2011 Nebraska Energy Plan

STATE ENERGY POLICY STRATEGIES

Incentive Opportunities
Energy Challenges
Methane Recovery
Woody Biomass
Higher Costs
Incentives for Businesses
Hydroelectric Power
Nuclear Power
Demand-side Energy Management
Waste-to-Energy
Renewable Energy
Investment Opportunities
Foreign Oil Dependence
Lower Rates

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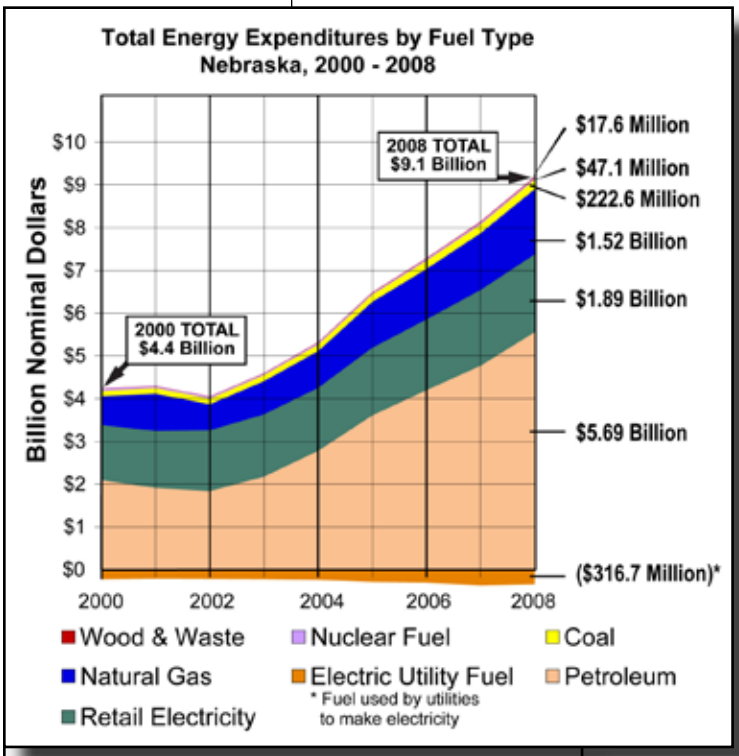
STATE OF NEBRASKA



Sources: State Energy Price and Expenditure Report. Energy Information Administration, Washington, DC. Nebraska Energy Office, Lincoln, NE.

In 2008 Nebraskans spent $9.1 Billion on energy – more than double the $4.4 Billion spent in 2000. In 2008, the cost of petroleum energy alone is greater than Nebraska's total energy expenditures in 2000.

Whether talking about electricity or motor fuels, energy costs impact business and the daily lives of Nebraskans. Managing these costs to maximize the benefits to Nebraska families, businesses and communities is vital to economic and energy security.

Over the last decade, Nebraska's total expenditures on energy have more than doubled. Looking forward to the decades ahead, the costs of delivering affordable and reliable energy to Nebraskans will continue to increase due to factors both within and beyond our control. Effective management of the costs within our control is a key to maintaining a competitive advantage when it comes to regional energy prices.

The Nebraska Energy Plan provides strategies for the state to consider in meeting the following objectives:

- Ensure access to affordable and reliable energy for Nebraskans to use responsibly
- Advance implementation and innovation of renewable energy in the state
- Reduce petroleum consumption in Nebraska's transportation sector

Objective: Ensure access to affordable and reliable energy for Nebraskans to use responsibly

Nebraska's public power electric utilities have a statutory responsibility to deliver low-cost, reliable electric power to our citizens, communities and industries. Managing a diversified and integrated energy resource portfolio, Nebraska's public power providers deliver some of the most affordable electricity in the nation and serve to promote economic development opportunities across the state and region.

Public power providers are increasingly challenged to improve, upgrade or expand existing generation facilities, transmission infrastructure and renewable energy generation while keeping with their mission of providing affordable and reliable service. Communities, industries and citizens play a significant role in the ability of public power systems to meet these challenges. Investing in commercial, residential and municipal energy programs increase diversified portfolios, but could also add to utility challenges by reducing needed revenues and increasing costs. This is a delicate balance that local communities and municipalities, in partnership with utilities, need to manage appropriately to meet the needs that best suit the State of Nebraska.

