



Hall County Regional Planning Commission

**Wednesday, September 3, 2014
Regular Meeting**

Item F5

Amendment to the Wood River Comp Plan

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ENERGY ELEMENT



Energy Element

Energy usage in the early 21st Century is becoming a critical issue throughout Nebraska as well as the entire United States. Our dependency on energy sources that are not renewable has increased significantly over the past 100 years. Energy usage comes in several forms, such as:

- Lighting our homes and businesses
- Heating our homes and businesses
- Heating our water for homes and businesses
- Food preparation
- Transportation – both personal and business related
- Recreation and Entertainment – vehicular, computers, music, etc.

The 21st Century ushered in an increased concern for energy usage and its impacts on the environment. With the increased concern for the environment came an increased understanding of the carbon footprint generated by any one individual as well as striving towards modifying our behavior patterns in order to lessen that footprint. In addition, the phrase and concept of sustainability has become more widely used, even in the smaller communities of Nebraska and United States.

Energy and the issues connected to the different sources are becoming more critical every year. The need for the Energy Element in the Wood River Comprehensive Development Plan was established by the Nebraska Unicameral and Governor when LB997 was passed and signed during the 2010 legislative session. All communities and counties, with the exception of villages, in Nebraska are required to have an energy element in their comprehensive development plan (if they have one) by January 1 of 2015. This additional requirement forces communities to look at their energy usage and needs and plan that into the future development of the community. This makes the comprehensive development plan more comprehensive and therefore more meaningful. The passage of LB 997 appears to be a first step toward new comprehensive plans addressing the entire issue of Sustainability.

Sustainability

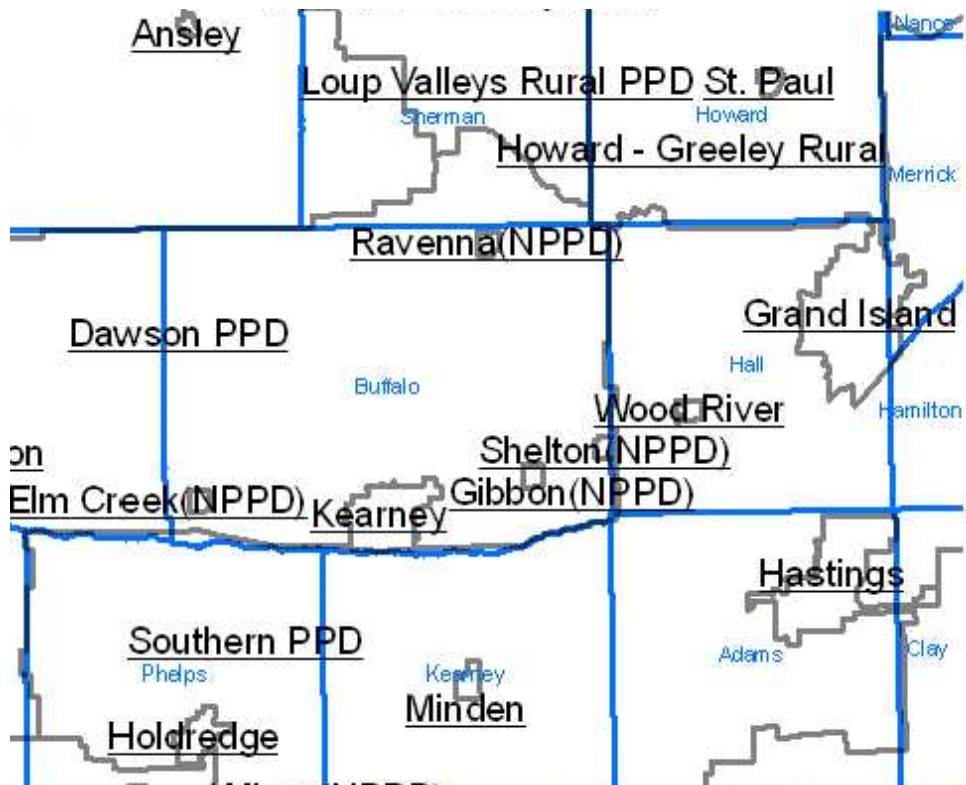
Sustainability, in today's discussions, has a number of meanings. According to Webster's Third International Dictionary, the verb "sustain" is defined as "to cause to continue...to keep up especially without interruption, diminution or flagging". However, the Brundtland Commission Report in 1987,¹ described sustainability as "...development that meets the needs of the present without compromising the ability of future generations to meet their own needs". In other words, sustainability is the ability of the present generation to live without jeopardizing the ability of future generations to sustain life as we know it today.

