

Interim 2009 Nebraska Energy Plan

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Introduction

In the 16 years since Nebraska's first energy plan was unveiled, the world has changed profoundly, and with astonishing speed. New networks of trade and investment have led to global economic growth on an unprecedented scale, and to complex new systems of production and consumption. The one thread connecting these developments is energy. Energy is both a driver of production and a commodity for consumption. The availability of energy is a precondition for and a direct result of human ingenuity, perseverance and security. Energy, as has been so often repeated, is no less than the lifeblood of our modern society.

Energy is also, at least in many of its current forms, a scarce resource. As demand for energy increases in newly affluent nations around the world; as current stocks of oil, coal and natural gas are depleted; and as new regulatory structures establish financial disincentives for the carbon emitted by fossil fuels, the cost of these fuels may rise precipitously. As Nebraskans, we accept the necessity of belt-tightening in difficult times; however, the problem of ensuring continued access to affordable, reliable energy is a problem beyond the power of mere frugality and sensibility to solve. It is a problem that will call upon the creativity and dedication of private actors in the marketplace, and upon the concerted action of local, state and national governments.

This plan offers a vision of the role that Nebraska's state government agencies, officials and elected representatives can play in solving energy problems and shaping our energy future. To be sure, the United States government and private entities outside Nebraska must address larger issues such as funding for energy research, regulation of interstate and international energy markets, and so on. However, there are steps that Nebraska can take to move toward more stable, independent patterns of energy generation and use; this plan attempts to identify those steps.

The plan has been created by deleting obsolete materials from and inserting new objectives, goals and ideas, generated by comments and suggestions of Nebraskans, into the collection of recommendations submitted to then Governor Ben Nelson by a committee of energy experts in 1991.

These new goals and policies, whether through support for clean, renewable sources of energy or for advanced energy efficiency measures, can create jobs, lessen dependence on fossil fuels, help Nebraska and the world meet ambitious climate stabilization targets, and boost new industries capable of revitalizing the economy.

Agriculture

Agriculture is a heavy user of energy, and energy costs are a significant agricultural expense. In 2007, approximately 45.6 million acres of land, totaling nearly 93 percent of Nebraska's total land area, were devoted to agricultural use by the state's 47,300 farms and ranches.

The agricultural sector in Nebraska consumes energy in the form of diesel, gasoline, natural gas, propane, and electricity. Expenditures on these energy sources account for 5-7 percent of total farm spending, with diesel comprising more than half of these energy expenses, gasoline comprising 16 percent, natural gas 9 percent, propane 9 percent, electricity 13 percent, and other fuels 2 percent. The agricultural sector also consumes energy indirectly, through the use of fertilizers and pesticides, and these indirect energy costs account for roughly 10 percent of farm expenditures.

After 24 years of stable electricity expenditures in Nebraska's agricultural sector, spending began to increase in the early 1970s, before peaking in 2002 at \$164.1 million. Since 1949, fertilizer expenditures have increased almost every year, peaking in 2007 at \$900 million. Fuel and oil expenditures, while relatively stable throughout the 1950s and 1960s, rose dramatically in the 1970s, peaked in 1981 at \$416.7 million before stabilizing, and rose quickly again in the first decade of this century to a peak figure of \$580 million in 2007.

In the face of these rising costs, agricultural producers have a tremendous interest in all forms of renewable energy. Nebraska farms and ranches could benefit both by consuming more renewable energy in their operations, and producing more renewable energy and renewable energy inputs to be sold in an expanding renewable marketplace. As the technologies for producing energy from agricultural products continue to advance, the agricultural sector in Nebraska could contribute even more to the production of clean, renewable and affordable energy for the state and the country.

POLICY STATEMENT

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.
- B. Promote the use of alternate fuels, for agricultural vehicles and equipment.
- C. Maintain efforts to make the agricultural sector more aware of funding opportunities for increasing energy efficiency of buildings and equipment.
- D. Work with other federal and state agencies to help farms recycle the waste they produce.
 - 1. E.g., in early 2009, the Nebraska Energy Office and the Nebraska Department of Environmental Quality will hold a conference on electricity generation from methane.
- E. Cooperate with federal officials and representatives to establish incentives for the conversion of farm equipment into E85-ready vehicles.
- F. Collaborate with the Nebraska Department of Agriculture, the U.S. Department of Agriculture and Nebraska utilities to provide energy audits to farms at little or no cost.

Irrigation

Nebraska is fortunate to have a vast, though diminishing, source of irrigation water available to it in the form of the Ogallala aquifer. This abundant resource allows Nebraska to rank second nationally in total irrigated land area, with 7,625,170 acres of land served by 91,609 registered, active irrigation wells. However, as non-agricultural demands on a finite water supply increase, water for irrigation is likely to become less plentiful and more costly. Water is already extremely scarce in dry Western states, where agriculture accounts for more than 90 percent of consumptive water use (compared to 80 percent nationally), and disputes between states over water use have become some of the most contentious conflicts faced by local and state governments. Further complicating irrigation and water use issues are the rise of biofuels which consume tremendous amounts of water in their production processes, and the energy required both to pump groundwater to/through irrigation systems and to move irrigation equipment across fields.