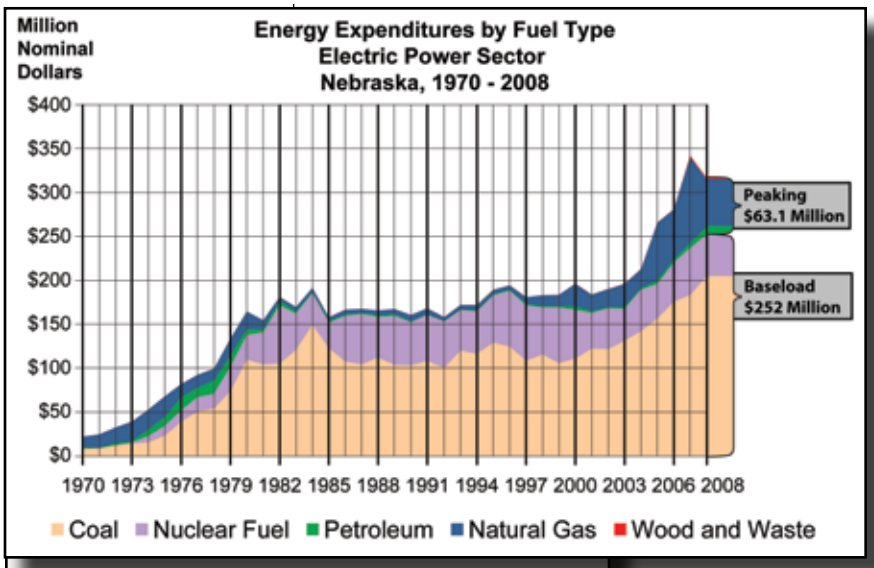
Strategy 1: Continue support of Nebraska's unique public power system

Nebraska is the only state in the nation in which all electric power is delivered to consumers by customer-owned utilities such as public power districts, municipalities and rural electric cooperatives. In all, 167 public power providers serve Nebraskans with electricity generation, transmission and distribution facilities whose average rates consistently rank among the nation's lowest.

Every Nebraskan has the right and opportunity to participate in their local power system. Public power providers are not-for-profit utilities governed by publicly-elected or appointed board members. It is our public power boards and city councils that consider the needs of their customer-owners by approving funding for equipment to enhance reliability, rate setting, and supporting efforts to strengthen Nebraska's economy. Public participation in Nebraska's electric power industry is essential to ensuring access to affordable and reliable electricity used responsibly.

Strategy 2: Increase opportunities for demand-side energy management and energy efficiencies

Demand-side energy management (DSM) presents a long-term opportunity for Nebraskans to reduce energy costs and continue to provide affordable and reliable electricity through responsible consumption. Demand-side energy management describes actions taken by utilities that modify consumer behavior patterns during times of peak energy use. Examples of DSM include programs promoting energy efficiency strategies such as more efficient equipment and time of use rate structures to encourage consumers to manage their use.



Sources: State Energy Price and Expenditure Report. Energy Information Administration, Washington, DC. Nebraska Energy Office, Lincoln, NE.

The costs for all electric generation resources are increasing. The rate of increase, total money spent per unit of energy and market volatility of peak generation resources is greater than that of baseload generation resources. Utilities base need for new generation on peak power projections.

The greatest opportunity for demand-side energy management in Nebraska is managing irrigation resources. A partnership between irrigators and electric utilities is reducing costs by managing water and electric use.

Nebraska's public power providers and the Nebraska Energy Office are making considerable investments in energy efficiency programs and low-interest loans to promote the purchase of new equipment and insulation, improvements in lighting, heating and cooling systems, and home weatherization for low-income families. In addition, many new Nebraska businesses are providing products and services for Nebraskans to learn how to use their energy more efficiently at home, at the office and in our schools.

Strategy 3: Maximize the investment in Nebraska's coal plants

Coal from Wyoming provides 65.4 percent of Nebraska's electric power.

Over the last 30 years, Nebraska's investment in coal-fired resources has been a tremendous asset for electric power in the state. Nebraska benefits from close proximity to an ample supply of low-sulfur coal from Wyoming, which offers the state one of the lowest costs and cleanest sources for coal energy in the nation. The abundance, accessibility, affordability, availability and reliability of coal assure its continued role in Nebraska's energy supply.

