

# NEBRASKA ENERGY OFFICE

*The vision of the Nebraska Energy Office is for Nebraska to have reliable and affordable sources of energy that support a cleaner environment and ensure security for our lifestyle and economy.*

*The mission of the Nebraska Energy Office is to promote the efficient, economic and environmentally responsible use of energy. Our principles: we value teamwork, are customer oriented, believe in creativity and innovation, are committed to excellence and pursue the highest standard of professionalism and integrity in serving the state's citizens.*

*In support of the agency mission, the following goals have been adopted:*

- Advance the conservation of traditional energy resources.
- Encourage the development of alternate and renewable energy resources.
- Advise the executive and legislative branches of state government in the development of energy policy.
- Utilize the Internet and computer technology to augment the delivery of information and services.

## The Programs

The Nebraska Energy Office operates a number of different programs. These programs can be categorized as follows: low-income weatherization, oil overcharge-funded activities, state energy program activities, organization activities and natural gas technical assistance. An overview of the 2002-2003 financial activity appears at the end of this section. The period covered by this report is from July 1, 2002 to June 30, 2003, except where noted.

### Low Income Weatherization Assistance Program



The Energy Office administers this federally-funded program for weatherizing homes to save money and energy.

Typically, the types of improvements made include wall and attic insulation and checking the energy efficiency and safety of furnaces, stoves and water heaters.

The agency is responsible for inspecting the homes that are weatherized and for monitoring the subgrantees, primarily community action agencies, that actually make the home weatherization improvements. In this reporting period, an estimated one-quarter of the homes weatherized were inspected by agency staff.

In fiscal year 2002-2003, 1,379 homes were weatherized by Energy Office subgrantees. This effort received a total of \$4,478,182 from two sources: \$2,329,208

from the U.S. Department of Energy's Low Income Weatherization Assistance Program and \$2,148,974 from the Low Income Home Energy Assistance Program.

Since the program's inception in 1979, \$88.17 million has been spent to make energy efficiency improvements in 54,434 homes. An estimated 55,000 homes of Nebraskans remain eligible for the weatherization program.

Energy savings resulting from weatherization typically last 20 years or longer. The cumulative savings since the program began are illustrated in Figure 1. Conservatively, estimated savings of \$62.2 million have been achieved. About \$4.2 million in new savings accrue annually.

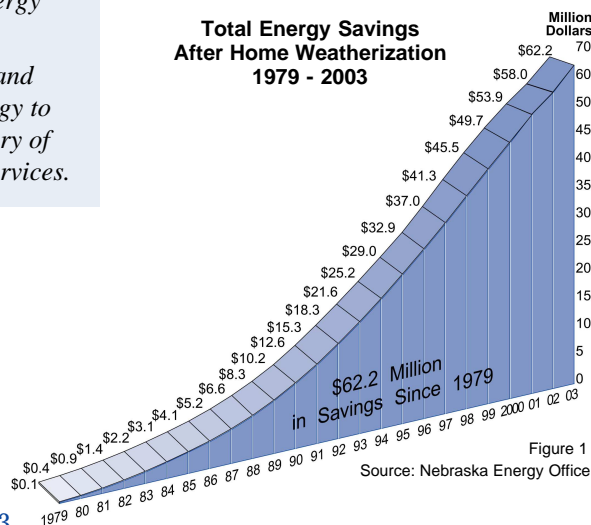
### Oil Overcharge Funds

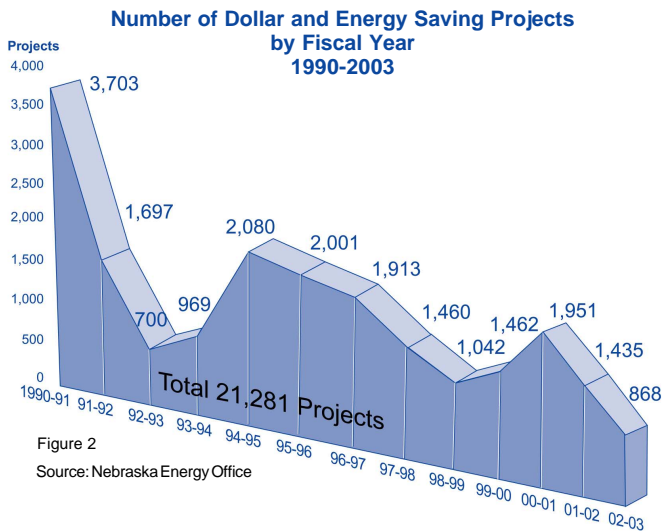


Since 1982, Nebraska has received oil overcharge funds — also called petroleum violation escrow funds — as a

result of various court actions against oil companies that overcharged their customers during the period of federal price controls from 1973 to 1981. Since direct compensation to injured consumers was not possible, the courts ordered the money be distributed to the states and used, within parameters established by the courts and federal regulators, to fund energy assistance and efficiency programs.

The Legislature requires the Energy Office to annually report on disposition of these funds. A summary of Nebraska Energy Settlement Fund activities follows and is detailed in Figure 4 on page 3.





## Dollar and Energy Saving Loans

This program, which was capitalized with oil overcharge funds and is recharged with loan repayments, provides low-interest loans to Nebraskans to finance home, building, transportation and system improvements. Presently, 253 participating lenders at 686 locations provide five percent interest rate financing for up to 15 years on loans for energy saving improvements.

