

**Renewable Energy Production in
Residential Neighborhoods**

**Planning & Zoning Commission
Workshop**

February 18, 2009

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Renewable Energy Production in Residential Neighborhoods

Planning & Zoning Commission Workshop February 18, 2009 Staff Report

Introduction

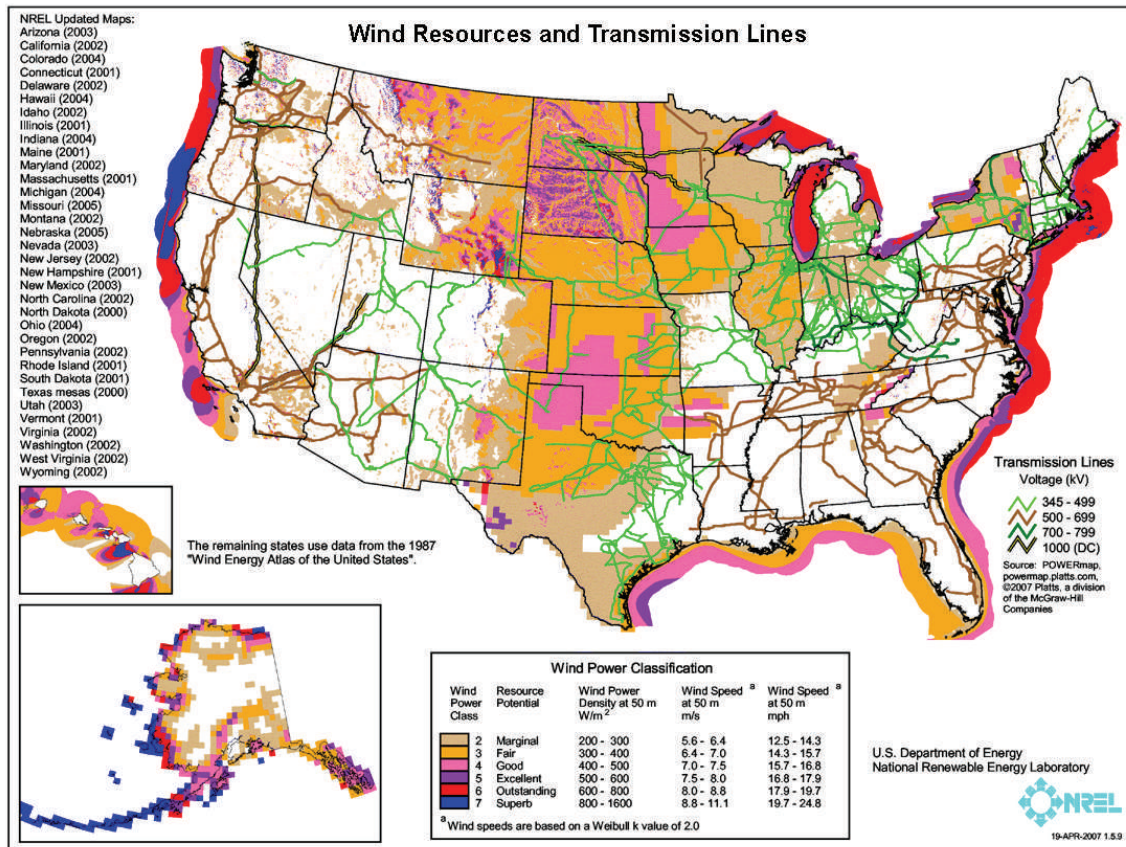
The Ames City Council has made it clear to the community that we have a goal of thinking and living “green.” There are many other related catch phrases (such as “smart,” ecologically-friendly, sustainable or environmentally-friendly) but for the purposes of this report, we shall stick to “green.”

One of the ways to work toward this goal is to reduce the energy demand on the municipal power plant by allowing all or even part of one’s electricity needs to be produced on-site from wind, solar, or some other form of “renewable” energy. What is unique about the community’s march towards this goal, is that there is interest on both sides—both the private property owners (citizens) and the city government. The motivating factors behind the interest are diverse and not limited to:

1. global concern of limited availability of “fossil fuels”
2. global concern of harm to air quality when energy is produced from fossil fuels
3. financial benefit of reducing monthly electric bill
4. community concern of a power plant that’s near its capacity without a significant expansion/financial investment
5. renewable energy credits for installing energy producing equipment
6. personal fulfillment resulting from an individual’s own initiative to assist in the community effort of reducing energy demand
7. less dependence on grid-based power supply may provide feeling of security during uncertain economic times
8. a university town citizens are well attuned to latest trends, as well as feel responsible for leading the way in community advancements
9. concern for general success of future generations of Ames citizens (similar to #’s 1, 2 and 4 above)

This Commission workshop will likely be followed up with the City holding an open house, in which the community can engage in this topic and provide valuable feedback to the City before any options or recommendations are forwarded to City Council. A brief summary of a possible timeline is at the end of this report.

Iowa, as part of the upper Midwest, ranks high compared to the majority of the United States, for wind resource availability, as determined in the 1987 study by the National Renewable Energy Laboratory division of the Department of Energy. See the included color United States map below.



