NEBRASKA ENERGY POLICY PLAN

RECOMMENDATIONS TO THE GOVERNOR

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Introduction

Why does Nebraska need a comprehensive energy policy plan? This question was often asked during the development of this plan. But in today's fast-paced times, a better question should be why doesn't Nebraska have a comprehensive plan for the production and use of our energy resources.

Energy is the foundation of our productivity. Business, industry and agricultural production is based on the use of energy. Without energy, the economy of Nebraska would come to an abrupt halt. The Nebraska Power Association predicts that 76 percent of new electrical generating additions over the next 20 years will be required to serve new obligations. Only 24 percent will replace retiring generating capacity. Our use of energy and more importantly, our efficient use of energy may well determine our success in the world marketplace.

Energy efficiency is an economic opportunity. To capture that opportunity, we must focus on how intelligently we use our energy resources. For example, of every dollar a Nebraskan spends for energy, 20 cents goes to in-state suppliers, while 80 cents flows out of the state without creating a job or encouraging economic expansion.

In addition to the challenges of ensuring clean, affordable sources of energy to sustain our economy, Nebraska must look at its heavy reliance on others for our energy supply. Although some of our current energy sources, such as Wyoming coal, are considered secure, many of our energy sources, such as oil from the Middle East, are not secure. We can improve Nebraska's energy security by increasing our energy efficiency and expanding our use of renewable resources such as ethanol, solar energy and wind.

With the development of a comprehensive energy policy plan, Nebraska has accepted the challenge to maintain a balance between economic growth, environmental integrity and energy security in the years ahead. This first energy policy plan sets forth recommendations that can put Nebraska on the road to make efficient use of our resources, to maintain a clean environment and to ensure security for our life-style and economy.

Policy Development

In April of 1991, Governor E. Benjamin Nelson appointed 52 Nebraskans to the Nebraska Energy Policy Council. Governor Nelson directed the Council to use their expertise, to solicit input from other Nebraskans and to make recommendations for the state's first comprehensive energy policy plan. In his remarks to the Council members at their first meeting, Governor Nelson asked the Council to give Nebraska a road map for our future which concentrated on the efficient use of our energy, the development of renewable resources and the need to balance the interests of economic development.

At its first meeting on April 17th, the Council divided itself into five working committees — Buildings, Electricity, Fossil Fuels, Alternate Fuels and Waste-to-Energy. The committees each met two to three times during April and May to identify issues in each topic area they felt should be a part of the state plan. During this time, other topic areas surfaced which the Council members felt were important. These include Education, Research and Renewable Energy Sources.

The Alternate Fuels Committee's recommendations, in part, became the Transportation section of this plan to more adequately reflect issues it identified. The Waste-to-Energy Committee re-named its section Waste to reflect the broader context of its work. The result of the working committees efforts became the first draft of the plan. This draft was ratified by the members of the Council at a meeting on June 7th.

Citizen involvement is the cornerstone in the development of these recommendations. Once the first draft was complete, the Council requested input from nearly 2,000 Nebraskans. Our citizens responded through a series of 15 regional meetings held across the state in June and July. The recommendations and suggestions from the public were particularly helpful in identifying additional information and considerations needed in the plan.

The second draft of the recommendations was the result of the public input at the regional meetings. A summary of the second draft was shared with approximately 10,000 Nebraskans and the full document was sent to nearly 400 Nebraskans. Comments on the second draft were received at six public meetings held in September and October. The Council met a final time and made changes in the plan to reflect public input. Governor Nelson received the final plan in December.

Overall, the Policy Council found that Nebraska is doing a good job of providing clean, low cost energy to its citizens. They found efforts in many areas which continue to identify new strategies and technologies which will maintain our energy position. The Council also found that most Nebraskans seem unaware of the fact that our state is the only state in the nation where all electrical generating, transmission and distribution facilities are owned by the public. As such, the citizens of Nebraska not only reap benefits such as low rates, local control and profits staying

within the state, but they also face a greater responsibility to insure that these facilities are functioning in the best interests of the citizens of the state.

There will be costs involved with the implementation of the recommendations in this plan. These costs — both of time and money — will be assessed as each individual recommendation is considered for implementation. The total economic impact of the collective recommendations has not been assessed. The Nebraska Energy Policy Council attempted to look as far in the future as possible in assembling this document. While there are recommendations which are not feasible to implement at the present time due either to a lack of technology or a lack of available funding, the Council felt it was important to set a direction for the state — to set a starting point from which we can all work.

Nebraska Energy Policy Council Members

*** Executive Committee Members**

Tony Acosta ..... Omaha
*** Ray Alvine, Buildings Committee ..... Omaha**
*** Jerry Berggren, Buildings Committee ..... Lincoln**
*** Tim Burke, Fossil Fuels Committee ..... Bellevue**
Paula Casey ..... Columbus
Michael Cherney ..... Omaha
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Curt Donaldson ..... Lincoln
Don Egenberger ..... Minden
Keith Fickenscher ..... Lincoln
Ken Fielding ..... Omaha
*** Rod Gangwish, Transportation Committee .. Shelton**
*** Gary Goldberg, Transportation Committee Kearney**
Betsy Hancock ..... Lincoln
John Hansen ..... Lincoln
Ken Hillman ..... Gering
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*** Clint Johannes, Electricity Committee ..... Columbus**
Paul Kelpe ..... Omaha
Duane Kristensen ..... Hastings
Steve Krajewski ..... Ogallala
Daryl LaPointe ..... Winnebago
Bill Lucke ..... Lincoln
Flora Lundberg ..... McCook
Nelson Merz ..... Falls City
Francis Moul ..... Lincoln
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Jim Parks ..... Scottsbluff
*** Corrinne Pedersen, Energy Policy Council Chairperson ..... Lincoln**
Randy Reyzlik ..... Fremont
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*** Shelley Sahling, Electricity Committee ..... Lincoln**
Brian Skeahan ..... Wahoo
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Rich Walters ..... Ainsworth
John Ways, Sr. ..... Lincoln
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Ione Werthman ..... Omaha
Rose White ..... Omaha
Jess Wolf ..... Hartington
Tom Wurtz ..... Omaha
Edie Young ..... Lincoln
Wayne Ziebarth ..... Wilcox

Allison Meyer ..... Staff

Executive Summary

In all, over 200 recommendations made by the Energy Policy Council are contained in this plan. These recommendations are intended as a starting point for the development of programs and policies which will benefit all Nebraskans in the energy arena. This executive summary lists each of the recommendations made in each sector identified by the Council. **Specific policy statements are in bold text.** For further explanation on each recommendation, please consult the appropriate section of the plan.

Agriculture

As Nebraska's largest and most diverse industry, undertake special efforts to encourage energy efficiency and conservation in all aspects of the agricultural sector.

- Use currently existing agricultural organizations to disseminate information on energy saving techniques and opportunities.
- Promote the use of alternate fuels, such as propane, for agricultural vehicles and equipment.
- Promote the use of renewable energy sources such as solar pumps for cattle watering and solar systems for electric fencing.
- Encourage the use of conservation tillage to reduce energy use and overall cost.
- Mandate the certification of agricultural vehicles and equipment in horsepower-hours per gallon at a 75 percent load factor.
- Identify an agency or entity to be responsible for testing irrigation wells for water and energy efficiency. Consider using a circuit rider concept for well testing.
- Encourage research and development of drought-resistant and drought-tolerant crops.

Buildings

Take action to implement and encourage programs and processes which increase the affordability, cost-effectiveness and energy efficiency of buildings in Nebraska. Total operating costs, including the cost of energy used over the life of the building should be considered in building design rather than initial construction cost alone.

Building Codes

Adopt a state-developed energy building code for new and retrofit construction which is affordable, cost-effective, user-friendly and enforceable. Special consideration must be given to achieve energy efficiency without unduly reducing housing affordability.

- Use a public process to develop a code which is easily understood and achieves the goal of energy efficiency, affordability and cost effectiveness.
- Regularly evaluate the code to keep it current and effective.
- Enforce the code on a regional basis and include provision for information and education in its requirements.
- Encourage local governments to develop ordinances or to revise existing ordinances to allow for innovative energy efficient building designs.

Public Buildings

Maximize energy efficiency in public buildings so government serves as a model for conservation and to reduce the tax burden on the state's citizens.

- Establish and/or maintain financing necessary for public entities to implement energy conservation building improvements.
- Energy building audits, energy accounting audits and corrective action plans should be required for all public buildings. Noncompliance would result in loss of state funding.
- Require government entities to publish energy consumption data.
- Require governmental subdivisions proposing to exceed budget limitations to demonstrate formulation of a corrective action plan.
- Require compliance with the energy building code for all new and remodeled public buildings.

Residential, Commercial and Industrial Buildings

To improve the overall efficiency and affordability of buildings, the state should institute a comprehensive and coordinated approach to energy improvements including a home energy rating system, energy efficient mortgages, enforcement of energy building codes, coordination between federal, state and local government agencies and incentives to building owners to make energy improvements.

Energy Rating System and Energy Efficient Mortgages

- Endorse the implementation and use of **Energy Rated Homes™**, a uniform rating system to document the energy efficiency of homes including heating, air-conditioning, lighting and appliances.

- Educate and encourage potential home buyers to purchase energy efficient homes to reduce monthly expenses.

- Require all Nebraska Investment Finance Authority mortgages to adopt the rating system.

- Encourage lenders to recognize the value of lower operating costs and include the value of these lower costs in energy efficient mortgage formulas.

Incentives

To promote energy efficiency in all buildings in the state, encourage building owners to make energy efficient improvements without incurring "penalties" for making those improvements.

- Allow energy efficiency improvements as a one-time credit on federal and state income taxes.

- Exempt energy improvements from real estate valuations for a specified period of time.

- Encourage local utilities to participate in financing energy improvements for their customers.

- Encourage incentives for landlords to make existing rental units more efficient.

- Require recipients of heating assistance payments to participate in the federal Weatherization Assistance Program to improve their home's energy efficiency.

Recycling and Recyclable Construction Waste

Implement programs which encourage the reduction and recycling of construction waste.

- Encourage research in innovative construction material use.

- Facilitate recycling and reuse of construction materials.

- Encourage the use of recycled materials in construction.

- Teach building techniques that limit construction waste.

Education

Organize an Energy Education Action Council to facilitate resource sharing, communication and implementation of results-oriented activities which achieve a greater level of understanding and responsibility regarding energy production, use and environmental impact.

- Through the Nebraska Energy Office, with guidance from the Action Council, coordinate the design, development, promotion, implementation and evaluation of energy education programs.

- Through the Nebraska Energy Office, with guidance from the Action Council, develop and implement an energy education action plan with incentives for educators and objectives for elementary, secondary, post-secondary and life-long learners.

- Coordinate implementation of information and incentive programs with the Department of Education, Nebraska State Education Association, educational service units and other appropriate organizations.

- Utilize state colleges and community colleges to develop and provide in-service and pre-service training opportunities.

- Provide centrally located information, training and dissemination sites for elementary and secondary educators and the general public.

- Offer courses or degrees in energy management through the state colleges and/or community colleges.

- Offer continuing education courses at state colleges and/or community colleges for certification of energy professionals such as building code inspectors and energy auditors.

- Coordinate educational efforts through the University of Nebraska Cooperative Extension.

- Offer periodic classes or seminars for various trades and professions.

Electricity

Conventional Resources

Utilize new technologies to improve the efficiency of conventional energy sources. Maintain efforts to operate conventional generating plants in an environmentally safe manner.

- Support federal research efforts in the development of clean coal technology.

Fully educate the public about the differing viewpoints concerning of nuclear power, keep abreast of technological developments and keep nuclear energy open as an option for the future.

- Monitor nuclear developments such as advanced reactor design and license extension requirements.

- Given the major uranium deposit near Crawford, encourage the development of this energy resource consistent with safe environmental practices.

- Ensure that the state's nuclear power plants have access to a low level radioactive waste disposal facility.

Utility Planning Coordination

Continue full participation of Nebraska's electric utilities in state and regional planning efforts to ensure adequate and low cost power for Nebraskans.

- Continue cooperation with Mid-Continent Area Power Pool, Western Area Power Administration (WAPA) and other regional power suppliers.

- Continue coordination of electric utilities through the Nebraska Power Association (NPA).

Maintain awareness among Nebraska's congressional delegation of the need to continue Western Area Power Administration as a public entity and maintain its current repayment schedule and continue the Rural Electric Administration loan program.

Integrated Resource Planning

Encourage an effective combination from a full range of supply-side and demand-side alternatives to achieve the most reliable electric service at the lowest reasonable cost in an environmentally responsible manner.

Supply Side

- During integrated resource planning processes, environmental impacts must be an important consideration.

- Encourage the streamlining of federal permitting and repermitting and seek a greater role for states in the current federal regulatory process.

- Encourage district energy systems which are central heating and cooling units providing heat and air conditioning to a number of buildings.

Demand Side

- Conservation and efficiency must be an integral part of an integrated resource plan.
- Encourage the use of high efficiency appliances and equipment, lighting and basic energy conservation improvements by the state and utilities.

- Endorse utility conservation programs currently operated by the state's electric utilities.

- Clarify the statutes regarding the ability of the state's public power providers to offer loan programs for energy conservation.

- Allow a state income tax exemption for cash rebates offered for energy efficiency improvements.

- Encourage utilities to tie rebates for equipment and appliances to the efficiency rating of the equipment.

- Expand the lighting program being developed by the Nebraska Energy Office and the state's electric utilities to the residential sector.

- Encourage all utilities to operate programs which control or limit peak demand.

- Support state and utility research of demand side resources available with specific emphasis on regional analysis.

- Encourage utilities to develop rate structures which reward conservation and are consistent with cost of service principles.

- Encourage WAPA to coordinate assistance to small utilities in complying with WAPA regulations regarding integrated resource planning through the Nebraska Energy Office, utilities and electric service providers.

Financing Opportunities

Explore opportunities to provide additional funding for the 5% Dollar and Energy Saving Loan Program operated by the Nebraska Energy Office.

- Through the Nebraska Investment Council invest state funds in the Dollar and Energy Saving Loan Program at a low interest rate.

- Encourage the Legislature to fund expansion of the program.

- Explore the possibility of additional funding for the program through the issuance of bonds similar to those issued by the Nebraska Investment Finance Authority.

- Modify the program to finance conversion of vehicle fleets to use compressed natural gas, propane, electricity and other alternate fuels.

Research and summarize energy tax policy, check-offs and incentive plans used in other states.

- Use tax policy to change public behavior toward energy use and conservation.

- Offset loss of revenue due to implementation of tax credits through a tax on those industries benefiting from changes generated through this policy.

Fossil Fuels

Promote initiatives which reduce fossil fuel use and reduce consumer energy costs.

- Develop a state-approved, certified energy efficiency audit program for public facilities, residential, commercial, industrial and agricultural sectors.

- Audits should include checks for efficiency and safety in appliances and should be free to low-income residents.

- Continue fuel assistance for low income residents.

- Encourage the purchase of energy efficient appliances through a sales tax exemption.

Crude Oil

- Stimulate Nebraska petroleum production to aid the economic development of oil producing regions and to reduce dependency on out-of-state petroleum.

- Review the state's severance tax structure and make appropriate changes to encourage production.

Natural Gas

Promote the production, efficient use and continued price competitiveness of natural gas because of its environmental quality and abundant supply.

- Provisions should be made in state statutes or regulations to allow utilities which participate in state approved conservation activities to recover the cost of these activities in their rate base.

- Review the state's severance tax structure and make appropriate changes to encourage production.

Propane

Support legislation which requires the formation of a state propane commission to license dealers, set certification standards for industry employees and oversee and regulate the potential production, importation, distribution, storage, handling and safety of propane in Nebraska.

Heating Oil

- Encourage monitoring of the supply, pricing and efficient use of heating oil.

Other Opportunities

Trees

Encourage the planting of trees as a renewable energy source, a method of pollution control, an energy conservation technique, an economic development opportunity and an improvement in our quality of life.

- Encourage the use of energy and water efficient landscaping to conserve energy.

- Encourage low maintenance plant materials in the landscaping of public buildings and road rights-of-way.

- Encourage planting of wind breaks to reduce heating and cooling costs.

Appliances

Promote the purchase and use of energy efficient appliances.

- Research and establish appliance and equipment efficiency standards for Nebraska.

- Encourage the use of efficient appliances through sales tax exemptions.

Energy Programs Administration

Study the feasibility of coordinating all state agencies with energy responsibilities.

- Examine the structure of agencies, sources of funding, continuity of functions, elimination of duplication and opportunities for improved coordination.

- Provide adequate funding to carry out state mandates and additional program duties resulting from this policy plan.

Renewable Energy Sources for the Future

Increase Nebraska's energy security by investigating the full potential of all types of environmentally responsible renewable resources by developing and funding demonstration projects.

- Overall policy must consider long term environmental costs, long term availability and best use of fossil fuel sources.

- Treat energy conservation and efficiency as viable energy sources.

- Provide financial incentives, such as tax credits, for the implementation of renewable energy projects.

- Promote the use of renewable energy sources where cost effective.

Solar

Continue to encourage and develop, where appropriate and cost effective, the use of solar energy in the state .

- Encourage utilities to include solar resources in integrated resource planning activities.

- Develop and fund projects which show the viability of solar energy in Nebraska.

- Encourage the commercial sector and other owners of energy-using facilities to use both active and passive solar energy.

Wind

Promote the use of wind energy as new technologies improve cost-effectiveness.

Biomass

Pursue the use of biomass as an energy resource, including the use of biomass in the production of ethanol, in an environmentally responsible manner.

Hydro Power

Continue the use and further development of hydro power as an energy source as new technologies improve cost effectiveness.

- The environmental impacts must be assessed and considered in evaluating the cost effectiveness of hydro power installations.

Fuel Cells, Hydrogen Fuel and Geothermal

- These are examples of technologies which are currently not cost competitive, but which should continue to be pursued and examined as part of an overall strategy to encourage their continued technological development.

Research

Develop and fund research initiatives to foster financially and environmentally responsible use and production of energy and coordinate current and future research efforts on a state, regional and national basis.

- Coordinate basic energy research in the state and facilitate technology transfer of energy research.

- Foster research efforts which will make Nebraska an energy producing state.

- Establish a Nebraska Energy Information Center within the Nebraska Energy Office to maintain a computerized energy data bank accessible to the general public.

Encourage the state's electric utilities to participate in funding research through the Electric Power Research Institute (EPRI).

- Foster information sharing with the Nebraska Energy Office.

Transportation

Conventional Fuels

Create policies and programs to promote fuel efficiency, reduce dependence on petroleum and improve air quality in Nebraska.

- Encourage Nebraska's citizens and businesses to purchase fuel efficient vehicles and maintain current vehicles in a manner that results in maximum fuel efficiency.

- Undertake a general education program on the benefits of fuel efficiency.

- Reinstitute the Gas Saver Van program.

- Undertake a study of the fuel efficiency of Nebraska vehicles.

- Review Nebraska's energy emergency preparedness plan and assess the need for the state to monitor retail petroleum prices in the event of energy shortages.

- Reinitiate a testing and enforcement policy for gasoline quality.

- Encourage monitoring of the supply, pricing and efficient use of diesel fuel.

Alternate Fuels

Increase the use of alternate fuels such as ethanol, natural gas, propane and electricity in the public and private transportation sectors to lessen the use of petroleum and improve air quality.

- Establish a Fleet Alternate Fuel Incentive Fund to provide low interest loans for fleet conversions and fueling facilities.

- Provide incentives and undertake demonstration projects to promote conversions of vehicles to alternate fuels.

- Encourage operators of private vehicle fleets to develop alternate fuel use policies.

- Extend the Nebraska Special Fuel User Permit program to all alternate fuel vehicles.

- Establish standards for motor fuel quality and require content labeling at retail fuel pumps.

- Tax alternate fuels on an equal basis with the tax based on British Thermal Unit content rather than gallons.

Ethanol

Continue the state policy of increasing production of and demand for ethanol to lessen our dependence on foreign oil, provide local economic development, enhance the price of local grain products and provide for improved air quality.

- Continue federal and state tax incentives for ethanol production and use.

- By the year 2000, all gasoline-based motor fuel sold in the state should be at least a ten percent blend of ethanol.

- Encourage the use of ethanol in county and local government vehicles.

- Support production of vehicles using an 85 percent ethanol-15 percent gasoline blend.

- Encourage research to reduce the cost of producing ethanol through reduced energy input.

Natural Gas

Encourage the use of compressed and liquefied natural gas as a motor vehicle fuel for private and government fleets and develop the fueling infrastructure necessary to support these fleets.

- Provide tax incentives for natural gas powered vehicles and for the development of natural gas fueling stations.

- Encourage automobile manufacturers to increase production of dedicated alternate fueled vehicles.