By June 30, 2003, 21,281 projects totaling more than \$162.8 million have been financed with low-interest loans. Of that total, the Energy Office has provided more than \$76.5 million which leveraged more than \$86.3 million from Nebraska lenders. These projects also leveraged from borrowers an additional \$14.1 million that was spent on non-energy related improvements.

Loans have financed projects in all of the state's 93 counties. During the reporting period, 868 new projects were financed. The number of projects financed each year since 1990 are shown in Figure 2.

For reporting purposes, the agency categorizes loans into 11 types. More than 95 percent of the loan funds have financed improvements in just four categories: agriculture, mortgages, residential and small business. Summaries of the major loan categories appear in Figure 3 and are detailed as follows:

pumps and motors, making well modifications and replacing grain dryers. Since 1990, the Energy Office and lenders have financed 552 agricultural projects totaling \$10.1 million.

### Energy Efficient Mortgages

The Energy Office began financing new home construction in 1996. To date, the agency and lenders have financed 150 homes which meet or surpass the *1995 Model Energy Code* by up to 30 percent. In financing these projects, the agency offers inducements in the form of interest rate reductions, from ¼ to 1 percent, to encourage the construction of very energy efficient homes. The Energy Office and lenders have financed construction totaling \$21.1 million, and lenders and homeowners have financed an additional \$4.2 million on the same projects. Currently, 13 percent of all funds used to finance energy efficiency projects has financed mortgages for new homes.

### Residential Improvements

More than 92 percent of the total number of the energy efficiency projects financed are in the homes of Nebraskans. More than 67.9

## Agricultural Improvements

Improvements in agricultural equipment and systems rank fourth in the use of low-interest financing. More than 6.2 percent of all loan funds have financed typical agricultural projects such as low-pressure irrigation systems, replacing irrigation

percent of all the funds loaned finance residential improvements such as replacing or installing furnaces, air conditioners and heat pumps, replacing windows and doors and insulating walls and ceilings. To date, 19,610 projects totaling more than \$110.7 million have been undertaken by Nebraskans.

### Small Business Improvements

More than 8.3 percent of all energy efficiency financing, \$13.5 million, has been used to make improvements in 856 buildings and systems in small businesses in the state. Typical small business improvements include replacement of furnaces and air conditioners as well as insulation, lighting and replacement doors and windows.

### Nebraska Green Buildings

During the reporting period, three Nebraska Green Built Homes were built with \$902,100 in construction loan financing from *Exxon* funds added to the Dollar and Energy Saving Loan pool. The prototype homes demonstrated the benefits and requirements of the Energy Office's Green Building Program in which builders use methods to reduce construction waste, integrate

### Oil Overcharge Funds Invested In Types of Dollar and Energy Saving Loans as of June 30, 2003

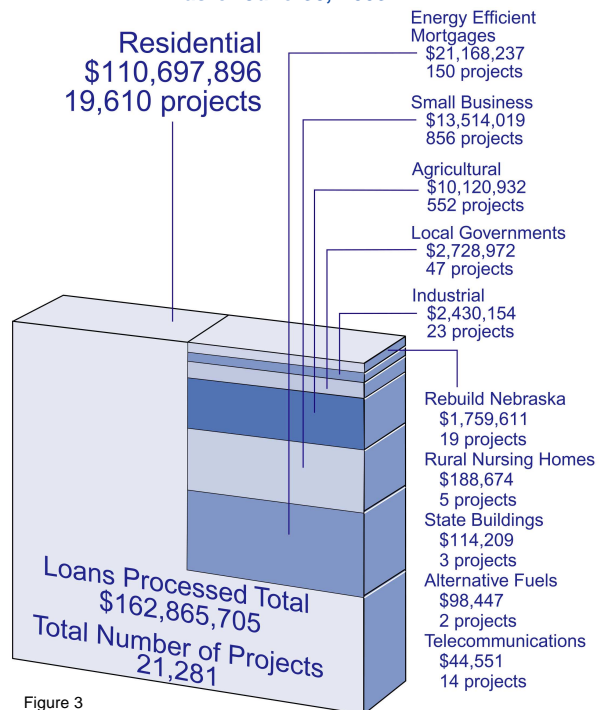


Figure 3  
Source: Nebraska Energy Office

**Nebraska Energy Settlement Fund  
A Summary of Exxon, Stripper Well and Diamond Shamrock  
Oil Overcharge Funds as of June 30, 2003**

	<i>Exxon</i>	<i>Stripper Well</i>	<i>Diamond Shamrock</i>	<b>Total</b>
Funds Received	\$15,504,944	\$15,411,142	\$359,172	\$31,275,258
Interest Earned and Miscellaneous Income	\$9,530,584	\$6,901,568	\$306,757	\$16,738,909
<b>Total</b>	<b>\$25,035,528</b>	<b>\$22,312,710</b>	<b>\$665,929</b>	<b>\$48,014,167</b>
<b>Funds Budgeted</b>	<b>\$25,035,528</b>	<b>\$22,249,122</b>	<b>\$665,929</b>	<b>\$47,950,579</b>
<b>Low Income Designated</b>	<b>\$0</b>	<b>\$84,082</b>	<b>\$0</b>	<b>\$84,082</b>
<b>Uncommitted Balance</b>	<b>\$0</b>	<b>\$63,588</b>	<b>\$0</b>	<b>\$63,588</b>

Source: Nebraska Energy Office

Figure 4

recycled materials, reduce water consumption and achieve high energy efficiency.