Current Code

Ames Municipal Code Section 29.501(4)-4 lists “energy production” as a land use under the “Manufacturing and Processing” category of the **Industrial Uses** section of the Use Categories in the Zoning Code. Because this land use is listed as a use within the Industrial Uses, then it falls under the general code definition for all Manufacturing and Processing land uses, which is:

*“Uses that involve the manufacturing, processing, fabrication, packaging or assembly of goods. Products may be finished or semi-finished and are **generally made for the wholesale market**, for transfer to other plants, or to order for firms or consumers. Goods are generally not displayed or sold on-site, but if so, they are a subordinate part of the sales.”*

Because electricity generated by wind or solar activated equipment will typically be connected to the same home electrical system that is also powered by the grid, then the system is at least partially connected to, or capable of feeding electricity back into the grid, which then makes it a wholesale product, described above, by the “manufacturing and processing” definition.

Because of the determination that energy production is only an industrial land use in the current code, it is subsequently not listed as a permitted principal or accessory land use in residential zoning districts. Therefore, this makes the land use prohibited at this time. This prohibition ultimately led to the Council referral to City staff because of an inquiry for solar panels proposed to be installed at a residential address.

Adding Energy Production as an Allowable Land Use

Recent inquiries so far from the public have either been about solar or wind technology installations. These are the two most common forms of renewable energy. The inquiries have all been from single-family detached property owners, with the exception of one industrial property owner inquiry and one institutional property owner. Of the single-family property owners that have inquired, all have been inquiries to install equipment on property with a previously-built residence, with the exception of one owner, who was inquiring during the pre-construction planning phase about the installation of a wind turbine to supplement power for the new home.

Given the fact that the majority of the inquiries have been regarding residential properties, it would be logical for the City to include at a very minimum, in any code changes, residential zones which typically contain single-family detached homes. Another consideration that should be made is that nearly all properties in Ames have access to electrical service; therefore, it is conceivable that there may be a wide variety of other land uses that would benefit from on-site renewable energy production. These land uses could include a wide variety of commercial, residential, industrial, and institutional uses. Therefore, adding “energy production” as an allowable use in all zones may be one option that the City should explore.

When the current zoning code was adopted in May 2000, it is likely that on-site energy production was not anticipated, since energy production was only written into the industrial zone. For that reason, the City may want to explore whether renewable energy systems should be separately accommodated for in the Municipal Code. For example, it is likely that the energy production in industrial zones would be of a very large scale, such as for the entire city. An energy production facility of that scale would likely be powered by chiefly non-renewable energy sources—such as natural gas or coal. Because of this significant difference in the goals between an industrial property owner and a residential property owner, the City may want to consider allowing only renewable energy sources in non-industrial zones. This would likely be handled through distinctive definitions separating the broader term of “energy production” away from something like “on-site” or “small-scale” power systems, which might only be allowed to use renewable sources.

One side effect of prohibiting non-renewable energy production is that the City may need to determine if the intention is to prohibit emergency generators connected to wiring systems. If the policy is not to prohibit emergency generators, then another definition will need to be created for emergency systems so that the adoption of a code which promotes renewable energy will not create land use nonconformities throughout the city where there are legitimate needs for emergency power, such as hospital services, public safety, and or even typical residential homes where temporary power can be provided by generators.

The potential options contained in this report deal only with residential and mixed use zones. This is based on the notions that energy production is already a permitted land use in the Industrial zones and that there have been no inquiries in Commercial or Agricultural zones. However, it still may be wise for the City to place the same level of emphasis on each zone to better prepare for growing interest in the field.

Wind Power in Neighborhoods and Applicable Code Definitions

Any new tall structure, such as a wind turbine tower, in a residential neighborhood is typically a source of neighborhood concern. The typical investment for the homeowner varies greatly depending on size and site conditions. The installed price range can be as little as \$15,000 and go upwards of \$30,000. The following are likely concerns that may be cited by neighbors:

- The potential for the tower to fall on adjacent property
- The potential for shadow flickering on adjacent property or window openings
- Neighborhood blight of a structure very different from surroundings
- Noise/vibration during operation/movement
- Tower structure/color: monopole, webbed, legged or protruding from rooftop. Also the color of the structure in comparison with surroundings.

Because the list of potential concerns is difficult to predict, it may be wise for all wind turbines proposed in residential and mixed use zones to be reviewed by the Zoning Board of Adjustment (ZBA) through the Special Use Permit (SUP) process. The SUP process allows various voices to be heard, as well as bring the neighborhood together to determine if there is a common thread among those concerned about the proposal or alternatively, those generally in favor of the proposal. This process may be enhanced by requiring that a neighborhood association meeting be required prior to the ZBA hearing. This approach would attempt to meet the City Council goal of strengthening neighborhoods. However, one of the options included in this report allows administrative approval of some wind energy systems if a list of conditions is met by the applicant.

Definitions

Current residential zone development standards (not including F-VR and S-SMD) refer only to maximum height of accessory **buildings**, but do not speak generally to accessory **structures**. This is important regarding wind turbines, because current code defines **buildings** as:

“any structure having a roof supported by columns or walls for shelter, support or enclosure of persons, animals or chattels.”

Because of this definition, it appears that “non-building” accessory structures were not anticipated by the current code. The wind turbine would be an example of such a structure because it does not have a roof. If these were anticipated by existing code, it may have been determined that the likelihood was low enough not to consider expanding the development standard so that it would refer to accessory structures. The current code definition of **structure** is:

“anything constructed or erected, the use of which requires, directly or indirectly, a permanent location on the land.”

