emitted by combusting the biofuel. However, inputs such as fertilizer and the energy used to produce the ethanol change the equation. On average, using ethanol (in any blend)

<sup>&</sup>lt;sup>9</sup> Greg Krissek, ICM, personal communication, September 2007.

<sup>&</sup>lt;sup>10</sup> Irrigating the corn used for one gallon of ethanol can require up to 200 times the water used in processing the feedstock, according to the National Research Council, 2007, Committee on Water Implications of Biofuels Production in the United States, p. 38: http://books.nap.edu/openbook.php?record\_id=12039&page=R1 (accessed September 2007).

<sup>&</sup>lt;sup>11</sup> Donald Carlson, Kansas Dept. of Health & Environment, Bureau of Water, personal correspondence, December 2007.

<sup>&</sup>lt;sup>12</sup> In some instances, oxygenates can lead to higher emissions of nitrogen oxides and volatile organic compounds, which can combine with atmospheric conditions to increase ground-level ozone formation. Source: U.S. Government Accountability Office (GAO), 2007, Biofuels: DOE Lacks a Strategic Approach to Coordinate Increasing Production with Infrastructure Development and Vehicle Needs (GAO-07-713), p. 12.

<sup>&</sup>lt;sup>13</sup> C. Hammel-Smith, J. Fang, M. Powders, and J. Aabakken, 2002, Issues Associated with the Use of Higher Ethanol Blends, DOE National Renewable Energy Laboratory: http://www.nrel.gov/docs/fy03osti/32206.pdf (accessed November 2007).

instead of gasoline reduces carbon emissions by 19%, and with improvements in ethanol production, this reduction is expected to be 21% by 2010.<sup>14</sup>

*Distribution and Blending Issues*—Because of its chemical characteristics (e.g., it is water soluble and a corrosive solvent), ethanol can't share the existing gasoline pipeline distribution system; gasoline pipelines would have to be switched over to transporting ethanol exclusively, which is unlikely to happen. In 2005, 60 percent of U.S. ethanol production was shipped by rail, then offloaded and transported by truck, pipeline, or barge to the point of sale. Transportation is typically the third highest expense for ethanol producers.<sup>15</sup> In Kansas, as in most of the Midwest where ethanol plants are numerous, most ethanol sold in state is shipped short distances to the terminal by rail and then distributed by tanker trucks. Most ethanol produced in Kansas is shipped to western and southwestern U.S.

Blending of ethanol and gasoline usually occurs at or near local fueling terminals. After being blended at the terminal, the resulting ethanol-gasoline mixture (e.g., E10, which contains 10% ethanol by volume) is trucked to fueling stations. Of the 18 terminals (totaling 50 loading bays) operating in Kansas as of September 1, 2007, 11 have E10 available (at a total of 27 bays), and only three terminals in eastern Kansas have E85 available. Due to this somewhat limited availability of blended product, many marketers, especially in western Kansas, have to send a tanker truck to both a gasoline fueling terminal and an ethanol plant and splash-blend the product in the tanker.<sup>16</sup>

Because of ethanol's solubility and solvency, marketers have to pay special attention to pumping and storage equipment. Although E10 can be combusted in nearly any gasoline engine, higher blends such as E85 are officially approved only for flex-fuel vehicles. According to DOE data, 6.6% of all light duty vehicles sold in 2007 were E85 capable flex-fuel vehicles, up from 3.4% in 2004.<sup>17</sup> In Kansas, as of November 2007, 26 stations offered E85.<sup>18</sup>

Pure ethanol provides only 66% of the energy in the same volume of regular gasoline—in other words, a vehicle will travel further on a gallon of gasoline than it will on a gallon of some ethanol blend.<sup>19</sup> It is useful to account for this fact when comparing the price of ethanol and gasoline.

<sup>17</sup> U.S. Dept. of Energy, Energy Information Administration, 2007, Supplemental Tables to the Annual Energy Outlook 2007, Light Duty Vehicle Sales by Technology Type, Table 39, Middle Atlantic:

http://www.eia.doe.gov/oiaf/aeo/supplement/pdf/suptab\_39.pdf (accessed October 2007).

<sup>&</sup>lt;sup>14</sup> M. Wang, M. Wu, and H. Huo, 2007, Life-cycle energy and greenhouse gas emission impacts of different corn ethanol plant types, Environmental Research Letters (April-June 2007): http://www.iop.org/EJ/article1748-9326/2/2/024001/erl7\_2\_024001.html#erl245942s5.6 (accessed October 2007).

<sup>&</sup>lt;sup>15</sup> U.S. Dept. of Agriculture, Agricultural Marketing Service, 2007, Ethanol Transportation Backgrounder, September 2007: http://www.ams.usda.gov/tmd/TSB/EthanolTransportationBackgrounder09-17-07.pdf (accessed December 18, 2007).

<sup>&</sup>lt;sup>16</sup> Curt Wright, KEC member representing petroleum marketers, personal communication, September 2007.

<sup>&</sup>lt;sup>18</sup> See Kansas Ethanol web page, E85 Fuel for Flexible Fuel Vehicles, for listing of E85 stations with addresses: http://www.ksgrains.com/ethanol/e85.html.

<sup>&</sup>lt;sup>19</sup>U.S. Dept. of Energy, Energy Efficiency and Renewable Energy, 2007, Biomass Energy Data Book, Appendix A.1, Heat Content for Various Fuels: http://cta.ornl.gov/bedb/appendix\_a.shtml (accessed November 2007).

#### **Existing Policies and Programs**

- 1. The Volumetric Ethanol Excise Tax Credit (VEETC), established under the 2004 American Jobs Creation Act, provides an excise tax exemption of \$0.51 per gallon of ethanol blended into gasoline by petroleum blenders. The credit is currently set to expire in 2010.
- 2. The Renewable Fuel Standard (RFS), part of the 2005 Energy Policy Act, mandates that 4.0 billion gallons of renewable fuel be blended in 2006, increasing incrementally to 7.5 billion gallons in 2012.
- 3. The 2005 Energy Policy Act extended and slightly modified the existing federal production tax credit; ethanol producers with capacity below 60 MGY receive \$0.10 per gallon for the first 15 million gallons produced.
- 4. The 2006 Tax Relief and Healthcare Act imposes a 2.5% *ad valorem* tariff and a most-favored-nation duty of \$0.54 per gallon of ethanol imported to the U.S. from most countries, with some exceptions such as the Caribbean Basin Initiative nations.
- 5. The Kansas Ethyl Alcohol Production Incentive (K.S.A. 79-34,163) provides producers with \$0.075 per gallon of ethanol sold. Ethanol producers must produce at least 5 million gallons per year to qualify and are limited to a maximum of 15 million gallons per year (or \$1.125 million per year). Funding for the incentive is \$875,000 per quarter through 2011.
- 6. Kansas H.B. 2038 provides 10 year property tax exemptions, accelerated depreciation over 10 years (55% the first year and 5% thereafter, and Kansas Development Finance Authority (KDFA) financing for biomass to energy projects, excluding projects using corn or grain sorghum feedstocks.
- 7. The Kansas Alternative-Fuel Fueling Station Tax Credit provides tax credits to distributors of renewable fuels. Alternative-fuel fueling stations in service between January 1, 1996, and January 1, 2005, qualify for 50% of total expenditures up to \$200,000; stations built between January 1, 2005, and January 1, 2009, receive 40% of expenditures up to \$160,000; and stations built after January 1, 2009, receive 40% of expenditures up to \$100,000.
- 8. K.S.A 79-34,141 reduces the ethanol fuel tax from \$0.24 per gallon to \$0.17 per gallon, starting January 1, 2007. Beginning in 2020, the tax will be reduced to \$0.11 per gallon.
- 9. The Kansas Dealers Incentive Fund provides incentives to retail dealers who sell and dispense renewable fuels at the pump. This fund will begin receiving quarterly payments of \$400,000 on January 1, 2009, giving dealers \$0.065 per gallon for ethanol sales.
- 10. The Storage and Blending Equipment Tax Credit provides an income tax credit for equipment used to store and blend biofuels as well as petroleum-based fuels. The income tax credit of 10 percent is provided for the first \$10 million of the taxpayer's qualified

investment, with a 5 percent credit applied to the amount of investment that exceeds \$10 million. The program applies to tax years beginning January 1, 2007, and running through December 31, 2011.

- 11. The Biomass-to-Energy Plant Tax Credit (K.S.A. 79-32) establishes an income tax credit for new construction or expansion of a biomass-to-energy facility. Investors get a 10% tax credit for the first \$250 million invested and a 5% tax credit for any investment exceeding \$250 million. The tax credit is applied over 10 years in equal annual installments.
- 12. A new Kansas law (K.S.A. 79-32,201) establishes an income tax credit covering up to 40% of the incremental or conversion cost of an alternative fuel vehicle (AFV). Owners of E85 flex fuel vehicles must show that they have used at least 500 gallons of E85 in their vehicle to qualify.
- 13. The 2006 Tax Relief and Healthcare Act allows a 50% tax deduction of the adjusted basis of a new enzymatic cellulosic ethanol plant in its first year of operation.
- 14. Among Kansas laws targeting biofuels and the state vehicles, K.S.A. 75-3744a requires that a 10% or higher blend of ethanol be purchased for use in state vehicles, provided the cost is not more than \$0.10 per gallon more than gasoline. In addition, SB 262 requires the purchase of E85 vehicles when making new purchases or leases.
- 15. The U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) provides biorefinery grants to address specific technological improvements in the refining process.
- 16. The 2000 Federal Biomass Research and Development Act establishes grants for research, development, and demonstration of feedstock production, cellulosic ethanol, and product diversification. The grants are administered by the Biomass Research and Development Initiative (BRDI), which is coordinated jointly by USDA and DOE.
- 17. The DOE offers a number of biofuels loan guarantee and incentive programs authorized by the 2005 Energy Policy Act. Several loan guarantee programs support the production of ethanol from cellulose, municipal waste, or sugar cane. One program authorizes the DOE to provide loan guarantees to projects that reduce air pollution and greenhouse gas emissions, including biofuels projects.