These challenges require the focused attention of Nebraska's farmers, government agencies and educational specialists. Researchers and extension educators at the University of Nebraska are working with farmers, and with the Nebraska Departments of Agriculture and Environmental Quality to find the proper balance between crop and land management measures and improved irrigation techniques. Taking steps on both these fronts will help Nebraska's agricultural sector reduce the environmental impacts of irrigation while continuing to capture its economic benefits.

- A. 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.
- B. Continue to promote the University of Nebraska's research and education programs relating to irrigation system management and improvement.
- C. Work with the University of Nebraska's Drought Mitigation Center to develop and implement the most energy efficient solutions to irrigation challenges posed by drought conditions.
- D. Partner with the University of Nebraska-Lincoln's extension educators to promote research and implementation of best practices in irrigation.

Buildings

The structures in which we live and work pose particular problems with regard to energy. Because the efficiency with which a home, factory or office building will use energy is determined in part by decisions made far in advance of the actual use of that energy, the network of incentives and disincentives regarding energy choices is more complex. Choosing less energy efficient materials or processes may save a developer, architect, builder, and landlord money or time at various stages in the construction of a building, and only result in increased energy costs for the eventual occupant of that building at a time far in the future. Furthermore, the choices made by builders from decades ago, when methods for conservation were less developed, continue to impact energy users for as long as those buildings are occupied. This decoupling of the choices and consequences results in a unique role for government in setting and enforcing building codes and standards, promoting improvements, and collecting and disseminating information regarding new technologies and best practices.

POLICY STATEMENT

Institute a comprehensive and coordinated approach to building energy efficiency by updating and enforcing energy building codes; facilitating cooperation among federal state and local government agencies; promoting incentives for building owners to make energy improvements; and develop programs which increase the affordability, cost effectiveness and energy efficiency of buildings in Nebraska.

Building Codes

Building energy codes in the U.S. began to be adopted in the 1970s as part of a broad response to the recurrent energy crises experienced during that decade. Continued awareness of the need to reduce strains on world energy supplies has driven the development of new codes in the years since those initial codes were enacted, and with few exceptions each new code has taken up the challenge of requiring that new buildings be as energy efficient as possible.

Thus, adherence to energy building codes should help to ensure energy efficient buildings. These efficient buildings provide an infrastructure that is better protected from unforeseen energy price escalation; a market for newly developed energy efficient products and materials; and an incentive for

capital investment in energy efficient retrofits for older buildings, that they may better compete with new buildings in attracting buyers and tenants.

Building Codes In Other States

For many of the above reasons, forty states have adopted commercial building energy codes, and thirty-eight have adopted residential building energy codes. Many of the remaining states have local code jurisdictions with codes that exceed state mandated minimum standards. Generally, states that have mandated building energy codes have adopted either a code developed and published by the International Codes Council (ICC) or a standard developed by the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE). The advantages to states that adopt one or the other of these two standards include technical assistance in interpretation and enforcement from the group which created the code, and a consistent, orderly code updating process.

Codes in Nebraska

Nebraska adopted its first building energy code in 1980. That code was updated in 1983, and replaced in 2004, when the state legislature adopted the 2003 International Energy Conservation Code (IECC) as the Nebraska Energy Code for all new buildings constructed within the state, and for certain substantial renovation projects. At present, the Nebraska Energy Office, using funds from a U.S. Department of Energy initiative, is evaluating the feasibility of adopting an advanced commercial building energy code which exceeds by 30% the requirements of the 2006 IECC.

- A. Continue to obtain independent analyses of each new IECC as it is developed, to determine its relationship to the existing Nebraska code. When an analysis indicates that a new code differs meaningfully from Nebraska's code, and the adoption of that new code would be cost effective for Nebraska's consumers, the Nebraska Energy Office should make the analysis available to the state legislature and the public.
- B. Reaffirm the importance of energy building codes by offering education/training programs to the public and to members of the construction industry.
- C. Provide technical assistance to local code jurisdictions for the adoption and enforcement of building energy codes.
- D. Explore the possible benefits and drawbacks of increasing the penalties for non-compliance with current codes.
- E. Work with Nebraska's congressional delegation, and other relevant federal officials and agencies on the creation of a federal plan to phase out the use of incandescent light bulbs in the United States.

Public Buildings

Government's obligation to its citizens requires a careful assessment of how energy is used in public buildings. As for Nebraska's state government offices and facilities, the Nebraska Department of Administrative Services (DAS) has published a detailed compendium of energy efficiency measures to be undertaken by all state agencies, titled "Governing for Energy and Environmental Efficiency"; that document will be appended to the final version of this Nebraska Energy Plan when the plan is published in early 2009.

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. Enact legislation requiring any government entity which proposes to override statutory or constitutional budget limitations to demonstrate that it has completed an approved energy audit on all buildings under its control and is actively implementing a corrective action plan if corrective action is necessary.
- B. Coordinate programs with federal, state and local governments to maximize energy efficiency in public buildings. Fully energy efficient government buildings serve as a model for conservation, and reduce tax burdens on the state's citizens.
- C. Continue to encourage local governments to take advantage of the Nebraska Energy Office's Dollar and Energy Saving Loan Program as a source of financing for energy efficiency improvements to public buildings.
- D. Support the use of xeriscaping in all publicly funded development projects.
- E. Promote the use of LED lighting in and around public buildings, and especially in municipal street and area lighting plans.

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.

