

From Conrad LeBeau
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Aug 19, 2008

A request for changes/additions to the zoning regulations to allow for *small wind turbine* installations in West Allis to be used for supplemental electrical generation in residential areas and also for business, including solar panels that are installed on roofs as well as fixed yard and solar tracking panels, vertical and horizontal geothermal heat transfer systems for heating and cooling and other green technologies. For purposes of language clarity, windmills used for electricity production for use in buildings will be referred to in this article as "wind turbines".

To Mayor Dan Devine
Alderman Gary T Barczak
Alderman Michael J Czaplowski
Alderman Kurt E Kopplin
Alderman Thomas G Lajsic
Alderman Richard F Narlock
Alderwoman Rosalie L Reinke
Alderman Daniel J Roadt
Alderman James W Sengstock
Alderman Vincent Vitale
Alderman Martin J Weigel

Greetings,

I am writing to ask each of you to address the complex issues of incorporating green technologies into the city of West Allis including wind energy, solar, geothermal, electric cars and other technologies. My immediate personal interest is that I recently purchased online a small wind turbine which now sits in a cardboard box in my living room. Each blade is about 24 inches long and the length from front to back is 28 inches. It can generate 400 watts in a 28 mph wind. The wind turbine is currently in my living room because the zoning inspector Ted Atkinson told me he is not sure that existing codes allow me to install it for electrical generation purposes, although at one point he suggested that I might want to install it on top of a flagpole since flagpoles are listed in the municipal codes. I originally estimated that with a battery and inverter, I could power my garage and yard lights at night with this small wind turbine called the AIR-X made by Southwest Wind Energy that has manufactured and sold over 45000 of these units worldwide in the past several years. Hence this letter.

First, a brief statement about myself. I am a 65 y.o. working retiree who collects social security, has a part time business developing and marketing special purpose health products and has written various books on health subjects. I am also a homeowner who has lived in West Allis since 1998 and am a member of Mary Queen of Heaven parish. I have had a life long interest in alternative energy and

well as alternative medicine. In 1979 when I lived in South Milwaukee, I first built a vertical axis wind turbine. It did not function very well and I quickly replaced it with a horizontal type wind turbine that functioned much better. This second wind turbine incorporated a bicycle generator that lite up a small taillight. Both wind turbines were novelties at the time and did not reach the threshold of practical value. Since then, a lot has progress has been made all over the world on wind turbine technology since 1979.

Speed forward to 2008. Two months ago, I searched through the local municipal codes and found nothing mentioned in the zoning codes on wind turbines, solar or geothermal. For several years, I have quietly gathered files of information on the subject of alternative energy. As the price of gas kept rising this spring and summer, I asked myself: Am I going to do anything about this or just be a spectator and watch events unfold on CNN and other news channels?

Midwest Renewable Energy Association (the-mrea.org)

Last month, June 21, I decided to attend the annual Energy Fair in Custer, WI sponsored by the Midwest Renewable Energy Association (the-mrea.org) and to learn as much as I could learn about the options available, the cost and the rate of return on investment. With 270 exhibitors, I looked forward to the event. Before going to the Energy Fair, I visited a residential site in Franklin that had a \$20K investment in solar panels that was grid tied. A government grant distributed through WE Energies paid 20% of the total cost of the investment. WE Energies has committed in writing to buy all the electricity produced by the solar panels for 23 cents a kilowatt hour for the next 12 years. I located the residential solar installation through the Midwest renewable Energy Assn website (the-MREA.org). MREA has year round instructional seminars for officials, businesses and residential persons to learn more about all green energy options.

American Wind Energy Assn (awea.org)

AWEA is a national organization that provides information on wind energy and to promote wind energy. They have a model zoning code based, in part, on what California has done in this area to promote the use of wind energy in rural and urban areas. All the model codes I found are for lot sizes of ½ acre and more. I don't have anything to add to these proposed codes. However, requiring a ½ acre lot for any wind turbine would leave most residents of West Allis in the dark as far as wind energy is concerned which is why I have proposed small wind turbines for smaller lots. The model codes for local government and links to other state codes can be viewed online at awea.org.

Is there a place in West Allis for small wind turbines? Solar? Geothermal? I hope so. proposed Municipal Codes for small wind turbines and Solar systems.