#### Section 5.1 Policy and Program Recommendations

1. Encourage State agencies currently administering biofuel incentives to coordinate an internal program review of existing biofuel incentives and report to Legislative Committees on both the effectiveness and potential problems, inefficiencies.

Note: This recommendation is also listed in Section 5.2.

#### Description

Since 2001, the Kansas Legislature has passed various incentives to promote the state's production and use of biofuels. As each tax credit, incentive, or other policy became law, State agencies—specifically, the Kansas Corporation Commission (KCC), the Kansas Department of Commerce (Commerce), and the Kansas Department of Revenue)—were tasked with establishing rules and regulations and then implementing these various programs. Because most of these incentive programs were enacted in the past two years, information is lacking to determine whether they are achieving their intended purposes.

The KCC, Commerce, and Revenue should conduct reviews of those incentive and credit programs they administer.<sup>20</sup> The findings over the course of the review period would be compiled by Commerce and reported to the Kansas Legislature, along with any program design problems or inefficiencies as seen on the administrative level.

Reports will be made to the appropriate legislative committees at the beginning of each Legislative session. There will be no fiscal note associated with this recommendation; the only cost to implementation will be the labor hours associated with composing and reporting notes on the programs.

The resulting dialogue between the Legislature and agencies will provide essential information of the effectiveness of these incentives and allow for needed improvements or eliminations.

#### **Recommended Actions**

#### a. Responsible parties

The Department of Commerce and Department of Revenue. Commerce will administer review and compile report for all three agencies.

<sup>&</sup>lt;sup>20</sup> Among the programs to be reviewed are the Biomass-to-Energy Plant Tax Credit (Commerce), Coal or Coke Gasification Nitrogen Fertilizer Plant Tax Credit (Commerce), Renewable Electric Cogeneration Facility Tax Credit (Commerce), Storage and Blending Equipment Tax Credit (Commerce), Ethyl Alcohol Production Incentive (Revenue), Biodiesel Fuel Producer Incentive (Revenue), Alternative-Fuel Fueling Station Tax Credit (Revenue), Kansas Retail Dealers Incentive Fund (Revenue), Waste Heat Utilization System Tax Credit and Deduction (Revenue).

#### b. Legislative action

None is required.

#### c. Budget requirements

No additional State funding is needed.

#### d. Implementation timeline

The initial review of state biofuel incentive programs will commence immediately upon passage of the recommendation and an initial review of programs being administered will be delivered to the Legislature during the 2008 session. Additional information will be provided on an annual basis as programs are added, modified, and terminated.

#### **Implications of Proposal**

#### a. Pros

- i. Promotes information sharing between agencies that administer biofuel programs, and could foster additional coordination efficiencies.
- ii. Increases the knowledge and awareness of legislators in regards to the effectiveness of past policies.
- iii. Increases the chances of pursuing effective policies in the future based on agency and consumer demand and commentary.
- iv. Decreases the chances of implementing ineffective policies in the future.
- v. Provides the Legislature with a recommended, structured reason to break from creating new policy that will allow for a study the effectiveness and resource allocations of existing programs.

#### b. Cons

- i. Requires a time commitment from state agency staff to gather information and coordinate for presentation to the Legislature.
- ii. May not provide an accurate portrayal of current or future markets and future demand for resources as the evaluation will be looking at existing data and past concerns. The exercise will not provide projections of future activity.

## Section 5.2: Biodiesel

#### **Topic/Issue Description**

Biodiesel is produced using oils extracted from crops, animal fat, or waste vegetable oilusing a chemical process called transesterification. In this process, glycerin is separated from the fat or vegetable oil, generating two products—methyl esters (the chemical name for biodiesel) and glycerin (which can be used in soaps and other products).

Most U.S. biodiesel is produced from soybean oil, although other vegetable oils such as canola, corn, cottonseed, flax seed, sunflower, or peanut oil can be used, but their use will be largely dictated by price. Soybean oil is generally less expensive than other vegetable oils, is readily available in most parts of the country, and, unlike animal fat or waste oil, has a homogeneous and predictable composition.<sup>1</sup> Soybeans are processed into soybean oil through solvent or mechanical extraction. In solvent extraction, which is the predominant method, the soybean oil is extracted by exposing the cleaned and shelled soybeans to the solvent hexane. Mechanical extraction involves heating and grinding the soybeans to produce soybean oil and protein meal. Solvent extraction removes significantly more of the available oil than mechanical extraction, but mechanical extraction is more economically feasible for small processing operations.<sup>2</sup>

As of December 2007, Kansas has two small biodiesel refineries with capacities of 1 million gallons per year (MGY) or less.<sup>3</sup> One 72-MGY biodiesel plant is under construction in Emporia by Renewable Energy Group.

With the growth in the biodiesel industry, demand for soybeans has increased. In August 2007 the feedstock cost from soybeans was approximately \$3 per gallon of biodiesel.<sup>4</sup> In order to expand production, biodiesel refiners are looking beyond soybeans towards other, less expensive feedstocks.

*Environmental Impacts*—Biodiesel production uses roughly three gallons of water per gallon, about a gallon of which is consumptive use.<sup>5</sup> Wastewater from biodiesel plants, which may contain high amounts of oxygen, grease, and oils, is regulated by the Kansas Department of Health and Environment (KDHE).<sup>6</sup>

<sup>&</sup>lt;sup>1</sup> Robert L. Stroup, 2004, Feedstock Considerations for Future U.S. Producers, Biodiesel Magazine (Jan./Feb. 2007): http://biodieselmagazine.com/article.jsp?article\_id=649&q=&page=1 (accessed October 2007).

<sup>&</sup>lt;sup>2</sup> Schumacher, Joel, 2007, Overview of Oil Crushing and Processing Technologies, 2007, Montana State University, Dept. of Economics and Agricultural Economics: http://www.deq.state.mt.us/Energy/bioenergy/Biodiesel\_Production\_Educ\_Presentations/Extraction\_Tech\_J\_Schumacher\_Polson\_Oct2007.pdf

<sup>(</sup>accessed December 2007).

<sup>&</sup>lt;sup>3</sup> National Biodiesel Board, 2007, Commercial Biodiesel Production Plants (September 2007): http://www.biodiesel.org/buyingbiodiesel/producers\_marketers/ProducersMap-Existing.pdf (accessed October 2007).

<sup>&</sup>lt;sup>4</sup> Western Farm Press, 2007, High Soybean Prices Take a Bite out of Biodiesel, Aug. 21, 2007:

http://westernfarmpress.com/news/082107-soybean-prices/ (accessed October 2007).

<sup>&</sup>lt;sup>5</sup> This use is expected to decrease as recycling technologies are introduced and perfected.

<sup>&</sup>lt;sup>6</sup> Donald Carlson, Kansas Dept. of Health & Environment, Bureau of Water, personal correspondence, December 2007.

Compared to standard diesel's life-cycle emissions, biodiesel emits 78% less carbon<sup>7</sup> and 75–83% fewer particulates. However, NO<sub>x</sub> emissions for biodiesel are slightly higher based on standard laboratory (i.e., test stand dynamometer) testing procedures.<sup>8</sup> Under more "real-world" conditions, recent research found that NO<sub>x</sub> emissions from biodiesel were not significantly higher than those of standard diesel fuels.<sup>9</sup>

*Distribution and Blending Issues*—Unlike ethanol, biodiesel is non-corrosive and may be transported in the existing pipelines if they are heated and insulated to prevent gelling. Magellan Midstream Partners, a pipeline corporation with mileage in Kansas, has plans to test pipeline shipping of B5 from Houston to Dallas and anticipates shipping B10 in the future.<sup>10</sup>

To ensure blend homogeneity, biodiesel uses a technique called ratio blending. Ratio blending injects biodiesel and petrodiesel into a tank at proportionate rates, creating a suspended mixture, as opposed to the splash blending technique used for ethanol, which creates a stratified mixture. (However, splash blending, with adequate after-mixing in the transport truck, has been shown to work well and may be the only method available in some localities.) Ratio blending equipment is expensive, and the process requires that biodiesel and petrodiesel be brought to the same site prior to blending. Currently, the McPherson terminal is the only Kansas fuel distribution terminal to provide blended biodiesel.

Due to biodiesel's potential to gel in cold weather, marketers may need to provide heated storage and purchasers may need to use biodiesel blends that will not congeal in prevailing weather conditions. Although biodiesel requires no engine or fuel system modifications to run in diesel engines, engine manufacturers have expressed concerns over problems (e.g., clogged fuel filters and sticking piston rings) associated with earlier use of high biodiesel blends. Currently, most major manufacturers support using blends up to B20 in their engines so long as the fuel meets the American Society for Testing and Materials (ASTM) D 6751 standard for biodiesel.<sup>11</sup>

Concerns over quality and consistency of biodiesel have hampered acceptance of the fuel. Currently, the ASTM D 6751 fuel standard and an accompanying process quality control standard titled BQ-9000 are not mandated. As of 2007, about 40% of U.S. biodiesel plants

<sup>&</sup>lt;sup>7</sup> John Sheehan and others, 1998, Life Cycle Inventory of Biodiesel and Petroleum Diesel for Use in an Urban Bus, Final Report Prepared for U.S. Dept. of Energy's Office of Fuels Development and U.S. Dept. of Agriculture's Office of Energy, NREL/SR-580-24089, p. 5: http://www.nrel.gov/docs/legosti/fy98/24089.pdf (accessed November 2007).

<sup>&</sup>lt;sup>8</sup> Knothe, Gerhard, Sharp, Christopher, and Ryan, Thomas, 2005, Exhaust Emissions of Biodiesel, Petrodiesel, Neat Methyl Esters, and Alkanes in a New Technology Engine, Energy & Fuels, vol. 20, no. 1, p. 407 (published online 11/30/2005): http://www.biodiesel.org/resources/reportsdatabase/reports/gen/20051130\_gen-372.pdf (accessed November 2007).