Coal-fired power has been the major source of low-cost electricity for Nebraska. New federal regulations on the emissions from coal-fired energy will require additional investments in environmental controls technologies. Co-firing biomass pellets produced from crop residues, capturing carbon dioxide to grow algae for biofuels and blending fly ash into cement products are examples of ways to maximize Nebraska's investment in coal.

Strategy 4: Expand Nebraska's nuclear power generation capacity

Nuclear power generation provides non-carbon emitting electricity, high-paying jobs and enables the state to take advantage of new partnerships in workforce training opportunities.

Nuclear energy is challenged by expensive capital investments as well as intensive licensing, regulatory and security requirements. The designers of the next generation of nuclear power reactors are addressing the security, licensing and cost concerns with new "modular" designs. The trend of smaller, modular reactor designs has given prospect to reducing the high initial capital costs of a new nuclear plant.

Planning for new nuclear power generation requires immediate and ongoing analysis to demonstrate the feasibility of new technology. New nuclear power stations are licensed for an initial operating lifespan of 40 years with opportunities for future 20-year license renewals. Although expensive, nuclear plants have much lower emissions than coal plants. Expanding Nebraska's nuclear power generation can enable the state to continue providing affordable and reliable electricity, demonstrate state-of-the-art reactor designs and partner in regional and international workforce training programs.

Fort Calhoun Station, 20 miles north of Omaha, has a generation capacity of 478 MW.

In the near-term, both Omaha Public Power District (OPPD) and Nebraska Public Power District (NPPD) have received Nuclear Regulatory Commission approval to operate their respective plants for an additional 20 years (60 years total for each plant). The Nebraska nuclear plants have the potential for increased generation through a plant modification process known as power up-rate. OPPD has made a decision to move forward with a power up-rate. NPPD is still taking this decision under advisement.

Strategy 5: Increase opportunities for industrial and municipal waste-to-energy projects

Waste-to-energy (WTE) projects provide an opportunity for large energy consumers to reduce energy costs by generating electricity, heat or fuel from readily-available waste streams. Examples of WTE practices include thermal technologies such as gasification to produce hydrogen and synthetic fuels and mechanical-biological technologies such as anaerobic digesters and fermentation to produce biogas (methane) and biofuels (ethanol). In Nebraska, WTE projects include several landfill gas operations that generate electricity and biogas for local industries and utilities.

In 2002, OPPD partnered with Waste Management to generate electricity from methane produced at the Douglas County landfill near Elk City. With a generation capacity of more than 6 Megawatts (MW), the project delivers enough energy to power about 4,000 homes and offices for OPPD customers.

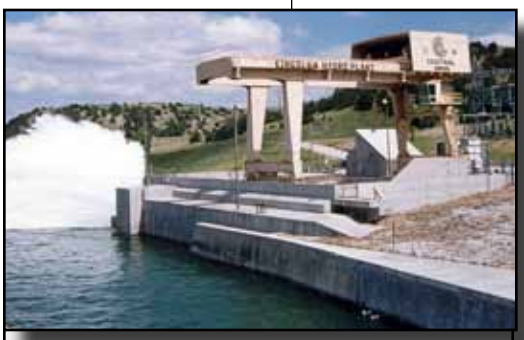
In 2008, the Butler County landfill partnered with Timberline Energy to deliver the equivalent of 1.2 MW of natural gas energy to steam boilers at Henningsen Foods, a poultry processing plant in David City and the county's largest employer. The project provides 100% of the steam boiler needs at the plant.

In 2011, the City of Lincoln is beginning construction of 54 wells that will capture and flare methane produced at the Bluffs Road landfill. The project will reduce emissions at the site and provide revenue to the city through international carbon credit markets. The city will also use the data provided by the project to explore the market potential for various energy generation projects.

Landfill gas operations can also provide opportunities to smaller, privately-owned landfills across the state. In 2007, the L.P. Gill Landfill Gas Recovery Project near Jackson began delivering natural gas energy to Siouxland Ethanol near Sioux City.