- A. Continue to encourage Nebraskans to take advantage of the Nebraska Energy Office's Dollar and Energy Saving Loan Program as a source of financing for energy efficiency improvements to privately owned homes, office buildings, factories, and other commercial structures.
- B. Continue working to promote the Nebraska Energy Office's Low Income Weatherization Program, which aids low-income individuals in taking steps to improve the energy-efficiency of their homes, particularly during the winter months.
- C. Support state and federal tax credits to offset the cost of home energy audits.
- D. Encourage the use of thermal solar units for residential heating needs.
- E. Educate the public on the real savings obtained by using energy efficient appliances, water-saving devices and fixtures, and high-efficiency lighting, and by properly orienting windows for energy conservation.

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.

- A. Promote the use of the national Home Energy Rating System (HERS), a uniform rating system, to document the efficiency of homes including heating, air conditioning, lighting and appliances.

- B. Encourage the training and certification of individuals as Home Energy Rating System (HERS) raters. This will create an incentive for builders to build more single-family homes that can be certified and marketed as achieving a benchmark HERS rating.
- C. Promote the use of EnergyStar® rated equipment including heating and cooling systems, appliances, lighting and electronics.

Energy Efficiency Considerations in Lending

To encourage the use of energy efficiency considerations in lending:

- A. Educate and encourage lenders, realtors and appraisers to recognize the value of lower energy operating costs and to incorporate the value of these lower costs into energy efficient financing formulas.
- B. Recommend that federal and state home financing agencies including the U.S. Department of Housing and Urban Development, Fannie Mae, Freddie Mac, the Federal Housing Administration, the Veteran's Administration, the Department of Economic Development and the Nebraska Investment Finance Authority require program participants to be informed of energy efficiency opportunities at the time of financing. Allow the cost of energy inspection, rating and improvements to be included in the amount financed.
- C. Encourage the construction financing industry to incorporate Home Energy Rating System (HERS) mortgage lending practices into decisions regarding loan amounts and buyer qualification rules (ratios) so that those decisions fully reflect the value of lower energy operating costs.

Incentives

- A. Support a one-time state tax credit for building owners who invest in energy efficiency improvements and highly energy efficient new construction. Energy efficiency improvements qualifying for the credit must meet the minimum energy efficiency standards established for the Federal Energy Efficiency Income Tax Credit.
- B. Encourage the exemption of 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 programs that support the financing and implementation of energy efficiency projects for their customers, including:
 - 1. Offering rebates or financing as incentives for efficiency improvements and/or the installation of efficient appliances/equipment.
 - 2. Providing funding for the Dollar and Energy Saving Loan Program administered by the Nebraska Energy Office.
 - 3. Partnering with the state's public utilities to develop and advance other energy efficiency programs.
- D. Encourage incentives for landlords to make existing rental units energy efficient and to build energy efficient units.

Recycling and Recyclable Construction Waste

- A. Encourage segregation of construction waste at the construction site to facilitate recycling or reuse of appropriate materials.
- B. Encourage the use of recycled materials in construction.
- C. As a part of educational efforts directed at the construction industry, encourage building techniques which focus on limiting construction waste.

Economic Development

Renewable energy has the potential to be the transformative industry of the 21st century, perhaps nowhere more so than in renewable resource-rich states like Nebraska. Already Nebraska is the nation's second leading producer of biofuels, and while the current corn-based ethanol industry in Nebraska may be at or near maturity, there remains a potential for tremendous growth in so-called "next generation" cellulosic ethanol production. Nebraska also has tremendous wind and solar resources, both of which could make the state an attractive location for renewable energy sector businesses.

Development of these resources into a clean, renewable energy sector that could provide energy to much of the nation will require Nebraska to preserve existing advantages such as low energy costs and an educated workforce, while expanding the benefits offered to businesses that invest in renewable energy in the state. Together with a robust federal investment in alternative energy growth, an aggressive state policy of supporting innovative energy-related businesses should help Nebraska's new energy economy create jobs, revitalize rural areas, and meet important environmental goals.

- A. Explore possible state tax incentives for research and development of renewable energy technologies.
- B. Consider amending the Nebraska Advantage Act to:
 - 1. Include an expanded personal property tax exemption for companies making significant new investments in Nebraska.
 - 2. Offer specific incentives to renewable energy companies that locate in Nebraska or otherwise invest in the state.
- C. Encourage a legislative set aside of Community Development Block Grant (CDBG) funds to be used in support of:
 - 1. Job retention programs and job training for workers in the renewable energy sector.
 - 2. Modernization of manufacturing equipment.
 - 3. Updating of business models and plans.

Education

Energy education is a key component of the new energy economy to which Nebraska and the world are transitioning, and Nebraska's strong primary, secondary and post-secondary education systems are well positioned to provide the various kinds of basic and advanced education required. Included in these efforts should be basic energy efficiency and conservation curricula in K-12 schools, advanced renewable energy research at Nebraska's colleges and universities, and technical instruction in renewable energy systems construction and maintenance at state community and technical colleges. The Nebraska Energy Office can play an important role as well, both by providing access to energy

efficiency materials through its website and publications, and by providing Energy Code training for specific groups such as builders, code officials, and others in the construction industry.