1. **Number of wind turbines and size of rotor wind swept areas:** In lots less than ½ acre, the maximum number of wind turbines for residential or business use shall be two. If one wind turbine is installed, the rotor's wind swept area shall not exceed 80 sq ft. If two wind turbines are installed, the combined wind swept areas of both wind turbines shall be added together and shall not exceed 80 sq ft. In lots of ½ acre or more, the combined wind swept area of all wind turbine rotors shall not exceed 140 sq ft. Wind turbines with wind swept rotors areas greater than 140 sq ft shall require a Special Use Permit from the zoning commission (Green Energy planning commission?). The formula for determining the wind swept area of a wind turbine is $A = \text{Radius Squared} \times \text{Pi} (3.1419)$

Examples: $A = \text{Radius Squared times Pi}$ (3.1419) An 8 ft diameter wind turbine has a radius of 4 ft. $4 \text{ times } 4 = 16 \text{ times } 3.1419 = 50.27 \text{ sq ft}$. A 1.5 meter wind turbine has a diameter of 4.92 ft and a radius of 2.46 ft. $2.46 \text{ times } 2.46 = 6.0516 \text{ times Pi (3.14119) = 19.0135 sq ft}$. Now if you add the wind swept area of the first wind turbine (50.27 sq ft) to the second which is 19.0135 sq ft, your total wind swept area is just under 70 sq ft. At an estimated 12 mph average wind speed, the monthly Kwh produced from an 80 sq ft wind swept area (Southwest Whisper 200) would be about 200 Kwh monthly. At today's current price of .12 per Kwh, that would be about \$24 a month and about 40% of the average residential electrical needs. However, if WE Energies gets its 21% rate increase that is now predicted, the value of the electricity produced would be about \$29 a month.

2. **Wind turbines towers** shall be mounted according to manufacturers recommendations. Tilt up towers or stationary monopole towers may be used. Wind turbines of 1.5 meters or smaller in size may be roof mounted if recommended by the manufacturer. **Locations of wind turbine towers including the blades:** Side or back yard. Minimum 10 ft away from trees branches and electrical power lines. The position of the blade in rotation must be considered in determining this distance.
3. **Distance to lot lines:** In a lot of $\frac{1}{2}$ acre or less, the distance of the wind turbine tower to the nearest lot line shall be not less than 5 feet. In lots of $\frac{1}{2}$ acre or more, the minimum distance shall be 10 ft.
4. **Height of towers:** In lots of $\frac{1}{2}$ acre or less, any wind turbine whose diameter is one meter or more in size or rated at 200 watts or more shall be at least 30 ft in height and the maximum height of the tower (the fixed portion not including the blades) shall be limited to 60 ft. In lots of $\frac{1}{2}$ acre or more the minimum height of the tower shall be 40 ft and the maximum 80 ft. (Note: for ideal wind turbine performance, the tower should be 20 to 30 ft above the average tree or building height within 200 ft in the prevailing wind direction, SW, West and NW. Example: If the proposed site of a wind turbine is 100 ft directly east of a tree that is 60 ft tall, then investing in a wind turbine on a 60 ft tower would not be advised as the tree will interfere with the wind flow and the wind turbine's electrical output).
5. **Grid-tied or off-grid:** Wind turbines used for electricity generation that are grid tied or are used in existing electrical circuits in a building with a battery and inverter shall require an electrical inspection to insure they are safe and compliant with existing electrical codes. No installation of a grid-tied system may proceed without first notifying the local utility company.
6. **Low voltage wind turbines self-installed:** Wind turbines having a diameter of 1.5 meters or less or rated at 500 watts or less with low direct current voltage DC (12 or 24 volts) output may be self installed without an electrical permit providing they are used only for battery charging and for use with a portable DC to AC inverter.
7. **Research,** testing and development of existing or new wind turbine designs shall not require a permit or be impaired by these regulations.
8. **Flat roofs:** any building with a flat roof may mount as many wind turbines as desired providing that the size of the diameter of the blades of each wind turbine is limited to 1.5 meters or less.
9. **Solar panels for heating or producing electricity can be installed on roofs or in the yard as separate structures without size limitations.** Location: Roofs, side or backyard.
10. **Combining wind and solar:** Wind turbines may be combined with solar panels roof mounted or as separate structures in the yard for electrical generation and may be used off- grid with a battery and inverter or grid-tied to the local utility company.
11. **Noise limitations** shall be the same as for wind turbines installed on areas greater than $\frac{1}{2}$ acre and are limited to
 - a. 60 db (decibels) except that in storms of above average winds (greater than 12 mph), higher db levels are allowable for the duration of the higher wind speeds or
 - b. A