Electric and Propane

- Encourage further research, development and demonstration of electric and propane vehicles.

- Provide tax incentives for electric and propane powered vehicles.

Methanol

- Methanol is presently not considered to be a viable alternate fuel for Nebraska.

Mass Transportation

- Assess inter- and intra-city transportation needs.

- Develop programs to stimulate the operation and use of mass transportation systems and create incentives for vehicle pooling.

- Support efforts to retain or establish railroads in the state.

- Encourage greater use of bicycles and development of bicycle trails.

Waste

Affirm the hierarchy of solid waste management established by the U.S. Environmental Protection Agency of Reduce, Reuse, Recycle, Burn and Bury and implement policies and practices leading to energy conservation through waste management.

- Establish programs and incentives to promote reduced generation of waste and increased reuse of materials.

- Support development of regional recycling centers.

- Support research and demonstration projects for composting and digesting waste.

- Establish incentives for reuse, use of recycled materials and a used oil recycling system.

- Support research and development of products from waste tires.

- Promote research to assess feasibility of waste-to-energy facilities with primary consideration for protecting air and water quality.

- Use the most environmentally safe methods for the burial of waste. Burial would take place only after all cost-effective energy has been extracted.

Government at all levels must lead by example in waste management through source reduction, reuse and recycling.

- Establish education and action programs for employees and constituents served by government.

- Support the development of a statewide solid waste management plan which emphasizes energy conservation and energy generation.

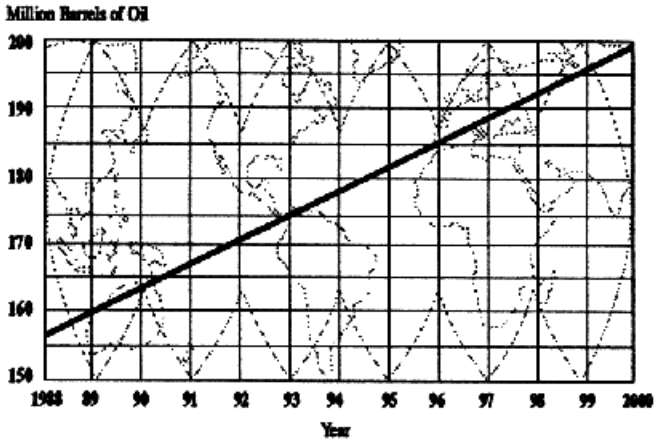
- Develop industries which reprocess recyclable materials.

A Summary of Energy Use

World

Many experts predict that world energy demand will increase by two percent each year during the next decade from the equivalent of 157 million barrels of oil each day in 1988 to 200 million barrels in the year 2000. About half of the total increase will occur in developing nations where growing urbanization and industrialization are stimulating greater energy consumption.

World Energy Demand By Year 2000



Source: Worldwatch Institute Paper 82, March, 1988.

Through the year 2010, the major consumers of oil will remain the highly industrialized nations and regions of the world including the United States, the Soviet Union, Europe and Japan. The developing countries are likely to show the fastest rate of growth in oil consumption because their economic activity is expected to grow more rapidly.

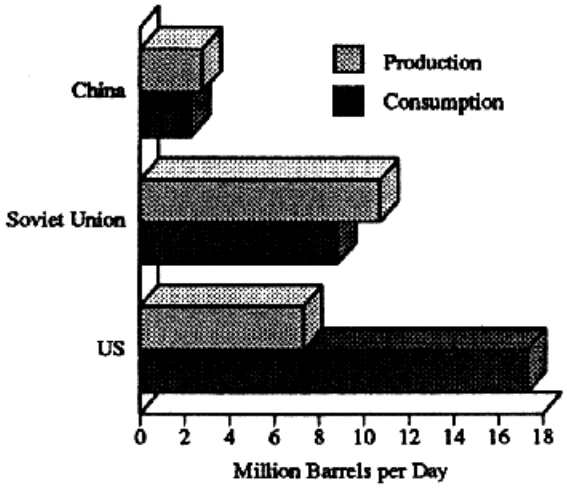
According to the U.S. Department of Energy's Energy Information Administration (EIA), in 1989, the United States, the Soviet Union and China were responsible for producing and consuming nearly half of the world's energy. The Soviet Union was the world's largest producer, accounting for 21 percent of the world's total. With five percent of the world's population, the United States consumed 24 percent of the world's total energy — more than any other country.

Throughout the 1980s, petroleum was the world's most heavily used type of energy. World production of petroleum was more that 64 million barrels per day. During the decade, oil production increased by over one million barrels per day. Oil production in North America, however, remained the same during the 1980s. Declines in production in the United States were offset by increases in production in Mexico.

United States

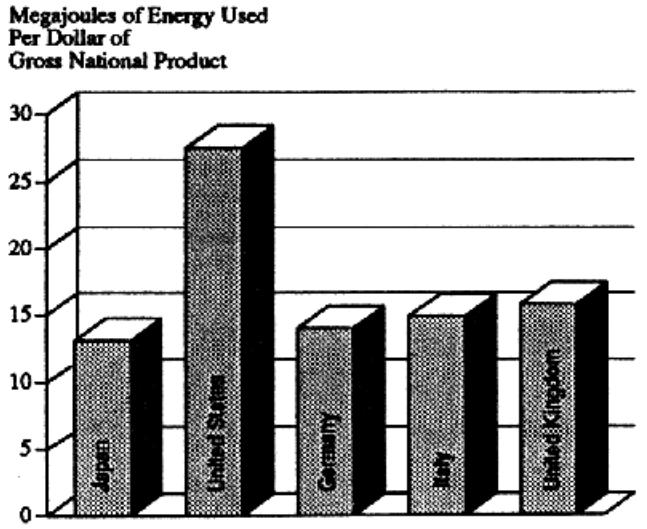
Given assumptions on future economic growth and energy prices, the EIA predicts that total domestic consumption of primary energy in all its forms will grow between 20 to 38 percent over the next 20 years. Over the same period, the gross national product in the U.S. is expected to grow by 52 to 77 percent. The difference is due to the increasing levels of energy efficiency expected over the time period.

Oil Production and Consumption of Selected Countries, 1990



Source: Energy Information Administration, U.S. Department of Energy.

Energy Use of Selected Countries, 1985



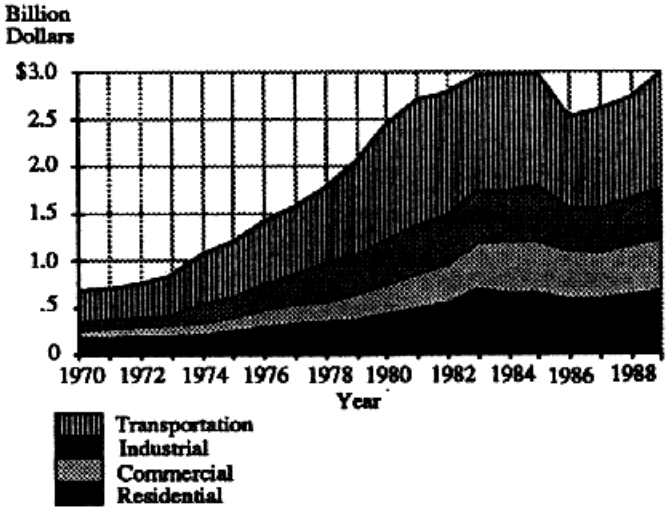
Source: Worldwatch Institute Paper 82, March, 1988.

If the United States used energy as efficiently as some other industrialized countries, it would lower our national fuel bill by $200 billion annually. The United States currently uses twice as much energy as Japan, Germany, Italy or France to produce a dollar of goods and services. In looking at this comparison, however, it is important to understand that there is great diversity in the manner and types of goods produced. In addition, limited space in Japan and other countries has naturally led them to more efficient use of all resources. The greater distances in the United States for both travel and transport increases our use of energy. This, however, should also spur our development of greater efficiency in the transportation sector.

Nebraska

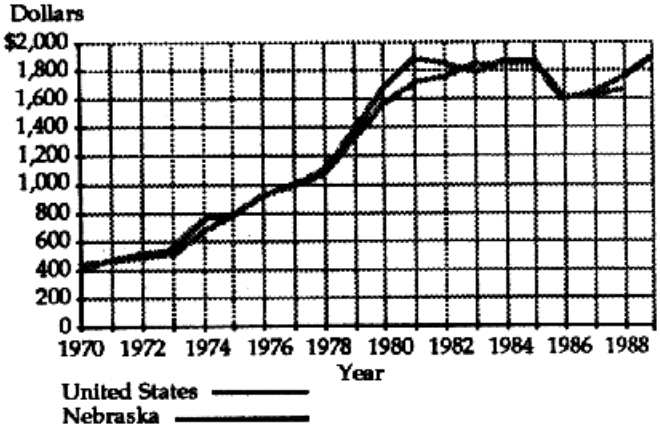
Expenditures on energy in Nebraska in 1989 were $2.981 billion, an increase of 9.1 percent from 1988 and only 0.1 percent below the peak expenditures of $2.986 billion in 1985. Expenditures for petroleum products and electricity were up dramatically from 1988 expenditures, primarily due to higher prices and increased consumption of these resources.

Nebraska Energy Expenditures, 1970 - 1989



Sources: *State Energy Price and Expenditures Report: 1988.* Energy Information Administration, U.S. Department of Energy. September 1990. 1989 Preliminary Estimates. Nebraska Energy Office.

Nebraska Per capita Energy Expenditures 1970 - 1989



Sources: *State Energy Price and Expenditures Report: 1988.* Energy Information Administration, U.S. Department of Energy. September 1990. *Statistical Abstract of The United States, 1989.* U.S. Department of Commerce, Bureau of the Census. December 1990. 1989 Preliminary Estimates. Nebraska Energy Office.

Per capita energy expenditures in Nebraska increased to $1,851 in 1989 from $1,705 in 1988. Peak per capita expenditures were $1,860 in 1985. In 1989, expenditures on energy represented 9.5 cents of each dollar of gross state product, a 0.2 cent increase from 1988, which had been the lowest level since 1973.

Agriculture

According to the Nebraska Department of Agriculture, one of every two Nebraskans depends on agriculture for their employment. Agriculture is Nebraska's primary source of wealth and is its dominant industry. In 1990, Nebraska consisted of 57,000 farms and ranches encompassing 47.1 million acres or about 96 percent of its total land area.

In 1989, Nebraska farmers spent $545 million on maintenance of buildings, repairs and operation of motor vehicles and other machinery, including fuel and oil. Farm and ranch equipment and vehicles were valued at $3.2 billion on January 1, 1990.

POLICY STATEMENT

As Nebraska's largest and most diverse industry, undertake special efforts to encourage energy efficiency and conservation in all aspects of the agricultural sector.

A. Use currently existing agricultural organizations to disseminate information on energy saving techniques and opportunities. (Also see Education, section A2 and A7.)

B. Promote the use of alternate fuels, such as propane, for agricultural vehicles and equipment. (Also see Transportation Fuels section, Alternate Fuels.)

C. Increase efforts to make the agricultural sector more aware of funding opportunities for increasing energy efficiency of buildings and equipment. (Also see Financing Opportunities section.)

D. Promote the use of renewable energy sources such as solar pumps for cattle watering and solar systems for electric fencing. (Also see Renewable Energy Sources for the Future section, Solar.)

E. Encourage the use of conservation tillage to reduce energy use and overall cost.

1. Explore opportunities for presentations on conservation tillage at seminars and training sessions for Nebraska farmers.

F. In conjunction with the U.S. Department of Energy, mandate the certification of agricultural vehicles and equipment in horsepower hours per gallon at a 75 percent load factor.

Irrigation

Irrigation is essential to the net economic value of the agricultural economy in Nebraska.

Approximately eight million acres of land are available for irrigation with about half irrigated using 28,000 center pivot irrigation units. Although much has been done by Nebraska's irrigators to improve the efficiency of irrigation operations, more can be accomplished to improve the efficient use of water and energy.

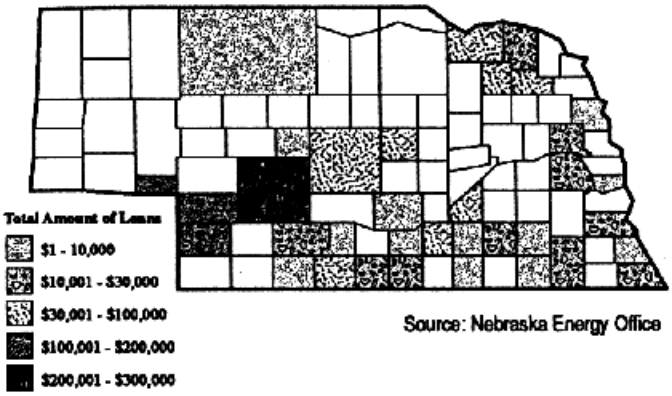
The University of Nebraska has done considerable work on the application of surge irrigation to Nebraska conditions. Surge irrigation is a more energy and water efficient method of irrigation. One current example of this work is being done at the Management Systems Evaluation Area site near Shelton.

Using research done by the University of Nebraska, Idaho operates an extensive irrigation efficiency program. In Idaho, most electrically-operated pumps were running at approximately 55 percent efficiency although the highest achievable efficiency is closer to 73 percent. Many of the irrigation pumps were operating with efficiencies as low as 20 percent. Idaho found through its irrigation efficiency program, more than 20 million kilowatt hours of energy and over $700,000 has been saved since 1984.

The pump itself is only one component of an irrigation system which can be improved. Other areas which affect system efficiency include pump fittings and valves, the pump power unit, mainline pipe sizing, nozzle management and leak prevention, irrigation management and scheduling, irrigation requirements and techniques for specific crops, sprinkler conversion to low pressure and well condition and maintenance.

Mechanical changes to irrigation systems may have considerable upfront costs. Operational changes, however, can also be considered to improve system efficiency. These

Distribution of 5% Dollar & Energy Saving Loans for Agricultural Systems 1991



Source: Nebraska Energy Office

generally do not have any costs associated with implementation. They may include understanding utility demand charge profiles and modifying the irrigation schedule to avoid demand charges.

In Nebraska, the 5% Dollar and Energy Saving Loan Program as of October 15, 1991, has funded over $1.2 million in improvements to irrigation systems — mostly replacing high pressure sprinklers with low pressure sprinklers. No statistics are yet available on the energy savings generated from these improvements.

A. Identify an existing agency or entity responsible for testing irrigation system efficiency. This testing should specify both water and energy efficiency and should be done by qualified individuals.

Pump tests and system audits can determine which pumps are operating inefficiently, which management practices waste energy and which irrigation system components consume more energy than necessary. Efficient irrigation systems will assure that agriculture dollars are spent wisely.

1. Utilize a circuit rider concept similar to the Energy Management Circuit Rider Program for irrigation well testing through an appropriate agency. The Circuit Rider Program is operated out of the Central Community College — Platte Campus and the Mid Plains Community College. This program provides energy management assistance to a wide variety of institutions alleviating the need for each institution to hire an energy manager.

   a. Consider a program which would require the testing of well and pump efficiency in conjunction with the other well testing programs.

2. Intensify efforts to publicize the University of Nebraska's research and education programs on all types of irrigation system management and improvement.

3. Promote the use of the most efficient irrigation system possible which is appropriate for the site, given crop production and economic situations.

4. Encourage research and development of drought-resistant and drought-tolerant crops and farming practices which reduce the need for irrigation. This will save both water and the energy to pump irrigation water.

Buildings

Significant opportunities exist to reduce energy consumption in Nebraska by making improvements in the insulation, heating, cooling and lighting of buildings. An energy marketing study completed for the Nebraska Energy Office in April of 1987 indicated that over $250 million worth of cost effective energy improvements could be made in the residential, commercial and industrial sectors in Nebraska.

Often the amount of energy consumed by older buildings is significantly higher than energy consumed by recently constructed buildings. Nationally, houses built in 1980-84 are using slightly more than half the energy used in the oldest houses and the same is true of commercial buildings. Most of the increase in energy efficiency in newer buildings came as a result of improved design, material and construction techniques.

An important energy factor in the building sector involves the orientation of the building to the movement of the sun and shading. Many studies have shown proper orientation (placement of the building on the site, appropriate use of windows and use of energy efficient landscaping) can reduce a building's space heating and cooling needs by nearly 50 percent. This can have many implications for building designers, local government building officials and zoning officials.

POLICY STATEMENT

Take action to implement and encourage programs and processes which increase the affordability, cost effectiveness and energy efficiency of buildings in Nebraska. Total operating costs, including the savings from energy efficiency along with initial construction costs, should be considered in building design.

Energy Building Codes

The energy crisis of the early 1970s, coupled with the passage of the Energy Production and Conservation Act (PL 94-163) by the United States Congress in 1976, resulted in the adoption of energy codes and standards in all 50 states. These codes and standards share a common goal of improving the energy efficiency of new and remodeled buildings.

Energy building codes are important to more than just the construction industry and the agencies which enforce the codes. Although engineers, architects, contractors and local building code officials must understand and effectively enforce the codes, the implementation costs and the resulting cost-savings can have a broad and far-reaching impact.

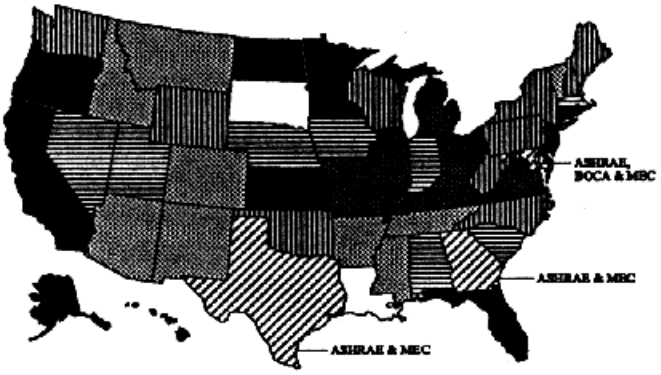
Adherence to energy building codes helps to ensure energy efficient buildings. Efficient buildings make a better infrastructure which is more protected from unforeseen energy price escalation. Increases in energy prices don't affect the budget of the energy efficient homeowner or business owner to the degree that the budgets of owners of inefficient buildings are affected. Capital investment in energy efficient buildings creates greater economic benefits through the local purchase of materials and labor.

Consumers and lenders have an underlying interest in the total cost of a building — purchase price plus operating costs. Adherence to energy efficient building codes can reduce the operating costs over the life of the structure and thereby increase the amount of money which can be loaned through a mortgage by reducing the amount of necessary monthly expenditures. Since consumers and lenders often do not have the training or skills to adequately assess construction quality, adherence to codes helps to assure minimum standards are met or exceeded.

Building Codes in Other States

Twenty-nine states enforce a state-developed energy building code. These codes are either based on one or more of the national codes (25 states) or are independently developed by the state (four states). Seventeen states and the District of Columbia enforce one or more of the national

Building Codes Used In The U.S., 1989



- State Developed
- American Society of Heating, Refrigeration and Air conditioning Engineers Inc. (ASHRAE)
- Model Code for Energy Conservation (MCEC)
- Model Energy Code (MEC)
- Building Officials and Code Administrators (BOCA)
- No Energy Code
- Combination of Several Codes

Source: *The Energy Directory*, National Conference of States on Building Codes and Standards, 1989

codes. Two states, South Dakota and Louisiana, do not enforce a statewide energy building code. A listing of building codes used in the different states and definitions of those codes are found in Appendix A of this plan.

Nearly all states (46) have mandatory enforcement of the codes in state owned and operated buildings. Codes for private construction are either mandatory (34 states) or mandatory if adopted by a local ordinance (11 states). Five states have mandatory enforcement with exceptions for private construction and the remaining five states either have voluntary enforcement or no codes governing private construction.

The enforcement of codes varies greatly from state to state, ranging from stringent state oversight, to enforcement by local government, to no enforcement at all. Most states have some type of advisory council, building code board or state department which is responsible for updating and revising the code.

History of Building Codes in Nebraska

Nebraska's energy building code was implemented in 1980 with the passage of the Nebraska Building Energy Conservation Standard Act. Currently, the 1983 Model Energy Code (MEC) developed by the Council of American Building Officials (CABO) is in effect as Nebraska's Building Energy Conservation Standard. CABO updated the MEC in 1986 and again in 1989. Nebraska's statutes, however, were not updated to reflect these changes. Nebraska is currently one of two states using the 1983 MEC, although two other states use the 1983 MEC as the basis for a state-developed code.

POLICY STATEMENT

Adopt a state-developed energy building code for new and retrofit construction which is affordable, cost-effective, user-friendly and enforceable. Special consideration must be given to achieving energy efficiency without unduly reducing housing affordability.