Agency staff and the Green Builders Council finished the development of the green building construction standards, participated in the construction requirements of the prototype homes, trained and certified five additional builders, hosted three on-site home builder trainings covering different phases of construction and promoted the Green Building Program to the general public through press events, open houses and radio advertising.

### Native American Tribal Governments

The Stripper Well court order requires the state to provide an equitable share of oil overcharge funds to Native Americans. Based on their Nebraska population, ~~\$92,187~~ have been set aside for eligible projects. Thus far, \$68,472 has been spent on Tribal energy projects.

### Other Funds

Another \$1,813 in *Diamond Shamrock* funds were spent on agency operating expenses.

### State Energy Program



In 2002-2003, Nebraska received \$437,000 for this federally-funded effort and supplied \$87,400 in state funds from oil and

natural gas severance taxes, as required matching funds.

These funds are used to provide energy efficiency services to consum-

ers and other small energy users, and include the publication of this *Annual Report* and the *Nebraska Energy Quarterly* as well as maintenance of the state's energy database and web site.

These funds also provide program support for a wide array of activities that include energy shortage management and emergency preparedness, education and information, Dollar and Energy Saving Loans and management of competitive federally-funded Special Projects grants secured by the agency.

A number of activities are grouped under the State Energy Program, in part, because the federal energy department primarily funds them. The activities that occurred under each special projects grant during the reporting period is documented in this section.

### Accelerating Wind-Power Development in Nebraska

This project utilized \$15,000 in unexpended U.S. Department of Energy funds and a new grant of \$13,000 from the same federal agency to examine the state's unique public power structure and suggest four different ways wind power models could be developed. The models examined in the study included a large public power district, one or more smaller municipal utility systems, a rural electric district and Native American jurisdiction. The study was completed and is on the Energy Office web site at [http://www.nol.org/home/NEO/reports/accel\\_wind.htm](http://www.nol.org/home/NEO/reports/accel_wind.htm)

At the end of the reporting period, \$28,000 had been spent and the project was completed.

### Biomass Roadmap

This \$30,000 grant from the U.S. Department of Energy, received in April 2003, is for preliminary design of a state biomass roadmap to utilize Nebraska's biomass resources. The agency will utilize members of the state's Biomass Steering Committee to assist university personnel to identify the elements and steps necessary for developing biomass resources in the state. This project is scheduled for completion by June 2004.

No funds were spent during the reporting period.

### Biomass Steering Committee Development

This \$24,000 grant from the U.S. Department of Energy, received in April 2003, is for program activities in support of the state's Biomass Steering Committee. Since the Committee was created in 1999, no state funds have been provided to support its activities. At the end of the reporting period, \$223 had been spent on Steering Committee activities.

### Create and Identify High Performance and EnergyStar Buildings

This Rebuild America grant totaling \$125,000 was received from the U.S. Department of Energy in August 2002. Under this project, the Energy Office and its partners, the University of Nebraska at Omaha engineering staff and the Omaha Public Power District, will develop and demonstrate the Continuous Commissioning Leading Retrofit Process using three case studies. This Continuous Process allows building owners to make major energy efficient improvements with no or minor initial capital investment. One of the goals of this project is for the state to become one of the top ten ranked EnergyStar™ building states within two years. EnergyStar™ is a joint U.S. Environmental Protection Agency and U.S. Department of Energy effort to identify the most energy efficient and least polluting products, systems and building techniques.

At the end of the reporting period, \$35,776 had been spent. This project is



scheduled to be completed on or before August 2004.

### **Develop Persuasive Nebraska Specific Materials to Further the Adoption of the Next Generation of Energy Codes**

This \$100,000 Building Technologies/Codes and Standards special project grant was received from the U.S. Department of Energy in September 2002. The Energy Office and its partner, the University of Nebraska-Lincoln architectural engineering department, will complete a survey of local codes and building practices and the types and sizes of homes being built, analyze energy savings, construction costs, and economic benefits associated with updating the current energy code and produce a report on the study's findings.

At the end of the reporting period, \$34,564 had been spent. This project is scheduled to be completed before August 2004.

### **Energy Star**

In April 2003, the agency received a \$10,000 grant from the U.S. Department of Energy to promote Energy Star-labeled products in conjunction with the Nebraska Green Building Program's training and information activities to increase energy efficiency and environmental actions targeted at new construction and remodeling in the residential sector. Energy Star is a joint effort by the Environmental Protection Agency and U.S. DOE to identify the most energy efficient products available in a number of categories such as appliances, lighting equipment and heating and cooling equipment.

At the end of the June 2003, no funds had been spent on this activity, which is scheduled to be completed by June 2004.

### **Federal Energy Management Program/Omaha Public Power District**

This \$76,000 grant was received September 2001. In partnership with the Omaha Public Power District and the U.S. Air Force, the feasibility of using renewable geothermal power to displace natural gas at Offutt Air Force Base will be explored.

This project included thermal conductivity testing at Offutt Air Force Base, performing energy use simulations at base dormitories and other facilities, production of preliminary design of construction documents and presentation and publication of the study's findings. The study can be found at the utility's web site at <http://www1.oppd.com/prodsvr/comprodsrv/successes/OffuttReport11.pdf>

During the reporting period all funds were spent and this project was completed in July 2003.