However, at this time, the likelihood of non-building accessory structures appears to be increasing, and it may be time for new definitions specific to non-building accessory structures, and allow the existing definition regulating the placement of accessory buildings be continued. This may be a good approach for the City, since renewable energy systems appear to be an

evolving technology. While we have some examples of current fixtures and equipment, it is likely that newer technologies will replace those that are outdated and inefficient at some point in the future. Therefore, using the rigid development standards currently used to regulate building placement may only be a stopgap approach.

Applicable current codes for maximum height, placement and bulk of **accessory buildings** in Agricultural, Residential, or Hospital zoning districts are:

Municipal Code Section 29.408(7)(a):

- a. A detached garage or accessory building on the same lot with a 1 story principal building shall not exceed the height of that principal building.
- b. Detached garages or accessory buildings on the same lot with a principal building that is taller than 1 story shall not exceed 80% of the height of the principal building or 20 feet, whichever is lower.
- c. Detached garages and accessory buildings in the rear yard shall not occupy more than 25% of the rear yard.
- d. The construction of a detached garage or accessory building shall not precede the construction of the principal building on the same lot.
- e. In no case shall a detached garage or an accessory building in the rear yard be placed closer than 15 feet to any lot line that abuts a street.

Applicable current code for maximum height including “allowable projections”:

Municipal Code Section 29.401(5):

- (a) Projections allowed. Chimneys, flag poles, radio and television antennae, satellite receiving dishes, and other similar items with a width, depth or diameter of 5 feet or less may rise above the height limit if within 5 feet above the highest point of the roof. Elevator mechanical equipment may extend up to 16 feet above the height limit. Other rooftop mechanical equipment which cumulatively covers no more than 10% of the roof area may extend 10 feet above the height limit. Parapet walls may extend 10 feet above the height limit.
- (b) Architectural features. Steeples, spires, cupolas, clock towers and similar features with a footprint of less than 200 square feet are permitted above the height limit, but may not exceed one and one-half times the allowable height.

It appears that these current codes which regulate height, placement, and projections of buildings, were not written to include the wide variety of sizes and configurations common with wind and solar equipment, therefore some customized definitions may be a good approach to separate accessory buildings from renewable accessory structures. It may also be wise for the city to include statements which explicitly exclude renewable energy equipment in these existing codes provisions in order to prevent conflicting regulations.

Many zones in the city of Ames have a maximum building height of 35 feet. A recent issue of *Solar Today* (industry periodical on solar and wind power) published an article with a statement about “zoning obstacles in local government.” One of the obstacles that the article referred to was regarding maximum height. The author found that the maximum heights of 35 feet, which are found in hundreds, if not thousands of cities across the country, were actually a remnant of original fire codes that were adopted to prevent buildings being built beyond the height that water could be pumped to put out fires. It may be possible to therefore reach a conclusion that what we may currently use as a bulk regulation to control neighborhood character may actually have been a side effect of old fire code.

Excerpted from: Sagrillo, Mick, “Zoning for Small Wind Turbines,” *Solar Today*, November/December 2008, pages 54-55.

It should also be noted that building codes in Ames requires any **structures** that are built, be built to withstand 90 mph wind. That standard must be certified by an engineer. Based on these two facts, it may be wise for the City to consider if the perceived safety concerns regarding unusual tall structures are actually valid. If they are valid, then should the review processes that the City might adopt serve to mitigate actual safety risks, or perceived safety risks—or should they balance both in the name of the public trust?

Solar Power in Neighborhoods

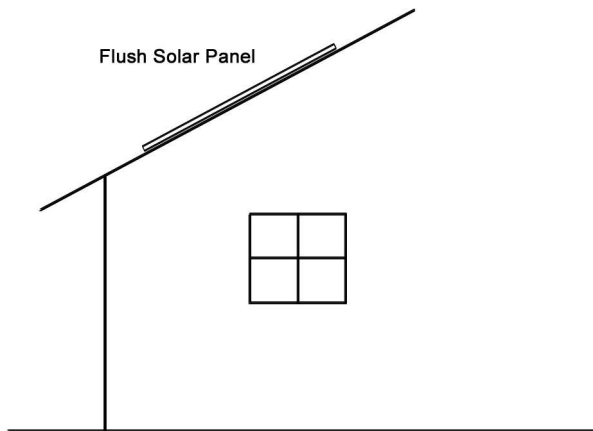
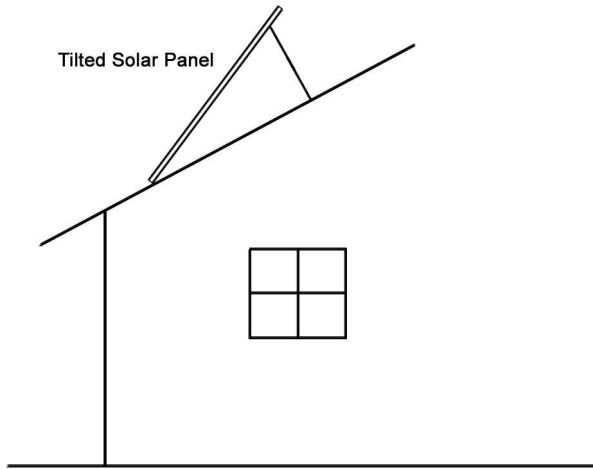
Solar energy can be converted to a useful domestic purpose in several ways. Many of these ways are traditionally more common, such as “passive” solar heat, which is simply a wall or roof system that is designed to trap solar energy more effectively than conventional building materials, typically because of the home orientation toward the sun. “Active” solar energy systems usually include the automated movement of air or water, such as solar water heating systems. Neither the active nor the passive systems have to be electricity generators. However, active systems that are not electricity generators may have exterior equipment which is out of character with the rest of the neighborhood. Because materials and placement are common among exterior solar equipment, it may be wise for the City to regulate all solar systems with exterior equipment in the same way, regardless of whether electricity is generated or not. This approach could be implemented through a very broad definition of a solar energy system, which includes all exterior applications that were active, passive, and/or electrical.