A. Regularly assess the code, according to a specified time frame, to determine if the code is achieving the goal of energy efficiency, affordability and cost-effectiveness. The code should allow for and encourage innovative design such as passive solar, earth sheltered and energy efficient landscaping.

   1. Involve all affected groups in the assessment process. Groups may include, but are not limited to, the construction industry, building code inspectors, architects, engineers, building component manufacturers, utilities, local and state officials, as well as the real estate and mortgage lending industries.

   2. Utilize a review, evaluation and revision process to keep the code current and effective.

   3. Encourage local governments to develop ordinances to allow innovative, energy efficient building designs such as passive and active solar, super-insulation and earth sheltered buildings.

B. Reaffirm the importance of energy building codes through the following recommendations for implementation:

   1. Information/Education. Even though Nebraska currently has an energy building code, very few persons outside of the larger population areas are aware of its existence and the requirements for enforcement. Make efforts to provide information and education through an extensive publicity campaign.

      a. Require the Nebraska Energy Office to regularly disseminate information on energy building codes to all authorities issuing building permits.

      b. Require the inclusion of information on energy building codes in city and county clerk, city council and county commissioner training.

      c. Utilize the currently existing system which identifies the number of building permits issued in the state each year to assess an information and education strategy.

   2. Non-Technical Code. An energy building code cannot be used if it cannot be understood by those who are required to use it. The updated code text must be developed in a manner that allows laypersons and professionals alike to correctly interpret and implement it.

      a. Require the Nebraska Energy Office to develop a handbook which explains the energy building code in non-technical terms. The handbook should be divided into sectors such as residential, commercial, industrial, public, etc.

   3. Qualified Enforcement. Regardless of the benefits of compliance, statewide implementation of an energy building code can only be accomplished

when accompanied by an enforcement tool. To ensure that adherence to the code increases the energy efficiency of buildings in Nebraska, a qualified interpretive and enforcement authority needs to be established. The inspecting authority can be a separate entity or can utilize a currently existing structure. Since energy conservation has many distinct and specialized trades when associated with building construction, it is extremely important that the code enforcement authority be knowledgeable and be kept up-to-date on changes.

a. Require state certification with requirements for continuing education for energy building code inspectors.

b. The cost of enforcing the code should be recovered through the building permit fee structure.

4. Regionalization. While the concept of enforcing energy building codes is important, the practical reality is that many rural areas of the state have limited services available from both the public and private sectors. When determining the logistics in requiring code enforcement at the same degree of availability to rural and metropolitan areas of Nebraska, strong consideration should be given to regionalization. It is reasonable to expect that many communities and counties in a particular area can share the services of an energy building code inspector. An example of a regional enforcement agency is the State Fire Marshal's Office. Regionalization, or "sharing of services", can be accomplished through the State of Nebraska Interlocal Cooperation Act (Neb. RRS 23-2201) and can be administered through community colleges or other regional organizations.

5. Federal, State and Local Coordination. Improving technologies in the energy conservation and building construction areas present problems in the updating and revision of energy building codes. Compound this by 50 states and numerous federal agencies and consistency becomes lost. Although a federally-mandated uniform energy building code is unlikely in the near future, state and local government should attempt to achieve compatibility of policies and codes with federal planning. The Nebraska Energy Office should closely monitor and actively participate in building code policy.

6. Progressive Enforcement. Changing from a passive to a proactive position on enforcement of a state-adopted energy building code may prove to be unacceptable if immediately implemented in its entirety. Progressive implementation of enforcement should be sensitive to the location and population of communities in determining length (in time) and level of exemption (if any) granted during the interim between adoption and the required full enforcement.

Public Buildings

Government's obligation to its citizens requires a careful assessment of how energy is used in public buildings. A 1988 study done for the Nebraska Public Buildings Energy Program Task Force by the Technical Development Corporation of Boston and Pacific Energy Corporation of Portland on public institutions showed a significant potential exists to save energy in Nebraska's public buildings. Although the state enjoys favorable energy prices compared to the rest of the nation, this study found that improvements in public buildings to reduce energy use is a sound investment of public dollars.

Many public facilities use enormous amounts of energy. Hospitals, prisons and air conditioned office buildings are among the most energy-intensive buildings. Many of these buildings are used 24 hours a day, 365 days per year. Comprehensive engineering studies of schools and hospitals carried out under federal programs indicate that energy costs can be reduced substantially in these buildings. The audits show that the costs of the greater portion of these projects can be recovered through energy savings over a period of five years or less.

Although no comprehensive data base exists on the use of energy in all public buildings, we do know that state government, including the University, spends over $38 million each year on energy. Government on both the state and local levels will continue to increase energy use as new equipment, such as computers, are added to improve government service and efficiency.

POLICY STATEMENT

Maximize energy efficiency in public buildings so government serves as a model for conservation and to reduce the tax burden on the state's citizens.

For the purposes of this section, public buildings shall include any and all buildings and facilities used by the public and constructed or remodeled in whole or in part by the use of federal, state, county or municipal funds.

A. Establish and/or maintain public financing necessary for public entities to implement energy conservation measures. (Also see Financing Opportunities section.)

B. Enact legislation and/or adopt administrative policy requiring all public buildings to undergo an energy audit and develop a plan for corrective action within a specified time frame. Non-compliance would result in forfeiture of state funding.

C. Require all government entities to collect and publish energy consumption figures and costs on a yearly basis in a standardized format provided by the Nebraska Energy Office. This information should identify monthly utility costs per utility meter and/or per building.

1. Require all government entities to perform an energy accounting audit on an annual basis. This audit shall be maintained and made available for public review.

   Energy accounting is a formal system to record, analyze and report energy use and cost on a regular basis. Once the system is set up, it is very easy to maintain. Benefits of energy accounting include the ability to identify trouble spots for quick corrective action and to catch billing errors.

   For example, after implementing an energy accounting system, one school district in California found two accounts that used no kilowatt hours over the past two years and yet cost the district $17.00 per month. A $200 savings resulted when the district notified the utility to shut off the meters on the unused accounts. A municipality found one account unused until December every year when the bill amounted to about $600. It was paying a monthly charge to keep an account open for the luxury of plugging in the Christmas tree lights once a year.

D. Require all newly constructed and remodeled public buildings to comply with the Nebraska Building Energy Conservation Standard. All public buildings constructed must be inspected by a certified energy building inspector.

1. Require public entities to design and evaluate new construction projects with consideration for energy efficiency, maintenance, total operating costs and lifetime cost-effectiveness of energy-consuming features.

E. Require all public buildings with mechanical systems to have regular inspections of the heating, ventilating and air conditioning (HVAC) equipment and other energy-using systems. Regular maintenance schedules should be established and provisions made for continuing education for maintenance staff.

F. Require any government entity which proposes to override any legislatively or constitutionally enacted budget limitation to demonstrate it has completed an approved energy audit on any/all buildings under its control and is actively implementing a corrective action plan, if any corrective action is necessary.

Residential, Commercial and Industrial Buildings

Almost everyone agrees that constructing or retrofitting a building to make it energy efficient is a desirable thing to do. Energy costs are an important expense and it is sensible to use energy in the most efficient manner at the least possible cost.

According to the U.S. Department of Energy's Energy Information Administration (EIA) total energy consumption in the building sector in 1989 was estimated at approximately 27 percent of the total energy consumed. Total energy consumption will tend to grow over time in response to the net increase in the number of buildings occupied in the United States.

The effect of new buildings on energy use will present a mixed picture. Existing buildings tend to use more energy than newer buildings, however, newer buildings tend to incorporate more energy-using features such as air conditioning. By the year 2010, approximately 30 percent of all residential units and 44 percent of all commercial buildings will be of post-1987 construction.

POLICY STATEMENT

To improve the overall efficiency and affordability of buildings, the state should institute a comprehensive and coordinated approach to energy improvements including a home energy rating system, energy efficient mortgages, enforcement of energy building codes, coordination between federal, state and local government agencies and incentives to building owners to make energy improvements.

Energy Rating Systems

An energy rating system is a method of certifying energy efficient design and construction so that valid comparisons can be made between houses. A rating system can be used as both an educational and a promotional tool. It can be compared to the yellow Energy Guide found on appliances or mileage ratings on cars.

A. Endorse the implementation and use of **ENERGY RATED HOMES™**, a uniform rating system to document the energy efficiency of homes including heating, air-conditioning, lighting and appliances.

   1. Encourage an energy rating be established for a home at the time of purchase or on a periodic basis to ensure lenders of the permanence of improvements.

   2. Educate and encourage potential buyers of new and existing homes to purchase homes that are energy efficient to reduce monthly expenses.

   3. Require all houses financed through the Nebraska Investment Finance Authority (NIFA) to be rated prior to sale.

B. Promote the implementation and use of the rating system in conjunction with energy efficient mortgages by lenders, underwriters and borrowers.

   1. Incorporate **ENERGY RATED HOMES™** in mortgage lending practices so both the loan amount and the buyer qualifying rules (ratios) fully reflect the value of lower energy operating costs.

Energy Efficient Mortgages

Energy efficient mortgage provisions recognize the increased buying power of a borrower who pays less for monthly utility bills. These mortgages also acknowledge the increased value of an energy efficient home.

Typically, the lender determines the applicant's monthly gross income and compares it to his or her expenses. Lending institutions use debt-to-income ratio as a yardstick in determining the size of a loan for which an applicant can qualify. A debt-to-income ratio is determined by comparing the borrower's yearly expenses to their yearly income. In a conventional mortgage, lenders generally use 28 percent as the maximum expenses compared to income. With an energy efficient mortgage, the expected lower utility bills reduce the borrower's monthly expenses. The lender can stretch the borrower's debt-to-income ratio to allow for a higher monthly payment. This higher payment will cover the slightly higher purchase cost of an energy efficient home. In some cases, it can help qualify someone who otherwise might not qualify.

Another aspect of marketing energy efficient homes is ensuring their added value is recognized in the marketplace. In new construction, the energy efficient features add to the value, as well as the cost of the home and it is important that the lender's appraiser document this for the lender.

The implementation of a home energy rating system will provide lenders and appraisers with a benchmark for determining what is an energy efficient home and what potential borrowers can expect in terms of monthly utility bills. The energy efficient mortgages coupled with a home energy rating system will provide a strong educational tool to home buyers to examine and compare the energy efficiency of homes.

To further encourage the use of energy efficient mortgages:

A. Encourage lenders to recognize the value of lower energy operating costs and to implement the value of these lower costs into energy efficient mortgage formulas.

B. Encourage lending appraisers to recognize the added value of energy efficient homes.

C. Recommend that the U.S. Department of Housing and Urban Development (HUD) require borrowers be informed of energy efficient mortgage opportunities at the time of purchase and allow the cost of energy inspection, rating and improvements to be financed.

D. Encourage uniformity among Fannie Mae, Freddie Mac, FHA and VA loans for energy efficient programs. Establish a networking system which maintains a dialogue between these agencies and interested entities in the state.

Incentives

POLICY STATEMENT

To promote energy efficiency in all buildings in the state, encourage building owners to make energy efficiency improvements without incurring "penalties" for making those improvements.

A. Allow energy efficiency improvements as a one-time credit on federal and state income tax. Energy

efficiency improvements qualifying for the credit should meet detailed criteria established by the Nebraska Department of Revenue with assistance from the Nebraska Energy Office. Improvements must be for energy conservation and not for home improvement, beautification or simple rehabilitation.

B. Exempt energy improvements from real estate valuation increases for a specified period of time. This would prevent homeowners from being penalized for making energy improvements which increase the valuation of their homes.

C. Encourage local utilities to participate in financing energy efficient improvements for their customers. Options to achieve this recommendation may include:

   1. Promote energy efficiency through utility loan programs, rebates or other incentives for their customers. Loans and rebates should reflect the efficiency of equipment installed or improvements made.

   2. Encourage utilities to provide funding for energy improvement loans through the 5% Dollar and Energy Saving Loan Program administered by the Nebraska Energy Office. (Also see Financing Opportunities section.)

D. Educate the public on the real savings obtained by using energy efficient appliances, water-saving devices and fixtures, high-efficiency lighting and orientation of windows for energy conservation.

E. Encourage incentives for landlords to make existing rental units energy efficient and to build energy efficient units.

F. Tie the receipt of heating assistance funding to the weatherizing of homes through the federal Low Income Weatherization Assistance Program. Unfortunately, many of the state's low income residents live in energy inefficient housing and are forced to seek heating assistance. Requiring the weatherization of these homes, at no cost to the resident, will allow heating assistance to provide help to more low income citizens and enhance the use of public dollars.

Recycling and Recyclable Construction Waste

According to the American Institute of Architects, the building industry in the United States accounts for 20 to 30 percent of municipal solid waste. This is made up of not only demolition waste, but also the construction waste from new buildings. In addition to the environmental impact of the construction industry on landfills, the energy required to produce new building materials may be greater than the energy consumed by the finished building during its entire life cycle. Recycling and reusing building materials extends the life of the products and saves energy.

POLICY STATEMENT

Implement programs which encourage the reduction and recycling of construction waste.

A. Encourage research in construction technology to develop innovative construction material use and integration into the construction process by industry and appropriate government agencies including universities and national laboratories.

B. Encourage segregation of construction waste at the construction site to facilitate recycling or reuse of appropriate materials.

C. Encourage the use of recycled materials in construction.

D. As a part of educational efforts directed at the construction industry, encourage teaching building techniques which focus on limiting construction waste.

Education

Nebraska has traditionally ranked high in the nation's educational efforts. We are proud of our educational system and the number of students we graduate. Standard aptitude test scores and pre-college entrance exam scores achieved by Nebraska students consistently rank above the national average. Nebraska has an excellent post-secondary educational system built on the foundation of six technical community college areas, state and private colleges and an outstanding university system.

In spite of these facts, a recurring theme during the discussions of the Policy Council on the energy policy plan was the need for greater energy education across all sectors of our state.

POLICY STATEMENT

Organize an energy education council to facilitate resource sharing, communications and implementation of results-oriented activities to achieve a greater level of understanding and responsibility regarding energy production, use and environmental impact.

A. Coordinate Energy Education Programs for All Ages. Do not limit energy education to our K-12 public schools. Energy education must be a part of on-going education at all levels.

1. Action Council. The Nebraska Energy Office should organize an Energy Education Action Council. This Council would provide recommendations to the Energy Office on ways to facilitate resource sharing, communication, program development and evaluation. It should include representatives from various interests such as industry, business, government, education, cooperative extension, etc.

2. Educational Efforts for the General Public. With recommendations from the Action Council, the Nebraska Energy Office would be responsible to coordinate implementation and/or promotion of existing programs funded by public and private entities to educate the general public on the efficient use of energy.

   For example, educational efforts regarding the nature of energy production are not just the responsibility of our utilities and state government. Greater emphasis must be made in schools and communities to educate the public on the benefits and responsibilities assumed by Nebraska's energy providers.

   In addition, efforts should be made to integrate classroom and community education to influence current and future decisionmakers and to motivate them to make local policy decisions or community resolutions regarding the prudent use of our natural resources. (Also see Agricultural section, part A.)

3. K-12 Schools. With recommendations from the Action Council, the Nebraska Energy Office would develop a statewide energy education action plan which identifies distinct objectives for specific grade levels. The action plan may designate curriculum, resource materials, teacher training and innovative education incentives for Nebraska's educators and students. Coordinate implementation with the Nebraska Department of Education, the Nebraska State Education Association and any other appropriate organization.

   a. Acquire, assemble and/or promote specific interdisciplinary curricula which include but are not limited to information on energy sources, production, efficiency, conservation, alternate resources and economic and environmental impacts.

   b. Establish energy concept learning priorities targeted at specific grade levels. For example, the focus of primary grade levels may be awareness and basic conservation. Secondary level activities may feature more advanced evaluation of the economic and environmental impacts of energy decisions.

   c. Encourage students to pursue careers in the math and science fields by providing experiential or experimental activities in energy that support state and national science and math enrichment priorities.

   d. Develop alternative, competitive funding opportunities for teachers which encourage educators to create and implement new activities or unique teaching methods in energy education.

   e. Coordinate experiential training, peer-to-peer sharing and field opportunities for educators.

4. Provide centrally located information, training and dissemination sites for elementary and secondary educators and the general public.

5. State Colleges and Community Colleges. State and community colleges should be utilized to develop in-service and pre-service training opportunities.

   The colleges should be encouraged to offer courses or degrees in energy management. Coordinate efforts to offer continuing education classes, certification of energy building code inspectors and energy auditors, conversion of vehicles to alternate fuels and alternate fuels fueling station design and maintenance.

6. University System. Coordinate educational efforts through the University of Nebraska system to take advantage of currently existing programs and to utilize research and training opportunities.

   a. Coordinate with Cooperative Extension and other outreach programs relating to energy production, use, conservation and efficiency.

7. Trades and Professional Training. Offer classes or seminars on a periodic basis on:

   a. Energy efficient building techniques for construction contractors,

   b. Irrigation well efficiency for farmers and ranchers,

   c. Operation and maintenance procedures for building operators and administrators,

   d. Home energy rating systems and energy efficient mortgages for lenders, real estate agents, brokers and appraisers,

   e. The importance of energy efficiency in public buildings for elected officials and public employees,

   f. Alternate transportation fuels for automobile mechanics, automobile dealers and fuel distributors and,

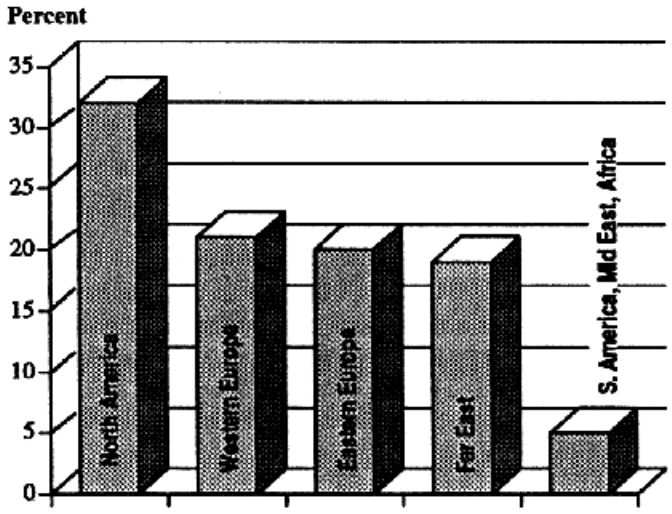
   g. Recycled building materials and how to recycle construction waste. (Also see Agricultural section, part A; Buildings section, Energy Rating System, Public Buildings and Construction Waste; and Transportation Fuels, Alternate Fuels.)

Electricity

Introduction

Although electricity is not a primary energy source since it is produced from other forms of energy, most people generally think of electricity as a major form of energy. In Nebraska, electricity is an important part of the state's overall energy policy since Nebraska is the only state which is 100 percent public power. As such, each power district, rural electric system and municipal system is governed by an elected or appointed board of directors.

Percent of World Electrical Generation, 1988

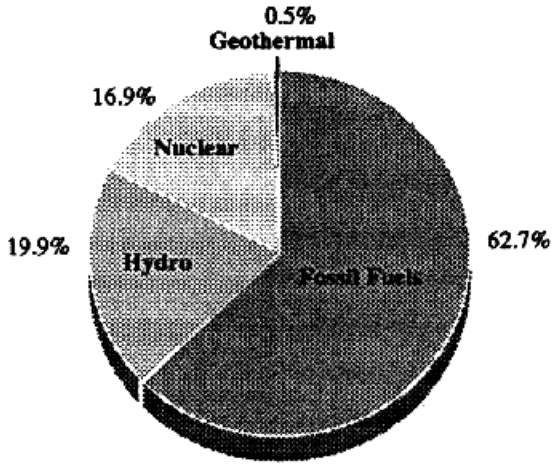


Source: Energy Information Administration, U.S. Department of Energy.

World

As reported by the Energy Information Administration (EIA), world total net electrical generation was 10.5 trillion kilowatt hours (kWh) in 1988. North America accounts for 33 percent; Western Europe, 22 percent; Eastern Europe and the Soviet Union, 21 percent; and the Far East and Pacific Islands, 19 percent. Central and South America, the Middle East and Africa account for less than 5 percent of the total electricity generated in 1988.

World Electrical Generation by Fuel Type, 1988



Source: Energy Information Administration, U.S. Department of Energy.

Electricity generated from fossil fuels (oil, coal and natural gas) accounted for about 63 percent of the total generated; hydro power 20 percent; nuclear 17 percent and geothermal less than one percent.