<sup>&</sup>lt;sup>9</sup> R. L. McCormick and others, 2006, Effects of Biodiesel Blends on Vehicle Emissions, U.S. Dept. of Energy, National Renewable Energy Laboratory (NREL) Milestone Report NREL/MP-540-40554: http://www.nrel.gov/docs/fy07osti/40554.pdf (accessed October 2007).

<sup>&</sup>lt;sup>10</sup> Bruce Heine, Magellan Midstream Partners, public testimony, September 20, 2007, before Kansas Legislature's Special Committee on Energy, Resources, and the Natural Environment.

<sup>&</sup>lt;sup>11</sup> National Biodiesel Board, 2007, Specification for Biodiesel (B100) – ASTM D6751-07b: http://www.biodiesel.org/pdf\_files/fuelfactsheets/BDSpec.pdf (accessed November 2007).

comply with BQ-9000 to produce D 6751-compliant biodiesel, and adoption of these standards has greatly increased acceptance of biodiesel in the marketplace.<sup>12</sup> Moreover, biodiesel can not be sold without a valid certificate of analysis (COA), and use of the ASTM standard is mandatory if the biodiesel is blended and the blender takes advantage of the "blender's tax credit"<sup>13</sup> (see existing policies and programs below). Testing for ASTM compliance has been estimated at \$1,000 per test.<sup>14</sup>

Biodiesel (B100) contains approximately 8% less energy (on a BTU-per-gallon basis) than standard #2 petrodiesel. However, because biodiesel has a greater cetane value (a measure of combustion efficiency) than petrodiesel, it is difficult to make an absolute determination on fuel efficiency (miles per gallon).<sup>15</sup>

#### **Existing Policies and Programs**

- 1. The Volumetric Ethanol Excise Tax Credit (VEETC), established under the 2004 American Jobs Creation Act, provides a \$1.00 per gallon pure biodiesel excise tax credit for agri-biodiesel producers and blenders, a \$0.50 cents per gallon pure biodiesel excise tax credit for biodiesel producers and blenders using agricultural products and animal fats, and a \$1.00 per gallon excise tax for "renewable diesel" producers and blenders. The biodiesel tax credits will expire at the end of 2008.
- 2. The Renewable Fuel Standard (RFS), part of the 2005 Energy Policy Act, mandates that 4.0 billion gallons of renewable fuel be blended in 2006, increasing incrementally to 7.5 billion gallons in 2012.
- 3. The 2005 Energy Policy Act extended and slightly modified the existing federal production tax credit; biodiesel producers with capacity below 60 MGY receive \$0.10 per gallon for the first 15 million gallons produced.
- 4. The Biodiesel Fuel Producer Incentive (K.S.A. 79-34,158) provides producers with \$0.30 per gallon of biodiesel sold. Funding for the biodiesel incentive is \$875,000 per quarter starting July 1, 2007, with a one-time payment of \$437,500 added to the fund at its inception.
- 5. Kansas H.B. 2038 provides 10 year property tax exemptions, accelerated depreciation over 10 years (55% the first year and 5% thereafter, and Kansas Development Finance Authority (KDFA) financing for biomass to energy projects, excluding projects using corn or grain sorghum feedstocks.
- 6. The Kansas Alternative-Fuel Fueling Station Tax Credit provides tax credits to distributors of renewable fuels. Alternative-fuel fueling stations in service between

<sup>&</sup>lt;sup>12</sup> Nelson, Richard, 2007, Biodiesel in Kansas—Background Report Prepared for the Kansas Energy Council: http://kec.kansas.gov/reports/Biodiesel\_in\_Kansas\_FINAL.pdf.

<sup>&</sup>lt;sup>13</sup> Richard Nelson, Kansas State University Engineering Extension, personal communication, December 2007.

<sup>&</sup>lt;sup>14</sup> Adrian J. Polanksky, Kansas Secretary of Agriculture, personal communication, October 31, 2007.

<sup>&</sup>lt;sup>15</sup> Richard Nelson, Kansas State University Engineering Extension, personal communication, December 2007.

January 1, 1996, and January 1, 2005, qualify for 50% of total expenditures up to \$200,000; stations built between January 1, 2005, and January 1, 2009, receive 40% of expenditures up to \$160,000; and stations built after January 1, 2009, receive 40% of expenditures up to \$100,000.

- 7. The Kansas Dealers Incentive Fund provides incentives to retail dealers who sell and dispense biodiesel at the pump. This fund will begin receiving quarterly payments of \$400,000 on January 1, 2009, giving dealers \$0.03 per gallon for biodiesel.
- 8. The Storage and Blending Equipment Tax Credit provides an income tax credit for equipment used to store and blend biofuels as well as petroleum-based fuels. The income tax credit of 10 percent is provided for the first \$10 million of the taxpayer's qualified investment, with a 5 percent credit applied to the amount of investment that exceeds \$10 million. The program applies to tax years beginning January 1, 2007, and running through December 31, 2011.
- 9. The Biomass-to-Energy Plant Tax Credit (K.S.A. 79-32) establishes an income tax credit for new construction or expansion of a biomass-to-energy facility. Investors get a 10% tax credit for the first \$250 million invested and a 5% tax credit for any investment exceeding \$250 million. The tax credit is applied over 10 years in equal annual installments.
- 10. A new Kansas law (K.S.A. 79-32,201) establishes an income tax credit covering up to 40% of the incremental or conversion cost of an alternative fuel vehicle (AFV).
- 11. Among Kansas laws targeting biofuels and state vehicles, K.S.A. 75-3744a requires that a 2% or higher blend of biodiesel be purchased for use in state vehicles, provided the cost is not more than \$0.10 per gallon more than diesel. In addition, SB 262 requires the purchase of E85 vehicles when making new purchases or leases.
- 12. The U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) provides biorefinery grants to address specific technological improvements in the refining process.
- 13. The 2000 Federal Biomass Research and Development Act establishes grants for research, development, and demonstration of feedstock production, cellulosic ethanol, and product diversification. The grants are administered by the Biomass Research and Development Initiative (BRDI), which is coordinated jointly by USDA and DOE.
- 14. The DOE offers a number of biofuels loan guarantee and incentive programs authorized by the 2005 Energy Policy Act. One program authorizes the DOE to provide loan guarantees to projects that reduce air pollution and greenhouse gas emissions, including biofuels projects.

15. The U.S. Department of Agriculture (USDA) Bioenergy Program, established by a 1999 Executive Order, reimburses biodiesel producers for commodity purchases necessary for expanding production.

#### **Section 5.2 Policy and Program Recommendations**

1. Encourage State agencies currently administering biofuel incentives to coordinate an internal program review of existing biofuel incentives and report to Legislative Committees on both the effectiveness and potential problems, inefficiencies.

Note: This recommendation is also listed in Section 5.1.

#### Description

Since 2001, the Kansas Legislature has passed various incentives to promote the state's production and use of biofuels. As each tax credit, incentive, or other policy became law, State agencies—specifically, the Kansas Corporation Commission (KCC), the Kansas Department of Commerce (Commerce), and the Kansas Department of Revenue)—were tasked with establishing rules and regulations and then implementing these various programs. Because most of these incentive programs were enacted in the past two years, information is lacking to determine whether they are achieving their intended purposes.

The KCC, Commerce, and Revenue should conduct reviews of those incentive and credit programs they administer.<sup>16</sup> The findings over the course of the review period would be compiled by Commerce and reported to the Kansas Legislature, along with any program design problems or inefficiencies as seen on the administrative level.

Reports will be made to the appropriate legislative committees at the beginning of each Legislative session. There will be no fiscal note associated with this recommendation; the only cost to implementation will be the labor hours associated with composing and reporting notes on the programs.

The resulting dialogue between the Legislature and agencies will provide essential information of the effectiveness of these incentives and allow for needed improvements or eliminations.

#### **Recommended Actions**

#### a. Responsible parties

The Department of Commerce and Department of Revenue. Commerce will administer review and compile report for all three agencies.

<sup>&</sup>lt;sup>16</sup> Among the programs to be reviewed are the Biomass-to-Energy Plant Tax Credit (Commerce), Coal or Coke Gasification Nitrogen Fertilizer Plant Tax Credit (Commerce), Renewable Electric Cogeneration Facility Tax Credit (Commerce), Storage and Blending Equipment Tax Credit (Commerce), Ethyl Alcohol Production Incentive (Revenue), Biodiesel Fuel Producer Incentive (Revenue), Alternative-Fuel Fueling Station Tax Credit (Revenue), Kansas Retail Dealers Incentive Fund (Revenue), Waste Heat Utilization System Tax Credit and Deduction (Revenue).

#### b. Legislative action

None is required.

#### c. Budget requirements

No additional State funding is needed.

#### d. Implementation timeline

The initial review of state biofuel incentive programs will commence immediately upon passage of the recommendation and an initial review of programs being administered will be delivered to the Legislature during the 2008 session. Additional information will be provided on an annual basis as programs are added, modified, and terminated.

#### **Implications of Proposal**

#### a. Pros

- i. Promotes information sharing between agencies that administer biofuel programs, and could foster additional coordination efficiencies.
- ii. Increases the knowledge and awareness of legislators in regards to the effectiveness of past policies.
- iii. Increases the chances of pursuing effective policies in the future based on agency and consumer demand and commentary.
- iv. Decreases the chances of implementing ineffective policies in the future.
- v. Provides the Legislature with a recommended, structured reason to break from creating new policy that will allow for a study the effectiveness and resource allocations of existing programs.

#### b. Cons

- i. Requires a time commitment from state agency staff to gather information and coordinate for presentation to the Legislature.
- ii. May not provide an accurate portrayal of current or future markets and future demand for resources as the evaluation will be looking at existing data and past concerns. The exercise will not provide projections of future activity.