### **State Heating Oil and Propane Program**

During the reporting period, the Energy Office began its second year of participation in the U.S. Department of Energy's State Heating Oil and Propane Program. This activity collects price information from Nebraska suppliers from October through March which, in turn, is shared with the Energy Information Agency and then posted on the agency's web site at <http://www.nol.org/home/NEO/statshtml/86.html> and <http://www.nol.org/home/NEO/statshtml/87.html>. The U.S. Department of Energy provided a grant of \$6,000 for this activity. By the end of the reporting period, all funds were expended and the project was completed.

### **Other Projects**

Some projects undertaken by the Energy Office are funded by sources other than the U.S. Department of Energy.

### **Department of Environmental Quality/Educating Home Builders to Use Recycled Construction Materials and Reduce Construction Site Waste**

This \$42,092 grant was received in January 2002. Under the proposal, the agency undertook an educational effort to increase awareness and understanding among consumers and the home building industry on how to design and build new homes so that construction waste would be reduced by 25 to 50 percent and the use of recycled construction materials would be maximized.

The project included developing a web-based resource library of recycled construction sources, green building construction details and a series of

factsheets on related topics; providing home builder training; offering a newly built home for inspection by the public; and educating realtors, appraisers and the mortgage industry.

During the reporting period, \$17,509.50 were spent. The project is scheduled to be completed by December 2003.

## **Organizations**



The Energy Office serves as the headquarters for four state, regional, national and international organizations:

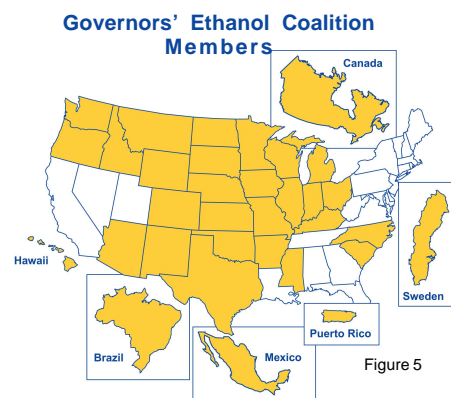
### **Governors' Ethanol Coalition**

Nebraska was the driving force in the Coalition's creation in 1991. Today, there are 29 members from Hawaii, Oregon and Washington in the West to the Carolinas in the East. There are also four international members. The members are identified in Figure 5.

An Energy Office staff member is one of the Nebraska governor's representatives for the group. The Energy Office serves as the Coalition's administrative headquarters, handling fiscal, media and operational matters.

During the reporting period, the Coalition:

- Worked on the passage of the energy bill which included a provision which would triple the use of ethanol in the United States. The



ethanol provisions in the energy bill would also:

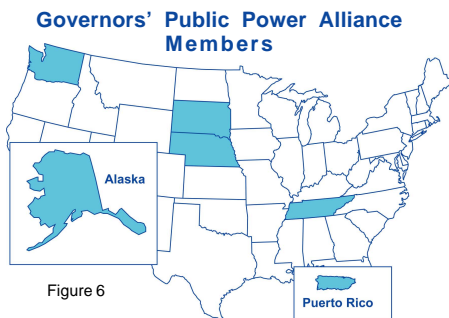
- ◆ Eliminate the oxygen requirement in reformulated gasoline,
- ◆ Ban MTBE — methyl tertiary butyl ether — over four years,

- ◆ Create the renewable fuel standard that triples the amount of ethanol used in gasoline over ten years,
- ◆ Extend the small ethanol production tax credit to farmer-owned cooperatives and
- ◆ Extend federal income tax credits to retailers who sell 85 percent ethanol blends.

- Maintained the Coalition's web site at <http://www.ethanol-gec.org>.
- Continued to work with the National Ethanol Vehicle Coalition to increase the number of public E85 fueling sites.

### Governors' Public Power Alliance

This bi-partisan coalition of six governors was formed so consumers served by publicly-owned electric systems would not be disadvantaged as the industry was restructured. Nearly one-quarter of the nation is served by consumer-owned systems, including all electric utilities in Nebraska.

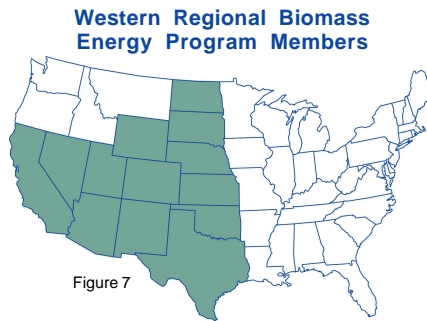


Formed in 1998, the governors of Nebraska and Tennessee serve as co-chairs of the Alliance.

During the reporting period, the Alliance continued to monitor federal legislative restructuring activity — especially the comprehensive energy bill considered by Congress — making its position known in a number of venues.

### Western Regional Biomass Energy Program

Since 1997, the Energy Office has administered this federal 13-state regional program. The 13-state Western region is illustrated in Figure 7. Biomass is renewable organic matter such as forest residues, agricultural



crops and wastes, wood and wood wastes, animal wastes, livestock operations residues, aquatic plants and municipal wastes.

Over the years, numerous projects in Nebraska have been supported with funds from this program, especially the state's ethanol industry.