Our world's ability to stabilize and begin to make the switch to cleaner and more renewable resources will aid future generations with their quality of life. The more renewable energy sources become the norm for our world, the more likely these sources will be second nature and common place in the future.

Americans have grown to rely heavily on electricity. However, state and federal policies have been increasingly more insistent on curbing this reliance; especially, those sources that are produced by non-renewable fossil fuels such as oil and coal. Federal policy has set a goal that 20% of all electricity, by 2030, in the United States be from renewable sources. Renewable sources would include solar, wind, water,

geothermal and any number of other sources that have not yet been discovered or brought to production levels.

Figure 1
Wood River Electric Service Area



Source: <http://www.powerreview.nebraska.gov/maps/South%20Central%20Munis%20Map%205-1-09.pdf>

Energy infrastructure

Electrical Power

The electrical power distribution system in Wood River is owned and operated by Wood River Utility Department. The city purchases their wholesale electricity from the Nebraska Energy Agency of Nebraska (NEAN) which is an entity Nebraska Municipal Power Pool and the Western Area Power Administration (WAPA).

Natural Gas Service

Natural gas is available in Wood River is supplied by Source Gas.

Energy Use by Sector

This section analyzes the energy use by residential, commercial, and industrial and other users. This section will examine the different types of energy sources that are utilized by these different sectors.

Table 1 shows the overall electricity usage by all consumers in Wood River. The categories are reflective of the ones established by the City. The categories are defined as:

Residential = all connections and demand by households in Wood River

Commercial = all retail and office users within Wood River

Industrial = all industrial users within Wood River

**Table 1: Total Electrical Usage
Wood River 2011 through 2013**

	2011	2012	2013
Residential kWH	6,310,088	6,096,841	6,193,882
Residential % of Total	52.4%	51.6%	50.4%
Commercial kWH	5,729,422	5,713,986	6,093,765
Commercial % of Total	47.6%	48.4%	49.6%
Industrial kWH	0	0	0
Industrial % of Total	0	0	0
TOTAL kWH	12,039,510	11,810,827	12,287,647
Annual Change		-1.9%	4.0%
Customer by Class:			
Residential	509	512	538
Commercial	152	144	161
Industrial	0	0	0
TOTAL	661	656	699

Source: Wood River Utilities

Table 1 shows the usage of electricity throughout the Wood River service area from 2011 through 2013. The data indicate the usage by residential, commercial and industrial uses for the time period. In addition, the Table indicates the number of customers per sector.

Overall, from 2011 to 2013, the total consumption increased by 4.0% while the customer base increased by 5.7%, which indicates that the number of customers increased a greater level than the overall electrical consumption. This would typically indicate that there were conservation measures being taken by consumers.

Residential Uses

The data indicate the percent of total used by sector. The Table shows the overall percentage of the total electrical usage for residential customers went from 52.4% in 2011 to 50.4% in 2013; while the overall number of residential customers increased by 29 connections. From 2011 to 2013, the residential demand saw an overall decrease; however, there was an increase of consumption from 2012 to 2013.

The overall residential demand for this period changed by -1.8%; however, the average per customer for the period saw a -7.6% change going from 12,397 kW in 2011 to 11,513 kW in 2013. These decreases would tend to suggest the following:

- More residential customers are becoming more conservation oriented
- More residential in turn are purchasing Energy Star products which consume less energy
- More residential customers are making the switch between incandescent bulbs to Compact Fluorescent lights (CFL) or Light Diode Emitting bulbs (LED).
- Better energy efficiency measures are be implemented in construction and remodels.
- A combination of all these items.