POLICY STATEMENT

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. Provide energy education opportunities for all ages. Energy education must be on-going for all Nebraskans.
 - 1. Coordinate, through the Nebraska Energy Office the implementation and/or promotion of existing programs funded by public and private entities to educate the general public on the efficient use of energy.
 - 2. Provide web-based information and training opportunities for all Nebraskans.
 - 3. State and community colleges should be utilized to develop in-service and pre-service job training opportunities in renewable energy technologies and energy efficiency.
 - 4. Offer classes or seminars on:
 - a. Energy efficient building techniques and code requirements for members of the construction industry;
 - b. Operation and maintenance procedures for building operators and administrators;
 - c. Residential building techniques for lenders, real estate agents, brokers and appraisers;
 - d. The importance of energy efficiency in public buildings for elected officials and public employees;
 - e. Green building materials and how to recycle construction waste.
- B. Work with utility companies to ensure that adequate instructions for connecting to the power grid are available to the public.
- C. Begin a public awareness campaign utilizing various media, including but not limited to Nebraska Educational Television and Nebraska Public Radio, to explain methods of conserving energy and to promote further sources of information on energy topics.
- D. Cooperate with the Nebraska Department of Education, the U.S. Department of Energy and other relevant state and federal groups to develop an energy education curriculum for the K-12 system.
- E. Expand the Nebraska Energy Office website to include links to federal agencies, energy policy groups and other informational resources.
- F. Partner with the UNL Energy Sciences Research Center and UNL extension educators to include energy education materials, programs and opportunities for children in the development of the UNL Innovation Campus.
- G. Coordinate with surrounding states to identify best practices in the development of community college curricula for wind and solar technicians.

Electricity

Nebraska is the only state in the nation in which 100% of electric power is provided at the retail level by public utilities. Constitutional and statutory requirements stipulating that Nebraska's public utilities provide power to consumers at the lowest possible cost have helped to keep electric rates in the state very low; Nebraska consistently ranks among the lowest-cost states in the nation, coming in fifth in 2008 with a cost per kilowatt-hour of 7.61 cents. However, certain features of the public power structure in Nebraska have acted as barriers to a rapid increase in the amount of electricity generated by renewable resources in the state. Nebraska's lawmakers and public utilities will need to work together to overcome these barriers very soon if carbon emissions from traditional coal-fired power plants come under greater scrutiny in the coming months and years. If carbon emissions should quickly become subject to stricter regulations, Nebraska may need to increase the percentage of its electricity generated from renewable and emission-free sources such as wind, methane, solar and nuclear, at an accelerated rate.

Regardless of future regulatory changes, the focus of Nebraska's electric utilities must be on maintaining a diverse portfolio of generating sources in order to provide affordable, reliable energy to Nebraskans in the most environmentally responsible manner possible. That portfolio may include any or all of the following sources:

Resources

A. Coal

Coal accounted for 43 percent of the electricity generated in Nebraska in 2007. The coal for Nebraska's power plants comes from the Powder River Basin in Wyoming which has an abundant supply of low-sulfur coal. At current production levels, Wyoming coal should be available for several hundred years. Thus, Nebraska should have access to this inexpensive, reliable power source for the foreseeable future. However, carbon dioxide emissions from coal-fired power plants can be very high; in 2006, electric power generated by coal emitted 21 million metric tons of carbon dioxide, by far the most of any electricity source in the state. Any regulations limiting carbon emissions may therefore increase the cost of coal relative to other sources, both by imposing financial penalties for emissions beyond a set target, and by necessitating increased expenditures on the development of carbon capture and sequestration technologies, and/or carbon-dioxide recycling technologies such as algae bioreactors.

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.

B. Hydro Power

Hydro power plants accounted for 3 percent of the electricity generated in the state in 2007. For the last 30 years, hydroelectric resources have provided the largest portion of renewable energy development in the state. However, the share of renewable generation comprised by hydroelectric generation is shrinking due to the growth of developing renewable energy sources such as wind.

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 17 percent of the total electricity generated in 2007. Though regulatory requirements for new or increased nuclear production are onerous, Nebraska must make clear its support for a renewed focus on nuclear power. This means working with Nebraska's congressional delegation, other relevant federal agencies, regional coalitions, and private industry groups to ease the path of increased nuclear power generation in Nebraska and around the country.

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 contributing to the federal government's spent fuel management program, ensuring the safe disposal of all low level radioactive waste generated within its borders and proceeding expeditiously to make certain that Nebraska's nuclear power plants have access to a low level radioactive waste disposal facility on a timely basis.

To this end, Nebraska Public Power District (NPPD) and Omaha Public Power District (OPPD), which own and operate Nebraska's two nuclear plants, have paid the United States Department of Energy more than \$200 million for the development of the Yucca Mountain Repository, and spent tens of millions more to construct on-site dry-cask storage facilities to contain spent fuel. Most utilities across the country, including NPPD, have litigation pending against the federal government for failing to honor its contractual obligation to begin accepting spent nuclear fuel for storage at Yucca Mountain or elsewhere by 1998.

E. Wind

Wind-generated electricity is currently the most economically competitive of any renewable method of electricity generation. No energy or water is necessary to generate electricity from wind, and the process of turning wind into electricity creates no emissions. Thus, wind is also one of the most environmentally sustainable methods of generating electricity. There are, however, certain problems associated with increased production of electricity from wind.

The first and perhaps most significant is that building more wind generators would also require significantly increased transmission capacity in the state. Simply put, where wind resources are most abundant there is little demand for electricity, and where there are higher levels of demand, there is less wind. Therefore, to move the energy generated by wind to the areas of the state where demand is highest would require constructing hundreds of miles of transmission lines, at an estimated cost of \$1-2 million per mile.