Solar energy equipment typically does not require mounting at significant heights, therefore neighborhood concerns may be related more toward the following topics:

- Reflectivity on neighboring properties or home windows
- Neighborhood blight of a structure very different from surroundings
- Blight of equipment mounted on home
- Placement within previous green space

One option contained in this report includes criteria that seek to retain the character found in the various architectural styles of homes, by requiring that the panels are flush-mounted to the roof, unless the applicant wished to seek a Special Use Permit. Depending on the desired efficiency of the system, most older homes with lower sloped roofs would require the panels to be tilted at a steeper angle. Within that same option, the applicant would alternatively be allowed to place the

panels on a separate structure(s) in the rear yard. This approach allows the applicant some options for placement without having to seek a Special Use Permit. It is likely that there are home owners that purchased their homes without considering whether their home is the proper orientation toward the sun or wind, but they are now considering a retro-fit application instead of building or purchasing a new home. This would be the City's approach to helping that property owner. See the below images to compare "flush-mounted" to "tilted" solar panels.



One of the other options would be to require a Special Use Permit for each and every situation of renewable energy systems in residential neighborhoods. This may be a wise option if the level of unpredictability is considered to be too high to not allow staff approval for some cases that may blend well with the neighborhood character, according to adopted criteria. For example, the placement of panels, even if they are flush to the roof slope, may still be too much of an inconsistency in some neighborhoods. However, given the fact that there is little or no design or color review of residential home construction (except for Somerset and some planned developments), this level of review may be beyond other City of Ames policies. Therefore, basing decisions solely on aesthetics may be important relating to panel tilt, but not factors such as other angles of installation/orientation or the percentage of roof coverage. A variation to all of these alternatives could be that the City would not regulate the placement of solar panels when they are attached to the principal structure, only when they are accessory structures.

What About Industrial, Commercial, and Agricultural Zones?

Currently, energy production is a permitted use in Industrial zones; therefore, the types of concerns that may arise in a residential setting would not be heard at a ZBA meeting. The only requirement is administrative approval of a Minor Site Development Plan, as well as the nearly complete City Interconnection Agreement. It may be wise to add language to the existing code, which makes it clear that renewable energy systems are a type of energy production that Ames does embrace in Industrial zones, and that a Special Use Permit is not required, but that FAA notification for tall structures may be required, where applicable.

What about Commercial and Agricultural zones, particularly where abutting residential zones? Although there have been no official inquiries from commercial property owners about investing in renewable energy systems, there will likely be growing interest. Due to the great variety of commercial development types and intensities, it may be difficult to predict how well received renewable energy systems will be by abutting property owners. It may be wise to add renewable energy production as a permitted accessory use in all commercial zones, and require a special use permit in every case. At some point in the future, as more is learned about the success and the interest of renewable energy in commercial areas, criteria can be developed to allow administrative approval of these systems. The transitional areas between commercial and residential, as well as those highly visible commercial corridors will likely be the areas which receive the greatest scrutiny for renewable energy systems. However, those areas of the city may also be areas where the City of Ames can be more visible to the public in educating about the values and benefits of renewable energy, in following the City Council's goal to "go green."

Taking Action

Three segments of the zoning code: (1) land use, (2) definitions, and the (3) development standards, appear to have not been written to address solar and wind renewable energy systems. If no action is taken on this subject, then the status quo will not allow City staff to consistently and accurately respond to inquiries. At a minimum, expanded definitions are needed which reflect the current staff response to public inquiries. However, this approach would mean that specific prohibitions against some types of renewable energy systems will have to be written into the code. This appears not to be the desire of the City Council due to our direction to go "green." Contained below are five options for code changes depending on the desired policy position. None of these options propose exact language for ordinances, but are simply policy statements,

which can be discussed in further detail and re-worked before and after one or more community open houses. Pros and cons of the various options may become more evident once further discussion proceeds.

The five options presented in this report are titled “options” so that titles are available to the Commission to springboard the discussion. The policies under each option are intended to be presented as ways in which the options are carried out. Near the end of each option is an italicized paragraph summarizing the regulatory approach that the City would be taking.

Review Procedures: Administrative or Zoning Board Approval?

General Guidelines:

Solar and wind-powered systems are the only two forms of renewable energy that have been investigated. If there are other viable forms of renewable energy that should be considered, planning staff will consider and investigate them. It is not the intention of these policy options to begin regulating geothermal systems, which do not typically require any visible exterior equipment that is uncharacteristic of current residential development.

To promote health, safety, and general welfare, evidence of an “Interconnection Agreement” from the local utility should be provided whenever there are proposed systems that are planned to provide supplemental power. Proposed systems that are isolated electrically and spatially (proximity distance may be needed) would not require the interconnection agreement. See the latter section on “Concurrent Policy Development” in this report for more details on the Interconnection Agreement being drafted by Ames Electric.