Commercial Uses

Wood River's commercial customers from 2011 to 2013 increased slightly from 47.6% of the total consumption to nearly 50% of the consumption. Based upon the data from Wood River Utilities, the overall commercial consumption increased by 6.4%% while the total customer base increased by 2.1% during the same time period. These data indicate that the increased consumption was over triple the increase in customer base. This indicates a couple of different dynamics may be occurring:

- Existing commercial customers are increasing the amount of electricity they require.
- Existing commercial customers have increased their space used to provide goods and services.
- The new commercial customers are higher than average electric consumers.
- A combination of all of these.

Short-term and Long-term Strategies

As the need and even regulatory requirements for energy conservation increases, residents of communities and even rural areas will need to:

1. Become even more conservative with energy usage
2. Make use of existing and future programs for retrofitting houses, businesses, and manufacturing plants



3. Increase their use of renewable energy sources.

Residential Strategies

There are a number of different strategies that can be undertaken to improve energy efficiency and usage in residences. These strategies range from simple (less costly) to complex (costly). Unfortunately not all of the solution will have an immediate return on investment. As individual property owners, residents will need to find strategies that fit into their ability to pay for savings at the present time.

There are several ways to make a residence more energy efficient. Some of the easiest include:

- Converting all incandescent light bulbs to Compact Florescent or LED bulbs
- Changing air filters more regularly
- Installing additional insulation in the attic
- Keeping thermostats set a cooler levels in the winter and higher levels in the summer
- Converting standard thermostats to digital/programmable thermostats
- Changing out older less efficient Air Conditioners and Furnaces to newer high-efficiency units
- Changing out older appliances with new more energy-efficient appliances

Some of the more costly ways to make a residence more energy efficient include:

- New insulation in exterior walls
- Addition of solar panels for either electrical conversion and/or water heater systems in cooperation with Wood River Utilities and in compliance with the local zoning codes.
- Adding individual scale wind energy conversion systems in cooperation with Wood River Utilities and in compliance with the local zoning codes.
- Installing geothermal heating and cooling system in cooperation with Wood River Utilities and in compliance with the local zoning codes.
- Installation of energy-efficient low-e windows

Commercial Strategies

Strategies for energy efficiency within commercial facilities can be more difficult to achieve than those for residential uses. Typically, these improvements will require a greater amount of investment due to the size of most of these facilities.

There are a number of different strategies that can be undertaken to improve energy efficiency and usage in residences. Again, not all of the solutions will have an immediate return on investment. As individual property owners, property owners will need to find strategies that will fit into their ability to pay for savings at the present time.

There are several ways to make a commercial business more energy efficient. Some of the easiest include:

- Converting all incandescent light bulbs to Florescent Lights, Compact Florescent Lighting, or LED on small fixtures
- Keeping thermostats set a cooler levels in the winter and higher levels in the summer
- Converting standard thermostats to digital/programmable thermostats
- Installing additional insulation in an attic space
- Changing out older less efficient Air Conditioners and Furnaces to newer high-efficiency units

Some of the more costly ways to make a business more energy efficient include:

- Installation of energy-efficient windows and/or storefronts
- New insulation in exterior walls, if possible
- Addition of solar panels for either electrical conversion and/or water heater systems in cooperation with Wood River Utilities and in compliance with the local zoning codes.
- Adding individual scale wind energy conversion systems in cooperation with Wood River Utilities and in compliance with the local zoning codes.
- Installing geothermal heating and cooling system in cooperation with Wood River Utilities and in compliance with the local zoning codes.

Renewable Energy Sources

Renewable energy sources are those natural resources such as the wind, sun, water, the earth (geothermal), and even methane (from



natural resources or man-made situations) that can be used over and over again with minimal or no depletion. The most common sources of renewable energy resources used in Nebraska is the wind, the sun, the water and/or the earth. The following are examples of how these renewable resources can be used to reduce our dependency on fossil fuels.