Since the Energy Office began administering this program, \$1.725 million in grants have been spent on projects in the 13 states. Western ended its grants program in 2003.

### Biopower Steering Committee

Authorized by the Legislature through 2008, the Energy Office provides assistance to this 12-member group. Its task is to foster the use of bio-based resources as energy production resources.

### Natural Gas Loans and Technical Assistance



On May 30, 2003, the *State Natural Gas Regulation Act* became law. The *Act* created a regulatory structure through which the Nebraska Public Service Commission became responsible for regulating investor-owned utilities which provide natural gas. Prior to the passage of the *State Natural Gas Regulation Act*, the Energy Office, under the auspices of the Governor's Policy Research Office, administered a revolving loan fund that financed municipal rate regulation. Groups of communities borrowed from the fund to finance rate studies and the fund was replenished by the regulated utilities who, in turn, billed their customers for the cost of the regulation.

As of June 30, 2003, eight loans had not been repaid:

### Area Hearing Phase

KN Energy Rate Area Two	\$84,864.00
KN Energy Rate Area Three	\$79,482.00
KN Energy Rate Area Four	\$106,119.00
KN Energy Rate Area Seven	\$119,535.00
<b>TOTAL</b>	<b>\$390,000.00</b>

### District Court Appeal Phase

KN Energy Rate Area Two	\$86,102.68
KN Energy Rate Area Three	\$80,642.12
KN Energy Rate Area Four	\$107,667.92
KN Energy Rate Area Seven	\$121,279.74
<b>TOTAL</b>	<b>\$395,692.46</b>

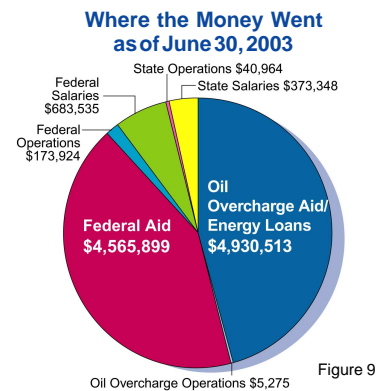
### Financial Activity



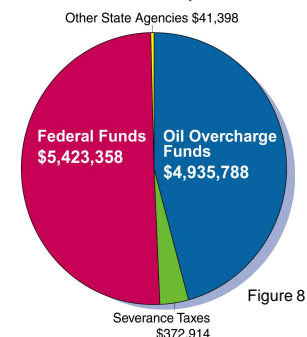
In 2002-2003, the expenditures for the agency totaled \$10,773,458 and includes federal, state, oil

overcharge and miscellaneous state funds. The source of the funds is illustrated in Figure 8. More than 50 percent was derived from federal sources. Nearly 49 percent of the funding came from oil overcharge accounts.

More than 45 percent of all expenditures were used for oil overcharge aid primarily in the form of Dollar and Energy Saving Loans and are detailed on pages one through three in this report. More than 42 percent of all federal funds were spent as aid in the Low-Income Weatherization Assistance Program. Complete expenditure details are found in Figure 9.



### Where the Money Came From as of June 30, 2003



(1) On or before February 15 of each year, the Director of the State Energy Office shall transmit to the Governor and the Clerk of the Legislature a comprehensive report designed to identify emerging trends related to energy supply, demand, and conservation and to specify the level of state-wide energy need within the following sectors: Agricultural, commercial, residential, industrial, transportation, utilities, government, and any other sector that the director determines to be useful.

(2) The report shall include, but not be limited to:

(a) An assessment of the state's energy resources, including examination of the current energy supplies and any feasible alternative sources;

(b) The estimated reduction in annual energy consumption resulting from various energy conservation measures;

(c) The status of the office's ongoing studies;

(d) Recommendations to the Governor and the Legislature for administrative and legislative actions to accomplish the purposes of sections 70-625, 70-704, 81-1602, 81-1606, and 81-1607; and

(e) The use of funds disbursed during the previous year under sections 81-1635 and 81-1641. The use of such funds shall be reported each year until the funds are completely disbursed and all contractual obligations have expired or otherwise terminated.

*Nebraska Revised Statutes  
81-1607*

## Trends and Needs

The Nebraska Energy Office follows the trends of different energy sectors as part of its mission. These trends can portend future energy use.

In all cases, the most current energy data has been used in this report. Detailed energy data required to be maintained by the Energy Office can be found at the agency's web site <http://www.nol.org/home/NEO/statshtml/index3c.html>

### State-wide Energy Need and Cost



In 2000, the state's total energy consumption was 583.5 trillion British thermal units, a decline of 3.3 percent from 1999.

Declines from 1999 levels were recorded for nuclear power, 14.7 percent; renewables, 6.4 percent; and petroleum, 8.4 percent. Coal and natural gas use increased 4.3 percent and 3.4 percent, respectively. (2000 is the most recent year for which consumption, expenditure and price data are available.)

Total energy expenditures in 2000, soared 21 percent above 1999 figures to \$4.323 billion. Dramatic rises in expenditures for petroleum, which accounted for 74 percent of the expenditures, and for natural gas, which accounted for 21 percent, were responsible for the \$748 million increase from 1999.

The prices for different types of energy, as compared to other states, reveals Nebraskans paid the lowest price for coal in the nation in 2000, and less than half the national average. The rankings are calculated by the Energy Information Administration (EIA). Electricity at 42<sup>nd</sup> in price, and gasoline at 37<sup>th</sup> in price, were little changed from rankings in 1999. Natural gas, another key energy source for Nebraskans, ranked 31<sup>st</sup> in price.