Another difficulty in harnessing wind for the production of electricity is that wind availability is intermittent. Again, in the simplest terms, the wind may not blow when demand for electricity is high. Improved storage technologies would allow for energy generated when the wind is strong and demand is low to be preserved, and tapped at a later time when demand is high and the wind is weak. However, such storage technologies are not currently viable on a commercial scale.

In spite of these challenges, Nebraska is committed to increasing the amount of electricity generated by wind in the state. The Governor, the Nebraska Energy Office, and other state offices and representatives are exploring ways in which Nebraska's abundant wind resources could be harnessed both to meet demand in Nebraska, and to export to other states. Exportation of electricity could provide Nebraska with revenue sources which can be used to avoid rate increases, reduce tax rates, and to re-invest in yet more wind generation and transmission capacity, thereby creating more jobs. Finally, Nebraska's exported wind energy can benefit other states as well by providing them with an additional source for meeting their renewable energy goals and mandates.

F. Solar

According to the U.S. Energy Information Administration, Nebraska has significant solar resources, especially in the western part of the state – of the 655 trillion Btus Nebraskans consumed in 2005, 200 billion of them came from solar production. As with wind generation, the process of generating electricity from solar energy requires no water, and creates no emissions. The primary barriers to increased production of electricity from solar energy, however, are cost and efficiency. Current estimates place the cost of a kilowatt-hour generated by a photovoltaic solar system at 16-32 cents per hour, nearly four times the cost of the average kilowatt-hour consumed in Nebraska. Further, current photovoltaic solar systems are capable of transforming only 15-20% of available solar energy into electricity. Improved technologies could boost efficiencies to as high as 70%, and research is ongoing at several labs around the country, in an effort to reach that mark.

E. Methane

Methane is a potent greenhouse gas produced by bacteria in the decomposition of organic material. Thus, emissions of methane from major centers of decomposition such as landfills and livestock operations have significant environmental effects. One way to combat the harmful effect of these emissions is to capture the methane generated by a landfill, feedlot, or other major emitter, and use it as natural gas is used – to heat buildings and generate electricity. This process not only makes use of methane that would otherwise be emitted, but supplants the need for homes, businesses and industrial facilities to use energy generated by fossil fuels that release carbon dioxide, sulfur dioxide, and other greenhouse gases when burned.

Of the approximately 2,300 landfills in the United States, more than 420 have landfill gas utilization projects in operation. Included in that number are two Nebraska projects, one in Butler County, and the other in Douglas County; the former began operation on November 21, 2008, while the latter was recently expanded by OPPD to an annual capacity of 56 million kilowatt-hours, enough to power 4,000 homes. Nebraska is also home to a feedlot methane digester. This privately-owned generation facility, OLean Energy, is located near Dodge, NE., and provides power to NPPD for distribution in Cuming County.

Though the initial investment required to develop methane generation capacity is substantial, the success of these existing facilities in Nebraska should encourage new investment in future projects.

F. Geothermal

Generating electricity from geothermal energy is not feasible on a commercial scale in Nebraska. However, geothermal resources in Nebraska are sufficient to provide direct heating to some residential buildings and single-family homes. One notable user of direct geothermal heating is Offutt Airforce Base in Bellevue, Nebraska, which uses a ground source heat pump for service personnel dormitories.

G. Biomass

Woody biomass from Nebraska's 1.3 million acres of timberland could be a reliable, carbon neutral source of electricity generation, and could reduce demand for electricity if used as a fuel for heating and cooling systems. Nebraska's timberland produces one million net tons of wood per year, yet current annual use of this wood is less than 100,000 tons per year. Increased wood usage could reduce carbon emissions, improve the health and safety of Nebraska's forests by thinning and culling small and/or dead trees, and lower utility costs for consumers of the wood-generated electricity, heating and cooling. However, the cost of converting existing facilities to woody biomass utilization facilities has proved prohibitively expensive for many institutions considering the move to biomass.

H. Energy Efficiency

Energy efficiency, or the reduction of demand for energy, is also generally considered a "resource"; reducing demand by one kilowatt-hour is equivalent to increasing supply by the same amount. Thus, products and practices such as programmable thermostats, "smart" meters, efficient appliances and

lighting systems, building insulation, and simple common-sense reductions in consumption can all play a role in meeting Nebraska's electricity production needs.

I. Transmission

Increasing the amount of electricity generated by wind in Nebraska will require a significant investment in the construction of new transmission lines. Though Nebraska's three largest utilities (Nebraska Public Power District, Omaha Public Power District, and Lincoln Electric System) recently joined the Southwest Power Pool, which should facilitate the planning and coordination of transmission line development throughout the region, uncertainties remain with respect to siting and routing of transmission line additions, responsibilities for the installation of new lines, and sources of financing for new lines and line upgrades. These are difficult questions, the answers to which will only be found if local, state and federal officials work together with public and private utilities toward a mutually beneficial solution.

POLICY STATEMENT

Support a balanced integration of resources so as to provide Nebraskans with affordable, reliable, and environmentally sustainable electricity.