Option 1: Administrative and Zoning Board Approval, Based on Threshold Criteria

Policy 1: Renewable energy production (solar or wind) is permitted in any residential or mixed use zone, subject to all governmental permits and requirements (such as: site development plan, zoning permit, building permit, electrical permit), and evidence of response from FAA, where applicable heights require notification. The approving body will vary depending on zone.

Policy 2: Any above ground mounted solar energy or wind energy system that is self-supported will be defined as a “Renewable Energy Accessory Structure” and regulated by bulk regulations within this section, and not by the general regulations for accessory structures and buildings.

Policy 3: In mixed use and residential zones RL, RM, UCRM, RH, RLP, S-SMD, F-VR, FS-RL, FS-RM and F-PRD, administrative approval is allowed on Solar Energy Systems under certain conditions only. If any of the administrative approval conditions are not met, then a Special Use Permit from the Zoning Board of Adjustment is required.

Administrative Approval Criteria and Submittal Requirements:

- If there are receiving panels that are attached to the structure, that are fixed to the roof structure, are parallel to the roof pitch, protrude no more than 6 inches (check on this with a manufacturer or installer), and are set back from all roof edges at least a distance equivalent to four (4) times the protrusion distance. The intent shall be to prevent panels from visibly protruding beyond roof edges and surfaces of the structure, when viewed from all public ways, to maintain the same architectural angles of the original structure previous to the solar energy system. If the receiving panels attached to the structure do not meet all of the above criteria, then they shall be completely screened from the ground level of any abutting residentially zoned lot and substantially screened from all other adjacent properties at any level, with materials that are consistent with the architectural materials on the exterior of the building; and,
- If there are ground mounted receiving panels, they must be located completely within the rear yard, on the same lot of record as the building being served, set back from all property lines at least two (2) times the overall height, must be no more 80% of the height of the building being served, must be no more total receiving surface area than 5% of the building footprint of the principal building, and must be no more total receiving surface area than 2% of the lot; and,
- Receiving surface area for detached systems shall not cause nonconformity with the maximum lot coverage; and,
- A site development plan is provided to the Department of Planning and Housing; and,
- Photographs of all exterior equipment to be installed is provided to the Department of Planning & Housing; and,
- If receiving media (film) is used, it shall be used according to the **receiving media** definition; and,
- The system maximum capability is 10 kilowatts (10 kW) or less; and,
- The principal use of the lot must be a permitted principal use not requiring a Special Use Permit.

ZBA Approval Criteria and Submittal Requirements:

- Any Solar Energy system over 10 kilowatts (10 kW) but not over 50 kW will need to demonstrate evidence of anti-islanding protection
- Site Plan
- Architectural Plan
- Photographs of all exterior equipment to be installed
- Evidence of preliminary approval of Interconnection Agreement from local utility
- A solar energy system located on a lot without a permitted principal land use can be approved by ZBA only
- If approved by the ZBA, the system can be on a separate lot of record as the building or use being served, as long as an evidence of an easement is provided and recorded prior to permits issued
- For attached systems, the roof edge setbacks, tilt angle and protrusion distance can be waived or reduced only by the ZBA
- For attached systems, the screening and screening materials can be waived by the ZBA only

- For detached systems, the receiving surface area limits can be waived by the ZBA only, but not to create nonconformity with maximum lot coverage
- For detached systems, the setback can be reduced to 110% of the overall height by the ZBA only
- For detached systems, placement can be allowed in the front or side yard by the ZBA only, but only if the overall height is 20% or less of the building height in the front yard or 50% or less of the building height in the side yard

Policy 4: In the RL zone, Wind Energy Systems can be administratively approved if certain conditions are met. If any of the conditions are not met, then a Special Use Permit is required. In any other residential or mixed use zone (RM, UCRM, RH, RLP, S-SMD, F-VR, FS-RL, FS-RM or F-PRD), a Special Use Permit is required.

Conditions for Administrative Approval in RL Zone:

- The lot shall be a minimum of 0.5 acres
- The wind tower height shall be limited to 50 feet
- The wind tower setback shall be 110% of the height
- The wind tower shall be completely within the rear yard
- The wind turbine shall be located on an accessory structure
- Located on the same lot of record as the building being served
- The principal use of the lot must be a permitted principal use not requiring a special use permit

ZBA Approval Criteria and Submittal Requirements:

- Any system over 10 kilowatts (10 kW) will need to demonstrate evidence of anti-islanding protection
- Site Plan
- Photographs of all exterior equipment to be installed
- Evidence of preliminary approval of Interconnection Agreement from local utility
- If approved by ZBA, the overall height can be up to 100 feet.
- If approved by ZBA, the turbine can be attached to the home
- If approved by ZBA, the tower setback can be reduced to 50% of total height, but not less than 110% of the total height from existing structures on adjacent property, only if evidence of an easement defining the 110% area is provided and recorded prior to permits issued
- If approved by ZBA the Wind Energy System can be located on a lot less than 0.5 acres
- In no case shall the wind turbine be allowed in any other location than completely in the rear yard
- If approved by the ZBA, the system can be on a separate lot of record as the building or use being served, as long as an evidence of an easement is provided and recorded prior to permits issued
- A wind energy system located on a lot without a permitted principal land use can be approved by ZBA only

The Option 1 approach would allow City staff approval only if certain safety, location, bulk and aesthetic conditions are met. This policy position is applied to both solar and wind systems. However, with wind systems, this policy position only allows staff approval on RL lots. RL makes up the majority of existing residential development, as well as being the zone in which there are larger lots. Wind turbines on large lots are more likely, due to setback distances likely to be preferred by land owners. For both solar and wind systems, this approach allows the ZBA to approve systems beyond staff approval, but within defined limits. The defined thresholds would utilize the ZBA's authority as a quasi-judicial body to go beyond staff approval, but also remove some pressure from their decision process by setting some pre-determined "absolute" limits.