According to the EIA, Nebraska ranked 37<sup>th</sup> in 2000 in total energy expenditures among the 50 states and the District of Columbia (Texas was first and the District was last). The state was 24<sup>th</sup> in the ranking of expenditures per person at \$2,526 (Louisiana was first and Florida was last).

### Agricultural Energy Supply



Energy supplies and needs for the agricultural sector of the state's economy have

been met. Any supply problems have been limited to infrequent shortfalls of petroleum products usually during periods of peak demand.

#### Demand

Energy demand information for the agricultural sector is not available on a consistent and annual basis. National energy databases merge agricultural energy use with data from the industrial sector.

#### Conservation

Over the years, agricultural producers have used a number of different approaches to conserve energy use. Energy reduction practices used have included conservation tillage and irrigation pump testing, scheduling and load management. The Energy Office provides low-cost financing for irrigation efficiency projects that demonstrate energy savings such as low-pressure pivots and replacement pumps and motors. Other farming and ranching energy efficiency projects such as grain dryers have also been financed with low-interest loans.

Typically, high fuel costs or limited availability of energy resources induces demand for efficiency practices in this sector.

#### Energy Need

At one time, energy costs were the second largest agricultural expense. As farm size has increased, energy has replaced labor allowing fewer people to produce larger volumes of agricultural goods.



The energy needs of the state's agricultural producers can fluctuate dramatically from growing season to growing season. For example, a 30 percent increase in gasoline and diesel use in 2000 was primarily due to increased irrigation use as a result of drought conditions in some areas of the state.

Most recently, the greatest energy concern was the limited availability and high cost of ammonia fertilizer which is a natural gas based product. If natural gas price volatility continues, agricultural producers could be adversely affected.

Fuel substitution or conversion to other types of fuel are very difficult for this sector to utilize.

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## Commercial



This sector which includes non-manufacturing business establishments closely parallels consumer economic activity in the state and includes energy use by local, state and federal governments.

### Energy Supply

For the last four years, at least 93 percent of the energy used in this sector came from only two sources: natural gas and electricity. Supplies of both energy resources were plentiful. However, prices for natural gas have departed substantially from historically stable price patterns.

Trends indicate these fuel types will remain the predominant fuel choices of this sector in the near term.

### Demand

The recent multi-year trend of declining demand in the commercial sector was broken in 2000. Net energy use increased 9 percent to 62.8 trillion British thermal units. Total energy use also increased by 3 percent to 113.8 trillion Btus. Increases in demand were reported across all types of fuel: electricity, up 9 percent from 1999; natural gas up 4 percent; petroleum use up 58 percent; and renewable energy use up 1 percent.

## Conservation

Reductions in energy use in the commercial sector generally follow patterns found in the residential sector. Efforts to conserve energy use tend to be economically driven, especially when fuel prices rise above historic levels.

### Energy Need

Because the predominant energy needs of the commercial sector are confined to readily available supplies of natural gas and electricity, no supply problems are likely if natural gas supplies are stable.

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## Residential



### Energy Supply

More than 87 percent of the energy used in the residential sector in 2000 came from only two sources: electricity and natural gas. More than half the energy used in this sector comes from natural gas. There are available supplies of both types of energy.

### Demand

Demand in the residential sector reversed a multi-year trend in 2000, which resulted in a small increase in net energy use of 4.2 percent over 1999 to 80.3 trillion British thermal units. Substantial increases in 2000 were reported in electricity, up 5.3 percent and natural gas, up 3.4 percent.

### Conservation

Most natural gas in the residential sector is used for heating and minor household uses such as heating water, drying clothes and cooking.

Like most of the other sectors, residential users are extremely responsive to dramatic price rises. Increases in the price of natural gas, at various times over the decades, have resulted in reduced average annual consumption. Higher than normal heating bills have propelled homeowners to make energy saving improvements such as replacing furnaces and adding insulation.

The 40-plus-year trend of increasing use of electricity in households, from 6.51 trillion Btus in 1960 to 28.48 trillion

Btus in 2000, illustrates the wide adoption by Nebraskans of energy-using technologies such as televisions, microwave ovens and computers.

### Energy Need

Energy need in this sector for the two major fuel types — natural gas and electricity — is likely to be determined in predictable ways: severity of winter and summer weather conditions and price volatility. The combined impact of a return to normal winter weather patterns coupled with high natural gas prices — as occurred in 2000-2001 — would likely result in predictable behavior: a surge in replacement of inefficient heating equipment, reduction in use and fuel switching by replacing natural gas furnaces with electric-powered heat pumps. A string of 100 degree summer days, can also lead to replacements of broken or old air conditioners with new energy efficient models which can reduce energy use.

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## Industrial



The industrial sector includes manufacturing, construction, mining, agriculture and forestry operations.

### Energy Supply

The industrial sector relies on more diverse types of fuel than other sectors. Natural gas, electricity and various petroleum products — gasoline, propane and diesel — are the primary energy inputs utilized in this sector's operations. Generally, supplies of all fuel types have been readily available.