## **Chapter 9: Energy Conservation and Efficiency**

For additional data related to energy efficiency and conservation, please refer to the *Kansas Energy Chart Book*, Chapter 9 (http://kec.kansas.gov/chart\_book/).

#### Overview

U.S. energy consumption is expected to continue to grow, with the rate of growth dependent on trends in population, economic growth, energy prices, and technology adoption. Nationwide, demand for electricity increased 3.2 percent from 2004 to 2005 (the most recent year for which data are available), though perhaps the average annual increase of 2.3 percent since 1980 is a better indicator.<sup>1</sup> With respect to natural gas, the use per customer has been declining for more than twenty years, although total consumption is expected to grow. The average U.S. residential natural gas consumption on a weather-adjusted basis declined by 1 percent annually from 1980 to 2000, and by 2.2 percent annually from 2000 to 2006, according to the American Gas Association (AGA).<sup>2</sup>

In Kansas, electric utility customers used 39,024,283 megawatthours in 2005,<sup>3</sup> a 5.4 percent increase over 2004. Natural gas consumption in 2006 was also up slightly—258,363 thousand Mcf in 2006 compared to 255,123 thousand Mcf in 2005—nonetheless, statewide consumption of natural gas in 2006 is still significantly lower than it was a decade ago.<sup>4</sup>

The growth in energy consumption occurs amidst discussions by U.S. policymakers and others of the potential for reduced usage through greater efficiency and conservation in the residential, commercial, industrial, and public sectors. A November 2007 report prepared by the National Action Plan for Energy Efficiency Leadership Group, states that aggressive pursuit of energy efficiency in the United States over the next 18 years could cut the nation's growth in energy use by 50 percent.<sup>5</sup>

Worldwide, businesses and industries are looking for ways to increase efficiency and reduce energy usage, with varying estimates of the potential to be achieved. A recent study by the International Energy Agency estimates that heavy industry could reduce its energy use by 18

<sup>&</sup>lt;sup>1</sup> U.S. Dept. of Energy, Energy Information Administration (EIA), 2006, Electric Sales, Revenue, and Average Price 2005: http://www.eia.doe.gov/cneaf/electricity/esr/esr\_sum.html (accessed September 5, 2007).

<sup>&</sup>lt;sup>2</sup> The total reduction from 2000 to 2006 was 13.1 percent; see American Gas Association, 2007, Response of the American Gas Association to the U.S. House of Representatives, Committee on Energy and Commerce, on Questions Regarding Climate Change, March 19, 2007:

http://energycommerce.house.gov/Climate\_Change/Solicited%20Responses/AGA.031907.resp.pdf (accessed November 2007).

<sup>&</sup>lt;sup>3</sup> U.S. Dept. of Energy, Energy Information Administration (EIA), 2006, Historical EPA Electric Sales and Revenue Spreadsheets: spreadsheet linked to http://www.eia.doe.gov/cneaf/electricity/esr/esr\_sum.html (accessed September 5, 2007).

<sup>&</sup>lt;sup>4</sup> U.S. Dept. of Energy, Energy Information Administration (EIA), 2007, Natural Gas Consumption by End Use, various spreadsheets: http://tonto.eia.doe.gov/dnav/ng/ng\_cons\_sum\_a\_EPG0\_VC0\_mmcf\_a.htm (accessed December 19, 2007).

<sup>&</sup>lt;sup>5</sup> See National Action Plan for Energy Efficiency Vision for 2025: Developing a Framework for Change: http://www.epa.gov/cleanenergy/pdf/vision.pdf (accessed September 2007).

percent to 26 percent. Light industries, such as retailing and the food sector, which haven't invested as much to date in efficiency, could reduce energy use even more.<sup>6</sup>

Here in Kansas, no one doubts that there are opportunities for cost-effective energy conservation and efficiency improvements. Many existing buildings are poorly insulated or have inefficient heating and cooling systems, resulting in excessive energy use and, consequently, excessive energy bills year round. Cost-effective energy conservation measures—such as upgrading attic insulation to at least R-38 or installing an Energy Star qualified furnace—may reduce energy usage by as much as 20 percent,<sup>7</sup> while providing dollar savings as well.

Increased adoption of these measures statewide can have a significant impact on energy consumption in Kansas. Reduced energy consumption through conservation may provide a range of benefits, including downward pressure on all energy-related prices, deferral of energy-related costs such as investment in new power plants and extraction equipment, and reduction in health and environmental costs related to the energy-related emission of pollutants and greenhouse gases. And, finally, energy conservation by individual consumers can result in lower monthly utility bills.

http://www.energystar.gov/index.cfm?c=heat\_cool.pr\_hvac and

 <sup>&</sup>lt;sup>6</sup> Leila Abboud and John Biers, 2007, Business Goes on an Energy Diet: Wall Street Journal, August 27, 2007.
<sup>7</sup> U.S. Environmental Protection Agency and U.S. Dept. of Energy, 2007, Energy Star web site:

http://www.energystar.gov/index.cfm?c=home\_sealing.hm\_improvement\_sealing (accessed October 23, 2006).

## Section 9.1: Utility-sponsored Programs

#### **Topic/Issue Description**

An oft-cited approach to increasing the adoption of energy conservation and efficiency measures is through utility-sponsored programs—commonly referred to as energy efficiency (EE) programs or demand-side management (DSM) programs. Such programs first appeared in the late 1970s and saw increasing popularity through the 1980s. Utility and ratepayer spending on EE programs peaked at \$2.74 billion in 1993 and then declined,<sup>8</sup> coinciding with a decline in political popularity of these programs.

Currently, with energy prices increasing relative to the rate of inflation and growing concerns about the relationship between energy use and the environment, U.S. policymakers are once again focusing on utility-sponsored EE programs (see, for example, the National Action Plan for Energy Efficiency discussed below). Many utilities across the country offer programs that are designed to help their customers use energy more efficiently and, as a consequence, conserve energy. Programs range from efforts to inform and educate (e.g., online energy use calculators, energy efficiency tips) to cash rebates or other direct subsidies (e.g., the recent Change a Light program) to installation of control devices that can actually shut off power at times of peak demand (e.g., smart metering devices), to name a few.

Kansas utilities also offer an array of programs, and many are considering expansion of these programs (see section on existing policies and programs for more details about Kansas utility EE programs). Although individual EE programs vary greatly among utilities, generally most programs result in somewhat higher bills for all customers to cover the cost of programs used by only some of the customers.

#### **Existing Policies and Programs**

1. Many Kansas utilities offer energy conservation and efficiency programs and services to their residential, commercial, and industrial customers (however, no comprehensive summary of these currently exists<sup>9</sup>). For example, Kansas City Power & Light (KCP&L) offers smart metering programs for residential and commercial customers to reduce peak load, rebates for commercial energy audits, and energy efficiency training for building operators, as well as assistance programs for low-income households. Kansas City Board of Public Utilities (KCBPU) and KCP&L offer rebates for installing energy efficient systems such as heat pumps in residential and commercial buildings. Midwest Energy offers time-of-day pricing to commercial and industrial customers, and a number of services such as infrared scans, blower door tests, energy audits, and duct leakage tests to various customer classes. Westar Energy offers time-of-use tariffs for commercial and

<sup>&</sup>lt;sup>8</sup> American Council for an Energy Efficiency Economy (ACEEE), 2000, State Scorecard on Utility Energy Efficiency Programs, by Steven Nadel, Tor Kubo, and Howard Geller: http://www.aceee.org/pubs/u004.htm (accessed November 2007).

<sup>&</sup>lt;sup>9</sup> KEC staff compiled a preliminary listing of some of the programs currently offered; this summary can be accessed on the Reports page of the KEC web site: http://www.kec.kansas.gov/reports.htm.

industrial customers and is developing a real-time pricing pilot program; they also offer an online energy usage calculator. In addition, many of the state's electric cooperatives have programs that include load reduction or curtailment credits, time-of-use pricing, real-time pricing, rebates for heat pump installation, home energy audits, peak alerts, load control programs, educational programs, and low-income weatherization assistance.

- 2. Midwest Energy recently received KCC approval for an energy efficiency program called How\$mart. The program will provide money for energy efficiency improvements such as insulation, sealing, and heating and cooling systems to customers who will repay the funds through energy savings on their monthly utility bill. Under the plan, participating customers must have an energy audit to determine their savings. If the customer qualifies, they will receive a lower net bill, even including repayment of the improvement costs. If the tenant moves or if a property owner changes the repayment obligation, like the energy savings, transfers to the next customer. The program is available to both electric and gas customers and will be piloted initially in Ellis, Rooks, Graham, and Trego counties, after which it may be offered to more of the utility's 41-county service area.
- 3. In September 2006, the Kansas Corporation Commission opened a generic investigation (Docket No. 07-GIMX-247-GIV), In the Matter of a General Investigation Regarding *Energy Efficiency Programs.*<sup>10</sup> After comments by interested parties and a Staff report, the Commission issued a Final Order on October 10, 2007. The Order concluded that the Commission should continue to work collaboratively with the utility companies to further energy efficiency programs and need not address various legal issues regarding KCC authority to mandate programs. The Commission found that it should develop a uniform framework for reviewing and encouraging energy efficiency programs. It therefore opened two separate dockets on November 6, 2007. The first one, Docket No. 08-GIMX-442-GIV, is intended to address the benefit cost tests to be used in evaluating potential EE programs. The second proceeding, Docket No. 08-GIMX-441-GIV, will look at cost recovery, decoupling, and incentives. Comments and reply comments on numerous questions posed in the orders are due December 21, 2007, and January 14, 2008, in the first proceeding, and January 25, 2008, and February 15, 2008, in the other docket. The Commission intends to conduct informal workshops in both proceedings. The goals are to complete these dockets in 6 and 9 months, respectively, but the orders recognize that the timelines may need to change.
- 4. The U.S. Environmental Protection Agency and the Department of Energy have developed a National Action Plan for Energy Efficiency, the goal of which is "to create a sustainable, aggressive national commitment to energy efficiency through gas and electric utilities, utility regulators, and partner organizations."<sup>11</sup> Chief among the recommendations released in July 2006 are the recognition of energy efficiency as a high-priority energy resource, a long-term commitment to implementing energy

<sup>&</sup>lt;sup>10</sup> The Commissions' Final Order on Docket 07-GMIX-247-GIV is available on the Kansas Corporation Commission (KCC) website: http://www.kcc.state.ks.us/scan/200710/20071010110245.pdf. Other dockets can be accessed through the KCC Docket web page: http://www.kcc.state.ks.us/docket/docket.htm.