Option 2: Special Use Permit Required in all Residential and Mixed Use Zones

Policy 1: In mixed use and residential zones RL, RM, UCRM, RH, RLP, S-SMD, F-VR, FS-RL, FS-RM, and F-PRD, a Special Use Permit is required for **Solar Energy Systems** and the proposal shall be reviewed by the Zoning Board of Adjustment using the following criteria:

- If there are receiving panels that are attached to the structure, that are fixed to the roof structure, are parallel to the roof pitch, protrude no more than 6 inches (check on this with a manufacturer or installer), and are set back from all roof edges at least a distance equivalent to four (4) times the protrusion distance. The intent shall be to prevent panels from visibly protruding beyond roof edges and surfaces of the structure, when viewed from all public ways, to maintain the same architectural angles of the original structure previous to the solar energy system. If the receiving panels attached to the structure do not meet all of the above criteria, then they shall be completely screened from the ground level of any abutting residentially zoned lot and substantially screened from all other adjacent properties at any level, with materials that are consistent with the architectural materials on the exterior of the building; and,
- If there are ground mounted receiving panels, they must be located completely within the rear yard, on the same lot of record as the building being served, set back from all property lines at least two (2) times the overall height, must be no more 80% of the height of the building being served, must be no more total receiving surface area than 5% of the building footprint of the principal building, and must be no more total receiving surface area than 2% of the lot; and,
- Receiving surface area for detached systems shall not cause nonconformity with the maximum lot coverage; and,
- A site development plan is provided to the Department of Planning and Housing; and,
- Photographs of all exterior equipment to be installed is provided to the Department of Planning & Housing; and,
- If receiving media (film) is used, it shall be used according to the **receiving media** definition; and,
- The system maximum capability is 10 kilowatts (10 kW) or less; and,
- Any system over 10 kilowatts (10 kW) will need demonstrate evidence of anti-islanding protection; and,
- The principal use of the lot must be a permitted principal use not requiring a Special Use Permit.

Policy 2: In mixed use and residential zones RL, RM, UCRM, RH, RLP, S-SMD, F-VR, FS-RL, FS-RM, and F-PRD, a Special Use Permit is required for **Wind Energy Systems** and the proposal shall include and be reviewed by the Zoning Board of Adjustment using the following criteria:

- All systems shall demonstrate evidence of anti-islanding protection
- Site Plan
- Photographs of all exterior equipment to be installed
- Evidence of preliminary approval of Interconnection Agreement from local utility
- The overall height shall not exceed 100 feet
- If approved by ZBA, the tower setback can be reduced to 50% of total height, but not less than 110% of the total height from existing structures on adjacent property, only if evidence of an easement defining the 110% area is provided and recorded prior to permits issued
- In no case shall the wind turbine be allowed in any other location than completely in the rear yard
- The system can be located on separate lot of record as the building or use being served, as long as an evidence of an easement is provided and recorded prior to permits issued
- A wind energy system located on a lot without a permitted principal land use can be approved by ZBA only.

The Option 2 approach requires a Special Use Permit from the ZBA in all cases. Since there is no staff approval as a springboard for the ZBA, the list of criteria was modified from Option 1. It is important to note that this option would even require Special Use Permits for non-electric generating systems, such as solar water heating. Based on the proposed definitions (at the end of this report), all solar and wind energy systems would be regulated the same way, regardless of whether they generated electricity or not. This is based on the notion that from the street, it may be difficult to distinguish between electric and non-electric systems. This may promote a sense of fairness among neighborhoods if renewable systems became so popular that multiple homes in one neighborhood were equipped.

Option 3: Add Renewable Energy Production to the List of Household Living (Residential) Accessory Uses with Administrative Approval Only (Staff-approved Site Plan and Building Permits Only)

Policy 1: Add “renewable energy production” to the list of Household Living (residential) accessory uses:

“Recreational activities; **renewable energy production**; home occupations, and home day care are Accessory Uses that are subject to limitations found in the Zone Use Tables and the Use Development Standards.”

Policy 2: Require a site plan for all energy production uses which are accessory to household living uses, administratively approve the site plan, and require all other permits, as well as Interconnection Agreement.

Policy 3: Replace accessory building definition with accessory structure definition so that structures such as wind turbines and detached freestanding solar panels are regulated. This approach would effectively require variances for each and every wind turbine in residential zones. It may also require variances for some free-standing solar panels, depending on placement.