Strategy 6: Optimize the use of Nebraska's water resources for hydroelectric power generation

Hydroelectric power has been a part of Nebraska's electricity generation portfolio since the late 19th century. In the 1930s and 40s with the advent of public power, the use of water for the generation of electricity emerged as a means to finance large irrigation storage projects such as canals, dams and reservoirs. Today, there are nine hydroelectric power plants in Nebraska with a generation capacity around 165 MW (164.8). Nebraska's public power providers collectively purchase more than 845 MW in additional hydroelectric power from the Western Area Power Administration (WAPA).



The Kingsley Hydroplant in Keith County has provided electric power since 1984.

The availability of hydroelectric power is contingent upon the availability of water resources, which can fluctuate significantly from one year to the next. Opportunities exist to expand the amount of hydroelectric power generated in Nebraska through increased efficiencies at existing locations, additional plants on rivers, streams, reservoirs and pumped-storage hydro facilities. Hydroelectric power licensing requirements at the federal level can impede development of smaller hydro facilities by increasing costs. However, expanding hydroelectric generation in Nebraska is one way to diversify our renewable energy portfolio.

Strategy 7: Improve municipal water and wastewater management strategies and water quality

Many Nebraska communities spend a substantial amount of money simply moving water from one location to another. Water management can account for as much as 20 – 40% of a community's energy budget. In the years ahead, municipal pumping expenditures will continue to increase. Managing water is a key strategy to minimizing the impacts of rate increases and preserving economic security in rural communities.

Many community water and wastewater treatment facilities are nearing the end of their expected operating lifespan and are in need of energy efficiency and equipment upgrades such as high-efficiency motors and control systems. Co-locating anaerobic digesters, algae-wheel systems, micro-hydroelectric generators and other appropriate technologies at these facilities can improve the economics of other necessary efficiency improvements and provide a source of affordable, reliable, renewable energy.

Upgrading to high efficiency motors in combination with adding biodigesters or other renewable energy technologies can save communities thousands of dollars in electricity expenses.

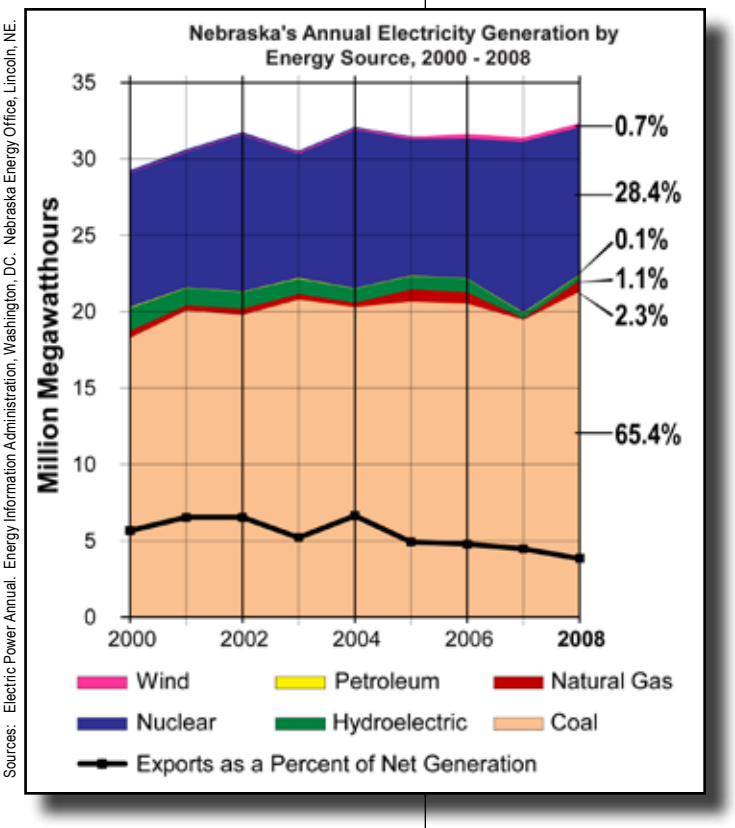
Anaerobic digesters are enclosed, oxygen-free environments that provide a method for managing wastewater capable of generating renewable heat and electricity from biogas as well as removing pathogens from the water prior to discharge back into the local hydrologic system.