### Demand

In four decades, total energy demand in this sector has grown from 85.53 trillion Btus in 1960 to 123.30 trillion Btus in 2000. Demand grew significantly for electricity, propane and diesel fuel while declines were recorded for coal and gasoline over the past 40 years.

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## Conservation

Over the years, the industrial sector has been more likely to make energy efficient system and building improvements, especially if energy costs are a significant factor in the cost of doing business.

The impact of conservation efforts are most clearly seen in natural gas use in this sector when usage peaked in 1973 at 73.7 trillion Btus. Demand subsequently fell precipitously after the energy price shocks of the 1970s to a low of 20.3 trillion Btus in 1986.

## Energy Need

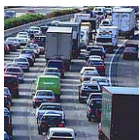
Energy need in the industrial sector is also subject to the ebb and flow of national and regional economic trends which can cause spikes or declines in energy demand.

Growth trends in this sector can also be affected by industrial expansions in the state. For example, the significant increase in ethanol production in the mid-1990s caused a substantial increase in natural gas need in this sector.

Based on past use patterns, increased need for electricity by this sector is likely. Energy need for other energy resources is impossible to predict.

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## Transportation



In addition to traditional methods of transportation — public and private vehicles, aircraft and boats — this sector includes energy used to transport natural gas through pipelines.

## Energy Supply

The transportation sector in Nebraska is almost exclusively dependent upon petroleum-based fuels. This level of dependency on petroleum has not essentially changed since 1960, when record-keeping began.

## Demand

Demand in this sector has nearly doubled since 1960, rising from 94.2 trillion Btus to 174.7 trillion Btus in 2000. Most recently, net energy demand decreased by 10 percent in 2000 from 1999, falling from 194.4 trillion British

thermal units in 1999. Demand for diesel fuel has increased more than seven-fold in the same period from 8.17 trillion Btus to 60.1 trillion Btus in 2000. Gasoline and diesel fuel account for nearly 93 percent of the resource types used in the transportation sector. Ethanol is now the fastest growing fuel type in this sector.

Factors that affect growth in this sector include population growth, replacement of vehicles with less efficient ones and the number of miles traveled a year.

## Conservation

The transportation sector is especially immune to conservation efforts. Over the decades, a variety of approaches by the state and federal governments have been tried: mandated Corporate Average Fuel Efficiency standards, reduced highway speed limits, introduction of efficiency technology in vehicles and driving modifications such as right-turn-on-red lights and carpooling/ridesharing.

Recent trends in this sector have run counter to conservation efforts. Price rises can induce conservation behavior in this sector, but typically the actions are limited and have not been sustained in the long term.

## Energy Need

Based on past demand trends in this sector, continued growth in energy use in this sector seems likely.

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## Utilities



Information in this sector consists exclusively of energy trends and needs by the state's electric utility sector.

## Energy Supply

Trends in the electric utility sector in Nebraska have remained generally constant over time: more than 90 percent — 93 percent in 2000 — of the fuels used to generate, distribute and transmit electricity has come from just two resource types: coal and nuclear. In-state hydropower resources used to generate electricity have also remained generally constant over the recent past, averaging about 5 percent a year.

## Demand

Since 1960, energy demand by electric utilities has increased more than six-fold from 50.2 trillion Btus to 309.6 trillion Btus in 2000. Increases in demand have been recorded each year between 1995 and 1999, but demand declined by 2.7 percent in 2000.

## Conservation

Efficiency efforts in the electric utility sector result from technological advances, either by the utility or the user.

One key target of efficiency improvements for utilities is reducing electricity losses during transmission. While technological breakthroughs can address part of the problem, other improvements can also be made. For example, local utilities estimate standard line loss at seven percent, but in some cases actual losses can be more than double that amount if preventive maintenance is not performed on a regular basis on the utility lines.

## Energy Need

Nebraska utilities remain net exporters of electricity. Between 1995 and 2000, the amount of electricity exported has increased each year, reaching a peak of 7.2 billion kilowatt-hours in 1999. In 2000, utilities exported 4.7 billion kilowatt-hours, an estimated 16.2 percent of net generation that year.

In time, however, continued growth in need will result in additional capacity requirements. Several of the state's largest utilities have begun the process for adding generation assets. For new base load and peaking facilities, the utilities are planning on using coal and natural gas, respectively, and they have also identified smaller generation options using wind and biogas.

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## State Energy Resources Assessment



## Current Supplies

Nebraska is not an energy resource-rich state.

Oil has been produced in the state since 1939. Oil production peaked in 1962 and has



declined significantly since then. In 2002, oil production fell to 2.779 million barrels from 2.922 million barrels in 2001. Over the past five years, oil production has declined 12.5 percent. In 2000 (the latest year for consumption data), the state's crude oil production represented only 7 percent of the petroleum products used in the state in that year.

Natural gas has been produced in the state since 1950. Natural gas production peaked in 1960 and has declined precipitously since with only minor increases in production, the last one occurring in 1998. In 2002, 1.193 billion cubic feet was produced, a decrease of 1.4 percent from 2001. In 2000, natural gas production represented only one percent of the natural gas consumed by Nebraskans.

The state's coal resources are insignificant and not economical to mine. However, the state's proximity to Wyoming's low-sulfur coal beds in the Powder River Basin allows Nebraska ready access to this resource used in electricity production.

Uranium has periodically been mined in the state, but must be sent outside the state's border for processing.