<sup>&</sup>lt;sup>11</sup> U.S. Environmental Protection Agency (EPA) 2007, Clean Energy, National Action Plan for Energy Efficiency: http://www.epa.gov/cleanrgy/actionplan/eeactionplan.htm (accessed October 24, 2006).

efficiency through stable funding, and the alignment of utility incentives with delivery of cost-effective energy efficiency programs.

#### **Section 9.1 Policy and Program Recommendations**

1. Monitor the Kansas Corporation Commission's ongoing energy efficiency investigations to determine need for further KEC investigation of rate design and other energy efficiency issues.

#### Description

The Kansas Corporation Commission due, in part, to the discussions and early draft recommendations of the Kansas Energy Council, opened a generic investigation (Docket No. 07-GIMX-247-GIV), *In the Matter of a General Investigation Regarding Energy Efficiency Programs.*<sup>12</sup> After comments by interested parties and a Staff report, the Commission issued a Final Order on October 10, 2007. The Order concluded that the Commission should continue to work collaboratively with the utility companies to further energy efficiency programs and need not address various legal issues regarding KCC authority to mandate programs.

The Commission found that it should develop a uniform framework for reviewing and encouraging energy efficiency programs. It therefore opened two separate dockets on November 6, 2007. The first one, Docket No. 08-GIMX-442-GIV, is intended to address the benefit cost tests to be used in evaluating potential EE programs. The second proceeding, Docket No. 08-GIMX-441-GIV, will look at cost recovery, decoupling, and incentives. Comments and reply comments on numerous questions posed in the orders are due December 21, 2007, and January 14, 2008, in the first proceeding, and January 25, 2008, and February 15, 2008, in the other docket. The Commission intends to conduct informal workshops in both proceedings. The goals are to complete these dockets in 6 and 9 months, respectively, but the orders recognize that the timelines may need to change.

Because these topics are of ongoing interest to the Council, the KEC will monitor the KCC's findings, decisions, and subsequent actions with respect to the questions raised in these dockets to determine whether further investigation may be warranted.

<sup>&</sup>lt;sup>12</sup> The Commissions' Final Order on Docket 07-GMIX-247-GIV is available on the Kansas Corporation Commission (KCC) website: http://www.kcc.state.ks.us/scan/200710/20071010110245.pdf. Other dockets can be accessed through the KCC Docket web page: http://www.kcc.state.ks.us/docket/docket.htm.

## Section 9.2: Residential Structures

#### **Topic/Issue Description**

Electricity sales to residential consumers in Kansas continue to grow, according to the latest data from the Energy Information Administration at the U.S. Department of Energy: up from 12,062,329 Megawatthours (MWh) in 2001 to 13,502,671 MWh in 2006.<sup>13</sup> Natural gas consumption in the residential sector, on the other hand, declined during the same time period: from 70,182 million cubic feet (Mcf) in 2001 to 57,116 Mcf in 2006,<sup>14</sup> presumably in response to the relatively high cost.

Throughout the residential sector in Kansas, it is likely that there are opportunities for the adoption of cost-effective energy conservation and efficiency measures. If energy costs continue to rise relative to the inflation rate, it is also likely that Kansas homeowners will be increasingly interested in investing in such measures.

#### **Existing Policies and Programs**

- Statewide, a number of municipalities have adopted ordinances addressing, to varying degrees, energy efficiency and conservation in residential structures. According to results of a 2007 KEC staff survey of the 25 cities of the first class, most of the state's larger cities have adopted some version of the International Residential Code (IRC) or the International Building Code (IBC). Specifically, Lawrence has adopted the 2006 IECC; Overland Park, Manhattan, and Prairie Village have adopted the 2006 IRC/IBC standards, which are equivalent to the 2006 IECC; Topeka, Great Bend, and Wichita have adopted the 2006 IRC/IBC (without the energy efficiency requirements); Junction City, Kansas City, Newton, Pittsburg, and Shawnee have adopted the 2003 IRC/IBC (with Kansas City also adopting the 2003 IECC); Salina, Lenexa, Garden City, and Dodge City have adopted the 2000 IRC/ IBC; Liberal and Parsons have adopted the 1997 UBC. Atchison, Emporia, Fort Scott, Hutchison, Leavenworth, and Olathe have not adopted any residential energy efficiency codes, though some of these cities haves plan to do so. Enforcement of these codes varies greatly among these cities.
- 2. K.S.A. 66-1228, as amended by HB 2036, requires the builder or seller of a new home to disclose to prospective buyers, "at any time upon request or prior to the signing of a contract to purchase and prior to closing," information regarding the energy efficiency of the structure using a revised, user-friendly form outlined in the statute.
- 3. The U.S. Department of Energy (DOE), through its Building Technologies Program, funds several initiatives to advance research and development of energy efficient buildings, improve building codes and appliance standards, and promote education.

<sup>&</sup>lt;sup>13</sup> U.S. Department of Energy, Energy Information Administration, 2007, State Historical Tables for 2006: http://www.eia.doe.gov/cneaf/electricity/epa/sales\_state.xls (accessed November 2007).

<sup>&</sup>lt;sup>14</sup> U.S. Department of Energy, Energy Information Administration, 2007, Natural Gas Consumption by End Use tables: http://tonto.eia.doe.gov/dnav/ng/ng\_cons\_sum\_a\_EPG0\_vin\_mmcf\_a.htm (accessed November 2007).

Energy Star, a joint program of the U.S. Environmental Protection Agency (EPA), is a voluntary labeling program designed to identify and promote energy-efficient products; the Energy Star label is now on major appliances, office equipment, lighting, and home electronics, and EPA has extended the label to cover new homes and commercial and industrial buildings. The Building Technologies Program also includes Rebuild America, and Zero Energy Buildings.

- 4. The Kansas Weatherization Assistance Program (WAP), operated by the Kansas Housing Resources Corporation, provides housing improvements that increase energy efficiency in households with income up to 150% of the federal poverty level or 60% of the state median income, whichever is higher. WAP has historically been funded solely through federal funds (annual allocation from the U.S. Department of Energy and 15% of the State's LIEAP funds transferred from SRS). In Fiscal Year 2007, State of Kansas general funds were appropriated to supplement the program.
- 5. In November 2006, the Kansas Housing Resources Corporation (KHRC) launched KEEP, a statewide loan program to promote energy conservation and efficiency. This low-interest program allows low- and moderate-income homeowners to obtain low-interest loans to finance energy conservation home improvements. [Note: On December 19, 2007, KHRC announced that they had eliminated the income requirements, allowing all Kansas homeowners to obtain low-interest loans; see Policy and Program Recommendation 2, p. 12.]
- 6. The U.S. Department of Energy (DOE) increased the federal energy efficiency standards for residential furnaces and boilers in November 2007. The new standards apply to the residential versions of gas- and oil-fired boilers; non-weatherized and weatherized gas furnaces; oil-fired furnaces; and gas furnaces for mobile homes. The standards will cause small increases in up-front costs for some of the products, such as non-weatherized gas furnaces, and more substantial cost increases for other products, but in all cases the energy savings will outweigh the up-front costs over the long run. For instance, a gas boiler meeting the new standard is expected to cost \$199 more to install, on average, but should pay for itself within 12 years and should save the consumer \$208 in energy costs over the expected life of the boiler. The new standards will become effective in 2015 and are expected to save 0.25 quadrillion Btu over the following 24 years. DOE plans to implement standards for 18 appliances over the next five years, in order to make a wide range of appliances more energy efficient.
- 7. The Residential Energy Services Network (RESNET), an industry membership corporation, has established energy efficiency standards and the HERS rating system. These standards are used in the mortgage and financial industry as well as by the U.S. DOE for verification of building performance for federal tax credits, Energy Star labeled homes, and in the Energy Building America program. A directory of certified Kansas raters is available online (http://www.resnet.us/directory/raters\_builders.aspx).
- 8. The Leadership in Energy and Environmental Design (LEED) rating system evaluates the energy efficiency and overall "environmental friendliness" of buildings on a four-tier

scale: certified, silver, gold, and platinum. LEED is maintained by the U.S. Green Building Council (USGBC). Separate LEED evaluation standards are provided for existing buildings, new construction, major renovations, commercial interiors, core or shell buildings, homes, and neighborhoods. In order to receive a LEED rating, a building project must register with the USGBC and undergo an audit; achieving any of the four certification levels requires a minimum number of points and the inclusion of points from certain categories. Many construction and architecture firms now advertise as experts in achieving LEED accreditation, and firms will offer to build to LEED standards even if the customer does not wish to pay for the certification Institute (GBCI). Currently, LEED-based standards and incentives have been adopted by 90 U.S. municipalities and 24 states. Almost all standards are aimed at public buildings; however, a few municipalities are requiring some degree of LEED for all construction. Incentives for LEED attainment include reduced building and permitting fees and faster permit application turnaround times.<sup>15</sup>

9. The National Association of Home Builders has developed a voluntary "Model Green Home Buildings Guidelines." The guidelines are divided into six primary sections: lot preparation and design; resource (e.g., building materials) efficiency; energy efficiency; water efficiency and conservation; occupancy comfort and indoor environmental quality; and operation, maintenance, and education.<sup>16</sup>

 <sup>&</sup>lt;sup>15</sup> U.S. Green Building Council (USBC), 2007: http://www.usgbc.org/ (accessed November 28, 2007)
<sup>16</sup> National Association of Home Builders, 2007, NAHB's Model Green Home Building Guidelines:

http://www.nahb.org/publication\_details.aspx?publicationID=1994&sectionID=155 (accessed December 17, 2007).