Resource Utilization Measures and Actions

1. Support the enactment of a Renewable Portfolio Standard (RPS). An RPS is a statutory requirement that all utilities operating within the state generate a certain percentage of the electricity they distribute from renewable sources. Currently 28 states have an RPS in place, and changes within the federal government, including the election of a new president and shifts in congressional committees, indicate that a nationwide RPS may be enacted in the near future. An RPS is a complex piece of legislation which must be carefully crafted A) to avoid causing precipitous rate increases, and B) to ensure an efficient transition to increased renewable generating capacity. Nevertheless, it is a valuable tool that can be used to stabilize demand in fledgling renewable energy markets, and to send a signal to the renewable energy industry and to environmentally conscious businesses that a state will be a promising location for the development of a renewable energy economy. The Nebraska Energy Office supports the development of just such an economy, and will work with the state legislature to create an RPS that is appropriate for Nebraska.
2. Partner with the Nebraska legislature and with Nebraska's congressional delegation to secure the resources necessary to enact a Renewable Energy Tax Credit (RETC).
3. Work with Nebraska's congressional delegation, and other federal agencies, officials and representatives to:
 - A. Extend the federal production tax credits for renewable energy.
 - B. Eliminate the legal, financial and technological barriers to the construction of a new interstate electric transmission system that would allow Nebraska and other Midwestern states to export wind-generated electricity.
 - C. Make federal tax credits for wind energy production tradable. This would allow public utilities to capture the tax credits that are otherwise only available to privately owned utilities.
 - D. Increase annual appropriations for the Renewable Energy Production Incentives (REPI). REPI is designed to offer public utilities incentives for the development of renewable generating capacity in place of the production tax credits, for which they do not qualify.

E. Expand the use of Clean Renewable Energy Bonds (CREBS). Under one congressional plan, billions in CREBS would be available to public utilities and electric cooperatives for new renewable energy projects.

F. Support the continuation of federal tax credits for small-scale wind production.

G. Support the continuation of federal tax credits for residential photovoltaic electricity generating systems.

4. Investigate the possibility of creating an exemption, for renewable generating sources, to Nebraska's statutory requirement that all new generating facilities be approved on a least-cost basis by the Nebraska Power Review Board.
5. Encourage the Nebraska legislature to consider changes to Nebraska's Community Based Economic Development (CBED) statute in order to facilitate increased renewable electric generating capacity in the state.
6. Work with federal regulators, utilities and other stakeholders to renew and expand the viability of increased nuclear generating capacity in Nebraska and in the U.S. generally.
7. Support the development and rapid, low-cost implementation of carbon capture and sequestration technologies at existing and future coal-fired generating plants.
8. In partnership with Nebraska's public utilities, explore the technological and financial viability of constructing algae bioreactors to recycle carbon-dioxide emitted by coal-fired power plants.
9. Support the creation of a standardized, statewide net-metering law.

Utility Planning Coordination

A. The Nebraska Energy Office will continue its cooperation with and participation in the activities of the Nebraska Energy Assistance Network (NEAN), the Nebraska Energy Efficiency Partnership (NEEP), the Nebraska Power Association (NPA), the Western Area Power Administration (WAPA), and other state and regional electric power groups.

Financing Opportunities

The Dollar and Energy Saving Loan Program

In July of 1990, the Nebraska Energy Office announced the availability of a \$13.2 million revolving loan program for energy improvements. The program created by this initial endowment, the Dollar and Energy Saving Loan Program, provides 5% interest loans to Nebraska residents, including, homeowners, small businesses, agricultural operations, local governments and other public and private institutions. Over the past eighteen years, the program's loan pool has been increased to \$23.6 million, categories of eligible borrowers have been added, and standards for qualifying improvements have been upgraded to include projects with Energy Star® or higher ratings. As of September 30, 2008, nearly 25,000 energy loans totaling more than \$195 million have been approved, with participating lenders across the state providing more than \$93 million of that total.

The loan pool is capitalized with \$23.6 million in oil overcharge funds. These funds were distributed to states in the 1980s, after the federal government prevailed in a series of court cases against oil companies that violated federal price control regulations between 1973 and 1981.

The program works in close cooperation with the state's lending institutions; 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. Energy loan forms detailing the requirements for qualifying projects can be downloaded from the Nebraska Energy Office Website at www.neo.ne.gov.

Fossil Fuel Production

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. These fuels are considered to be non-renewable and as such, their supply is not continuously or periodically replenished.

Crude Oil

Most of Nebraska's small oil reserves are located in the western half of the state. In 2006, Nebraska had 14 million barrels of proven crude oil reserves. Proven reserves are the estimated quantity of crude oil which geological and engineering data demonstrate with a given probability to be recoverable in the future assuming current costs of operation and market prices. Proven reserves peaked in 1961 at 100 million barrels. Since then, even with some activity during the 1980s, the number has declined to less than 20 million barrels.

An increasingly favorable economic environment, which includes high crude oil prices, has driven up the number of drilling permits issued in recent years. Drilling permits issued for exploratory oil and natural gas wells increased 16 percent between 2006 and 2007; permits issued for development wells tripled during that time.

The number of wells actively producing crude oil in Nebraska had been in gradual decline in the years preceding the 1973 oil embargo. That trend reversed course after the embargo, leading to a peak number of 2,100 active wells in 1983. Thereafter, the number of active wells again began a long, steady decline before stabilizing in 1998. The most current data indicates that there were 1,116 active wells in Nebraska in 2007. Those wells produced 2,335,375 barrels of crude oil, or 6,398 barrels per day, an increase of one percent from 2006 when annual production was 2,312,955 barrels or 6,337 barrels per day. These levels of production are approximately one-tenth of the peak levels seen in the early 1960s, and one-third of the relatively stable production levels seen throughout the 1980s.