Algae-wheel systems are an emerging form of wastewater management that incorporates the use of algae to remove pathogens from the wastewater. Once harvested, the algae can be used as a renewable feedstock for biofuels or in the production of bio-fibers and plastics.

Micro-hydroelectric generators offer another solution capable of reducing energy expenditures and providing a source of renewable energy. Traditionally, micro-hydroelectric generators are located along streams or springs with sufficient water head and flow rates capable of moving a turbine to generate electricity. Micro-hydroelectric generators also do not require the additional expense of constructing large reservoirs that full-scale hydroelectric plants do. Municipal wastewater treatment facilities with sufficient water head and flow rates can essentially function as small reservoirs and offer the same systematic services as a stream.

Objective: Advance implementation and innovation of renewable energy in the state

Nebraska is a state rich in renewable energy resources capable of electrifying and fueling a cleaner energy future. Commercially-available and emerging technologies developed in Nebraska through partnerships with academic institutions, industries and small businesses can lead the innovation of next generation clean technologies and processes.



Renewable energy offers many benefits. Scaling up these resources in a way that allows public utilities to continue providing affordable and reliable energy is the challenge. Renewable resources such as wind and solar power offer variable energy that is difficult and costly for utilities to manage and present distribution challenges that require new investments in transmission, storage and management systems technologies. Market demand will drive the need for investing in new generation and the ability for innovations in renewable technologies to compete with the affordability and reliability of conventional resources.

Nebraska is a net-exporter of electricity. The ability of Nebraska's electric power industry to export electricity is a key driver in supporting low electric rates and new investments in renewable energy. Based on the most recent utility projections, Nebraska's existing electric power resources are capable of supporting growth in local and regional demand until 2027. In recent years, Nebraska's public power utilities are facing declining export sales due to national economic factors, market demand and increasing diversified energy resources portfolios by utilities in other states.

Transmission is a limiting factor facing Nebraska's renewable energy development. Nebraska's public utilities are working with federal and state authorities and private industry to determine the most cost-effective methods for integrating renewable energy into the electric power system.

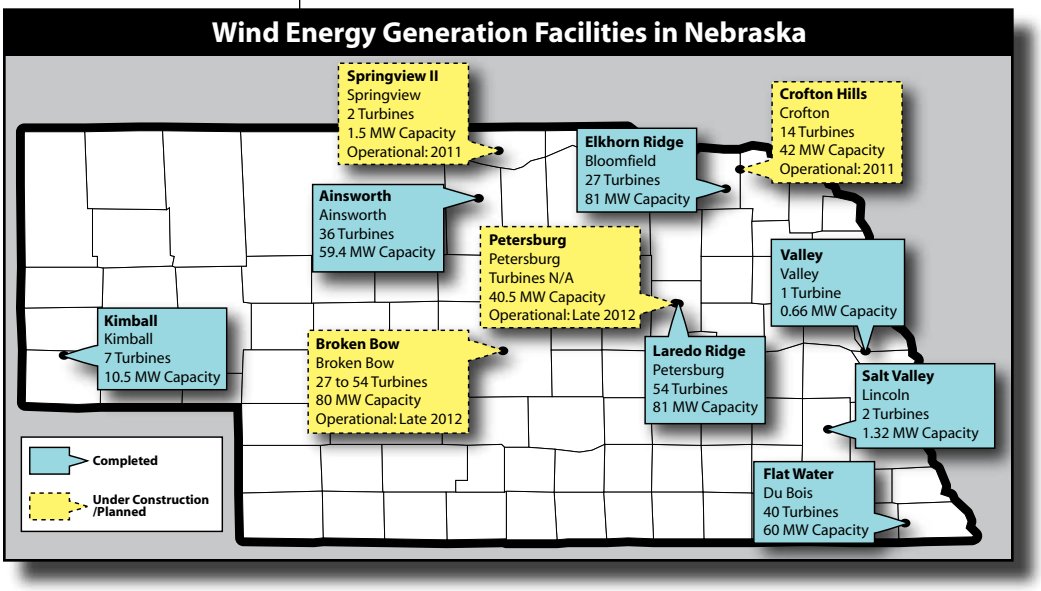
Strategy 8: Continue building Nebraska's wind energy through public-private partnerships

Since 2006, the first full year of operation for the Ainsworth wind farm, Nebraska's wind power generation has nearly doubled every two years from 72 MW in 2006 to 153 MW in 2008 (212% increase) to 293 MW in 2010 (191% increase). Nebraska's wind power generation is scheduled to nearly double again, reaching 458 MW by 2012 (156% increase). By the end of 2012, the potential for an additional 166 MW is under contract with the Broken Bow, Crofton Hills, Petersburg and Springview wind projects.