#### **Section 9.2 Policy and Program Recommendations**

1. The State of Kansas should provide \$2 million in annual funding to expand weatherization assistance to low-income households provided through the Kansas Weatherization Assistance Program (WAP).

#### Description

The average house in Kansas is over 40 years old, and homes of many low-income Kansans are much older. Most homes occupied by low-income families lack adequate insulation and have older, less efficient (and sometimes dangerous) mechanical systems.<sup>17</sup> The weatherization assistance provided by the Kansas WAP not only helps these Kansas residents save money on their energy bills, it also benefits the residents' health and safety through improvement of indoor air quality, vent repairs for water heaters and furnaces, removal of unvented heaters, duct balancing to eliminate backdrafts, and repair of gas leaks.

Operated by the Kansas Housing Resources Corporation (KHRC), WAP provides housing improvements that increase energy efficiency in households with incomes up to 150% of the federal poverty level or 60% of the state median income, whichever is higher. The weatherization improvements are provided through local public or private not-for profit agencies, which apply for the grants from KHRC. Due to the high technical investment and expertise required to operate the grants, the local grants are generally continued from year to year.

Historically, weatherization has increased residential energy efficiency by up to 25%. In 2006, a total of 1,726 homes were weatherized and 453 dangerous furnaces were replaced. Of the households served by WAP, 506 had occupants who were elderly and 370 were occupied by persons with disabilities.<sup>18</sup>

Traditionally, WAP has been funded solely through federal funds (15% of the LIEAP funds transferred from SRS and annual allocations from the U.S. Department of Energy), the amount of which varies from year to year. In Fiscal Year 2007, the State of Kansas appropriated \$2 million in state general funds to supplement the program's funding (\$2,264.099 from U.S. DOE; \$2,501,399 from LIEAP). The additional State funding allowed WAP to increase the number of homes weatherized by about 30 percent.<sup>19</sup>

With predictable State funding, WAP would be able to weatherize more low-income Kansas households and improve program performance at the local level. In addition,

<sup>&</sup>lt;sup>17</sup> According to a recent study conducted for LIEAP (On the Brink: 2006: The Home Energy Affordability Gap, April 2007), nearly 43,000 Kansas households spend 44.7% of their income on home energy bills and another 27,564 households spend 18.0% of their income on energy bills.

<sup>&</sup>lt;sup>18</sup> Al Dorsey, Kansas Housing Resources Corporation, personal communication, October 2007.

<sup>&</sup>lt;sup>19</sup> Al Dorsey, Kansas Housing Resources Corporation, personal communication, December 2007.

State funding would allow WAP to consider some changes to increase efficiency in weatherized homes.

#### **Recommended Actions**

#### a. Responsible parties

Kansas Housing Resources Corporation (KHRC) will continue to oversee WAP and should endeavor to coordinate weatherization activities with local utilitysponsored energy conservation programs.

#### b. Legislative action

Appropriate \$2 million from State General Funds to provide annual funding for WAP, as described above.

#### c. Budget requirements

\$2 million a year from State General Funds.

#### d. Implementation timeline

Funding would be made available upon effective date of enabling legislation.

#### **Implications of Proposal**

#### a. Pros

- i. Promotes energy conservation in Kansas residences.
- ii. Assists low-income Kansans in the adoption of energy conservation and efficiency measures.
- iii. Improves the comfort and safety of homes occupied by low-income Kansans, many of whom are elderly or disabled.
- iv. Reduces utility bills for more low-income Kansans, enabling families to use available resources more efficiently.
- v. Improves affordable housing stock by making energy-efficiency modifications.
- v. Allows WAP to improve program performance at the local level.
- vi. Allows WAP to expand services offered.
- vii. Allows WAP to better coordinate with existing utility-sponsored programs.

#### b. Cons

i. Costs the State \$2 million a year.

#### [Section 9.2 Policy and Program Recommendations, continued]

2. The Kansas Housing Resources Corporation (KHRC) should expand existing lowinterest energy efficiency loan program (KEEP) to facilitate adoption of energy conservation improvements by all Kansas homeowners.

#### Description

To improve the energy efficiency of the State's residential structures and increase energy conservation statewide, KHRC should redesign the current low-interest Kansas Energy Efficiency Program (KEEP) to remove income limits to make a portion of the loan program available to all Kansans.

In November 2006, KHRC launched KEEP with a one-time \$2 million State appropriation.<sup>20</sup> The program provides low-interest loans to qualified Kansas homeowners to make improvements to increase energy efficiency. Currently, the program is limited to individuals with incomes at or below 120 percent of the median income for their area, and KHRC provides state funds for half of the loaned amount, up to a maximum of \$7,500. As of November 2007, 25 loans had been made, totaling \$89,000 in state funds. Sunflower Bank is the only Kansas bank participating in the loan program.

By revising the program to eliminate income eligibility requirements, KHRC will enable all Kansans to participate in the loan program and better meet the objective of promoting energy conservation statewide. This change is also consistent with the successful Nebraska "5% Dollar and Energy Saving Loans" program.<sup>21</sup>

To promote the redesigned loan program, KHRC would partner with the Energy Programs Division at the KCC. KHRC should also partner with the Kansas Bankers Association (KBA) to encourage more lenders to participate in the low-interest loan program.

<sup>&</sup>lt;sup>20</sup> Kansas Housing Resources Corporation, 2007, Description of KEEP:

http://www.kshousingcorp.org/programs/KEEP.shtml (accessed September 2007).

<sup>&</sup>lt;sup>21</sup> The Nebraska Energy Office has operated a highly successful revolving loan program, the 5% Dollar and Energy Saving Loan Program, since 1990, funding \$192 million of energy conservation and efficiency projects statewide. They have roughly 260 lending institutions participating in the program. To date, only \$80,000 has been written off as uncollectible.

#### **Recommended Actions**

#### a. Responsible parties

Kansas Housing Resources Corporation (KHRC) staff will continue to oversee the program; KCC Energy Programs Division will assist in program promotion.

#### b. Legislative action

None required.

#### c. Budget requirements

None required for 2008.

#### d. Implementation timeline

KHRC would begin implementation of recommended changes to KEEP no later than January 2008 and provide the KEC with a program review by July 1, 2008.

#### **Implications of Proposal**

#### a. Pros

- i. Promotes energy conservation in Kansas residences.
- ii. Assists all Kansan homeowners in the adoption of cost-effective energy conservation and efficiency measures.
- iii. Improves the comfort and safety of Kansas homes.
- iv. Reduces utility bills for Kansas homeowners.
- v. Promotes reduced energy consumption in Kansas households.
- vi. Allows WAP to expand services offered.

#### b. Cons

i. Requires a time commitment from KHRC staff to implement proposed changes.

#### [Section 9.2 Policy and Program Recommendations, continued]

## **3.** The KCC's Energy Programs Division should develop a program to promote adoption of model energy efficiency codes by local units of government.

Note: This recommendation is also listed in Section 9.3.

#### Description

In June and July 2007, KEC staff surveyed the 25 Kansas cities of the first class for information on their local energy efficiency (EE) codes.<sup>22</sup> The survey suggests that interest in EE codes is on the rise at the local level and could benefit from state-level support and education.

Building on the recommendation in the *Kansas Energy Plan 2007*—to encourage local units of government to adopt minimum EE standards for new construction—the KCC Energy Programs Division should work with an advisory group to develop an effective program to promote adoption at the local level of model EE codes for new construction in the residential, commercial, and industrial sectors. The advisory group will include homebuilders, the Kansas League of Municipalities, and representatives of local government, especially city managers and local building code officials.

An essential component of this new program would be the selection of an appropriate existing EE code to be promoted as the model for new construction in the residential, commercial, and industrial sectors. The code should be at least as stringent as IECC 2006, which was adopted by the Legislature as the statewide standard for commercial and industrial structures (see discussion of K.S.A. 66-1228 under existing policies and programs). Possible other components of the program might involve training building code officials on energy efficiency code enforcement and dissemination of the latest information on national energy efficiency building codes to city managers and building code officials.

With input from the advisory group, the KCC Energy Programs Division should identify the primary components of the new program by April 1, 2008, in order to include in their annual funding request to the Department of Energy, State Energy Program (SEP). The program would be ready for implementation by July 1, 2008.

<sup>&</sup>lt;sup>22</sup> The KEC staff summary of the survey results is available on the Reports page of the KEC web site: http://www.kec.kansas.gov/reports.htm.

#### **Recommended Actions**

#### a. Responsible parties

KCC Energy Programs Division.

#### b. Legislative action

None required.

#### c. Budget requirements

No additional funding required for FY2008.

#### d. Implementation timeline

The program would be ready for implementation on or before July 1, 2008.

#### **Implications of Proposal**

- a. Pros
  - i. Promotes energy efficiency in newly constructed Kansas buildings.
  - ii. Assists local officials and building managers who may lack the resources to develop EE codes on their own.
  - iii. Reduces energy consumption in Kansas structures.
  - iv. Reduces utility bills for Kansas consumers.
  - v. Provides information and education on energy conservation and efficiency.
  - vi. Fosters more communication between state and local government.

#### b. Cons

i. Requires a time commitment from KCC Energy Programs Division staff to implement new program.