United States

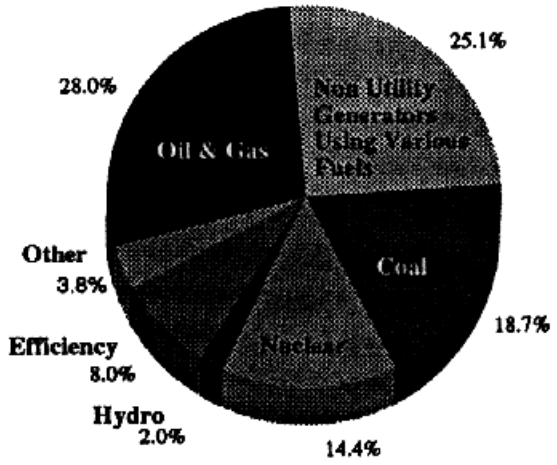
The electric power industry in the United States consists of more than 3,200 utilities. There are approximately 260 investor-owned electric utilities operating in all states except Nebraska where all electric utilities are publicly owned. Hawaii is the only state where all electric utilities are privately-owned. Investor-owned utilities currently account for more than 75 percent of all electric utility generating capacity, generation, sales and revenues.

According to the North American Electric Reliability Council, the electric utility industry is planning to bring on line 72,200 megawatts (MW) of additional generating capacity by 1998 to meet the nation's anticipated electricity needs. Oil and natural gas-fired generators are expected to make the largest contribution to future additions of electric generating capacity.

The EIA expects to see electricity consumption claiming a steadily increasing share of end-use energy demand throughout the next 20 years. The EIA projects a growth from 15 percent in 1989 to 18 percent by 2010. Annual increases in the demand for electricity have fluctuated over the past 30 years. During the 1960s, energy demand increased approximately 7.4 percent per year. In the 1970s, demand increases fell to around 4.5 percent annually. The 1980s began with another significant drop in demand. Up to 1986, average yearly demand increased 1.9 percent. After 1986, demand increased by 2.3 percent per year and the rate of increase is expected to remain at this level until the year 2000.

The North American Electric Reliability Council expects that oil and gas will provide 28 percent of the new generating capacity brought on line by the year 2000; non-utility generators 25.1 percent (using various fuels), coal 18.7 percent, nuclear 14.4 percent, two percent from hydro power and the remaining eight percent through utility efficiency, conservation and demand-shifting programs.

Predicted U.S. Electrical Generation by Fuel Type in Year 2000

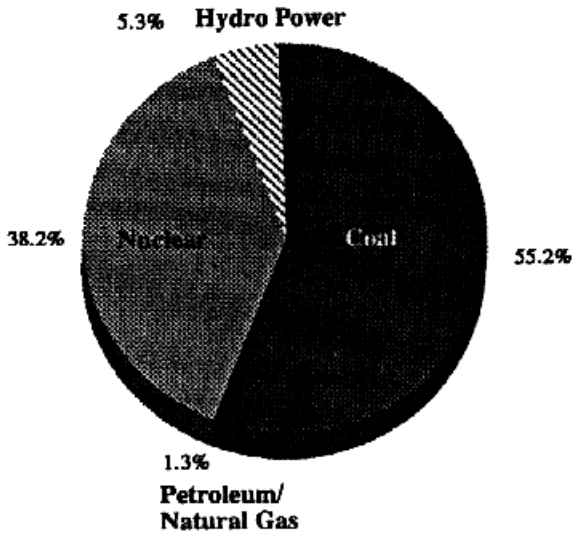


Source: North American Electric Reliability Council.

Nebraska

Generation of electricity in Nebraska reached a record in 1989 of 21 billion kWh. Coal accounted for 55.2 percent, nuclear 38.2 percent, hydro power 5.3 percent (including production from Gavins Point Dam on the Missouri River) and natural gas/petroleum 1.3 percent of the power generated. Nebraska remained a net exporter of electricity. Ten percent of the electricity used in Nebraska in 1989 was purchased from the Western Area Power Administration (WAPA). This was obtained at an average cost of 0.98¢/kWh.

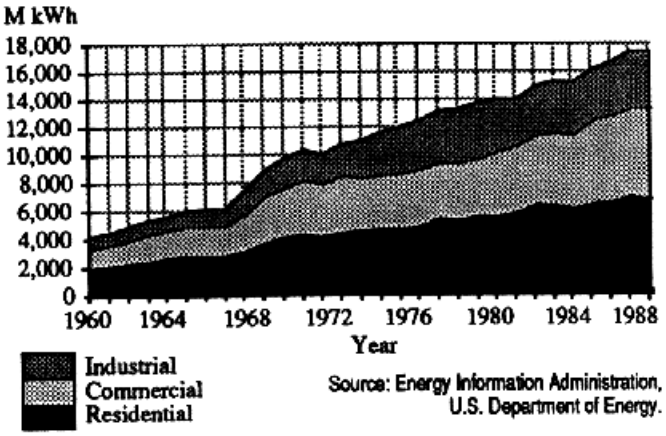
Electrical Generation in Nebraska by Fuel Type, 1989



Source: *Electric Power Annual, 1989.*
Energy Information Administration, U.S. Department of Energy.

Electricity use in Nebraska increased to 17.54 billion kWh in 1989, a 0.3 percent increase over 1988 and a new all-time record. Electricity use decreased in the residential sector but increased in the commercial and industrial sectors from 1988.

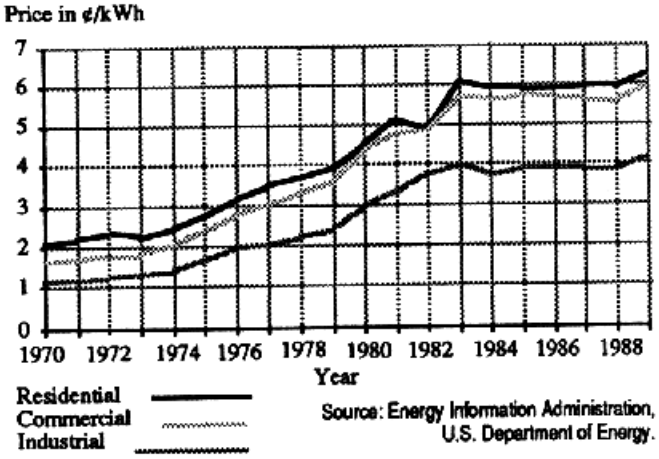
Electric Use in Nebraska, 1960-1989



Source: Energy Information Administration, U.S. Department of Energy.

The average price of electricity in 1989 was 6.3¢/kWh for the residential sector, 5.95¢ in the commercial sector, 4.16¢ in the industrial sector for a statewide average of 5.65¢/kWh. Expenditures for electricity increased to $990 million in 1989, an 8.3 percent increase from 1988.

Average Electric Prices in Nebraska, 1970-1989



Source: Energy Information Administration, U.S. Department of Energy.

The following table shows the largest electrical generating units owned partially or totally by the state's utilities including net summer capacity, fuel type and first year of commercial operation. The plants are listed by age and grouped according to fuel type. Gavins Point, which is operated by the U.S. Army Corps of Engineers, is not included in this table although Nebraska receives a large share of its WAPA allocation from the power plants at the dam.

Plant Name	Net Summer Capacity (MW)	Fuel Type	Year
North Omaha 1-5	629.6	Coal	1954-1966
Fremont 6-8	125.0	Coal	1957-1976
Sheldon 1 & 2	225.0	Coal	1961-1962
Nebraska City #1	584.9	Coal	1979
G. Gentleman #1	630.0	Coal	1979
Hastings	72.0	Coal	1981
G. Gentleman #2	648.0	Coal	1982
Laramie River*	183.0	Coal	1982
Grand Island-Platte	100.0	Coal	1982
North Platte 1 & 2	24.0	Hydro	1936
Columbus	40.0	Hydro	1936
Jeffrey Canyon 1 & 2	18.0	Hydro	1940
Johnson 1 & 2	38.0	Hydro	1940
Kingsley	38.0	Hydro	1985
Fort Calhoun	476.0	Nuclear	1973
Cooper Station**	778.0	Nuclear	1974

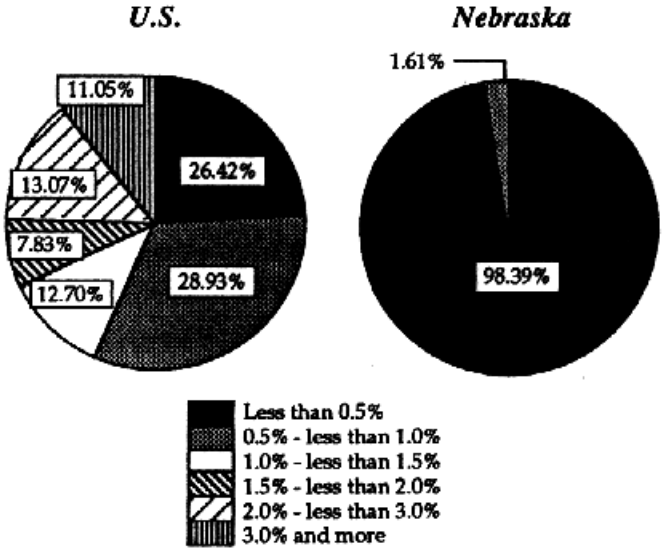
* This represents the Lincoln Electric System share of a larger facility.
** 50 percent of the production is purchased by Iowa Power and Light Company.

Planning for the future electricity needs of Nebraska is the responsibility of the Nebraska Power Association (NPA). In May of 1991, the NPA released its latest study and recommendations on future electric resources in the 1991 Statewide Resource and Transmission Planning Study. In that report, it is estimated that 76 percent of the new generating additions will be required to serve new load obligations and 24 percent to replace retired generating capacity. It is also expected that 88 percent of the existing Nebraska generating facilities will be operational 20 years from now.

Demand-side management (DSM) options identified in the study should delay the need for a new generation facility from the year 2000 until 2002. The selected DSM options, residential heat pumps, industrial interruptible load, leased customer generation and commercial lighting, should provide 292 MW of electricity. The DSM options are listed as the first priority, followed by two 160 MW combustion turbines in 2002 and 2003, a 600 MW coal-fired plant in 2005, another 600 MW coal unit in 2008 and another 160 MW combustion turbine in 2010.

Installing the DSM resources increases emissions slightly because they delay the installation of new coal units which have lower emissions than the existing units. Existing coal facilities in Nebraska have relatively low emissions because of past investment in emission controls and the use of low-sulfur Wyoming coal. More than 20 percent of the cost to install and operate future coal units is dedicated to environmental protection.

Sulfur Content of Coal Used at U.S. and Nebraska Generating Plants, 1989



Source: *Electric Power Monthly*. Energy Information Administration, U.S. Department of Energy.

Conventional Resources

POLICY STATEMENT

Utilize new technologies to improve the efficiency of conventional energy sources. Maintain efforts to operate conventional generating plants in an environmentally safe manner.

A. Coal. Coal accounted for 54.9 percent of the electricity generated in Nebraska in 1989. The coal for Nebraska's power plants comes from the Powder River Basin in Wyoming which has an abundant supply of low-sulfur coal. It is expected that Nebraska will continue to rely on coal as its primary fuel source in electrical generation for decades to come. At current production levels, Wyoming coal should be available for nearly 400 years.

1. Support the federal research efforts in the development of "clean coal" technology.

B. Hydro Power. Hydro power plants accounted for 5.3 percent of the electricity generated in the state in 1989. Most of this came from WAPA, Central Nebraska Public Power and Irrigation District, Loup Power District and the Nebraska Public Power District (NPPD).

1. Consider the technology of hydro power pump storage as an alternate source of electric capacity. Although not currently economically viable, this technology should be considered as an option in an overall integrated resource plan.

   Pump storage is a system where two bodies of water are exchanged to generate electricity. During times when electricity is needed, the water is released from the upper storage facility through turbines to the lower storage facility. During times of low electrical use, the water is pumped back to the upper storage facility.

C. Oil and Gas. Many of the short-term capacity additions planned for Nebraska are combustion turbines. While the cost of constructing combustion turbines is quite low, the relatively high cost of the fuel compared to coal makes these units generally attractive as peaking plants. Peaking plants meet loads which occur for a limited number of hours during the year such as air-conditioning loads in the summer or peak heating loads in the winter.

D. Nuclear. Electricity generated at Nebraska's two nuclear stations accounted for 38.3 percent of the total electricity generated in 1989. It is expected that the Cooper Nuclear Station will continue to operate until 2014. The Fort Calhoun Nuclear Station license expires in 2008 but may be extended until 2013.

POLICY STATEMENT

Fully educate the public about differing viewpoints concerning nuclear power, keep abreast of technological developments and keep nuclear energy open as an option for the future.

1. Monitor nuclear developments such as advanced reactor design and license extension economics.

2. Encourage the development of the major uranium deposit near Crawford, in a manner consistent with safe environmental practices.

3. Nebraska derives significant economic benefit from the state's two nuclear power plants. The use of uranium fuel eliminates air emissions and solid waste disposal issues associated with fossil fuel power plants. However, the plants do generate radioactive waste material which must be handled and disposed of in an environmentally responsible manner. Under federal law, Nebraska is responsible for the safe disposal of all low level radioactive waste generated within its borders and must proceed expeditiously to make certain that Nebraska's nuclear power plants have access to a low level radioactive waste disposal facility on a timely basis.

Utility Planning Coordination

POLICY STATEMENT

Continue full participation of Nebraska's electric utilities in state and regional planning efforts to provide adequate and low cost power for Nebraskans.

A. Regional Planning. Nebraska's electric utilities currently work closely with regional energy entities such as the Mid-Continent Area Power Pool and other planning entities to assist in providing power to the region. Periodically, other power suppliers can provide generating capacity to Nebraska electric utilities at a lower cost than building additional capacity within the state. Close coordination between Nebraska's utilities and regional planning entities should continue.

B. Nebraska Power Association (NPA) Joint Planning. Nebraska's electric utilities are required by law to coordinate planning activities. This coordination has been accomplished over the years through committees and task forces including the Nebraska Power Industry Committee, the Industry Task Force and finally, the NPA which was formed in 1980.

   The Nebraska Joint Planning Subcommittee, a subcommittee of the NPA, is responsible for completing statewide generation and transmission studies which "integrate the loads and resources of all Nebraska utilities, integrate demand and supply side resource options and integrate resource and transmission plans."

C. Western Area Power Administration (WAPA). WAPA, headquartered in Golden, Colorado, markets federal hydro power resources from 51 power plants operated by the Bureau of Reclamation, the U.S. Army Corps of Engineers and the International Boundary and Water Commission. Current maximum operating capacity is nearly 10,400 MW.

   WAPA's service area covers 1.3 million square miles in 15 western states including Arizona, California, Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Texas, Utah and Wyoming. WAPA works with its customers to market power "...in such a manner as to encourage the most widespread use

thereof at the lowest possible rates to consumers consistent with sound business principles..."

At the end of fiscal year 1990, the total federal investment to be repaid by WAPA customers was about $5.02 billion. Of that amount, about $2.08 billion or 41.4 percent has been repaid. Although proposals have been made to Congress to sell federal electrical generating facilities as a means to raise revenue, Congress has, to date, rejected such proposals.

POLICY STATEMENT

Maintain awareness among Nebraska's congressional delegation of the need to continue WAPA as a public entity and maintain its current repayment schedule; and continue the Rural Electric Administration Loan Program

D. Rural Electrification Administration (REA). The REA, an agency of the U.S. Department of Agriculture, provides credit and other assistance to electric utilities, including Nebraska's public power districts and rural electric cooperatives which, in turn, provide electric service to rural areas and communities.

In the United States there are 1,000 rural electric systems. Of these, all but 55 are cooperatives. Of the 55 not cooperatives, 33 are located in Nebraska. Only three rural electric systems in Nebraska are cooperatives.

The REA loan programs provide rural electric systems access to low-cost capital. Both access and lower interest rates are needed to assist Nebraska's rural electric systems provide reasonable prices for electric service. Loan funds are used to build new facilities, replace obsolete or worn-out facilities and to make other improvements to the electric systems.

The electric utility system infrastructure in rural Nebraska made possible by the REA lending program represents an important part of the economic development, past and future, of rural Nebraska.

Integrated Resource Planning

Integrated resource planning (IRP) is a process which examines and then selects a mix of demand-side resources — energy efficiency and load management — and supply-side resources — new generating facilities — which results in reliable electricity at the lowest reasonable cost.

This planning process assures the cost-effective potential for all resources is assessed and that resources are ranked according to their relative cost-effectiveness. Externalities such as environmental impact are considered as part of the overall cost-effectiveness.

POLICY STATEMENT

Encourage an effective combination from a full range of supply-side and demand-side alternatives to achieve the most reliable electric service at the lowest reasonable cost in an environmentally responsible manner.

Supply-Side

Supply-side measures, as a part of an integrated resource plan, are those activities which generate or supply electricity to the consumer. These activities customarily include new generating facilities or purchases of electricity, improvement in the efficiency of generating facilities or transmission lines and changes in the regulatory environment.

A. Environmental Impact. All energy resources used, or proposed for use in Nebraska, must be used in an environmentally responsible manner. During the IRP processes, environmental impacts must be an important consideration.

1. Clean Air Act. The recently amended federal Clean Air Act addresses the effects of acid rain by requiring the reduction of annual emissions of sulfur dioxide and nitrogen oxides in the United States. This legislation covers all existing fossil-fuel electric generating units except for simple combustion turbines or units with a 25 MW capacity or less. The Act requires power companies to maintain or achieve particular air quality levels based on emissions from previous years. For some power companies around the country, this means investing millions of dollars to retrofit or otherwise reduce the emissions at fossil fuel electrical generating facilities.

   Nebraska utilities are fortunate that the requirements under the Clean Air Act are not expected to require major investments to Nebraska's generating facilities. Nebraska's emissions are already in compliance with the Act due to the use of low sulfur coal and past investment in scrubbers and other pollution abatement technology.

The Clean Air Act may have an impact on the economics of building new facilities in the future. It is expected that utilizing demand-side resources will result in slightly higher emissions in Nebraska because they delay the installation of new coal units which have lower emissions than the existing units.

B. Regulatory Environment. The state regulatory environment for electrical generation in Nebraska is good and should be maintained. Encourage the streamlining of federal permitting and re-permitting and seek a greater role for states in the current federal regulatory process.

1. Permitting/Site Inventory. Some consideration should be given for a process which allows a power provider to complete certain parts of the regulatory process prior to the construction of a generating facility or transmission lines. Permits for future electrical generating sites should allow for long lead times to optimize optioning resources and to keep costs low.

2. Conflict Resolution. Promote conflict resolution between Nebraska entities through the NPA and then to the state level prior to advancing conflicts to the federal level.

C. District Energy Systems. A district energy system utilizes a central heating and cooling unit which provides heat and air conditioning to a number of buildings. The district energy system in Lincoln, for example, provides heating and air conditioning to the city/county building, the new jail, and has the potential for use by other buildings in the downtown area.

District energy systems can be developed and promoted as an economic development tool and are particularly advantageous in industrial tracts. The systems ease overall load and expand existing resources to run more efficiently. The state and the state's electric utilities should promote the further development and use of district energy systems.

D. Co-generation. Include co-generation as part of any IRP process to save energy and reduce equipment size. Nebraska statute 70-1002.02 limits the ability of a power producer to sell power in a utility's assigned service area. Most co-generators sell excess power to the utility.

1. Independent power producers (IPP). Nebraska's low cost electricity and ability of public power districts to use tax exempt financing limits the cost effectiveness of IPPs. However, certain situations may make IPP an option and it should be considered as part of an overall IRP when economically viable.

PURPA, or the Public Utility Regulatory Policy Act, passed by Congress in 1978 allows IPPs to sell electricity to the utility for the utility's "avoided cost." Avoided cost is that incremental cost which the utility would have had to pay to generate power from their own sources rather than purchasing the power from an independent producer. Nebraska's low cost power means that it usually costs an IPP more to produce the power than it does to sell the power back to the utility. This limits the cost-effectiveness of IPPs in the state.

E. Transmission. Reaffirm the state's existing statutes and policies regarding the regulatory framework for siting and access of electricity transmission lines.

Demand-Side

Demand-side measures as a part of an IRP are those activities which reduce the amount of energy used by the consumer. These activities are generally conservation and efficiency measures but can also include other measures which aid in reducing the amount of energy used or capacity required such as rate restructuring or load management.

The Electric Power Research Institute (EPRI) predicts demand-side measures could account for 30 percent of new capacity needs nationwide from 1990-2010. Today's DSM activities have grown into a $1.5 billion per year industry with some of the nation's utilities investing up to six percent of gross revenues on DSM budgets.

A. Conservation/appliance and equipment efficiency/ lighting efficiency. Conservation and efficiency must be an integral part of any integrated resource plan. Continue efforts and programs which encourage the use of high efficiency appliances and equipment, upgrading of lighting and basic energy conservation measures.