- second criteria shall be if the wind turbine is audible in an adjoining building with the windows and doors closed on a day of normal wind speed, the noise level shall be considered excessive.
12. **City Authority to disable a noisy wind turbine:** The City shall have the authority to order the owner of a wind turbine that produces excessive noise to fix the problem within 10 days, after which the City may order the owner to disable it (stop it from rotating) or take it down within 3 additional days.
 13. **Green Energy Permits:** Permits for all renewable energy systems (wind, solar and geothermal) shall be referred to as “Green Energy Permits.” The first 10 city residents of each calendar year who apply for “Green Energy Permits” to install small wind energy systems, solar or geothermal heating and cooling systems shall have all building and electrical permit fees waived after which the fees shall be \$25 for installations costing less than \$2500. \$50 if the cost of the project is between \$1000 and \$2500 and \$75 if over \$2500 in value.
 14. **Special Use Green Energy Permits** are required for wind energy projects for wind turbines rated at greater than 10KW or wind turbines whose rotors have a wind swept area greater than 140 sq ft. The zoning commission (Green Energy Commission) will make recommendations and the Common Council will evaluate each case on its own merits. The codes proposed by the American Wind Energy Assn (AWEA) and those used in California shall be considered in evaluating each proposal.

Evaluating the benefits of wind turbines and solar for a city resident

The two sized wind turbines (2.5 m) and 1.5 m) covers a combined wind swept area of about 70 square feet. This is based on the formula of Area = radius squared times pi (3.1419). The two wind turbines combined could produce as much as 150 to 200 Kwh monthly for the average homeowner on a small lot and provide about 1/3 to 4/10th of the electrical power needs of a local residence. This is a significant contribution and if combined with solar panels could provide even more of the electrical needs of a grid tied or off-grid system. For the wind turbines alone, return on investment could take from 8 to 12 years.

Partial funding in grants is available for local governments, non-profit organizations, businesses and residences who participate in a grid tied solar or wind-solar system. Information on available funds for grants can be obtained from WE Energies or the local public utility. While this the return on investment in wind and solar may not be spectacular, it is more than the rate of return on electricity purchased from the local grid that is produced from coal and natural gas. For the consumer, the rate of return for buying coal generated electricity will always be zero percent and the cost will always be rising. With solar, it depends on where you shop, the return on initial investment could be as little as 15 years or as long as 25 years for high end PV panels. Even with solar electric, at least there is a rate of return.

Wind energy produced and used on site will cost less than wind energy imported from wind farms up north.

No source of electricity from wind or solar will cost less than that produced and used on site. This is because the middlemen want their piece of the pie – the farmer on whose land the wind turbine is placed, the transmission line charges and the local grid stockholders. All three of these charges are eliminated when the electricity is produced and used on site.

The three wind turbines at Discovery World

Checkout the three wind turbines at Discovery World in the City of Milwaukee – located just north of Summerfest grounds at 500 N Harbor Dr. in Milwaukee, WI 414-765-8773. See how quiet the Bergey wind turbine is (the one with the yellow nose cone). This one would be appropriate for small lots in the city. The manufacturer of the Skystream 3.7 (12 ft diameter) from Southwest Wind Energy recommends a ½ acre lot for this wind turbine. The Skystream 3.7 with its uniquely shaped blades can also be seen at Discovery World. (Note: You can drive up to the Wind turbines and observe them from the street.) Check them out.