### Section 9.3: Commercial and Industrial Structures

#### **Topic/Issue Description**

Electricity sales to commercial and industrial consumers in Kansas continue to grow, according to the latest data from the Energy Information Administration at the U.S. Department of Energy. The state's commercial sector consumed 12,786,614 Megawatthours (MWh) in 2001 and 14,786,349 MWh in 2006; the industrial sector's consumption grew from 10,569,144 MWh in 2001 to 11,462,282 MWh in 2006.<sup>23</sup>

Natural gas consumption in the commercial sector declined from 37,560 Mcf in 2001 to 27,461 Mcf in 2006. However, demand in the industrial sector for natural gas grew during the same interval, from 93,351 million cubic feet (Mcf) in 2001 to 103,870 Mcf in 2006.<sup>24</sup>

Throughout the commercial and industrial sector in Kansas, it is likely that there remain opportunities for the adoption of cost-effective energy conservation and efficiency measures. If energy costs continue trend upwards, it is also likely that Kansas businesses and industry will be increasingly interested in investing in such measures.

#### **Existing Policies and Programs**

- 1. K.S.A. 66-1227, as amended by HB 2036, adopts the International Energy Conservation Code 2006 (IECC 2006) as the applicable energy efficiency standard for new commercial and industrial structures in Kansas.
- 2. The U.S. Department of Energy (DOE), through its Building Technologies Program, funds several initiatives to advance research and development of energy efficient buildings, improve building codes and appliance standards, and promote education. Energy Star, a joint program of the U.S. Environmental Protection Agency (EPA), is a voluntary labeling program designed to identify and promote energy-efficient products; the Energy Star label is now on major appliances, office equipment, lighting, and home electronics, and EPA has extended the label to cover new homes and commercial and industrial buildings. The Building Technologies Program also includes Rebuild America, and Zero Energy Buildings.
- 3. The DOE also administers the Industrial Technologies Program, which focuses on researching new methods, materials, and machinery to conserve energy as well as promoting best practices in industry.
- 4. The Leadership in Energy and Environmental Design (LEED) rating system evaluates the energy efficiency and overall "environmental friendliness" of buildings on a four-tier

<sup>&</sup>lt;sup>23</sup> U.S. Dept. of Energy, Energy Information Administration, 2007, State Historical Tables for 2006: http://www.eia.doe.gov/cneaf/electricity/epa/sales\_state.xls (accessed November 2007).

<sup>&</sup>lt;sup>24</sup> U.S. Department of Energy, Energy Information Administration, 2007, Natural Gas Consumption by End Use tables: http://tonto.eia.doe.gov/dnav/ng/ng\_cons\_sum\_a\_EPG0\_vin\_mmcf\_a.htm (accessed November 2007).

scale: certified, silver, gold, and platinum. LEED is maintained by the U.S. Green Building Council (USGBC). Separate LEED evaluation standards are provided for existing buildings, new construction, major renovations, commercial interiors, core or shell buildings, homes, and neighborhoods. In order to receive a LEED rating, a building project must register with the USGBC and undergo an audit; achieving any of the four certification levels requires a minimum number of points and the inclusion of points from certain categories. Many construction and architecture firms now advertise as experts in achieving LEED accreditation, and firms will offer to build to LEED standards even if the customer does not wish to pay for the certification Institute (GBCI). Currently, LEED-based standards and incentives have been adopted by 90 U.S. municipalities and 24 states. Almost all standards are aimed at public buildings; however, a few municipalities are requiring some degree of LEED for all construction. Incentives for LEED attainment include reduced building and permitting fees and faster permit application turnaround times.<sup>25</sup>

5. The Green Globes System is an online assessment program for commercial buildings that was developed in Canada and introduced in the U.S. in 2004. Essentially, the Green Globes certification process is a self-administered interactive survey that rates and suggests design choices. At each stage of the design process, users are walked through a logical sequence of questions that guide their next steps and provide guidance for integrating important elements of sustainability. Third party verification is available through the Green Building Initiative (GBI).<sup>26</sup>

<sup>&</sup>lt;sup>25</sup> U.S. Green Building Council (USBC), 2007: http://www.usgbc.org/ (accessed November 28, 2007)

<sup>&</sup>lt;sup>26</sup> Green Building Initiative, 2007, Commercial—The Green Globes System: http://www.thegbi.org/commercial (accessed December 17, 2007).

#### Section 9.3 Policy and Program Recommendations

## **1.** The KCC's Energy Programs Division should develop a program to promote adoption of model energy efficiency codes by local units of government.

Note: This recommendation is also listed in Section 9.2.

#### Description

In June and July 2007, KEC staff surveyed the 25 Kansas cities of the first class for information on their local energy efficiency (EE) codes.<sup>27</sup> The survey suggests that interest in EE codes is on the rise at the local level and could benefit from state-level support and education.

Building on the recommendation in the *Kansas Energy Plan 2007*—to encourage local units of government to adopt minimum EE standards for new construction—the KCC Energy Programs Division should work with an advisory group to develop an effective program to promote adoption at the local level of model EE codes for new construction in the residential, commercial, and industrial sectors. The advisory group will include homebuilders, the Kansas League of Municipalities, and representatives of local government, especially city managers and local building code officials.

An essential component of this new program would be the selection of an appropriate existing EE code to be promoted as the model for new construction in the residential, commercial, and industrial sectors. The code should be at least as stringent as IECC 2006, which was adopted by the Legislature as the statewide standard for commercial and industrial structures (see discussion of K.S.A. 66-1228 under existing policies and programs). Possible other components of the program might involve training building code officials on energy efficiency code enforcement and dissemination of the latest information on national energy efficiency building codes to city managers and building code officials.

With input from the advisory group, the KCC Energy Programs Division should identify the primary components of the new program by April 1, 2008, in order to include in their annual funding request to the Department of Energy, State Energy Program (SEP). The program would be ready for implementation by July 1, 2008.

<sup>&</sup>lt;sup>27</sup> The KEC staff summary of the survey results is available on the Reports page of the KEC web site: http://www.kec.kansas.gov/reports.htm.

#### **Recommended Actions**

#### a. Responsible parties

KCC Energy Programs Division.

#### b. Legislative action

None required.

#### c. Budget requirements

No additional funding required for FY2008.

#### d. Implementation timeline

The program would be ready for implementation on or before July 1, 2008.

#### **Implications of Proposal**

- a. Pros
  - i. Promotes energy efficiency in newly constructed Kansas buildings.
  - ii. Assists local officials and building managers who may lack the resources to develop EE codes on their own.
  - iii. Reduces energy consumption in Kansas structures.
  - iv. Reduces utility bills for Kansas consumers.
  - v. Provides information and education on energy conservation and efficiency.
  - vi. Fosters more communication between state and local government.

#### b. Cons

i. Requires a time commitment from KCC Energy Programs Division staff to implement new program.

### **Section 9.4: Public Structures**

#### **Topic/Issue Description**

Many publicly owned buildings, from State government buildings to public schools, require large amounts of energy to power lighting and run heating, ventilation, and cooling systems, the costs of which are ultimately borne by Kansas taxpayers. As Governor Sebelius noted in her January 2007 Executive Directive on Energy Conservation and Management, the State of Kansas should be "at the forefront of appropriate and effective energy and environmental practices." The Kansas Legislature is also engaged with this issue, as evidenced, for instance, by recent meetings of the Special Committee on Energy, Natural Resources, and the Environment (see recommendation below).

#### **Existing Policies and Programs**

- 1. In Executive Directive 07-373, Governor Sebelius targeted energy conservation and efficiency throughout State government. The directive requires state agencies—primarily the Department of Administration, Kansas Corporation Commission, and Kansas Department of Health and Environment—to (1) survey state employees for energy saving suggestions; (2) require energy audits on any facility being considered as leased space and require landlords to make necessary improvements; (3) collect energy data associated with state-owned and leased space and identify locations using excessive energy; (4) ensure that the average EPA mileage rating for auto purchases and leases in 2010 is at least 10% higher than the 2007 average; (5) review purchasing practices to assure 100% compliance with existing energy conservation requirements and develop or increase standards for such products as appliances, light bulbs, and computers using Energy Star as a minimum; (6) turn off all computers not having a technical or operational need when not in use for four or more hours; (7) expand state recycling program to every state office by December 2007; (8) include information on fuel efficiency and driver behavior in driver's handbook and exam; (9) use the Facility Conservation Improvement Program (FCIP) to implement cost-effective conservation and efficiency measures in all stateowned buildings by 2010; (11) accelerate efforts to market FCIP to school districts and local governments; and (12) review all state construction projects, both new and remodeling, that exceed \$100,000 for possible inclusion in FCIP, including Regents facilities. The Governor's directive also established a new Energy Auditor position at the Department of Administration, responsible for oversight of these initiatives.
- 2. K.S.A. 75-3783 specifies the powers and duties delegated to the Secretary of Administration in overseeing the construction or renovation of state buildings and provides, in subsection (b), that the Secretary may adopt rules and regulations establishing standards for the planning, design and construction of buildings, and major repairs and improvements to buildings. These standards must include energy conservation standards. To date, the Secretary has not promulgated any regulations concerning energy conservation standards. However, the Division of Facilities Management in the Kansas Department of Administration has adopted a policy to use the

2003 International Energy Conservation Code (IECC) as its conservation standard for all new state-financed construction, though there are no formal design review or enforcement procedures. However, because industry standards generally exceed IECC 2003, there is an expectation that the standard is met.