B. Utility Conservation Programs. Recognize, endorse and encourage the expansion of programs currently operated by the state's electric utilities including loan programs for conservation measures. (Also see Financing Opportunities, Utility Loan Programs.)

C. Utility Incentives and Rebates. The state's electric utilities currently offer a number of different kinds of incentives and/or rebates to promote the use of electrical appliances and to encourage energy conservation.

1. Undertake legislative efforts to allow cash rebates provided by utilities for energy conservation to be exempt from state and federal income tax.

   A recent ruling by the Internal Revenue Service stated that if a customer of an electric utility participates in an energy conservation program for which the customer receives a rate reduction or nonrefundable credit on the customer's electric bill, the amount of the rate reduction or nonrefundable credit is not considered as income and is not taxable. Cash rebates, such as are offered by many Nebraska utilities, are still considered income and subject to federal income tax.

   a. Encourage utilities to consider offering rebates in the form of a rate reduction or a nonrefundable credit on the customer's electric bill.

2. Encourage utilities to tie rebates for the purchase of energy-using appliances and equipment to the efficiency of the appliances and equipment.

D. Lighting program. Endorse and encourage the commercial lighting program being operated by the Nebraska Energy Office, NPPD and OPPD to increase lighting efficiency in commercial and industrial buildings. Encourage the expansion of this program to the residential sector.

   Using *Stripper Well* oil overcharge funds, the Nebraska Energy Office has been working with the state's largest electric utilities to develop a commercial lighting program which subsidizes the cost of compact fluorescent (CF) lightbulbs. The intent of the program is to encourage the use of CF bulbs which use 75 percent less electricity, provide as much light and last ten times longer than standard incandescent light bulbs.

E. Demand side resource supply curves. Resource supply curves identify how much energy could be saved as a result of demand-side activities and at what cost. As part of an overall research effort, the state and utilities should encourage ongoing research into the assessment of the amount of demand-side resources which are available in the state with specific emphasis on regional analysis. This should include localizing the data for variations in weather, demographics, customer mix and should separate maximum amounts from feasible amounts.

F. Rate structuring. Encourage utilities to implement rate structures which encourage and reward conservation and yet maintain cost of service principles.

   1. Encourage utilities to consider incentive rates and off-peak rates with the primary objectives being to foster energy conservation and peak reduction.

   2. Recommend that the Legislature allow utilities to provide rate structures in the commercial and industrial sectors which reflect a positive attitude toward economic development.

   3. Encourage electrical peak demand management (load management) by devising a rate structure that rewards reduced peak loads.

   4. Once the Energy Rated Homes™ system is established, encourage energy suppliers to offer residential rates that reward the structure's current earned energy rating.

G. WAPA regulations. WAPA is currently considering new regulations which would require power suppliers receiving low cost, federally-generated power to have an IRP in place. Encourage WAPA to coordinate assistance to small utilities in complying with these regulations through the Nebraska Energy Office, electric utilities and electric services providers.

H. Load management. Encourage all utilities to operate or be involved in programs which control or limit peak electrical demand.

Financing Opportunities

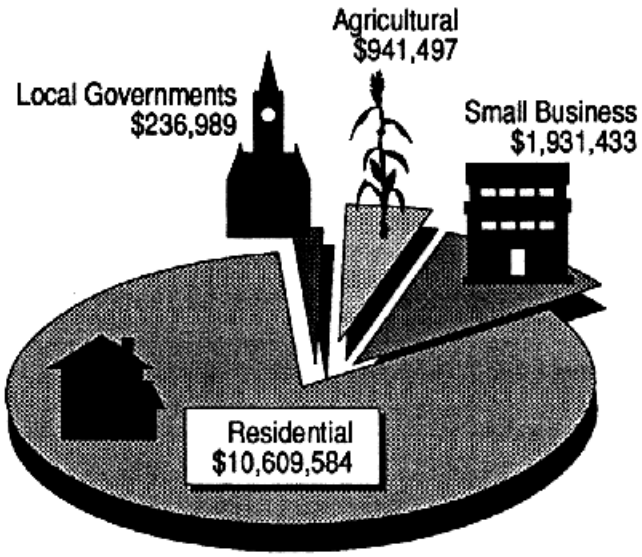
The 5% Dollar and Energy Saving Loan Program

In July of 1990, the Nebraska Energy Office announced the availability of a $13.25 million revolving loan program for energy improvements. The response was overwhelming. The Dollar and Energy Saving Loan Program provides 5% interest loans to consumers in the residential, small business, agriculture, local government and rural nursing home sectors. As of October 15, 1991, over 4,600 loans had been approved since the start of the program.

The loan pool is capitalized with $10.39 million in *Exxon* and $2.86 million in *Stripper Well* oil overcharge funds — almost half of all overcharge funds received by Nebraska. Oil overcharge funds resulted from a series of court settlements against oil companies which violated federal price control regulations between 1973 and 1981. States were assigned to designate restitutionary programs that would reach the greatest number of consumers.

The program works in close cooperation with the state's lending institutions which have added over $10.5 million from their funds to the available pool of funds. Borrowers apply for a loan in much the same way they would apply for a conventional home improvement loan and must meet their lender's credit requirements. The maximum loan amount is $10,000 for a single family residence, $37,500 for a multi-family residence, $100,000 for a small business/non-profit organization, $75,000 for agricultural operations, $175,000 for local government entities and $100,000 for rural nursing homes.

Oil Overcharge Funds
Invested in
Dollar & Energy Saving Loans by Type
(as of 10-15-91)



Total Loans Processed $13,719,503

No nursing home loans have beens made

Source: Nebraska Energy Office

One example of how the program has made a difference is seen in the project done at a grocery store in Ewing, Nebraska. The store owner used the program to replace eight existing refrigeration compressors with four new compressors. The electric bill for the old units ran approximately $1,200 per month with another $330 per month maintenance. Costs for the new units run $700 per month for electricity. The loan repayment is $634 per month for eight years. The store owner is already pocketing over $200 a month. When the loan is repaid, the energy savings will make a substantial difference in his operating expenses.

The Dollar and Energy Saving Loan Program will be available for ten years as the loan pool continues to revolve and loans are made from repayments. Applicants in the residential and commercial sectors are placed on a 30 to 90 day waiting list because the initial capitalization of funds in these sectors has been depleted. New loans in these sectors are made exclusively from loan repayments. The other sectors still have funds available.

The Nebraska Energy Office is currently working with a variety of organizations to secure additional funds for this extremely successful program. These organizations include utilities, private pension funds and other state entities.

POLICY STATEMENT

Explore opportunities to provide additional funding for the 5% Dollar and Energy Saving Loan Program.

A. Through the Nebraska Investment Council, invest state funds in the 5% Dollar and Energy Saving Loan Program at a low interest rate.

B. Encourage the Legislature to fund expansion of the program.

C. Explore the possibility of additional funding for the program through the issuance of bonds similar to those issued by the Nebraska Investment Finance Authority.

D. Modify the program to finance the conversion of vehicle fleets to use compressed natural gas, propane, electricity and other alternate fuels.

Other State and Federal Energy Financing Programs

Nebraska Energy Efficiency School Loan Program. The School Loan Program offers 0 percent interest, no finance charge loans to Nebraska K-12 public school districts to implement projects which reduce energy consumption or achieve more efficient resource consumption in buildings, facilities or complexes owned or leased by the school district. The program was begun by the Legislature in 1979 as a grant program and was changed to a loan program in 1985. It is funded by state oil and gas severance tax receipts and loan repayments. The program is structured so that one-half of the anticipated annual energy dollar savings is retained by the school district and one-half is applied against the loan. Applications are accepted continuously. The program is scheduled to end in 1996 with the program revenues going to the Permanent School Fund.

Technical Assistance Grants. A part of the School Loan Program is the availability of technical assistance grants which provide $2,500 per building for a technical study of the building and its energy-using systems. The study must be performed by a registered professional engineer or architect. The school district can use the report to identify energy conservation measures which can be financed through the loan portion of the program. Grants are made once a month and applications are accepted year round.

Institutional Conservation Program (ICP). ICP is a federal grant program designed to help schools and hospitals reduce their energy costs. The program is open to public and non-profit K-12 schools, vocational schools, colleges, universities, public and non-profit hospitals. The program covers only those buildings constructed on or before May 1, 1989. Most grants are 50 percent matching grants in which the grant covers half the projected cost of the project and the recipient is responsible for the remaining half. A limited number of hardship grants are available which provide up to 90 percent of the project cost. Applications are processed once a year with the grant cycle beginning in January.

Utility Loan Programs

In 1980, the Nebraska Legislature passed LB954 which allowed publicly owned electric utilities providing either wholesale or retail services within the state to operate loan programs for the purpose of assisting customers with the purchase or installation of energy conserving measures. Since the adoption of the statute (R.R.S. 66-1001 to 1011), questions have arisen regarding the constitutionality of the law. The concern is that this section of law conflicts with the constitutional prohibition of lending the credit of the state (Article 13, Section 3).

One municipal utility in Nebraska is currently using the utility loan statute with great success. The utility expects to offer $400,000 in loans over the next five years to its 1,540 residential customers and predicts a savings of nearly two million kilowatt hours or 14 percent of annual residential sales. On average, customers participating in the program paid 22 percent less on their winter heating bill compared to the previous year's bill.

A. Clarify the ability of the state's public power providers to utilize loan statutes for energy conservation improvements.

   1. Pursue legislation to clarify that loan programs operated by public utilities are not intended to lend the credit of the state.

   2. Repeal Nebraska statute 66-1010.5 limiting utility loans to $3,000. The cost of energy conservation measures varies widely and artificial limits on the amount of a loan creates a disincentive to consumers.

POLICY STATEMENT

Research and summarize energy tax policy, check offs and incentive plans used in other states.

A. Use tax policy to change public behavior toward energy use and conservation.

B. Offset the loss of revenue due to the implementation of tax credits through a tax on those industries benefiting from changes generated through this policy plan.

Fossil Fuels

Fossil fuels are generally defined as those fuels which originated from the remains of plant and animal life of previous geological epochs. Crude oil, natural gas and coal are examples of fossil fuels. Fossil fuels are considered to be non-renewable and as such, their supply is not continuously or periodically replenished.

POLICY STATEMENT

Promote initiatives which reduce fossil fuel consumption and reduce consumer energy costs.

A. Develop a state-approved, certified energy efficiency audit program for residential, commercial, industrial and agricultural sectors and public facilities. These audits will include checks for efficiency and safety in appliances.

   1. Offer the audits at no charge for low income residents.

   2. Continue to provide fuel assistance for low income residents coupled with advice or assistance in reducing use through energy efficiency improvements in their homes.

B. Utilize incentives for implementation of the recommendations from the state-approved energy audit.

   1. Promote the use of low interest loans or other incentives to encourage the implementation of energy efficiency measures. (Also see Financing Opportunities.)

C. Encourage the use of energy efficient appliances through upfront incentives such as a sales tax exemption. (Also see Other Opportunities, Appliances.)

Crude Oil

World

According to the Energy Information Administration (EIA), as of January 1, 1990, known world crude oil reserves were estimated to be between 933 billion barrels and 1,002 billion barrels which would last 42.5 years if used at current levels of consumption. Nearly 66 percent of the total reserves are found in the Middle East.

The countries of Saudi Arabia, Iraq, the United Arab Emirates, Kuwait, Iran, Venezuela, the Soviet Union and Mexico account for more than 80 percent of the world crude oil reserves. The United States has approximately three percent of the world's reserves but accounts for 13 percent of the world current crude oil production.

Known World Oil Reserves, 1989

Source: Energy Information Administration. U.S. Department of Energy

United States

Petroleum provides about 41 percent of the nation's energy needs and it is expected to remain our country's primary energy source for some years to come. After a decrease in consumption between 1979 and 1983, oil consumption has increased from 15.2 million barrels per day in 1983 to 17.24 million barrels per day in 1989. The EIA projects that consumption of petroleum products will continue to be strong, increasing to between 18.9 to 24.0 million barrels per day by 2010.

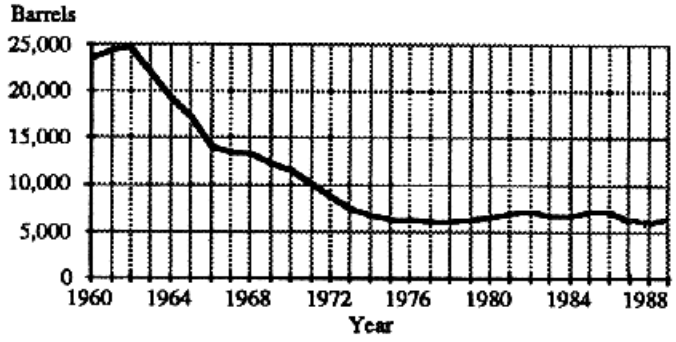
Although oil consumption is increasing, domestic oil production has been decreasing. Total crude oil production has declined substantially from the historical high of 9.6 million barrels per day in 1970 to 7.3 million barrels per day in 1990, a trend which is expected to continue over the next 20 years.

As domestic production has decreased, oil imports have increased. The EIA projects that net imports will increase from 42 percent of total U.S. consumption in 1990 to between 57 and 74 percent of total U.S. consumption by the year 2010. Persian Gulf imports accounted for 26 percent of total U.S. imports in 1989.

Nebraska

Nebraska ranks 20th in total production among the nation's 31 oil-producing states. In 1989, 1,687 wells in 17 counties in Nebraska produced 6.23 million barrels of oil, an increase of 4.2 percent from 1988 production of 5.98 million barrels. Current crude oil reserves were estimated at 32 million barrels as of December 31, 1989.

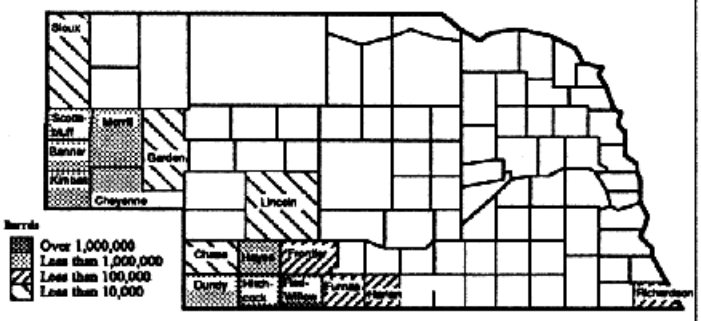
Nebraska Crude Oil Production, 1960 - 1989



Sources: American Petroleum Institute, 1989, Nebraska Oil and Gas Conservation Commission.

Petroleum use in Nebraska for 1989 was 42.39 million barrels, an increase of 1.8 percent from 1988. After remaining fairly constant from 1982 to 1986, petroleum consumption increased in Nebraska each year from 1987 to 1989. Petroleum use peaked at 46.22 million barrels in

Production of Crude Oil by County, 1989



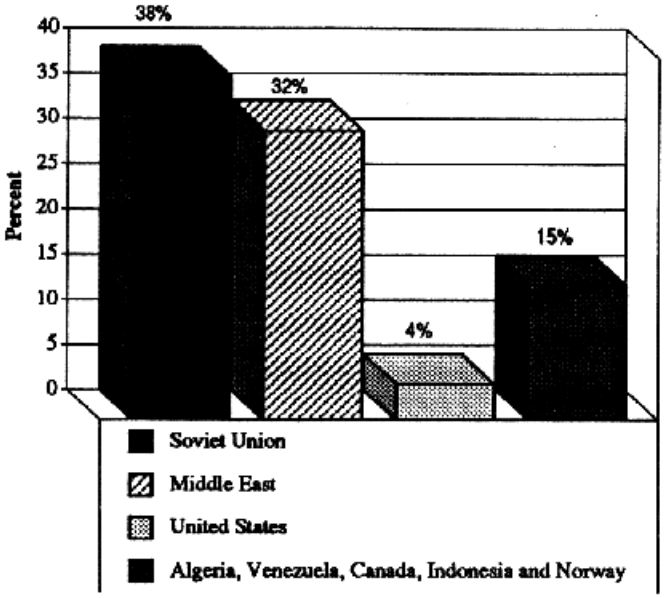
Source: Nebraska Oil and Gas Conservation Commission.

1978 before falling sharply between 1979 and 1981 due to the rapid increase in prices.

A. Encourage Nebraska petroleum production as a method to contribute to the economic development of the oil producing regions and reduce our dependency on out-of-state petroleum.

B. Examine the state's severance tax structure and, if necessary, make appropriate changes to encourage production.

World Natural Gas Reserves, 1990



Source: Energy Information Administration, U.S. Department of Energy.

Natural Gas

World

According to the EIA, on January 1, 1990, world natural gas reserves were estimated at 4.1 quadrillion cubic feet which would last 56 years at current levels of consumption. Of this amount, 37 to 38 percent is located in the Soviet Union, 31 to 32 percent is in the Middle East and four percent is located in the United States. The countries of Algeria, Venezuela, Canada, Indonesia and Norway collectively account for 15 percent of the total natural gas reserves.

United States

Natural gas production in the United States comes predominantly from Louisiana, Texas, Oklahoma, New Mexico and the Gulf of Mexico. The fields in Louisiana, the Texas Gulf Coast and the Gulf of Mexico make up approximately 45 percent of natural gas supplies. The Gulf of Mexico alone currently supplies 27 percent of domestically produced natural gas.

Current domestic production supplied approximately 84 percent of U.S. consumption in 1989. By 2010, these sources are expected to provide only 73 percent. The EIA projects natural gas production will grow from 17.5 trillion cubic feet in 1990 to 19.2 trillion cubic feet in 2010.

Imports accounted for eight percent of total U.S. consumption in 1990. Imports are expected to increase and should account for 14 percent of consumption by 2007.

Canada has historically provided nearly all of the U.S. import market and this is expected to continue. A price increase expected toward the turn of the century should provide the impetus to encourage lower cost imports from Mexico on a larger scale.

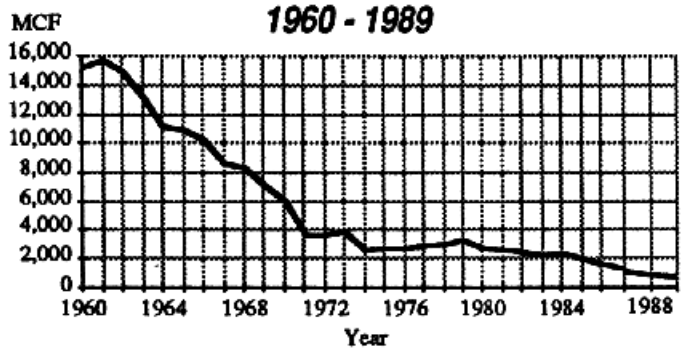
Natural gas consumption should show substantial increases over the next 20 years growing by an average rate of 0.5 to 0.8 percent each year. This increase is based on the growth of natural gas-fired co-generation facilities in the northeast, increasing concerns over clean air and global warming and the use of compressed natural gas as a vehicle fuel. (Also see Transportation Fuels, Alternate Fuels — Natural Gas.)

In 1990, total natural gas consumption was estimated at 19 trillion cubic feet (tcf). This is expected to increase to 22.8 tcf by the year 2000 for a 1.8% annual rate. By 2010, consumption is projected to decrease to 22.4 tcf.

Nebraska

Nebraska's total natural gas production in 1989 amounted to 878,517 thousand cubic feet (mcf), the lowest

Nebraska Natural Gas Production, 1960 - 1989



Sources: American Petroleum Institute. Nebraska Oil and Gas Conservation Commission.

reported in Nebraska since natural gas production amounts were first recorded in 1950. This is a decrease of 3.5 percent from 1988 production levels of 910,468 mcf. Nebraskans paid $4.53 per mcf of natural gas in 1989 compared to a national average of $5.32 for residential use.

POLICY STATEMENT

Encourage the production, efficient use and continued price competitiveness of natural gas because of its environmental quality and abundant supply.

A. The local utility (public, private or municipal) must play an important role in the development and implementation of the state's policy plan.

1. If a utility participates in a state-approved conservation plan, provisions should be made in state statute or regulations to allow for the cost of the conservation activities to be included in the utility's rate base.

   The intention of the Policy Council is to promote utility-sponsored conservation and efficiency measures. It is not intended that activities such as advertising, promotions and equipment sales be included as part of a state-approved conservation plan.

B. Encourage natural gas production in Nebraska to reduce dependence on out-of-state sources and contribute to the economic development of natural gas producing regions of the state.

1. Examine the state's severance tax structure and, if necessary, make appropriate changes to encourage production.

Propane

Propane, also known as liquefied petroleum gas (LPG), is produced from two sources — processing natural gas, which accounts for approximately two-thirds and the refining of crude oil. It is used by nearly 60 million people in the United States where over 18 billion gallons of propane are consumed annually. Propane is currently the fourth largest source of energy in the United States.