*The Option 3 approach would allow the status quo to be continued by improving the “**accessory building**” code definition to better reflect the City’s legal position on bulk regulations. If no new regulations or exceptions for solar panels were proposed, then the current definition for “mechanical unit” would require mandatory screening of any rooftop solar panel associated with home climate control, similar to the screening that is required for rooftop air conditioners. This would not be required of any rooftop solar system solely for electrical production or water heating. This exposes an inconsistency in the code in which the “**mechanical unit**” definition may not have ever been intended to apply to solar panels, since the mechanical unit definition includes only “climate control” and “utility transfer” equipment. This option would allow little or no oversight by the City, beyond regulations that are currently applied to garden sheds or detached garages.*

Option 4: Add Renewable Energy Production to the List of Household Living (Residential) Accessory Uses with ZBA Approval

Policy 1: Add “renewable energy production” to the list of Household Living (residential) accessory uses:

Recreational activities; **renewable energy production**; home occupations, and home day care are Accessory Uses that are subject to limitations found in the Zone Use Tables and the Use Development Standards.

Policy 2: Require Special Use Permit/ZBA approval for all wind energy and solar energy systems.

The Option 4 approach would be a continuation of the status quo except that ZBA approval would be required. However, there would be no review criteria or standards for the ZBA to consider. There would also be no staff approval route. This approach would likely result in significant pressure on the ZBA to produce an outcome that may have otherwise been discovered through a neighborhood meeting or internal staff review. This may be the fast track method of allowing the land use legally, but there would be little community input on acceptable standards.

Option 5: Prohibit all Renewable Energy Production as a Residential Accessory Use Unless More Subtle Solar Media, Such as Film is Used

Policy 1: Add “renewable energy production” to the list of Household Living (residential) accessory uses:

Recreational activities; **renewable energy production**; home occupations, and home day care are Accessory Uses that are subject to limitations found in the Zone Use Tables and the Use Development Standards.

Policy 2: Specifically prohibit renewable energy production in the land use tables for all residential and mixed use zones, unless material that meets the definition of “receiving media” is used.

An example of receiving media is the film currently being developed by the local company in Boone, Powerfilm, who has developed flexible photovoltaic cells that can be fit to a much wider variety of architectural angles, materials, and slopes than traditional solar panels. In some cases, it may be possible for the film to serve as the water-resistant material as a replacement for shingles, windows, or even exterior siding, if building code would allow.

Policy 3: Specifically prohibit wind energy systems as a type of renewable energy production, underscoring the policy that only subtle forms of equipment and structures would be allowed.

The Option 5 approach strengthens the City’s current legal position regarding land use, with one exception if a certain material is used. It effectively prohibits most all types of renewable energy production, except the ground-breaking technology of film. It also goes further than the City’s current legal position, to not even allow non-electric systems. An appeal to the ZBA or ultimately the court system would be the only way that an owner would be able to gain permission for the prohibited use, unless it was one using film. This would leave out more traditional solar systems, and all of the wind systems.

Concurrent Policy Development

In process is a draft of an “Interconnection Agreement for Renewable Energy Net Metering,” by the Ames Electric staff. This agreement spells out the responsibilities, safety aspects, and account credits, as well as includes signatures from the owner and the City. It was modeled after one already in use by another city in Iowa, although it has been customized for the needs of Ames Electric.

This agreement, while chiefly directed toward the financial aspect of net metering, also contains some safety provisions for proper equipment to be installed so that Ames Electric can access a system disconnect switch in order to prevent current from energizing lines when repairs are being conducted on City lines. The lack of such a switch could mean that lines could be energized by the renewable energy system from someone’s home when the rest of the neighborhood could be in a black-out.

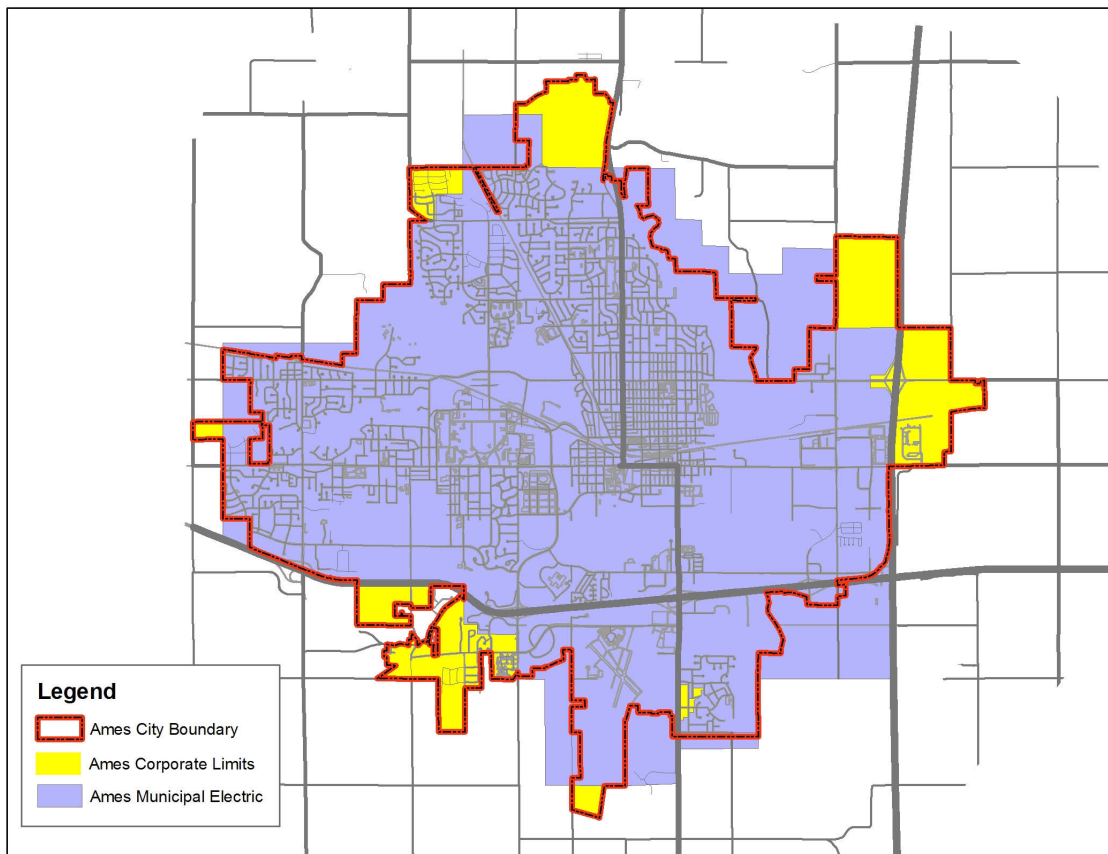
It is likely that any equipment installed will be manufactured to be compliant with the National Electric Code (NEC), Underwriters Laboratories (UL), and Institute of Electrical and Electronics Engineers (IEEE). This is a requirement of the proposed Interconnection Agreement. It is also likely that the installation of that equipment will be inspected by City inspectors who are ensuring that the installation is compliant with the National Electric Code, as well as any local amendments.