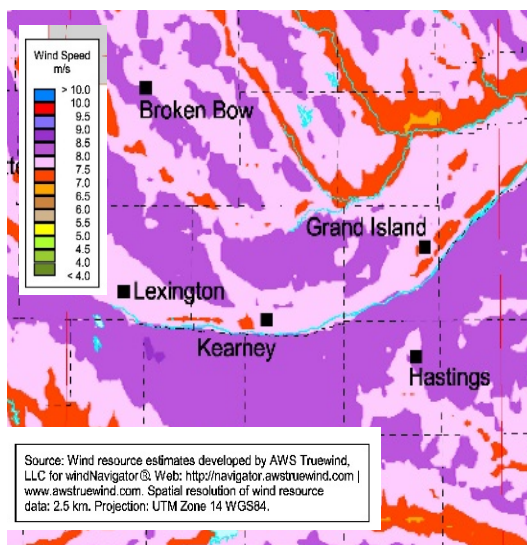
Wind

The wind is one of those resources that seem to be in abundance in Nebraska. Wind is not a new technology in Nebraska; the pioneers that settled in Nebraska used wind mills for power and to work the water wells on their farms and ranches.

Wind can be used to produce electricity through the construction of small-scale or utility/commercial grade wind conversion systems (wind turbines). However, not all areas of the state have the ideal levels needed to produce electricity on a utility or commercial level; but the use of small-scale wind turbines on homes and businesses will work in most parts of Nebraska.



Figure 3:
ANNUAL AVERAGE WIND SPEED AT 80 METERS
NEBRASKA



The wind quality in Wood River and Hall County is average to slightly above average, especially south of the Platte River and into Adams County. The darker purple areas are the more ideal locations for wind. However, any future wind development will be determined with the use of meteorological towers used to compile wind data for approximately a one year period prior to making any future decisions.

Solar

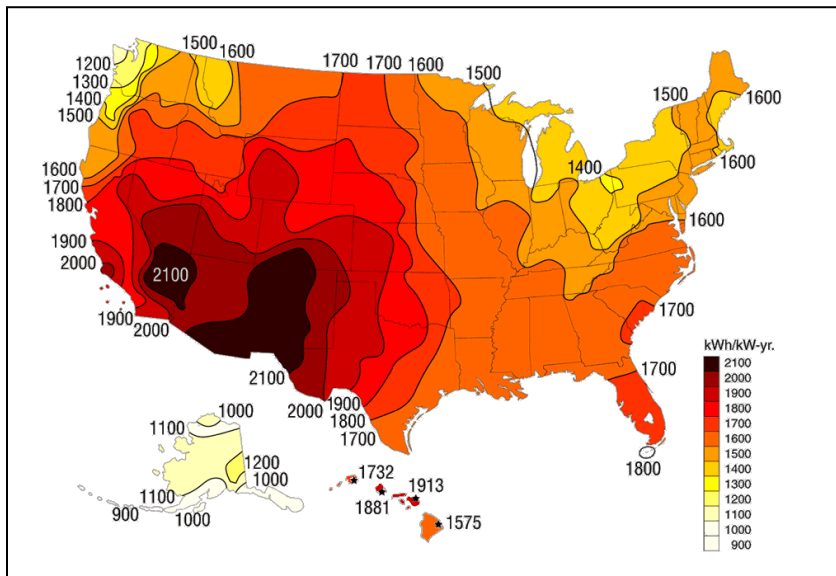
Solar energy has been around for decades and it last hit a high in popularity in the 1970's. However, today's solar energy design is much more efficient and are more aesthetically pleasing. Some of the aesthetic improvements have to do with the fact that today's systems are not as bulky as their ancestors. Today solar is being used much like wind turbines, on a small-scale level (home or business) or a much grander level (solar farms).

Solar energy includes solar water and space heating as well as taking solar photovoltaic panels to convert the sun's rays into electricity. Solar panels can typically produce between 100 and 200 watts per square meter at an installed cost of \$7 to \$9 per watt, but these costs are becoming less every year as more solar units are commissioned and new more cost effective technologies are developed.



Based upon the diagram to the right there is great solar potential in the state of Nebraska. A majority of the state lies within some of the better areas in the country for solar potential.