Propane is used for heating, water heating, cooking, clothes drying, air conditioning, refrigerating and lighting. Propane is also used on the farm for crop drying, for powering standby generators and as a fuel for farm vehicles and equipment. Propane is also used as an alternate fuel in vehicles. (Also see Transportation Fuels, Alternate Fuels — Propane.)

Nebraskans consumed over 210 million gallons of propane in 1989, a small decrease from 1988. In 1989, Nebraskans paid a statewide average of 53¢ per gallon of propane for a total of $116.7 million.

The supply and pricing of propane is an important issue in Nebraska. In many areas of the state, propane is the principal fuel available for space heating and water heating. The safe use of propane is unregulated. In Nebraska, the propane industry is largely self-regulated. Although codes developed by the National Fire Protection Association (NFPA 54 — National Fuel Gas Code and NFPA 58 — The Storage and Handling of Liquefied Petroleum Gases) have been adopted and do apply to propane dealers, there is no effective oversight to insure uniform compliance. As a result, the customer safety programs and practices of dealers vary widely across the state.

POLICY STATEMENT

Support legislation which requires the formation of a state propane commission to license dealers; set certification standards for industry employees; and oversee and regulate the potential production, importation, distribution, storage, handling and safety of propane in the state of Nebraska.

Heating Oil

Separate statistics for the consumption and pricing of heating oil in Nebraska are not available.

A. Encourage monitoring of the supply, pricing and efficient use of heating oil.

Other Opportunities

This section includes those policy statements and recommendations which were not appropriate for other sections of the policy plan but, nonetheless, are an important part of the comprehensive energy policy plan.

Trees

According to the American Association of Nurserymen (AAN), proper landscaping can help to reduce a building's heating and cooling costs by ten to 30 percent. Trees and shrubs planted on the north side of a building shield exterior walls from cold winds. They can also be planted as a windbreak to channel cold winter winds away from a building.

According to a 1988 study by DeWalle and Heisler, 17 percent of the total energy consumed in the United States was in the residential sector with 53 percent of the energy used going for heating and 12 percent going for cooling. The study also indicated that 15 to 20 percent of the heating load could be reduced by the use of windbreaks.

Deciduous trees (those that lose their leaves in the winter) can be planted on the south sides of buildings to soak up the sun's rays and shade the buildings in the summer. During the winter, these trees allow the sun's rays to strike the exterior walls and windows and yield passive solar gain.

The American Public Power Association and AAN have joined together to promote Tree Power, a tree planting program for utilities to meet energy conservation and environmental goals of public power utilities. The goal of Tree Power is to plant 16 million trees — one for each public power customer in the United States. Since its start in April, 1991, public utilities have commited to planting half a million trees.

POLICY STATEMENT

Encourage the planting of trees as a renewable energy source, a method of pollution control, a conservation technique, a local economic development opportunity and an improvement in quality of life.

A. Encourage the use of energy and water efficient landscaping to conserve energy.

B. Use low maintenance plant materials in landscaping public buildings and road rights-of-way.

C. Encourage the planting of wind breaks and appropriate planting of trees to reduce a building's heating and cooling costs.

Appliances

POLICY STATEMENT

Promote the purchase and use of energy efficient appliances.

A. Study and establish appliance and equipment efficiency standards for Nebraska to prevent the state from becoming a dumping ground for inefficient appliances and equipment that cannot be sold in states where standards are currently in place.

B. Encourage the use of efficient appliances through a sales tax exemption. (Also see Fossil Fuels section, part C.)

Energy Programs Administration

The Energy Policy Council recognizes that implementation of even part of this energy policy plan will create additional burdens on energy entities in the state including but not limited to the Nebraska Energy Office, the Ethanol Authority and the Oil and Gas Commission. Given the importance of energy in the future economic well-being of the state, proper consideration must be given for developing, coordinating and adequately funding energy activities.

POLICY STATEMENT

Study the feasibility of coordinating all state agencies with energy responsibilities.

A. Examine the structure of the agencies, sources of funding, continuity of functions, elimination of duplication and opportunities for improved coordination.

B. Provide adequate funding to agencies to carry out state mandates and additional program duties incurred as a result of this policy plan.

Renewable Energy Sources For The Future

Renewable energy is generally considered to be that class of energy sources such as solar, wind, hydro power and biomass, whose supply is continuously or periodically renewed. Few renewable energy technologies other than hydro power and wood combustion were pursued after the discovery of inexpensive oil and natural gas supplies in the early part of the 20th century. The 1970s energy price shocks and increasing environmental awareness revived interest in renewable energy supplies. By 1988, renewable energy resources provided approximately eight percent of domestic energy supply and about 12 percent of all electric power.

The Energy Information Administration reports that although hydro power presently accounts for approximately 40 percent of the total U.S. renewable energy use, biomass, geothermal, wind and direct solar technologies account for much of the current growth in the industry. By the year 2000, non-hydro power sources may account for 75 percent of the total energy from renewables.

POLICY STATEMENT

Increase Nebraska's energy security by investigating the full potential of all types of environmentally responsible renewable resources by developing and funding demonstration projects.

A. Energy policy must consider the long term environmental costs, long term availability and best use of fossil fuel energy sources.

B. Energy conservation and efficiency must be treated as a viable energy source and a method to reduce the importation of fossil fuels.

C. Provide financial incentives such as tax credits for the implementation of renewable energy projects.

D. Promote the use of renewable energy sources where cost effective.

Solar

There are two basic kinds of solar systems used to produce electricity in the United States today. Solar thermal electric plants and photovoltaic systems. Solar thermal electric plants use mirrors or lenses to concentrate sunlight which heats a fluid which is then used to produce electricity. Photovoltaic cells directly convert sunlight to electric current.

According to the Solar Energy Research Institute, solar thermal electric plants produce 0.01 quads of energy per year. Several solar thermal plants produce electricity for 12 to 15¢ per kilowatt hour (kWh). Three solar thermal electric technologies are considered competitively viable over the next 20 years. These are central receivers, parabolic dishes and parabolic troughs.

Central receivers are systems where a fixed receiver is mounted on a tower and a field of mirrors, or heliostats, track the sun and reflect solar energy onto the receiver. The major central receiver project today is the 30 megawatt Phoebus project in Jordan. The Solar Energy Research Institute predicts costs of 8¢ to 12¢ per kWh using the next-generation plants.

A parabolic dish is a dish-shaped collector with a receiver mounted at its focal point near the center. These dishes then track the sun and the generated heat is either used directly by a heat engine placed at the focal point or is distributed by a fluid or air for remote use. The most efficient system tested utilizes a Stirling engine at its focal point. When further development is complete, the cost per kWh is expected to be around five cents.

Parabolic troughs account for more than 90 percent of the current solar electric capacity in the world. The trough tracks the sun vertically and concentrates sunlight on a tube filled with fluid. The fluid circulates between troughs and transfers its heat to water or steam for use in a turbine generator. From 1984 to 1988, the LUZ Corporation in California built several commercial trough plants totaling 275 MW. The company expects to have another 380 MW available by 1994. Electricity is produced for approximately eight cents per kWh.

Photovoltaic (PV) cells have been used for years in calculators, watches and space satellites. Many remote power applications of PV systems are in use and cost competitive today. These applications have sustained the PV industry while the technology has developed for using PV cells for generating large amounts of electricity. The

present cost is now 20 to 30¢ per kWh. It is expected that PV's can become competitive with conventional resources by 2010.

An article in the May, 1991 issue of *Omni Magazine* reports that 1.2 million buildings in the United States utilize solar water heating systems. Even though U.S. funding for solar energy was slashed in the 1980s from $750 million to $150 million, the solar industry has developed into a billion dollar a year business.

When solar energy first became popular back in the 1970s, Nebraska saw the installation of many active (mechanical) solar systems for space and water heating. The installation of these systems was further encouraged by availability of state and federal income tax credits. At one time, approximately 50 to 60 people were employed full-time in the solar industry in Nebraska with an additional 50 people employed part-time. Many of the systems installed then, however, are no longer in use due to a lack of available service providers. Testimony received at public hearings on this policy plan indicate that no one appears to be currently employed by the solar industry in Nebraska.

Passive solar energy systems are also in use in Nebraska. In a passive solar system, thermal energy moves by natural means such as radiation, conduction and/or convection. Mechanical systems to transport the heat are not commonly used. In most passive solar systems the building itself or some other element of it *is* the system. There are no separate collectors or storage units.

There are two basic elements in passive solar systems: south facing glass and thermal mass for heat absorption and storage. The glass allows the building to collect solar heat during the day. The thermal mass absorbs this heat modulating it during the day and releasing it when solar energy is not available. Passive solar energy systems can be very cost-effective when integrated into the building designs of well insulated structures. Passive solar design can be as simple as relocating some of the glass originally designated for the east, west and north walls to the south walls. This reduces excessive heat loss from the north, reduces excessive summer heat gain from the east and west and adds usable heat gain from the south glass. An approach such as this increases the building's annual energy efficiency at no additional cost. Consumers, architects, engineers and builders need to be educated about cost-effective ways to add passive solar elements to residential, commercial and institutional buildings.

POLICY STATEMENT

Continue to encourage and develop the use of solar energy in the state where appropriate and cost effective.

A. Encourage utilities to include solar resources in integrated resource planning activities.

B. Through the state and the state's utilities, work cooperatively to develop and fund demonstration projects which show the viability of solar energy in Nebraska.

C. Encourage the commercial sector and other owners of energy-using facilities to use both active and passive solar energy.

Wind

Wind power is the renewable energy technology closest to being economically competitive in the bulk power market. According to the Solar Energy Research Institute, in 1989, windpower plants generated over two billion kWh of electricity at an average cost of 8¢ per kWh.

In California, Pacific Gas and Electric Company plans to purchase most of the 1,500 MW of electricity produced by wind power production plants. It accounts for approximately eight percent of the utility's needed capacity. The Green Mountain Power Corporation, a Vermont utility, recently invested $2.5 million in a wind project of U.S. Windpower Inc., the world's largest commercial producer of wind energy.

Closer to home, the Iowa-Illinois Gas and Electric Company and U.S. Windpower Inc. plan to develop wind farms in Iowa in the near future. The joint venture initially will invest $200 million to site and build enough wind turbines to generate 250 MW of electricity. After five years, the companies expect to expand to 500 MW — the equivalent of a coal-fired generating plant.

The Electric Power Research Institute (EPRI) recently reported that "alone among the emerging alternative energy technologies, wind power offers utilities with good wind resources pollution-free electricity that is nearly cost-competitive with today's conventional sources." Good wind resources are an important consideration in the development of wind energy. The U.S. Department of Energy has identified 37 states with sufficient wind resources to support development of utility-scale wind power plants and ample winds in all 50 states for small, residential-size wind turbines.

Battelle Pacific Northwest Laboratories, in a study for the U.S. Department of Energy in 1990, estimated that wind resources in the lower 48 states could meet 27 percent of the nation's electrical consumption even after avoiding many areas because of environmental sensitivity. The study found that 45.4 percent of the land area in Nebraska has the potential for wind power development. Additional information on Nebraska's wind potential is found in Appendix B of this report.

POLICY STATEMENT

Promote the use of wind energy as new technologies improve its cost-effectiveness.

Biomass

Biomass is generally defined as energy resources derived from organic matter. These include wood, some forms of solid waste, crop residue and other living-cell material. Biomass already is a significant source of renewable energy. The industrial sector in the United States uses two quads of energy from biomass, almost all of it in the pulp, paper and lumber industries.

The U.S. Department of Energy estimates a total energy potential of at least 55 quads by the year 2000 from biomass. Present capacity is around 14 quads. Most biomass resources are thinly dispersed and collection and transportation can be costly. Although the principal energy use of biomass is the production of heat, biomass can be used to generate electricity.

The use of biomass by utilities is generally considered to be uneconomical and impractical. The Electric Power Research Institute estimates the cost of producing electricity from wood-fired plants is 11¢ per kWh compared to 7¢ per kWh for coal-fired plants.

The following information is a summary of the availability and energy utilization potential of biomass in Nebraska. The study was done and the summary was written by L. Davis Clements, Michael S. Turner, Doug Simon and Elbert Dickey of the University of Nebraska-Lincoln.

> "Nebraska has the potential to be relatively energy self-sufficient in liquid fuels and electrical power. This goal of sufficiency must be tested for economic viability before it is considered as a policy goal....The production of ethanol from excess corn, sorghum residues and some contribution from sugar beets and other grains also is attractive. Feedlot wastes are not sufficient in quantity and concentration to have an impact on energy resources, unless the conversion is a part of a waste treatment strategy at a local scale."

POLICY STATEMENT

Pursue the use of biomass as an energy resource, including the use of biomass in the production of ethanol, in an environmentally responsible manner.

Hydro Power

Hydro power is generally defined as electricity generated by an electric power plant whose turbines are driven by falling water. Historically, many communities across Nebraska used small hydro power plants to generate electricity to meet their electrical needs. The creation of the major power districts and the construction of large generating facilities allowed an economy of scale which caused the abandonment of many of these small hydro power plants. The need for water for irrigation and the cost of maintenance were also important factors in the discontinuance of the hydro power plants.

In 1990, 5.3 percent of the electricity generated in Nebraska came from hydro power facilities.

POLICY STATEMENT

Continue the use and further development of hydro power as an energy source as new technologies improve its cost-effectiveness.

A. The environmental impacts of hydro power must be assessed and considered in determining the cost-effectiveness of hydro power installations.

Fuel Cells, Hydrogen Fuel and Geothermal

Fuel cells, hydrogen cells and geothermal resources are examples of technologies which are currently not cost competitive but which should be pursued and examined as part of an overall strategy to encourage the continued technological development of renewable resources.

Research

POLICY STATEMENT

Develop and fund research initiatives to foster financially and environmentally responsible use and production of energy and coordinate current and future research efforts on a state, regional and national basis.

A. Through the Nebraska Energy Office, coordinate energy research in the state, facilitate the technology transfer of energy research and further basic research when appropriate.

   1. The Energy Office should not duplicate other research efforts. Coordination with entities currently conducting research should be top priority to maximize available funding. For example, research by the state under the University Research Initiative Program would not be duplicated.

   2. Encourage research efforts which will make Nebraska an energy producing state where economical.

B. Establish a Nebraska Energy Information Center within the Nebraska Energy Office which maintains a computerized energy data bank available to the general public.

   1. The data bank should include but not be limited to information on conventional energy production and use, renewable and alternate forms of energy, new energy technologies, conservation and efficiency techniques, energy audits, home energy rating systems, energy efficient mortgages and energy efficient construction practices.

POLICY STATEMENT

Encourage the state's electric utilities to participate in funding research through the Electric Power Research Institute (EPRI).

Currently, three Nebraska utilities (NPPD, OPPD and LES) are contributing $2.2 million per year to EPRI research. EPRI is a research and development organization which focuses work on programs that will reduce the cost of electricity. EPRI's 1991 budget is $267 million of which approximately 30 percent is allocated to environmental programs and approximately 15 percent is allocated to demand side management programs.

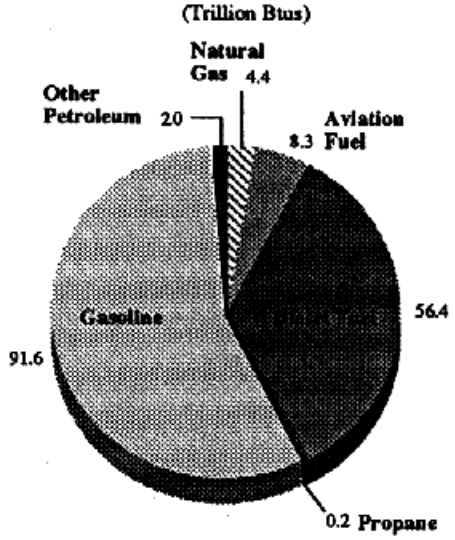
A. Make arrangements for the Nebraska Energy Office to obtain EPRI reports through the member utilities.

Transportation Fuels

Transportation accounts for 62.7 percent of the oil Americans use each day, most of it for gasoline. Transportation also accounts for a full one-fourth of the energy consumed in this country. While other sectors generally have the option of easily converting to another form of energy or taking other steps to increase efficiency, the transportation sector has, for the most part, been limited in its ability to achieve greater levels of efficiency and is generally limited to petroleum as a fuel source.

The transportation sector is generally defined as private and public vehicles that move people and commodities. Included are automobiles, trucks, buses, motorcycles, railroads, aircraft, ships and barges. Transportation energy use in Nebraska increased in 1989 by 1.7 percent over the previous year. A large part of that increase was due to an increase in diesel fuel consumption. Transportation sector expenditures on energy increased 15.7 percent in 1989 to $1.2 billion. This compares with peak expenditures of $1.3 billion in 1981.

Nebraska Energy Consumption by Fuel Type, 1989



Sources: Energy Information Administration, U.S. Department of Energy. Preliminary estimates, Nebraska Energy Office.

Conventional Fuels

POLICY STATEMENT

Create policies and programs to promote fuel efficiency, reduce dependence on petroleum and improve air quality in Nebraska.

Gasoline

Gasoline is the fuel most commonly used in the transportation sector. The vast majority of cars and light duty trucks are dependent on gasoline as their fuel source. According to Ken Lehman, Chairman of the Car Care Council, inefficient, gas-wasting vehicles weaken the position of the United States, particularly in times of energy crisis. Our dependence on foreign oil, nearly 50 percent of our consumption, can be dramatically affected by simply maintaining our current vehicles.

A car which is properly maintained will typically use five to 25 percent less gas than a car which needs maintenance. Under-inflated tires, dirty air filters and spark plugs and excessive exhaust emissions reduce fuel economy. These problems were found in a third of the vehicles which were checked during National Car Care Month in 1991.

Nationally, our cars consume about 72 billion gallons of gasoline every year. If vehicle owners would perform proper maintenance and reduce fuel consumption by only ten percent, we could reduce the amount of gasoline used by more than six million gallons daily.

The overall fuel efficiency of vehicles sold in the United States has declined since 1988. In 1987, fleet averages were 28.1 miles per gallon (mpg), 28.6 mpg in 1988, 28.1 mpg in 1989 and 27.8 in 1990 and 1991. According to the U.S. Environmental Protection Agency, 1992 cars show an overall fuel efficiency decline to 27.5 mpg. The annual fuel economy statistics cover about 1,000 cars and light duty trucks, both foreign and domestic. The overall average has increased substantially since 1974 when it was 14 mpg.

A. Encourage Nebraska's citizens and businesses to purchase fuel efficient vehicles and to maintain current vehicles in a manner that results in maximum fuel efficiency.

   1. Undertake a general education program on the benefits of fuel efficiency.

   2. Re-institute the Gas Saver Van program to provide "hands-on" demonstrations and to educate on the benefits of fuel efficiency.

B. Undertake a study regarding the fuel efficiency of Nebraska vehicles which identifies opportunities to conserve energy.

1. Implement the conclusions of this study in a comprehensive manner.

C. Review Nebraska's energy emergency preparedness plan.

1. Establish a plan to monitor retail petroleum product prices in time of energy crisis.

D. Re-initiate a testing and enforcement program for gasoline quality.

A study recently commissioned by the Nebraska Ethanol Authority and Development Board found that nearly 39 percent of gasoline samples taken at pumps statewide actually had lower octane levels than advertised. The study, done in May, June and July of 1991, stated that Nebraska's results are "no worse than anywhere else" but recommended that the state, at the very least, implement a program of random sampling for both octane and ethanol content.

1. LB 627 from the 1991 legislative session, incorporates American Society For Testing and Materials standards for gasoline and diesel fuel quality.

2. The Transportation Committee of the Legislature has been directed to conduct an interim study (LR 142) on the establishment of a random fuels quality testing program.

E. Through the Nebraska Energy Office, provide specifications for local governmental vehicles including cars, school buses, dump trucks and light duty trucks to include fuel utilization and efficiency standards.

1. Mandate all political subdivisions use life cycle costing in the purchase of motor vehicles. This will influence purchasing departments to evaluate the fuel economy as well as the acquisition cost of a motor vehicle.

2. The Nebraska Energy Office should work with the Transportation Services Bureau of the Department of Administrative Services to ensure that all vehicles purchased by the state are fuel efficient.

Diesel

Over 561 million gallons of diesel fuel were used in Nebraska in 1989. The largest sectors using diesel fuel were the agricultural, railroad and on-highway sectors which accounted for over 500 million gallons in 1989. The price for diesel fuel averaged 111.9¢ per gallon in 1989 which was a substantial increase over the 1988 average of 102.4¢. Between 1981 and 1985, the price of diesel fuel averaged around 130.0¢ per gallon.