Suggestions for City Hall

1. Setup a **Green Energy Planning Commission** to learn about and study ideas out for reducing our carbon footprint and oil consumption and promote green energy alternatives. Depending on demand, consider setting up a **City of West Allis Alternative Energy Store** and become a distributor for Bergey Wind Turbines, Southwest Wind Turbines, other wind turbines from other manufacturers, solar panels, inverters, kill-a-watt testers and other green energy products.
2. **Pass zoning codes** for allowing small wind turbines, solar photovoltaic panels and geothermal heating systems in West Allis for home owners and businesses.
3. **Education:** Join **the-MREA.org** and have members of the zoning commission, various zoning departments and the common council attend seminars to increase their knowledge and understanding of the issues and opportunities available involving wind, solar, geothermal and other technologies. **Invite spokesmen for wind turbines manufacturers, solar and geothermal heating system to speak at City Hall** and explain the costs and benefits to residents in West Allis for using alternative energy systems and how these systems can reduce the annual operating budget at City Hall.
4. **Promote green energy choices** through the city newsletter and website.
5. **Get site assessments** from for a geothermal heating system for a public school from one or more members of the Wisconsin Geothermal Assn 608-366-1839.
6. **An electrical generating wind turbine at City Hall or at the Farmers Market?** (Consider not only the function but the art and beauty in the design of the 10KW Bergey and other designs.) Consider these and other sites that would be appropriate for a wind turbine owned by the city that could generate thousands of dollars for the city of West Allis while helping to reduce carbon from polluting sources of electricity like coal. Contact **National Wind Assessments** in Grand forks ND at 888-337-9373 for an assessment for a mid-sized or appropriate sized wind turbine at City Hall and or the Farmers Market – cost, size, how long before it pays for itself, federal government grants attitudes for renewable energy projects etc. Consider joining **MEUW** Municipal Electric Utilities of Wisconsin. They currently have 82 members and provide 11% of the electricity used in Wisconsin. Ph 608-837-2263
7. **All new electric cars selling for less than \$16k:** Invite the Zenn dealership in Janesville to set up a dealership here in West Allis. zenncars.com or greenautos.com.

Resources:

the-MREA.org (Midwest Renewable Energy Assn Custer, WI)

AWEA.org (American Wind energy Assn)

geothermal.org/contact.html national links to all resources and organizations

majorsystemsinc.com – local Wauwatosa installer of geothermal heating systems 771-4400

Wisconsin Geothermal Assn 608-366-1839 wisgeo.org (website under construction)

renewwisconsin.org - small wind toolbox - an invaluable resource – covers grid tied systems.

nationalwindassessments.us (provides assessments, planning and installations of wind turbines and wind farms)

meuw.org (municipal electrical utilities of wisconsin)

pickensplan.org

ases.org (American Solar Energy Society)

nanosolar.com (New solar panels made by printing – drastically reducing the cost)

focusonenergy.org

wecansolveit.org

WE Energies renewable energy dept – contact jimhunt@we-energies.com

<http://home.altenergystore.com> (a popular website store and forum for renewable energy products)

Wind Turbines can be like small oil wells pumping money into the City treasury month after month and year after year.

Wind turbines for electrical generation are built from the smallest at 1/2 meter in diameter to the super sized Vesta models you see south of Fond Du Lac with blades up to 100 ft in length (200 ft diameter) wind turbines that are clearly too large for an urban application. These large wind turbines belong in the cornfields or remote areas where they are located. In large cities with condensed populations, there are probably pockets of unused public land where mid to large wind turbines (rotor blades 20 ft in length) but not the super sized types that would only be appropriate in fenced in areas. With 25% or more of the total cost paid by government grants dispersed through WE Energies, city owned wind turbines would be like small oil field wells pumping money into the city treasury year after year. My own estimate is that payback of the initial investment would be in 5 to 7 years. Areas to consider placing a mid-sized wind turbines include police stations, small parks, public schools, vacant land of several acres that is empty and not being used. Large wind turbines of 50 to 100 KW might be appropriate in these areas.

Wind turbines in these areas set up and owned by the local municipality could provide not only clean energy to the local grid but a constant source or revenue to the city treasury that would be the equivalent of owning several oil wells. With government grants paying up to 25% of the total cost, investments in wind turbines as well as geothermal heating systems for public schools could pay for themselves in 5 to 7 years after which the cost for the electricity used and the heating system would be virtually free. Solar photovoltaic (PV) panels for electricity production in Wisconsin do not pay well in the wintertime whereas the return on a wind turbine is year round. Assessments for individual projects including geothermal heating for public schools are available through focusonenergy.org. *Please note that WE Energies provides some funding for focusonenergy and their support for geothermal heating systems is less than robust.* Geothermal energy use could cut substantially into natural gas sales.