Figure 4:
SOLAR POTENTIAL CONTOURS



Geothermal Energy

Geothermal energy includes a process where a series of pipes are lowered into vertical cores called heat-sink wells. The pipes carry a highly conductive fluid that either is heated or cooled by the constant temperature of the ground. The resulting heat exchange is then transferred back into the heating and cooling system of a home or other structure. This is called a geothermal heat exchange system or ground source heat pumps. The California Energy Commission estimates the costs of a geothermal system can earn net savings immediately when financed as part of a 30-year mortgage (Source: American Planning Association, PAS Memo January/February 2009).

Renewable Energy in Wood River and the Hall County area

Renewable energy in Wood River and the Hall County area will be difficult now and into the future. The reasons for this difficulty is not rooted in the desire of the local residents or political reluctance but more due to nature itself. Nature and the lay of the land creates some very difficult situations for the use of wind energy or hydroelectric generation.

Wind generation will be difficult due to the migratory flyway that covers the Hall County area during a three to four month period in the spring and fall. Spring is the more critical period since the Hall County area is one of the major stopovers of the Sandhill Cranes and a limited number of Whooping Cranes. The Whooping Cranes are on the endangered species list and are protected. In addition, since the Whooping Cranes tend to fly north with the Sandhill Cranes, the Sandhill Cranes are afforded the same basic protections during this migratory period.

Any commercial or utility grade wind turbine development would likely need to be taken out of production during these periods. This shorter production time would likely harm the cost-effectiveness of most wind farms.

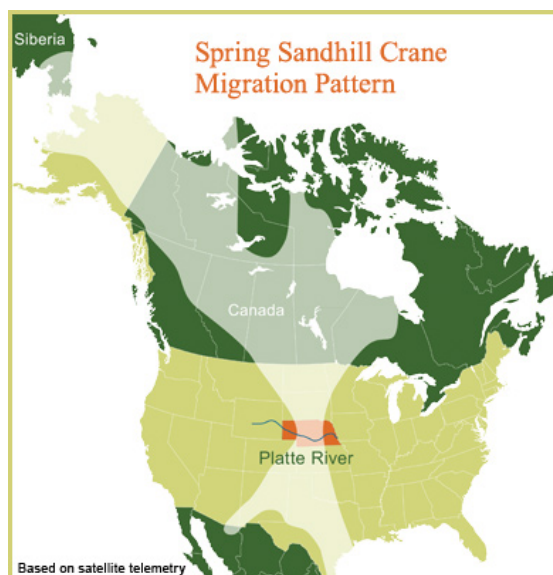


Figure 5:
SPRING SANDHILL CRANE MIGRATION PATTERN AND
PRIMARY
NEBRASKA
LOCATIONS

Source:
www.cranetrust.org and



Hydroelectric generation in Wood River and Hall County area is not practical and is nearly impossible due to the flatter topography found throughout the area. There are few to no areas that could be dammed up in order to create a large enough water reservoir to power the turbines.

However, the other types of renewable energy sources are possible within Hall County, including geothermal, methane, and solar. Solar may create some issues closer to the primary migratory areas of Hall County.

Energy Programs in Nebraska

The following provides a basic history and description of some newer programs in Nebraska; interested parties should contact the State of Nebraska Energy Office or their local public power district.

The following information is an excerpt from the Database of State Incentives for Renewables & Efficiency.

C-BED Program

In May 2007, Nebraska established an exemption from the sales and use tax imposed on the gross receipts from the sale, lease, or rental of personal property for use in a community-based energy development (C-BED) project. The Tax Commissioner is required to establish filing requirements to claim the exemption. In April 2008 L.B. 916 made several amendments to this incentive, including: (1) clarified C-BED ownership criteria to recognize ownership by partnerships, cooperatives and other pass-through entities; (2) clarified that the restriction on power purchase agreement payments should be calculated according to gross* and not net receipts; (3) added language detailing the review authority of the Tax Commissioner and recovery of exempted taxes; and (4) defined local payments to include lease payments, easement payments, and real and personal property tax receipts from a C-BED project.