In 2005, the most current year for which consumption data are available, Nebraskans consumed 43,209,000 barrels of petroleum products or 118,380 barrels per day; with production in 2005 totaling 2,413,452 barrels or 6,612 barrels per day, Nebraska was able to produce only 5.6 percent of the petroleum products consumed in the state.

Natural Gas

In 2006, Nebraska had 138 billion cubic feet of proven dry natural gas reserves, down from a peak, in 1981, of 191 billion cubic feet. Since 1977, Nebraska's reserves have been included, for data collection purposes, with a group of miscellaneous states, including Arizona, Illinois, Indiana, Maryland, Missouri, Nevada, Oregon, South Dakota, and Tennessee.

In 2007, 186 wells produced 1.6 billion cubic feet of natural gas. These figures represent 62 percent and 28 percent increases in the number of wells and cubic feet produced, respectively, in comparison with 2006 data. However, both figures are significantly lower than the peak numbers of the early 1960s.

In 2005, again, the most current year for which consumption data are available, Nebraskans consumed 119.1 billion cubic feet of natural gas, largely for residential and commercial heating

purposes. Natural gas production in Nebraska in 2005 totaled 1.2 billion cubic feet, or approximately 1 percent of the natural gas consumed in the state.

Research

Researching new energy technologies is crucial for the continued availability of affordable, reliable energy in Nebraska. Research that leads to advances in the viability or efficiency of renewable energy technologies, for example, can create jobs, lessen dependence on fossil fuels, and reduce greenhouse gas emissions. Research that identifies new means of conservation can help lower demand for energy and thereby reduce its cost. Through cooperation with federal grant-making bodies, local and state governments, and national research institutions, energy researchers in Nebraska can play a leading role in tackling these research questions.

The Nebraska Center for Energy Sciences Research (CESR) was created in 2006 as a collaboration between the Nebraska Public Power District and the University of Nebraska-Lincoln, and is home to a talented and diverse group of scientists pursuing energy breakthroughs on many different fronts. University of Nebraska faculty members working through the CESR have already conducted studies on a broad range of topics, from the viability of wind-generated electricity for farms and rural communities, to the properties of various enzymes that could be used in the production of cellulosic ethanol. With the success of these studies, the faculty who work in and through the CESR are well-positioned to compete for federal research funds, and will have an even greater advantage in that regard as the Nebraska Innovation Campus develops over the next several years. The Innovation Campus has the potential to harness public and private synergies to become one of the most dynamic research centers in the nation.

Other colleges and universities in the state contribute to the strong research environment in Nebraska as well, and in collaboration with Nebraska utilities, biofuel producers, policy groups and research entities such as the National Renewable Energy Laboratory (NREL), have made great strides in helping Nebraskans produce and consume energy in the most economically and environmentally advantageous way.

POLICY STATEMENT

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

- A. Work with state colleges and universities to encourage and facilitate research into “smart” technologies such as smart grids, smart meters, and smart appliances.
- B. Support research into the effectiveness of proposed and existing energy efficiency incentives and programs.
- C. Promote continued research into new feedstocks for the production of alternative fuels.
- D. Promote continued research into improvements in the production and distribution of alternative fuels from conventional feedstocks.
- E. Explore possible avenues of funding for research into the economic and technological viability, and the environmental benefits of gasified biomass as a source of electricity.

Transportation Fuels

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. While other sectors may have the option of 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.

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, accounting for more than half of the energy resources consumed by the nation's vehicles. According to the Nebraska Department of Motor Vehicles' 2007 Annual Report, there are 2,148,061 registered light-duty vehicles in Nebraska. Of this total, an estimated 1.5 million use gasoline or E-10 for fuel and another 70,000 are flex fuel vehicles, which can run on gasoline, E-10 or E85 for fuel. In 2007, these Nebraska vehicles consumed 770,267,406 gallons of gasoline, down from more than 800 million earlier in the decade. This decline is generally attributed to the increasing cost of gasoline, which resulted in both simple conservation, on the one hand, and large scale substitution of ethanol-blended fuels for regular gasoline on the other. Indeed, in 2007 the market share for ethanol-blended fuel reached 66 percent.

Though gasoline prices plummeted in late 2008, they will likely rise again in the near future, necessitating a renewed focus on conservation measures, improved fuel efficiency, alternate fuels and new technologies such as hybrid and plug-in electric vehicles. If, by focusing on these priorities, Nebraskans could decrease their fuel consumption by as little as 10%, the amount of gasoline used would decrease by more than 200,000 gallons per day. Such a reduction in gasoline consumption would reduce daily carbon dioxide emissions by nearly 2,000 metric tons.

- A. Purchase the most fuel efficient vehicles possible, including hybrid and plug-in vehicles, for Nebraska's government fleet.
- B. Work with the state legislature to create a tax credit for vehicle fuel efficiency improvements/conversions.

Diesel

The Nebraska Department of Motor Vehicles' 2007 Annual Report estimates that there are 560,000 diesel fuel vehicles in Nebraska. Those vehicles used approximately 420 million gallons of diesel fuel in 2007, a 70 percent increase over 1995 levels. Because there is a high concentration of diesel fuel vehicles in the agriculture sector, and because diesel fuel prices did not drop as sharply as gasoline prices near the end of 2008, the need for conservation of diesel fuel through proper vehicle maintenance, increased efficiency and increased use of alternative fuels is especially high in Nebraska. Again, if Nebraskans could reduce diesel consumption by only 10%, the result would be a savings of more than 100,000 gallons per day. The Nebraska Energy Office will continue to monitor 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.