- 3. The U.S. Department of Energy (DOE), through its Building Technologies Program, funds several initiatives to advance research and development of energy efficient buildings, improve building codes and appliance standards, and promote education. Energy Star, a joint program of the U.S. Environmental Protection Agency (EPA), is a voluntary labeling program designed to identify and promote energy-efficient products; the Energy Star label is now on major appliances, office equipment, lighting, and home electronics, and EPA has extended the label to cover new homes and commercial and industrial buildings. The Building Technologies Program also includes Rebuild America, and Zero Energy Buildings.
- 4. The Federal Energy Management Program, administered by DOE, targets the federal government for energy efficiency improvements, encouraging energy efficient equipment purchases, construction, retrofitting, and operations.
- 5. The Facilities Conservation Improvement Program (FCIP), administered by the Kansas Energy Office, is designed to streamline the acquisition and installation of energy conservation measures by public agencies. FCIP connects public agencies (e.g., the state, municipalities, counties, and schools) with qualified private energy service companies (ESCOs) that identify and evaluate energy-saving opportunities and recommend a package of improvements to be paid for through the projected energy savings. The ESCO guarantees that customer savings meet or exceed annual payments to cover all project costs—usually through a contract having a term of between ten and fifteen years. If actual savings don't materialize, falling below the annual payments made to cover the project cost, the ESCO pays the difference. To help ensure savings over the term of the contract, the ESCO offers staff training and long-term maintenance services.
- 6. The Leadership in Energy and Environmental Design (LEED) rating system evaluates the energy efficiency and overall "environmental friendliness" of buildings on a four-tier scale: certified, silver, gold, and platinum. LEED is maintained by the U.S. Green Building Council (USGBC). Separate LEED evaluation standards are provided for existing buildings, new construction, major renovations, commercial interiors, core or shell buildings, homes, and neighborhoods. In order to receive a LEED rating, a building project must register with the USGBC and undergo an audit; achieving any of the four certification levels requires a minimum number of points and the inclusion of points from certain categories. Many construction and architecture firms now advertise as experts in achieving LEED accreditation, and firms will offer to build to LEED standards even if the customer does not wish to pay for the certification Institute (GBCI). Currently, LEED-based standards and incentives have been adopted by 90 U.S. municipalities and 24 states. Almost all standards are aimed at public buildings; however, a few municipalities are requiring some degree of LEED for all construction. Incentives for

LEED attainment include reduced building and permitting fees and faster permit application turnaround times.<sup>28</sup>

<sup>&</sup>lt;sup>28</sup> U.S. Green Building Council (USBC), 2007: http://www.usgbc.org/ (accessed November 28, 2007)

#### **Section 9.4 Policy and Program Recommendations**

1. The Kansas Legislature should adopt legislation requiring all new publicly funded buildings to meet minimum energy efficiency standards, as recommended by the Special Committee on Energy, Natural Resources, and the Environment.

#### Description

Consistent with and building on the initiatives the Governor's January 2007 Executive Order (07-373),<sup>29</sup> the Kansas Legislature should target energy conservation and efficiency in all new publicly funded structures. As proposed by the Special Committee on Energy, Natural Resources, and the Environment, all new publicly funded construction would exceed by 25 percent the standards specified in the International Energy Conservation Code (IECC) 2006, provided specific conservation measures are estimated to be cost-effective over the life of the measure. Additionally, this new construction would also be required to use water more efficiently (use at least 20 percent less potable water for indoor and outdoor use than comparable existing buildings).

Although many activities are underway throughout State government to improve efficiency and reduce consumption in existing public buildings, it is important that the State adopt standards to ensure that all new taxpayer-funded buildings incorporate cost-effective energy efficiency and conservation measures.

#### **Recommended Actions**

#### a. Responsible parties

Kansas Legislature.

#### b. Legislative action

Adopt minimum EE standards for all publicly funded new construction, as described above.

#### c. Budget requirements

<sup>&</sup>lt;sup>29</sup> Specifically, Executive Order 07-373 directs the Department of Administration to (1) require energy audits on all facilities being considered as leased space and require landlord to make necessary improvements and (2) collect energy data associated with state-owned and leased space and identify locations using excessive energy. In addition, the Facility Conservation Improvement Program (FCIP) at the Kansas Energy Office is directed to: (1) implement cost-effective conservation and efficiency measures in all state-owned buildings by 2010, (2) accelerate efforts to market FCIP to school districts and local governments, and (3) review all state construction projects, both new and remodeling, that exceed \$100,000 for possible inclusion in FCIP, including Regents facilities.

Depending on the monitoring and enforcement provisions of the legislation, some additional funding may be required.

#### d. Implementation timeline

Initiated up on effective date of enabling legislation.

#### **Implications of Proposal**

#### a. Pros

- i. Promotes energy efficiency in newly constructed Kansas buildings.
- ii. Reduces long-term energy costs in public buildings.
- iii. Reduces energy consumption in Kansas public buildings.
- iv. Saves Kansas taxpayers money through reduced long-term energy costs.
- v. Sets an example for EE improvements in non-public buildings in Kansas.

#### b. Cons

- i. May require additional funding for State employees to monitor and oversee implementation.
- ii. May require additional time and training for Department of Administration employees to implement new EE standards in their practices.
- iii. May increase the initial, up-front cost of construction.

## **Chapter 12: Energy Education**

There is little disagreement that education on energy resources and energy-related issues will enable U.S. citizens to make more-informed choices about their use of energy resources. Although a vast amount of information on energy and energy issues is available (much of which is easily accessed through the internet), there is evidence that the availability of information has had little impact on the nation's "energy IQ." In a 2002 national Roper Starch study, three Americans in four rated themselves as having "a lot" or "a fair amount" of knowledge about energy, though only 12% of American adults were able to pass a quiz testing knowledge of very basic energy concepts.<sup>1</sup>

### Section 12.1: K-12 Education

#### **Topic/Issue Description**

Improving the "energy IQ" of school-aged children is an essential component of a statewide effort to promote energy conservation. The 2002 national Roper Starch study also found that older Americans are more likely to know more about energy conservation practices than younger Americans, pointing to a need to better educate school-aged children.<sup>2</sup>

Increasing efforts to provide energy education to school-aged students will help Kansas move toward a citizenry that is well educated about energy and energy conservation and therefore more likely to engage in energy conservation in their homes, work places, and in the transportation choices they make.

#### **Existing Policies and Programs**

- 1. The U.S. Department of Energy, Energy Efficiency and Renewable Energy hosts an Energy Education web site that provides lesson plans and activities for K-12 teachers and students.
- The U.S. Department of Energy, Energy Information Administration sponsors a webbased resource—Energy Education Resources: Kindergarten through 12<sup>th</sup> Grade. Content covers a wide range of energy and environmental categories.
- 3. The U.S. Department of Energy (DOE), through its Building Technologies Program, funds several initiatives to advance research and development of energy efficient buildings, improve building codes and appliance standards, and promote education.
- 4. The Kansas Association for Conservation and Environmental Education (KACEE), is a private, non-profit association that has been working with teachers and school

<sup>&</sup>lt;sup>1</sup> National Environmental Education Foundation and Roper Starch ASW, Americans' Low "Energy IQ:" A Risk to Our Energy Future, Why America Needs a Refresher Course on Energy (www.neefusa.org).

<sup>&</sup>lt;sup>2</sup> The Roper Starch survey also reports that 90% of the adults surveyed support energy and energy conservation education being taught in schools.

districts since 1969 to promote and provide "effective, non-biased and science-based" conservation and environmental education, including energy education.

5. The Kansas Corporation Commission's Energy Programs Division, in consultation with representatives from the state's electric and natural gas utilities is developing a statewide energy conservation education program.

#### Section 12.1 Policy and Program Recommendations

## **1.** The State should provide \$30,000 in annual funding to KACEE to support energy conservation education in Kansas public schools (K-12).

Because educating school children is an essential component of a statewide educational campaign to promote energy conservation, the State should provide funds to establish an ongoing K-12 energy conservation education program.

This program should be implemented by the Kansas Association for Conservation and Environmental Education (KACEE), a private, non-profit association that has an established statewide network that includes partnerships with the Kansas State Board of Education and Department of Education, the Kansas Association of Teachers of Science, numerous schools and school districts throughout the state, as well as supporting public and private entities that work to promote and provide environmental education throughout the state. These established partnerships uniquely position KACEE to work with audiences that will generate the most impact for the educational outreach effort.<sup>3</sup>

KACEE already has acquired curriculum materials targeting energy conservation—a program called Project Learning Tree Energy and Society. Project Learning Tree's Energy and Society program was developed nationally to provide teachers with nonbiased and science-based hands-on activities that promote critical thinking and problem-solving related to energy and energy issues. This is a supplemental program that can be used to help teachers attain state standards in reading, writing, math, science and social studies, while engaging students in exploring energy, energy use, natural resources and energy conservation. The materials have been evaluated by the North American Association for Environmental Education's Guidelines for Excellence and have been found to be high-quality energy conservation education materials.

In addition, KACEE is currently working with the Kansas Department of Health and Environment, Bureau of Air and Radiation to implement a Green Schools program, which includes energy audits and on-site conservation and service learning projects. Because of the strong statewide partnerships KACEE has established, they can use this and other related initiatives in combination with the proposed K-12 energy conservation education program to offer a comprehensive and exciting program for students throughout the state.

KACEE would provide training to teachers and other educators through workshops that would allow them to simultaneously meet recertification requirements, while exploring the energy and energy conservation curriculum KACEE staff estimates that they could provide energy conservation training for about 200 educators in geographically diverse regions of the state for approximately \$30,000 a year. These teachers would reach an estimated 6,000 school children in the first year, with the

<sup>&</sup>lt;sup>3</sup> More information about KACEE is available on their web site: http://www.kacee.org.

numbers nearly doubling in the second year, tripling in the third, etc., as trained teachers go on to teach each year's students. KACEE is also in the process of exploring opportunities to offer these courses to teachers in an online setting, which would allow even greater access to the energy conservation education program and materials, thus potentially significantly increasing impact.

#### **Recommended Actions**

a. Responsible parties KACEE.

#### b. Legislative action

Appropriate \$30,000 in annual funding to KACEE, as described above

#### c. Budget requirements

\$30,000 annually.

#### d. Implementation timeline

Funding would be made available upon effective date of enabling legislation.

#### **Implications of Proposal**

#### a. Pros

- i. Improves understanding of energy resources and conservation among Kansas school children and teachers.
- ii. Likely to increase awareness of energy resources and related issues among parents of children receiving this education.
- iii. Promotes conservation of energy resources statewide.
- iv. Promotes reduction of energy consumption statewide.

#### b. Cons

i. Requires \$30,000 in annual state funds.