A University of Nebraska-Lincoln chemical engineer, L. Davis Clements, recently announced a cost-effective method of turning animal fat into diesel fuel. If the method proves successful, Clements estimates that 850 million pounds of fat trimmed from animals annually slaughtered in Nebraska could be converted into 100 million gallons of diesel fuel or about half of the diesel fuel used by Nebraska farmers each year. Large scale production is probably not feasible for three to five years.

A. Encourage monitoring of the supply, pricing and efficient use of diesel fuel.

Alternate Fuels

Alternate transportation fuels including ethanol, liquefied and compressed natural gas, propane and electricity are currently available and economically viable for use in Nebraska. Increasing the use of these fuels will lessen our dependence on foreign oil and provide economic development opportunities within the state. These fuels have a reliable supply for the foreseeable future.

The use of alternate fuels in other states is often based on the need to comply with provisions of the federal Clean Air Act. The use of the alternate fuels recommended in this plan reduces air pollution which aids non-attainment cities (areas where air pollution is above allowable levels) in achieving the required goals in the Clean Air Act. Although Nebraska does not have any non-attainment cities, the use of alternate fuels will allow Nebraska to continue its compliance with federal standards.

POLICY STATEMENT

Increase the use of alternate fuels such as ethanol, natural gas, propane and electricity in the public and private transportation sectors to lessen the use of petroleum and improve air quality.

A. Establish a Fleet Alternate Fuel Incentive Fund to provide low interest loans for fleet conversions and fueling facilities.

1. Fund at a level of $100,000. Funding for the program should come from oil overcharge funds or other available sources. Legislation currently pending in the U.S. House of Representatives would establish an Alternate Fuels Initiative Act. Federal financing may be available through this act.

2. Provide oversight of the Fund through the Nebraska Energy Office.

3. Dedicated vehicle conversions (monofuel) should have first priority for funding over bi-fuel vehicles.

B. Provide incentives to promote the conversions of vehicles, business fleets and public vehicles to alternate fuels.

1. Encourage political subdivisions to implement a comprehensive program to convert vehicles owned by public entities to alternate fuels.

2. Provide financial incentives for private vehicle conversions.

C. Encourage private sector entities operating vehicle fleets to develop an alternate fuel use policy.

D. Extend existing Nebraska Special Fuel User Permit program to include all vehicles powered by alternate fuels.

E. Encourage state involvement in the conversion of vehicles for alternate fuel use through demonstration projects.

F. Establish standards for motor fuels quality to guarantee clean, high quality fuels and to ensure consumers' confidence in the use of alternate fuels. Alternate fuels will continue to be blamed for mechanical problems until a testing program is established.

1. Require content labeling on all retail fuel pumps for all fuel types.

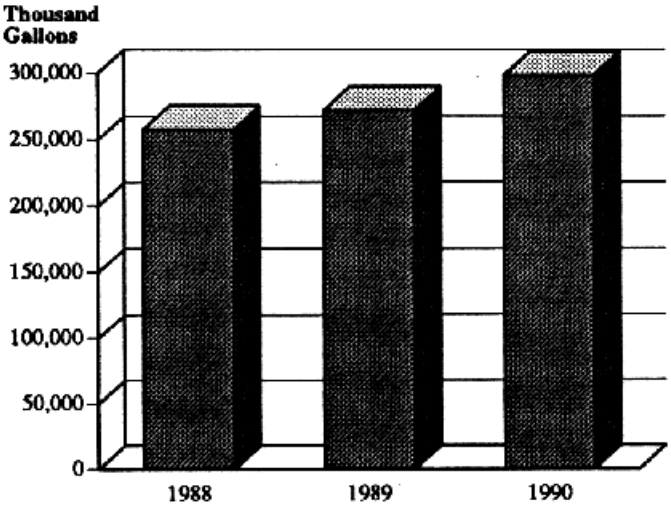
G. Tax all fuel on the BTU content of the fuel sold and not on the gallons sold.

Ethanol

Ethanol is an alcohol which is used as a motor vehicle fuel additive. In the United States, ethanol is generally blended with gasoline (ten percent ethanol) to form gasohol, now marketed as "Super Unleaded with Ethanol". The development of gasohol grew out of concern over the nation's increasing dependence on foreign oil and the abundant supplies of domestic corn from which most ethanol in the United States is made.

Ethanol can be produced from almost any raw material containing sugar or carbohydrates. Currently, about 95 percent of the ethanol in the United States is made from corn. This represents approximately four percent of the domestic corn production. Wheat, sorghum, barley, milo and food processing wastes are also used to make ethanol.

Gasohol Sold in Nebraska, 1988 - 1990

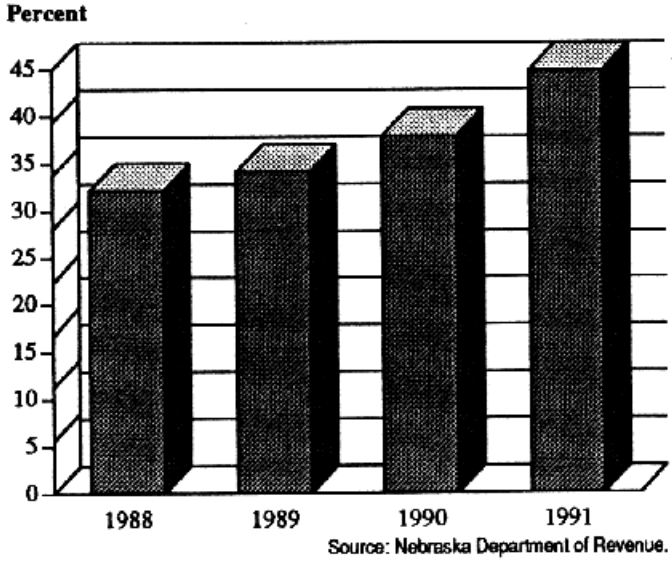


Source: Nebraska Department of Revenue.

In Brazil, the world's largest ethanol producer, straight ethanol as well as gasoline-ethanol blends are used as motor fuel. Most Brazilian ethanol is produced from sugar cane.

The current production capacity of operating ethanol plants in the United States totals 1.1 billion gallons per year. The annual capacity of existing plants not currently in operation totals 117 million gallons. Total planned additions to capacity are in the range of 296 to 496 million gallons annually. Most ethanol plants are located in the Midwest.

Gasohol as a Percent of Total Gasoline Sales in Nebraska, 1988 - 1991



Source: Nebraska Department of Revenue.

Leading users of ethanol blends are California, Illinois, Iowa, Michigan, Minnesota, Nebraska and Ohio. The states with leading market shares are Nebraska, Illinois, Iowa, New Mexico and North Dakota. In each of these states, ethanol-gasoline blends account for over 20 percent of the motor fuel sold. In Nebraska, this percentage was near 45 percent in 1991.

Ethanol production in Nebraska in 1990 was approximately 13 million gallons, a modest increase over the previous five years. Gasohol blended in Nebraska was 270 million gallons, an increase of ten percent over the previous high of 252 million gallons set in 1989. Ethanol produced in Nebraska was approximately 48 percent of the total used in blending gasohol in Nebraska in 1990.

Historically, Nebraska has been a major supporter of the development and use of ethanol. Nebraska is the only state which has two agencies to promote the use of alcohol-based fuels — the Nebraska Gasohol Committee and the Ethanol Authority and Development Board. In addition, 13 midwestern states are participating in the Governors' Ethanol Coalition which was proposed by Nebraska.

The purpose of the coalition is to actively work to expand ethanol production and use through the coordination of marketing and promotional activities, legislative and lobbying activities and research and development activities.

The Center for Engine Technology at the University of Nebraska's Engineering Research Center is leading the nation in the study of alternate fuels including ethanol and ETBE (ethyl tertiary butyl ether.) ETBE is produced from ethanol. Preliminary tests show ETBE blends in gasoline reduce hydrocarbon emissions and provide an octane boost to improve performance.

POLICY STATEMENT

Continue the state policy of increasing production of and demand for ethanol to lessen our dependence on foreign oil, provide local economic development, enhance the price of local grain products and provide for improved air quality.

A. Continue federal and state tax incentives for ethanol production and use.

B. Increase demand for ethanol to the point where government subsidies are no longer necessary by requiring that all gasoline sold in the state be at least a ten percent blend of ethanol by the year 2000.

   1. Encourage and promote the use of ethanol in local government vehicles.

C. Encourage automobile manufacturers to increase the production of alternate and flexible fuel vehicles including the E85 which is a vehicle which runs on an 85 percent blend of ethanol.

   1. Compliment automobile manufacturers on work-to-date in the development of these vehicles.

POLICY STATEMENT

Encourage research in the ethanol area to reduce the amount of energy used to produce ethanol, including the energy required in the production of corn or other source material.

During the development of this plan, one question concerning ethanol was heard at many of the public meetings. It concerned the production costs of ethanol in relation to the energy used to make ethanol compared to the energy saved. In particular, these questions commonly referred to the energy cost of corn production.

The Minnesota Ethanol Commission recently published a paper which summarized the conclusions of two studies completed by Iowa State University and Oak Ridge National Laboratory on the net energy perspective of corn to ethanol. The Minnesota Ethanol Commission stated:

> Despite the facts that ethanol is environmentally benign and the use of ethanol as a motor fuel greatly reduces exhaust emissions, some environmental organizations refuse to add the support of ethanol to their agendas. One reason for this, is a concern that the processing of corn to ethanol is not an energy efficient practice....
>
> A further concern by some is that it is somehow "wrong" to be using corn for fuel rather than food. Reality is that the corn has only been processed into more usable forms. There is actually more available protein left in the co-products after the starch portion has been converted to ethanol! Given the facts that this country has historically had corn surpluses and our farmers routinely leave land idle to comply with expensive government

programs, we realize that world hunger is a political issue, not a production issue.

The two studies done looked at the total cost of ethanol production including the energy costs of growing the corn. A summary of the two studies is included as Appendix C. The conclusion of the studies indicated that the production of ethanol has a net energy gain averaging 41,841 BTU/gal.

Natural Gas

Natural gas, as the name implies, is produced in its natural state from beneath the ground. It is a mixture of hydrocarbons consisting primarily of methane. Liquids including propane and butane are stripped from the gas near the point of production so that the gas delivered to the pipeline is usually 95 percent methane.

Natural gas is an attractive alternate fuel for fleet vehicles and may become the fuel of the future for private cars, fleet vehicles and urban buses. Today, more than 30,000 cars and trucks run on natural gas in the United States. Worldwide, about 500,000 vehicles are fueled with natural gas.

Natural gas can significantly reduce total emissions without adding other toxicants to the atmosphere. Vehicles operating on compressed natural gas will reduce ozone-causing emissions by 50 to 80 percent compared to gasoline vehicles according to estimates by the Environmental Protection Agency (EPA).

Natural gas must be compressed (CNG) or liquefied (LNG) to achieve a practical energy density for on-board storage. Over 90 percent of the vehicles running on natural gas in the world today use CNG mainly because of economics and convenience of handling.

The Natural Gas Vehicle Coalition estimates the cost of fueling a vehicle with natural gas is approximately 30 to 60 percent of the cost of fueling a vehicle with gasoline. The costs to convert a vehicle to natural gas range from $1,500 to $4,000. Factory built natural gas vehicles are expected to be much less. General Motors is presently building 1,000 dedicated natural gas 3/4 ton pickup trucks. Potential markets for these vehicles include cities designated by EPA as non-attainment areas (based on EPA emissions standards for ozone and carbon monoxide).

Initially, shorter vehicle range and the need for compression systems have limited natural gas as a vehicle fuel to fleet operations with central fueling facilities. Fueling infrastructure has improved with the installation of numerous public fueling stations throughout the United States.

POLICY STATEMENT

Encourage the use of compressed and liquefied natural gas as a motor vehicle fuel for private and government fleets and develop the fueling infrastructure necessary to support these fleets.

A. Encourage federal and state tax incentives for natural gas powered vehicles.

B. Encourage auto manufacturers to increase production of dedicated alternate fueled vehicles.

C. Provide tax incentives to encourage alternate fueling stations in the state.

Propane

Propane is a by-product of the refining of crude oil and the processing of natural gas. Propane, which has been used at a motor fuel since the early 1920s, has to date achieved the largest market share of any alternate transportation fuel. According to the California Energy Commission, there are approximately 370,000 propane vehicles operating in the United States. The National Propane Gas Association estimates that between 2.5 million and three million propane vehicles operate worldwide.

The use of propane in emission-controlled vehicles reduces hydrocarbon emissions by 50 percent compared to gasoline. Propane is not toxic and in this respect has a substantial advantage over gasoline and methanol. Propane vehicles have proven highly safe over their 50 years of use and new technologies being developed in Europe will greatly improve safety at vehicle refueling stations and should permit self-service at public service stations.

Propane provides the best mileage per gallon of any of the currently available alternate fuels. To travel the same distance in a vehicle powered by an alternate fuel, the propane vehicle would require 15 gallons, an ethanol vehicle would need 18.14 gallons, compressed natural gas — 22.50 gallons and methanol — 24.25 gallons.

In the United States, approximately 17.2 billion gallons of propane were produced in 1987 according to the U.S. Department of Energy. U.S. production supplied 85 percent of domestic demand with 60 percent of the imported propane coming from Canada. The total supply of propane available to the U.S. market is forecast to increase by 6.7 to 8.9 billion gallons in the period 1987 to 2004. If this supply were used for transportation purposes, an additional 5.2 to

6.5 million vehicles could be powered by propane by the year 2004.

While certain misconceptions about propane persist, such as vapor locking and damage to catalytic converters, no evidence exists to support these assertions. In addition, studies of the hazard potential from leakage from propane tanks in an enclosed parking garage found no significant difference between the gaseous fuels studied (propane and CNG) and gasoline with the danger of explosion being quite low for all fuels. Another scenario involving a vehicle collision in a tunnel with fuel being released found propane to have lower hazard potential than gasoline.

A. Encourage development and demonstrations of conversions to propane vehicles.

B. Encourage federal and state tax incentives for propane powered vehicles.

C. Encourage auto manufacturers to increase production of dedicated alternate fueled vehicles.

Electricity

Electric vehicles are any mode of transportation operated by a motor that receives electricity from a battery or fuel cell. The use of electricity as a vehicle fuel has several advantages including the available infrastructure and virtually no vehicle emissions. Although pollutants are emitted at electrical generating facilities which have long range implications such as acid rain and visibility, these pollutants usually play only a minor role in urban air quality. The U.S. Office of Technology Assessment has concluded that a fleet of tens of millions of electric vehicles could be supported by existing generating capacity if recharged at night when demand from other sources is low.

The batteries and electric motor are the main components making electric vehicles different from conventional automobiles. These pose both advantages and disadvantages. Compared to gasoline or other liquid fuels, batteries are poor at storing large amounts of energy which limit the range and speed of electric vehicles. The motors, on the other hand, are lightweight and highly efficient when compared to combustion engines and further technological advances are not considered necessary.

Prospects for electric vehicles in marketplace will depend on improvements in batteries and powertrain technologies. The Lux Corporation recently announced the development of a battery which has a 300 mile range. In September of 1991, Nissan Motor Company unveiled a car powered by an electric battery that can be recharged in 15 minutes — at least eight times faster than its leading rival. Nissan officials said their car has a range of about 100 miles at 45 mph. General Motors announced that by the mid 1990s, it will build an electric-powered car assembly plant in Lansing, Michigan. The GM Impact, the car scheduled to be produced in the Lansing plant, can travel for 120 miles at 55 mph before a recharge is necessary.

A consortium was formed in 1991 to accelerate research on electric vehicle batteries. This consortium consists of three U.S. automakers, the Electric Power Research Institute (EPRI) and several utilities. The consortium will coordinate a four year, $300 million research and development project focusing on battery improvement. The U.S. Department of Energy is providing up to 50 percent of the cost of the research.

Hybrid and solar-powered vehicles are other forms of electric vehicles being researched. Hybrid vehicles use electricity as their primary source of energy and use another source, such as gasoline, ethanol or methanol, as a backup. Solar-powered vehicles are electric vehicles which use photovoltaic cells (which convert sunlight to electricity) rather than utility-supplied electricity to recharge the batteries. These two types of vehicles are in the early stages of research and are not expected to be viable options for many years.

A. Encourage research, development and demonstrations of electric vehicles.

B. Encourage federal and state tax incentives for electric powered vehicles.

C. Encourage auto manufacturers to increase production of electric vehicles.

Methanol

Methanol is the simplest form of the group of chemicals known as alcohols. It is mostly used in the production of other chemical products. Most methanol is made from natural gas although approximately 43 percent of the energy content of natural gas is lost in the conversion to methanol.

Methanol is a high-octane fuel. As a liquid, methanol works more easily in the vehicle fuel network than gaseous fuels or electricity as a transportation energy source. However, methanol contains about half the energy content of gasoline, it is corrosive and vehicles using it have problems starting in cold weather. In addition, pure methanol burns nearly invisibly, giving rise to safety concerns.

There are thermochemical processes which can convert virtually all biomass, including municipal and agricultural

waste, animal waste, forest products and other agricultural products into methanol. No major plants employing these processes are in operation.

POLICY STATEMENT

Methanol is presently not considered to be a viable alternate fuel for Nebraska at this time.

Mass Transportation

A. Encourage programs which stimulate the operation and use of mass transportation systems.

B. Assess inter- and intra-city transportation needs.

C. Develop programs to stimulate the operation and use of mass transportation systems and incentives for vehicle pooling.

D. Support efforts to retain or establish railroads in the state.

E. Encourage greater use of bicycles and development of bicycle trails.

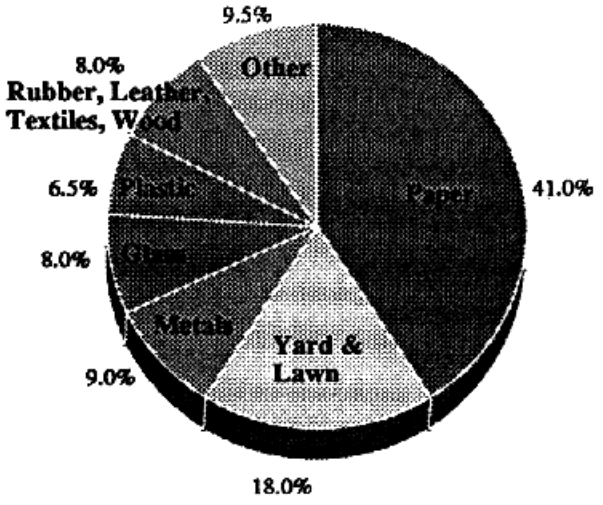
Waste

When recycling first began nearly 20 years ago, it was in response to an energy crisis. Today, we also face a solid waste management crisis and recycling and source reduction still hold many answers. If energy conservation isn't enough of a basis to drive us to significantly change our waste disposal habits, the reality of our diminishing landfills may be the seed for proactive efforts.

The United States generates more garbage per capita than any other country in the world, producing more than 160 million tons of garbage each year. Everyday the average person in this country generates four to five pounds of solid waste. By the year 2000, the U.S. Environmental Protection Agency (EPA) expects the annual garbage glut to exceed 190 million tons.

According to a 1988 survey by the Franklin Associates for the EPA, the average waste stream consists of 41 percent paper and paperboard, 18 percent yard waste, nine percent metals, eight percent glass, 6.5 percent plastics and eight percent rubber, leather, textiles and wood. It is estimated that 50 percent or more of the garbage is reusable or recyclable.

Composition of Average American Waste, 1988



Source: Franklin Associates for the U.S. Environmental Protection Agency.

The use of energy is greatly impacted by reducing and recycling our solid waste. Recycling one ton of paper saves up to 17 trees, 4100 kWh of energy, 7,000 gallons of water, three cubic yards of landfill space and reduces air pollution effluent by 60 pounds. Making newspaper from virgin materials uses twice as much energy as manufacturing from recycled paper. Making new aluminum from used cans saves 95 percent of the energy required to produce aluminum from bauxite. The energy saved by recycling one aluminum can is enough to power a 100 watt lightbulb for 3.5 hours.

Source reduction is the first step in developing positive disposal habits. Source reduction eliminates unnecessary discards before they enter the waste stream. Buying a product or packaging that has already been recycled, or that can be recycled and then recycling it, is probably the consumer's single most effective weapon in the war against garbage. According to a Gallup survey done in early 1990, more than 90 percent of the consumers are willing to make a special effort to buy products from companies trying to protect the environment. More than 90 percent also said they would sacrifice some convenience, such as disposibility, in return for environmentally safer products or packaging. And nearly 90 percent are willing to pay more for them.

Recycling is part of the manufacturing process — supplying raw materials to be made into new products. Every glass bottle or jar on the supermarket shelves contains at least 20 percent recycled glass. Many of the aluminum cans you buy are also made of recycled materials. In 1988, 55 percent of all aluminum cans were recycled by consumers.