Nebraska's two largest public power generators have each set voluntary renewable goals of 10% by 2020. Collectively, NPPD and OPPD have an estimated target of 850 MW of renewable electricity by 2020. Of the 458 MW of wind power scheduled to be in operation by 2012, NPPD and OPPD will own or purchase 333 MW of generation capacity. This places the two utilities on schedule to achieve almost 40% (39.1%) of their target for renewable generation with wind power only four years after adopting the voluntary goals.

The National Renewable Energy Laboratory (NREL) ranks Nebraska 3rd in the nation for wind energy potential at 80 meters across the state, which is the average height of a modern commercial wind turbine. NREL estimates that Nebraska can generate 35.5 trillion Megawatt-hours of electricity annually from about 918,000 MW of generation capacity. Developing less than 1% of this potential – 7,880 MW – will support local and marketable jobs; generate economic activity across the state; and support the goal of achieving more wind energy. This is about equal to the entire peak demand of the state today. The challenges Nebraskans and public power need to consider are additional costs of this development, markets for the energy generated and transmission constraints. Nebraska has taken methodical, cost-effective steps forward to diversify our energy portfolio. However, the need to grow generation is less than clear and needs careful and strategic consideration.

The passage of LB 1048 in 2010 defines a statutory process for approving and developing renewable energy projects for export in Nebraska. This law provides opportunities for landowners and communities and protects the electric power system from unnecessary costs and transmission disruptions. LB 1048 is one step in developing Nebraska's wind energy export potential. In the coming years, we will continue to evaluate options to further expand renewable energy developments and export opportunities in Nebraska.



Source: Nebraska Energy Office, Lincoln, NE. March 2011.

Strategy 9: Increase opportunities for methane recovery from agricultural and community biomass resources

Similar to previous discussions on municipal water management strategies and waste-to-energy projects, biomass resources such as crop residues, livestock manures and organic municipal wastes have the potential to displace conventional energy applications, add value to the agricultural sector and support the economic, energy and environmental security of rural communities and industries.

Currently, Nebraska hosts one on-farm anaerobic digester system. OLean Energy near Dodge generates up to 80 kW of electricity by converting manure from 8,000 head of swine into biogas that operates a gas generator selling 80% of the electricity produced into the grid.

In the agricultural sector, anaerobic digesters (also known as methane digesters) are an effective and proven waste management opportunity for livestock producers that can help control odors, protect the environment, and generate heat, electricity and value-added revenue to support expanding operations. Energy generation from methane recovery can provide cost savings to producers and a source of renewable power to rural utilities and energy-intensive local industrial consumers that may be more reliable and cost-effective than larger investments in other renewable technologies.

Advancing methane recovery at the producer level is challenged by capital costs as well as operation and maintenance issues that will vary on a project-specific basis. These challenges create opportunities for building partnerships with nearby communities and industries through co-digestion.

Co-digestion is the processing of more than one waste type in a methane recovery system. Co-digesting other locally-available organic materials such as food wastes, grease oils, animal fats, paunch, dairy whey or creamer, pet wastes and grasses with livestock manures has been shown to improve the quality and quantity of biogas produced while reducing expenses associated with both energy and waste management.

In addition to energy, methane recovery produces valuable by-products. The anaerobic digestion process produces nutrient-rich effluent that can be processed as a liquid, slurry or solid material. Liquid and slurry effluent can be stored in lagoons and used as a nutrient-rich irrigation resource. Solid effluent, also known as biosolids, is an excellent organic fertilizer. Livestock bedding material can also be recycled and reused as clean and dry-bedding.