A C-BED project is defined as a new wind energy project that meets one of the following ownership conditions:

- For a C-BED project that consists of more than two turbines, the project is owned by qualified owners with no single qualified owner owning more than 15% of the project and with at least 33% of the power purchase agreement payments flowing to the qualified owner or owners or local community; or
- For a C-BED project that consists of one or two turbines, the project is owned by one or more qualified owners with at least 33% of the power purchase agreement payments flowing to a qualified owner or local community.

In addition, a resolution of support for the project must be adopted by the county board of each county in which the C-BED project is to be located or by the tribal council for a C-BED project located within the boundaries of an Indian reservation.

A qualified C-BED project owner means:

- a Nebraska resident;
- a limited liability company that is organized under the Limited Liability Company Act and that is entirely made up of members who are Nebraska residents;
- a Nebraska nonprofit corporation;
- an electric supplier(s), subject to certain limitations for a single C-BED project; or
- a tribal council.

In separate legislation ([LB 629](#)), also enacted in May 2007, Nebraska established the Rural Community-Based Energy Development Act to authorize and encourage electric utilities to enter into power purchase agreements with C-BED project developers.

** LB 561 of 2009 established that gross power purchase agreement payments do not include debt financing if the agreement is entered into on or before December 31, 2011, and the qualified owners have a combined total of at least 33% of the equity ownership in the C-BED project.*

Local Government and Renewable Energy Policies

Local governments need to take steps to encourage greater participation in wind generation. Cities and counties can do a number of items to make these projects more attractive. Some of the things that could be done are:

- Develop or amend existing zoning regulations to allow small-scale wind turbines as an accessory use in all districts
- Develop or amend existing zoning regulations to exempt small-scale turbines from maximum height requirements when attached to an existing or new structure.
- Work with the Nebraska Public Power District and/or local public power district on ways to use wind turbines on small-scale individual projects or as a source of power for the community.

Net Metering in Nebraska

[LB 436](#), signed in May 2009, established statewide net metering rules for all electric utilities in Nebraska. The rules apply to electricity generating facilities which use solar, methane, wind, biomass, hydropower or geothermal energy, and have a rated capacity at or below 25 kilowatts (kW). Electricity produced by a qualified renewable energy system during a month shall be used to offset any kilowatt-hours (kWh) consumed at the premises during the month.

Any excess generation produced by the system during the month will be credited at the utility's avoided cost rate for that month and carried forward to the next billing period. Any excess remaining at the end of an annualized period will be paid out to the customer. Customers retain all renewable energy credits (RECs) associated with the electricity their system generates. Utilities are required to offer net metering until the aggregate generating capacity of all customer-generators equals one percent of the utility's average monthly peak demand for that year.

State Law of Solar and Wind Easements

Nebraska's solar and wind easement provisions allow property owners to create binding solar and wind easements for the purpose of protecting and maintaining proper access to sunlight and wind. Originally designed only to apply to solar, the laws were revised in March 1997 (Bill 140) to include wind. Counties and municipalities are permitted to develop zoning regulations, ordinances, or development plans that protect access to solar and wind energy resources if they choose to do so. Local governing bodies may also grant zoning variances to solar and wind energy systems that would be restricted under existing regulations, so long as the variance is not substantially detrimental to the public good.

LB 568, enacted in May 2009, made some revisions to the law and added additional provisions to govern the establishment and termination of wind agreements. Specifically, the bill provides that the initial term of a wind agreement may not exceed forty years. Additionally, a wind agreement will terminate if development has not commenced within ten years of the effective date of the wind agreement. If all parties involved agree to extend this period, however, the agreement may be extended.

Current Renewable Energy Programs and Funding Sources

Low interest Loan Program

This program makes available low interest loans for residential and commercial energy efficiency improvements. The Nebraska Energy Office administers this program, which was created in 1990 using oil overcharge funds. Only improvements to existing buildings that are at least 5 years old are eligible for loan assistance. As of March 31, 2010, 25,618 loans have been made totaling \$205.3 million and financing \$210.8 million in eligible projects.