Every recycling effort should focus on a four step process in order to be successful. The four steps are (1) analyze recyclable materials, (2) identify markets, (3) collect, process and deliver and (4) educate the public. Many recycling programs are doomed from the start because they only focus on step three — the collection process. These programs often find that once the recyclables are collected, there is no one willing to accept what has been collected. Identifying or developing markets for recycled products is the key to a successful recycling program.

POLICY STATEMENT

Reaffirm the hierarchy of solid waste management established by the U.S. Environmental Protection Agency of ***reduce, reuse, recycle, burn and bury*** *and implement policies and practices leading to energy conservation through waste management.*

A. Source Reduction. Establish expanded demonstration projects, education campaigns and economic incentives to conserve energy through source reduction.

1. Example: yard waste demonstration project

B. Reuse. Establish incentives to change consumer behavior from the "throw away" mentality to the "reuse" mentality.

C. Recycling.

1. Support the development of regional recycling centers.

2. Composting and digesting. Support research and development of demonstration projects in areas such as digester gas plants in connection with sanitary landfills, sewage treatment plants, hog confinement and feed lot facilities and other operations producing sizeable quantities of organic waste.

3. Educate citizens to expand awareness of the availability, feasibility and use of composting and digesting technologies.

4. Establish tax incentives to encourage reuse of materials and use of recycled materials.

5. Develop a used oil recycling incentive program.

Each year, it is estimated that do-it-yourself oil changers dump about 240 million gallons of used oil into the environment. By comparison, the Exxon Valdez's oil spill into Alaska's Prince William Sound released only ten million gallons. Oil recycling programs face difficulties due to conflicting EPA rules regarding the nature of the oil.

In 1985, EPA proposed to list all used oil as hazardous waste. In 1986, EPA, declared that used oil destined to be recycled would not be considered hazardous waste. The effect of these rulings has been to confuse the issue and put oil recycling programs on hold. Final EPA regulations are expected in late 1991 or early 1992.

6. Support research on development of products from waste tires.

D. Burning. Encourage independent research to assess if waste-to-energy-facilities are appropriate for Nebraska's needs and resources with primary consideration for protecting the quality of air and water to the greatest degree possible.

1. Provide an administrative framework to examine the issue from both an environmental and an electrical generating standpoint, bring together all interests and assess the total public good. This process should also examine methane recovery from landfills, refuse derived fuels and the use of waste oil as a heat source.

E. Burial. Continue to evaluate and use the most environmentally safe methods when burial is the last resort. Prior to final disposal, all feasible energy value should be extracted with primary consideration for the quality of air and ground water before waste is finally defined as such and buried.

POLICY STATEMENT

Government at all levels must lead by example in waste management through source reduction, reuse and recycling.

A. Implement programs through state and local governments which reduce the sources of waste and which use recycled materials.

B. Establish life-long learning and action programs for government employees and the constituents served by government.

C. Support a statewide solid waste management plan which emphasizes energy conservation and energy generation.

D. Encourage the development of industries which separate waste and reprocess recyclable materials.

Glossary of Energy Terms

Avoided Cost: The incremental cost that an electrical utility would have incurred if it had generated power from its own incremental source rather than purchasing that power.

Appliance Efficiency Standard: The minimum allowable efficiency level established for a given appliance installed or offered for sale after a specified cut-off date.

Barrel: A volumetric unit measure for crude oil and petroleum products equivalent to 42 U.S. gallons.

Biomass: Energy resources derived from organic matter. These include wood and wood waste, agricultural crops and residues, animal waste, food and ag processing waste, municipal solid waste and other formerly living-cell material that may be burned to produce directly or converted to a variety of gaseous, liquid or solid fuels.

British Thermal Unit (BTU): A standard unit for measuring energy. Technically, it is the amount of energy required to raise the temperature of one pound of water one degree Fahrenheit.

CAFE (Corporate Average Fuel Efficiency Standards): Federal standards for automobile fleet fuel efficiency. In 1987, the minimum efficiency for a fleet of cars built by a single manufacturer was 26 miles per gallon.

Capacity: The amount of electric power delivered for which a generator, turbine, transformer, transmission circuit, station or system is rated by the manufacturer.

Coal: A black or brownish-black solid combustible substance formed by the partial decomposition of vegetable matter without access to air.

Cogeneration: Generally industrial, commercial or other manufacturers that use steam, heat or resultant energy for the dual uses of processing materials and generating electricity.

Crude Oil: Petroleum in its natural unprocessed, unrefined state which is a mixture of thousands of different hydrocarbons — compounds of hydrogen and carbon.

Diesel Fuel: See distillate fuel.

Distillate Fuel: Light fuel oils distilled during the refining process and used primarily for space heating, on- and off-highway diesel engine fuel and electric power generation. Diesel fuel oils are used in compression-ignition engines.

Efficiency: The fraction of the total energy content of a fuel which is converted into usable work or heat. The remaining energy is lost to the environment as heat.

EIA: Energy Information Administration, U.S. Department of Energy.

Emissions: Gases and particulates discharged into the environment.

Ethanol: An alcohol (CH_3CH_2OH) produced upon the fermentation of grain, sugar, biomass and other organic and renewable resources.

Fossil Fuels: Fuels that originated from the remains of plant and animal life of previous geological epochs. Crude oil, natural gas and coal are examples of fossil fuels.

Gasohol: A blend of finished motor gasoline which is 90 percent unleaded gasoline and ten percent agriculturally-derived ethanol. This is a registered trademark of the State of Nebraska. Gasohol is now marketed as "Super Unleaded with Ethanol" or "Unleaded Plus."

Gasoline: A complex mixture of relatively volatile hydrocarbons, with or without small quantities of additives, that have been blended to form a fuel suitable for use in spark-ignition engines. Includes finished leaded motor gasoline (premium and regular), finished unleaded motor gasoline (premium and regular), motor gasoline blending components and gasohol.

Generation: The process of producing electric energy by transforming other forms of energy into electricity. Also, the amount of electric energy produced, expressed in kilowatt-hours.

Heating Oil: A distillate fuel oil for use in atomizing-type burners for domestic heating or for moderate capacity commercial and industrial burner units.

Hydro Power: Electricity generated by an electric power plant whose turbines are driven by falling water.

Independent Power Producers: Privately-owned electric power production facilities that sell power to one or more electric utilities but do not meet requirements for qualifying facilities.

Kilowatt (kW): One thousand watts (See Watt).

Kilowatt hour (kWh): One thousand watthours (see Watthours).

Load (electric): The electric power required at any specific point or points on a system. The requirement originates at the energy-consuming equipment of the customer.

Load Management: Actions by customers initiated by the customer or by the utility directly to change the peak loads or otherwise alter the shape of the load curve. Total energy consumption may not necessarily change.

MCF: A thousand cubic feet; a unit of measurement of natural gas.

Megawatt (MW): One million watts or one thousand kilowatts (See Watt).

Natural Gas: A mixture of hydrocarbons, primarily methane, existing in the gaseous phase or in solution with crude oil in natural underground reservoirs.

Nuclear Power: Electricity generated by an electric power plant whose turbines are driven by steam produced by heat from the fissioning of nuclear fuel in a reactor.

OPEC: The acronym for the Organization of Petroleum Exporting Countries, that have organized for the purpose of negotiating with oil companies on matters of oil production, prices and future concession rights. Current members are Algeria, Ecuador, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela.

Passive Solar: Heating and cooling strategies that rely on elements incorporated into the structure of the building such as orientation, room layout, placement of windows, use of shading devices and use of thermal mass materials, rather than on conventional heating and cooling systems that use electricity or fossil fuels.

Peak Demand: The point of highest demand for electricity or gas that occurs within a specified period of time. Peak demand is one determinant of the capacity requirements of a utility.

Petroleum: A generic term applied to oil and oil products in all forms such as crude oil, unfinished oils, petroleum products, natural gas plant liquids and non-hydrocarbon compounds blended into finished petroleum products.

Photovoltaic Cell: A solar energy collection device which converts light directly into electrical energy.

Propane: A normally gaseous hydrocarbon (C_3H_8) extracted from natural gas, crude oil or refinery gas streams. It is used as a fuel, solvent and refrigerant.

Proven Reserves: The estimated quantities of crude oil or natural gas which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

PURPA: The Public Utility Regulatory Policies Act was passed by Congress in 1978 to encourage energy conservation through cogeneration and the development of small power resources. Utilities are required to purchase any excess power produced by facilities meeting the Act's criteria for "Qualifying Facilities" (QFs) at rates established by states to reflect the avoided cost to the utility of not having to produce the power.

Quad: One quadrillion (10^{15}) Btu. An amount of energy equivalent to 170 million barrels of oil.

Qualifying Facility (QF): A cogeneration or small power production facility that is not more than 50 percent owned by electric utilities and meets certain standards as defined in Section 201 of PURPA. These facilities produce and sell power to electric facilities.

Refuse Derived Fuel (RDF): The result of solid waste processing which separates the combustible fraction of solid waste stream. This process results in a uniform and easily-handled fuel.

Renewable Energy: A class of energy sources, such as solar, wind, hydro power and biomass, whose supply is continuously or periodically renewed.

R-Value: A standard measure of the insulation value of various building materials.

Stripper Well: Wells which produce less than ten barrels of crude oil per day.

TCF: A trillion cubic feet; a unit of measurement of natural gas.

Watt: Unit of electrical power. The rate of energy transferred equivalent to one ampere flowing under a pressure of one volt at unity power factor.

Watthour: An electrical energy unit of measure equal to one watt of power supplied to or taken from an electric circuit steadily for one hour.

Weatherization: The tightening and insulating of a building to reduce its energy consumption.

Source: State Energy Data Report, Energy Information Administration, April, 1989.

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Appendix A

Inventory of Building Codes

There are five major code documents which serve as a technical basis for energy codes adopted by states. These are:

1. Energy Conservation in New Building Design, ASHRAE Standard 90-75, developed by ASHRAE.

2. Energy Conservation in New Building Design, ASHRAE Standard 90A-1980, developed by ASHRAE. Standard 90A-1980 is a revision of Standard 90-75.

3. Model Code for Energy Conservation in New Building Construction 1977 (MCEC) developed by the National Conference on Building Codes and Standards, Inc. (NCSBCS). The MCEC was developed under contract for the U.S. Department of Energy (DOE). It is technically compatible to ASHRAE 90-75 (Updated in 1983 and 1986).

4. Model Energy Code 1983 (MEC) developed by the Council of American Building Officials (CABO) with assistance from Building Officials and Code Administrators International, Inc. (BOCA); International Conference of Building Officials (ICBO); Southern Building Code Congress International, Inc. (SBCCI); and NCSBCS. This code was the result of revisions in the 1977 MCEC to make it compatible to ASHRAE 90A-1980 (Updated in 1986 and in 1989).

5. The Boca Basic Energy Code/1981 developed by Building Officials and Code Administrators International, Inc. (BOCA). (updated in 1985 and 1987)

State	Code or Basis for State Developed Code
ALABAMA	1983 MEC
ALASKA	State developed
ARIZONA	State developed (1977 MCEC)
ARKANSAS	State developed (1977 MCEC)
CALIFORNIA	State developed
COLORADO	State developed (1977 MCEC)
CONNECTICUT	State developed (1986 BOCA)
DELAWARE	1987 BOCA
FLORIDA	State developed
GEORGIA	State developed (1986 MEC and ASHRAE 90-1980)
HAWAII	State developed (Uniform Building Code Chapter 53)
IDAHO	State developed (1977 MCEC)
ILLINOIS	BOCA Basic Codes
INDIANA	State developed (1983 MEC)
IOWA	State developed (1986 MEC)
KANSAS	State developed
KENTUCKY	State developed (1987 BOCA)
LOUISIANA	no code
MAINE	State developed (ASHRAE 90-1980)
MARYLAND	1986 MEC, 1987 BOCA, ASHRAE 90-1980
MASSACHUSETTS	State developed (1977 MCEC)
MICHIGAN	1987 BOCA
MINNESOTA	State developed (1983 MEC)
MISSISSIPPI	State developed (1977 MCEC)
MISSOURI	BOCA Basic Codes
MONTANA	1983 MCEC
NEBRASKA	1983 MEC
NEVADA	State developed (1986 MEC)
NEW HAMPSHIRE	State developed (1977 MCEC)
NEW JERSEY	State developed (1987 BOCA)
NEW MEXICO	State developed (1986 MCEC)
NEW YORK	State developed (ASHRAE 90-75)
NORTH CAROLINA	State developed (ASHRAE 90-1980)
NORTH DAKOTA	Uniform Building Code Chapter 53
OHIO	State developed (1987 BOCA)
OKLAHOMA	ASHRAE 90-75
OREGON	State developed (Uniform Building Code Chapter 53)
PENNSYLVANIA	ASHRAE 90-1980
RHODE ISLAND	1987 BOCA
SOUTH CAROLINA	1986 MEC
SOUTH DAKOTA	no code
TENNESSEE	1977 MCEC
TEXAS	ASHRAE 90-75, 1977 MCEC
UTAH	State developed (1986 MEC)
VERMONT	ASHRAE 90-1980
VIRGINIA	State developed (1987 BOCA)
WASHINGTON	State developed (ASHRAE 90A-80)
WASHINGTON, DC	1985 BOCA
WEST VIRGINIA	ASHRAE 90-75
WISCONSIN	State developed (ASHRAE 90-1980 with 1984 equip.)
WYOMING	State developed (ASHRAE 90-75)

Appendix B

Nebraska Wind Energy Sources

Pacific Northwest Laboratory, September, 1990

Total Land Area ..... 198,508.0 km²

Total Windy Land Area ..... 131,400.0 km²
(Class 3 and greater, without exclusions)

Excluded Windy Land Area ..... 41,300.0 km²
(Environmental 100%, Urban 100%, Forest 50%, Agriculture 30%, Range 10%)

Potentially Available Windy Land Area ..... 90,100.0 km²

Windy Land Area as a Percent of State's Area 45.4 percent

Wind Electric Potential ..... 99,200.0 MW avg*
(10D x 5D spacing, hub height-50m, 25% efficiency, 25% losses)

Wind Electric Potential in
Oil Equivalent per Year ..... 1,500.0 mil. barrels

Wind Electric Potential as a Percent of
Contiguous U.S. Total
Electric Consumption (1987) ..... 31.1 percent

Wind Electric Potential as a Percent of
Contiguous U.S. Total Energy Consumption
(1987) ..... 10.9 percent

State's Total Electric Consumption
(1987) ..... 2,510.0 MW avg*

State's Total Energy Consumption
(1987) ..... 6,050.0 MW avg*

Wind Electric Potential as a Percent of
State's Total Electric Consumption (1987) 4,000. percent

Wind Electric Potential as a Percent of
State's Total Energy Consumption (1987) 1,600. percent

*As shown here, MW avg refers to an average power production over a one-year period and can be converted to units of billion kWh by multiplying by 0.00876.

Appendix C

Corn to Ethanol From a Net Energy Perspective

A Summary of Studies Done by Iowa State University and Oak Ridge National Laboratory

Energy Use in Corn Production

	Iowa State Study	Oak Ridge Study
Nitrogen	127# @ 32,900 BTU/lb =4,169,088 BTU/acre =34,742.4 BTU/bushel =13,624 BTU/gallon	127# @ 31,000 BTU/lb =3,937,000 BTU/acre =32,808.3 BTU/bushel =12,866 BTU/gallon
Phosphorus	48# @ 17,668 BTU/lb =856,015 BTU/acre =7,135 BTU/bushel =2,797 BTU/gallon	51# @ 5560 BTU/lb =283,560 BTU/acre =2,363 BTU/bushel =927 BTU/gallon
Potash	57# @ 6,033 BTU/lb =345,510 BTU/acre =2,879 BTU/bushel =1,129 BTU/gallon	64# @ 4,280 BTU/lb =273,920 BTU/acre =2,283 BTU/bushel =895 BTU/gallon
Pesticide	3.23# active ingredients =445,740 BTU/acre =37,145 BTU/bushel =1,457 BTU/gallon	classified as "other" = 218,726 BTU/acre =1,823 BTU/bushel =715 BTU/gallon
Fuel	6.45 gallons diesel =945,000 BTU/acre =7,875 BTU/bushel =3,088 BTU/gallon	classified as "direct uses" 977,698 BTU/acre
	(maximum)	(minimum)
Total Corn Production Energy Input	22,095 BTU/gallon	18,598 BTU/gallon

- The corn yield used is a national trend-line yield of 120 bushels per acre.
- The Oak Ridge Study was reported in joules per liter, kilogram and hectare and was converted to BTUs for the purpose of this comparison.
- Computation was based on the yield of 2.55 gallons of ethanol per bushel of corn.

Total Energy Used in Corn Processing

South Point Ethanol (1987)
Based on gross BTU value of
coal - 11,971/lb ..... 59,000 BTU/gal (max.)

- South Point Ethanol is a 60 million gallon per year dry-milling facility in South Point, Ohio. The energy use number was presented to the Gist-Brocades Ethanol Conference in St. Louis, Missouri on June 16, 1988 by Harold H. Hicks, Jr.

Energy Fuels Development Corporation
(1989) ..... 39,000 BTU/gal

- Energy Fuels Development Corporation is a 22 million gallon per year dry-milling facility in Portales, New Mexico. The energy use number was presented in a paper to the National Conference on Oxygenated Fuels in Washington, D.C. in October 1989 by Ben Henneke.

Archer Daniels Midland (ADM)
(1990 est.) ..... 34,000 BTU/gal (min.)

- Archer Daniels Midland operates a 280 million gallon per year wet-milling corn processing plant in Decatur, Illinois. The energy use number was estimated by Martin Adreas of ADM on November 12, 1990 with reference to the efficiency of the fluidized bed boiler that burns high sulphur coal at ADM's Decatur facility.

National Advisory Panel on
Cost-Effectiveness of Fuel
Ethanol Production (1987) ..... 40,000 BTU/gal

- The National Advisory Panel on the Cost-Effectiveness of Fuel Ethanol Production was a seven-member panel appointed by Secretary of Agriculture Richard Lyng to do an independent study for Congress on the cost-effectiveness of fuel ethanol production in 1987.

One gallon of ethanol contains 76,000 BTUs.

The co-products of ethanol are:
- 12.4 pounds of 21 percent gluten meal
- 3.0 pounds of 60 percent gluten meal
- 1.5 pounds of corn oil
- 17.0 pounds of carbon dioxide

Energy Allocated to Ethanol and Co-Products in BTUs per Gallon

	South Point+ Iowa State (59,000+ 22,095)	ADM+ Oak Ridge (34,000+ 18,598)	Mid-Point BTUs
Total Energy Input	81,095	52,598	66,846
Energy Cost of Co-Products (48.9%)*	39,665	25,720	32,693
Energy Cost of Ethanol (51.1%)*	41,440	26,878	34,159
BTU in One Gallon of Ethanol:		76,000	
Energy Gain	**34,560**	**49,122**	**41,841**

*The energy allocation was based on the market value of the processed products, based on that same formula Oak Ridge used to assign the production of CO_2 in ethanol production. That is 51.1 percent of the value to ethanol and 48.9 percent of the value to the co-products.

In April of 1991, Governor E. Benjamin Nelson appointed fifty-two Nebraskans to the Nebraska Energy Policy Council. Governor Nelson directed the Council to use their expertise, to solicit input from other Nebraskans and to make recommendations for the state's first comprehensive energy policy plan. In his remarks to the Council members at their first meeting, Governor Nelson asked the Council to give Nebraska a road map for our future which concentrated on the efficient use of our energy, the development of renewable resources, and the need to balance the interests of economic development.

The Council divided itself into five working committees — Buildings, Electricity, Fossil Fuels, Alternate Fuels and Waste-to-Energy. The committees each met two to three times during May to identify issues in each topic area they felt should be a part of the state plan. During this time, other topic areas surfaced which the Council members felt were important. These include Education, Research and Renewable Energy Sources. The Alternate Fuels committee's, recommendations, in part, became the Transportation section to more adequately reflect issues identified. The Waste-to-Energy committee renamed their section Waste to reflect the broader context of their work. The result of the working committees efforts became the first draft of the plan. This draft was ratified by the members of the Council at a meeting on June 7th.

Citizen involvement is a cornerstone in the development of this plan. Once the first draft was complete, the Council requested input from nearly 2,000 Nebraskans. Our citizens responded through a series of fifteen regional meetings held across the state in June and July. The recommendations and suggestions from the public were particularly helpful in identifying additional information and consideration needed in the plan.

A summary of the second draft was shared with approximately 10,000 Nebraskans and the full document was sent to nearly 400 Nebraskans. Comments on the second draft were received at six public meetings held in September and October. The Final Plan was submitted to Governor Nelson in December.

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