Strategy 10: Increase opportunities for woody biomass in Nebraska

Woody biomass is another resource with potential in Nebraska. There are an estimated 70 million dry tons of standing live tree woody biomass in Nebraska. Nebraska's 2.8 million acres of forests and lands with trees sustainably produce more than 2 million net tons of wood annually. An additional 270,000 tons of wood enters the waste stream every year, of which 90,000 tons/year is used for thermal energy applications. Capturing the potential of the state's underutilized woody biomass resources can displace a portion of the natural gas used to heat and cool buildings, for industrial applications and to generate electricity.

Chadron State College's woodchip fired boiler helps heat 20 campus buildings saving the college $360,000 each year.

Chadron State College and Lied Lodge at Arbor Day Farms in Nebraska City have been heating and cooling 1.5 million square feet of building space for the past 20 years using 13,000 tons of woodchips annually and saving millions of dollars in energy costs. Eight alfalfa dehydration plants in Nebraska use woody biomass as their primary energy source and burn an additional 12,500 tons/year.

Woody biomass and crop residues could also provide an alternative source of fuel for vehicles traveling in and through the state. The Nebraska Forest Service estimates that converting 600,000 tons, or about 30% of the state's annual wood production, can potentially produce 38 million gallons of cellulosic ethanol per year (at current efficiencies).

Strategy 11: Support distributed generation of renewable technologies

Nebraska has opportunities for businesses, landowners and residents wishing to invest in distributed generation from small renewable energy systems. Distributed generation refers to on-site generation from small sources and is an important component in achieving net-zero buildings and supporting small businesses in the state. Small solar and wind systems can increase energy savings from energy efficiency improvements alone and, when appropriately applied, can result in significant economic savings from high-demand energy uses.

With an average of more than 280 days of available sunlight per year, solar energy provides considerable opportunities for distributed generation in Nebraska. Photovoltaic (PV) growth will increase from 4.8 kW in 2010 to 192 kW in 2012.

In 2010, Behlen Manufacturing in Columbus, Gildemeister – a leading European solar manufacturer, the Nebraska Energy Office and NPPD partnered to install a state-of-the-art tracking PV solar system at NPPD's Norfolk Operations Center. The system is designed to generate up to 44 KW of electricity for use at the center. Real-time output monitoring of the solar array, 3 small wind turbines located at the center and NPPD's Ainsworth wind farm can be found online at: http://noc.nppd.greentouchscreen.com

Also in 2010, Creighton University partnered with OPPD, the U.S. Department of Energy and private industry to install and test several solar energy applications on Creighton's campus. This installation is the largest in the state and serves to educate the next generation of Nebraskans about the benefits of solar energy.

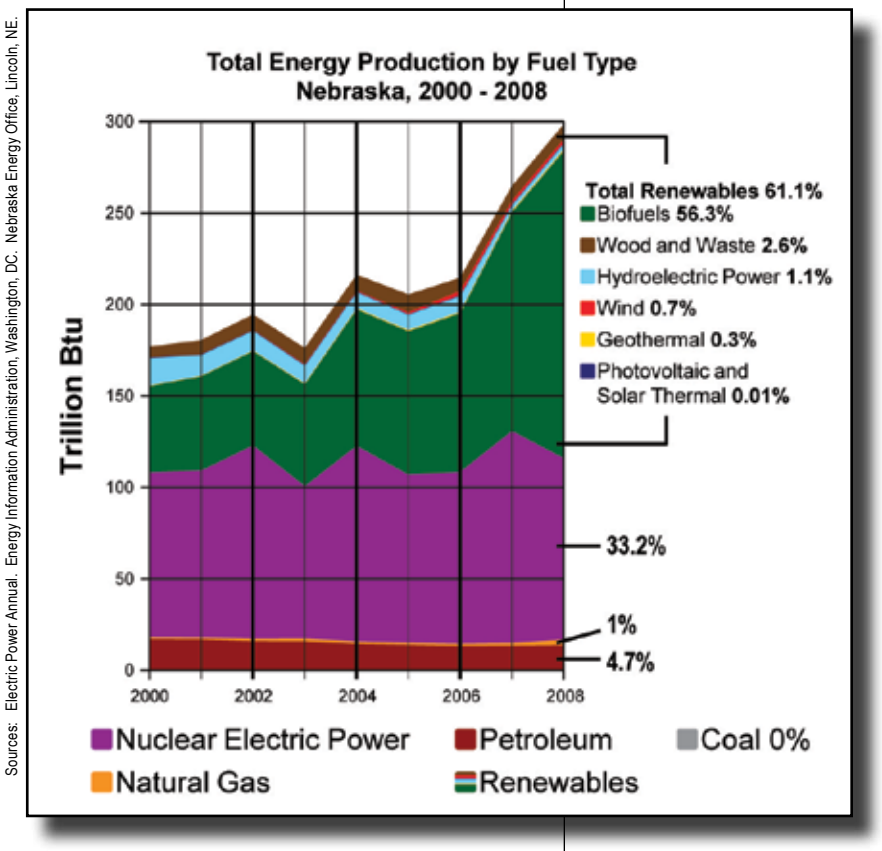
Nebraska Public Power District's photovoltaic solar energy system in Norfolk can generate up to 44 kilowatts of electricity an hour.