During the reporting period, there were 12 operational wind turbines generating electricity: Springview, 2; Lincoln, 2; Valley, 1; and Kimball, 7. In 2002, more than 17 million kilowatthours — enough for 2,880 homes — were generated. Energy generated by the turbines is estimated to supply less than one percent of energy consumption in Nebraska, based on 2000 consumption data.

### **Feasible Alternatives**

There are five main alternate energy sources available in Nebraska: biomass, geothermal, hydropower, solar and wind. Maps and other specific information about the state's alternative energy resources can be found at [http://www.eere.energy.gov/state\\_energy/mystate.cfm?state=ne](http://www.eere.energy.gov/state_energy/mystate.cfm?state=ne)

In 2000, an estimated 4 percent of the state's total energy consumption was met from renewable resources. Total energy consumption in 2000 was

583.5 trillion Btus of which 22.47 trillion Btus came from renewable sources.

Assessments of the five feasible alternatives follow:

#### **Biomass**

In 2000, wood and waste provided an estimated 4.0 trillion Btus, less than one percent of the state's energy need.

The most significant biomass energy resource in Nebraska continues to be ethanol that is produced from corn and grain sorghum. In 2000, an estimated 2.8 trillion Btus — almost 25 million gallons — of ethanol were consumed in Nebraska and represented about 0.5 percent of the state's total energy need.

In 2002, there were six operating plants that produced an estimated 357.57 million gallons of ethanol. The plant at Sutherland ceased operation in 2001. Projections for ethanol production for 2003 are estimated to top 388 million gallons. An ethanol plant in Plainview became operational in 2003, so total ethanol production is anticipated to increase as more plants come on line in 2004.

The state's ethanol board estimates that 20 percent of the state's corn crop and the equivalent of  $\frac{3}{4}$  of the state's grain sorghum crop is used to produce ethanol in a typical year. As production increases, these percentages should also increase.

#### **Geothermal**

There are two types of geothermal resources that can be utilized: hydrothermal fluid resources and earth energy. According to the Energy Information Administration, there are two pockets of high-temperature hydrothermal fluid resources in the north central and northern Panhandle portions of the state. This resource might be suitable for electricity generation. Development of these resources appears unlikely in the foreseeable future.

Earth energy, however, can be used directly to provide heat in a variety of applications, such as geothermal heat pumps and appears to offer Nebraskans a way to utilize this resource. Growth in the use of geothermal heat

pumps that can discharge waste heat into the ground in hot weather and extract heat from the ground during cold weather appears strong and is being promoted by the state's larger electric utilities.

In 2000, an estimated 0.32 trillion Btus were produced from geothermal resources in the state.

#### **Hydropower**

In 2000, 68 percent, 15.4 trillion Btus, of the renewable energy used in Nebraska came from hydropower sources. The electricity generated by the hydro resources came from 11 dams in or on the border of the state and from power supplied by Western Area Power Administration. Typically, the amount of hydropower generated is relatively constant from year to year, unless affected by drought conditions. As the state's energy need continues to grow, less and less of the need will be met by hydro resources.

According to a study by the Energy Information Administration and the Idaho National Engineering and Environmental Laboratory, an estimated 2.348 million megawatt hours of electricity could be produced from hydropower resources, meeting about 9 percent of the state's electricity needs in 1998. At this time, however, it is unlikely any additional hydropower resources will be developed.

#### **Solar**

According to the Energy Information Administration, Nebraska has good solar resources especially in the western part of the state. Based on that assessment, the federal agency estimated that a flat panel photovoltaic system the size of a football field would generate enough electricity to meet the needs of more than 103 households. A tracking-type photovoltaic system installed in western Nebraska on 150 acres would generate enough electricity to meet the needs of more than 4,330 households.

Current solar technology deployed by utilities in the state is limited to meeting the needs of cattle ranchers in remote regions where photovoltaic systems are less expensive than installing new power lines.

In 2000, an estimated 0.016 trillion Btus were generated from solar thermal and photovoltaic resources in the state.

### **Wind**

An Energy Information Administration analysis of Nebraska's wind resources concluded approximately 46 percent of the state contained good wind speeds suitable for development. If all of these resources were developed, only 4.6 percent of the land would be used, and an estimated 869 million megawatt hours of electricity could be produced annually.

The prognosis for an increase in wind generation capacity appears very strong in the near term. Nebraska Public Power District will be installing turbines capable of generating at least 30 megawatts in 2004. If demand materializes, Nebraska Public Power District could expand its project to 75 megawatts.

If demand materializes and other issues can be addressed, the Municipal Energy Agency of Nebraska has indicated up to 14 more turbines could be added to the Kimball site.

In 2000, 0.025 trillion Btus of wind generated electricity were produced.

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## **Estimated Energy Consumption Reduction**



Several evaluations have been conducted by the Energy Office that quantified energy consumption reductions that resulted from activities sponsored by the agency:

- A typical home weatherized under the agency's federally-funded program achieves a 25 percent or greater reduction in space heating needs, and saves an estimated \$152 a year in energy costs.

- Replacement natural gas fueled furnaces installed and financed with Dollar and Energy Saving Loans from the agency realized a 10.7 percent reduction in energy use for 80 percent efficient furnaces and a 19.2 percent reduction in energy use for 90 percent efficient furnaces.

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## **Status of Ongoing Studies**



The Nebraska Energy Office had no ongoing studies underway during this period.

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