Geothermal energy can heat public buildings for less than natural gas

Geothermal heating systems are set up using pipes to move air or water underground at depths of 6 feet or more to pick up heat stored inside the earth. The heat is removed with heat pumps and then distributed in the building through pipes or forced air systems. Geothermal systems can also be used for cooling in the summer by a reverse process – removing heat from a building and storing it in the earth. With the rising cost of natural gas, geothermal heating systems are being installed here in Wisconsin in residences at 15 to 20K per total setup and with a pay back time of less than 8 years. An expected doubling of natural gas rates in the next 5 to 7 years makes geothermal a wise investment for local governments, businesses and residences. Horizontal Geothermal heating systems (water or air) could easily be installed in public schools with large playgrounds that could be dug up in summer

when the kids are at home. Al Gore recently told Tom Brokaw on Meet the Press that the geothermal system he installed on his home in Tennessee has reduced his natural gas consumption by 90%.

For starters, the common council should invite experts who install geothermal heating systems to provide an estimate at one of the public schools and a cost benefit analysis of payback time. For more information and resources, contact the Wisconsin Geothermal Association at 1-608-366-1839 or their website at wisgeo.org. What would it do to the budget in West Allis if the use of natural gas could be cut by 90% and electricity purchased from WE Energies by 50%?

What is we do nothing? Can we afford to do nothing? What will a 7% rate of inflation in electricity prices do in 7 years?

I did the math on the solar panel installation and did not like the result – based on the credits earned even at 23 cents a Kwh, that annual rate of return was about 4% for the amount of electricity produced (about 260 Kwh monthly). However, based on the growing global oil shortage and the likelihood that energy prices will climb 7 to 12% a year (higher than the inflation rate) as far into the future as the eye can see, this changes the equation significantly. Starting at a base of about 12 cents a Kwh that we have now (2008 figures) and figuring a 7% increase annually, in 7 years the cost per Kwh will be about 18 cents per Kwh. Add another 4 years and the cost reaches 25 cents a Kwh. By the 12th year, it reaches 25 cents per Kwh and the annual rate of return is still about 4%. A household using 500 Kwh monthly that now pays about \$60 a month will in 7 years pay \$90.00 monthly. In 12 years, the cost would increase to \$120 a month.

What will a 12% rate of inflation in electricity and natural gas rates do to the cost of energy in 12 years? The answer is that if today's bill is \$166 monthly, it will be \$583 a month in 12 years.

What if the cost of electricity increased by 12% per year for the next 7 years? What a 12% rate of inflation would do to the cost of electricity in 7 years is to increase the base rate of 12 cents a Kwh (2008 prices) to 23.8 cents a Kwh – double in cost with the average monthly bill reaching about \$120 a month. In 12 years, a 12% annual increase in electricity rates would increase the cost per Kwh to 42 cents per Kwh. By year 12, the cost for 500 Kwh of electricity used monthly would increase to \$210.00 or an annual electricity bill of \$2520.

At a 12% rate of inflation, today's annual cost for natural gas and electricity would increase from \$2000 annually to \$7000 annually or a monthly average of \$583 a month.

August 14th 2008 – The Journal Sentinel carries an article this morning predicting a 21% increase in natural gas rates this winter. At that rate (21% a year), in 4 years the rates will have doubled. We need to stop being a captive audience and allow for other choices.

Thank you for considering these proposals.

I am ready and willing to take my small wind turbine that (weighs 19 lbs) to City Hall and answer any questions you may have about the proposed zoning codes for small wind turbines here in West Allis.

Conrad LeBeau

West Allis resident and home owner since 1998.

Phone home -545-6539 Days-329-0648

Copy to Ted Atkinson – Bldg inspection

Steve Schaer – Zoning Commission.

Exhibit packet enclosed –

Exhibit Packet

Rock Port, MO, First 100% wind powered community in U.S.

Geothermal Energy Assn

Green builders warm up to geothermal technology

Tapping into Geothermal Energy (Johnson Controls)

Midwest Renewable Energy Assn

**AIR-X model wind turbine (1.14 meters diameter) rated at 400 watts in
a 28 mph from Southwest Wind Energy
purchased by me in July 2008. Specs can be found at the
altenergystore.com**

Small Wind Turbine Manufacturer list (partial) from AWEA