Objective: Reduce petroleum consumption in Nebraska's transportation sector

Reducing Nebraska's dependence on petroleum is arguably the most important strategy in reducing energy expenditures in the state. The transportation sector is the second largest energy consumer in Nebraska. Almost all of this energy is petroleum-based. Petroleum accounts for more than 60% of the total energy expenditures in the state. Petroleum's contribution to energy expenditures presents an opportunity for the state's renewable energy resources to provide direct savings to consumers and add value to Nebraska producers.

Strategy 12: Increase ethanol production, blended and delivered across Nebraska and to markets outside the state

Nebraska shares in a 25-year relationship with the ethanol industry. This relationship has seen Nebraska's ethanol industry expand to become the nation's second leading producer of corn ethanol with an annual capacity of nearly 2 billion gallons. Increasing the amount of ethanol produced, blended and delivered to motorists and markets outside the state will serve to lessen dependence on petroleum, reduce energy expenditures and decrease emissions attributed to petroleum.



Sources: Electric Power Annual. Energy Information Administration, Washington, DC. Nebraska Energy Office, Lincoln, NE.

Ethanol is an important and viable alternative transportation fuel in Nebraska. The state's ethanol industry increases economic activity for agricultural producers and rural communities, creates jobs and drives innovation into advanced biofuels such as cellulosic ethanol and algae-based fuels.

As of October 2010, there are more than 96,600 flex-fuel vehicles (FFVs) registered in Nebraska and this number will continue to increase. An emphasis must be placed on building the necessary infrastructure, partnerships and policies to deliver fuel to these vehicles and those traveling through the state.

Strategy 13: Increase development and use of other alternative fuels

Nebraskans must also be mindful of opportunities in other alternative transportation fuels. Compressed natural gas (CNG) and electric vehicles (EVs) offer economical opportunities for motorists and industrial fleet vehicles.

Metropolitan Utilities District-Omaha (MUD-Omaha) is expanding the availability and demand for CNG fuel. This effort includes the installation of 2 public CNG refueling stations to be open around June 2011.

As automakers announce plans to deliver new electric vehicles to U.S. consumer and fleet markets in 2011, Nebraska's electric utilities are preparing to integrate local EV opportunities into their systems and educating consumers about the benefits and costs of EV technologies.

Strategy 14: Diversify and expand opportunities for renewable diesel in Nebraska

In 2011, there are more than 65 million gallons of renewable diesel (biodiesel) production capacity idle in the state. The challenge for Nebraska producers is building on this capacity to meet new market demand. Petroleum-dependent industries and government sectors are investing in renewable diesel fuel as a strategy to reduce energy costs and increase energy security. For example, the aviation industry is investing in renewable diesel as a way to reduce fuel costs and comply with various international air quality standards. The U.S. military also is interested in renewable diesel as a way to reduce its energy expenditures and increase energy security abroad. Renewable diesel can also be used to replace petroleum in the electric power, rail and transport industries.

Diversifying feedstock options to include soybeans, animal fats, waste oils and by-products is a key strategy in securing the economic viability of renewable diesel. The University of Nebraska is a national leader in renewable fuels research. Through the Nebraska Center for Energy Sciences Research and new partnership opportunities from the University of Nebraska's Innovation Campus and research centers across the state, Nebraska will continue to lead innovation in renewable fuels feedstock and technologies.

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