POLICY STATEMENT

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

Ethanol

Most ethanol in Nebraska is mixed with gasoline, either in a 10 percent (E-10) or 85 percent (E-85) blend. E-10 can be substituted for regular gasoline in most vehicles in Nebraska, and E-85 can be used in the roughly 70,000 flex-fuel vehicles on Nebraska's roads. With gasoline prices high, and so many cars capable of using these ethanol blends, the market share of ethanol-blended fuels neared 70% in 2007; these blended fuels are available at the state's 1,486 E-10 and 46 E85 fueling stations.

Ethanol has approximately two-thirds the energy content of conventional petroleum-based gasoline. However, while this results in fewer miles-per-gallon on a British Thermal Unit (BTU) basis, it also produces a cleaner-burning, higher octane fuel.

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.
 - 1. Encourage and promote the use of ethanol in local government vehicles.
- B. 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.
- C. Explore the feasibility, efficacy and impacts of making gasoline with an ethanol content higher than 10% widely available for use in conventional vehicles.
- D. Promote the purchase of E85-ready vehicles, and the installation of more E85 pumps in Nebraska.
- E. Support the development of "next-generation" ethanol production technologies, such as cellulosic ethanol derived from various plant-based sources, including switchgrass, miscanthus, and algae.
- F. Encourage increased use of alternative fuels to power machinery and stationary engines used in the agricultural sector.

- G. Work with federal officials and representatives, and with other states, to capture further ethanol production and use incentives.

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.

Biodiesel

Biodeisel is an alternative to petroleum-based diesel, and is produced from biomass. The most common feedstock for biodiesel in the U.S. is soybeans, but animal fats and waste vegetable oil can also be used, as can many other crops and plants, including miscanthus, flax, mustard, rapeseed, sunflower, palm, hemp, jatropha and pennycress. Biodiesel can be blended with petroleum diesel in any proportion, and requires no engine modification to be used in standard diesel engines.

According to the U.S. Departments of Energy and Agriculture, biodiesel has the highest energy balance of any transportation fuel, meaning that for every unit of fossil fuel consumed in the production of biodiesel, 3.2 units of energy are generated.

The most significant problem with biodiesel is that it begins to thicken, or gel, at roughly 30 degrees Fahrenheit, a much higher gelling point than that of petroleum-based diesel. Though blending biodiesel with regular diesel will lower the temperature at which gelling occurs, even blends may not perform as well as 100% petroleum-based diesel in extremely cold weather.

- A. Continue to encourage the production of biodiesel from conventional sources such as soybeans, and support research into the development of biodiesel from novel sources such as algae.
- A. Review the feasibility, efficacy and impacts of making diesel fuel blends with a biodiesel content higher than 10% widely available for use in conventional vehicles.
- B. Explore the creation of tax incentives for the production, blending, and/or purchase of biodiesel.

Natural Gas

Natural gas, as the name implies, is produced in its natural state from underground reservoirs. In its unaltered state, the gas 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 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.

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 tax incentives for natural gas powered vehicles.
- B. Encourage auto manufacturers to increase production of dedicated alternate fueled vehicles.
- C. Partner with Municipal Utility District-Omaha to work toward establishing more CNG refueling stations statewide.

Propane

Propane is a by-product of the refining of crude oil and the processing of natural gas. 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.

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, and a compressed natural gas vehicle 22.50 gallons

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 propane vehicles.
- B. Encourage federal 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.

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 the marketplace will depend on improvements in batteries and powertrain technologies.

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, or ethanol 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 incentives for electric powered vehicles.

- C. Encourage auto manufacturers to increase production of electric vehicles.
- D. Promote and possibly create incentives for the purchase of hybrid and/or electric vehicles.
- E. Study the challenges associated with the creation of a recharging infrastructure for electric vehicles.
- F. Support the continuation of federal tax credits for the purchase of hybrid vehicles.

Hydrogen

Hydrogen fuel cells could conceivably replace the internal combustion engine as the source of power in transportation vehicles. Though barriers to the commercial marketing of this technology remain, it is clear that an affordable, reliable hydrogen fuel cell would be a tremendous environmental and economic breakthrough for the world's transportation sector.

Fuel cells work by combining hydrogen and oxygen in an electrochemical process that produces electricity. That electricity can be used to power a vehicle, or any other electric device, with only water and heat as byproducts. Thus, the commercial availability of a viable hydrogen fuel cell vehicle could simultaneously slash greenhouse gas emissions and reduce the United States' and the world's reliance on petroleum.

- A. Work with Nebraska's congressional delegation, the U.S. Department of Energy's "Hydrogen, Fuel Cells and Infrastructure Technologies" program, and Nebraska's colleges and universities to speed the development of hydrogen fuel cell technology.

Mass Transportation

- A. Encourage programs which stimulate the operation and use of mass transportation systems.
- B. Encourage greater use of bicycles and development of bicycle trails through educational programs and materials that highlight the benefits of bicycling.
- C. Promote greater use of existing public transportation services, and assist in federal and state efforts to improve public transportation infrastructure.