It is inevitable that an electrical permit will be required, but there may also need to be a technical standard applied to installations which are inside the Ames corporate limits, but are outside the Ames Electric Services Territory. Some examples of these areas are, but not limited to: 1. the western section of Northridge Heights, 2. Ringgenberg Subdivision, 3, an area on the east side of South Duff Avenue, south of U.S. 30, which is part of Emerald, Teagarden and Richardsons

subdivisions. See the included map for an overview of the areas outside the Ames Electric Territory, but inside the corporate limits. Also note that there are areas outside the Ames corporate limits that are inside the Ames Electric Territory.

Adopting technical standards for these areas will ensure that the same level of quality of equipment will be installed as areas within the Ames Electric Territory, but also remove the periodic testing requirement unique to customers of Ames Electric. This will allow periodic testing and any other unique interconnection requirements to be handled by the applicable utility.

See the below graphic for an illustration of Ames Electric Service territory compared to the corporate limits.



Access Rights

Solar and Wind Easements: If the City grants a zoning permit for installation, that should not mean that the City is then guaranteeing access to the solar or wind resource. It should be the responsibility of the owner to obtain and maintain access through easements or property ownership. This can be accomplished through a general statement in a new code section.

Definitions

Accessory structure (definition amended to not include renewable energy accessory structures) means a subordinate structure detached from but located on the same lot as a principal building. The use of an accessory structure must be incidental and accessory to the use of the principal building. Accessory Structures include garages, decks, and fences. Accessory structures do not include renewable energy accessory structures, which are defined and regulated by this section.

Anti-islanding protection means isolation from the local utility electrical grid to prevent unsafe and inconsistent electrical fluctuations. Unsafe electrical fluctuations are determined by the local utility.

Building height refers to the building being served by the system and means the same as “height” in the existing zoning code definitions, Section 29.201(83).

Emergency power system means a device or assembly of devices which temporarily provides electricity when the local utility source is unexpectedly interrupted.

Energy production (expanded definition already in Article 5) means the generation of electricity for the wholesale market, which includes any wind energy or solar energy system that is capable of supplying power to a property or building which is also capable of being supplied electricity by a local utility.

Grid means the electrical utility distribution network managed, controlled, or owned by the local utility.

Interconnection or Interconnected, for the purpose of this section, means an energy producing system which is either attached permanently to a local utility electrical system, or can be temporarily detached from a local utility electrical system by automated switches or utility personnel.

Local utility means the agency or organization recognized by the Iowa Utilities Board who controls the grid.

Mechanical Unit equipment (definition amended to not include renewable energy systems and equipment) means a climate control device and/or a piece of hardware used for the delivery or measurement of utilities that is located above ground and is clearly visible. Mechanical equipment shall not include any and all parts of wind and solar energy systems, renewable energy accessory structures, and non-electric-generating solar equipment, which are defined and regulated by the Section 29.etc, etc, etc, (this section).

Non-electric-generating renewable energy equipment means a device or assembly of devices that are not an integral part of a building structure which are used to transfer renewable energy to use as an energy source for the heating of water, pumping of water, heating of buildings, swimming pools, or similar uses.

Non-interconnected, for the purpose of this section, means an electrical producing system which is not electrically, mechanically, physically, temporarily or permanently attached to a local utility electrical system. A switch is not sufficient to meet this requirement. Non-interconnected shall require the spatial separation of at least X feet away from any portion of the local utility electrical system, as well as any attached electrical system.

Photovoltaic (PV) means the technology using solar cells to convert sunlight into electricity.

Receiving media means that portion of the solar energy system that absorbs the solar energy which is part of the original structure of a building in a way that is visibly seamless and architecturally similar to the building exterior, and will not stand alone from the rest of the building as a protrusion without being contained by or completely flush with all exterior surfaces of the building. An example of receiving media is flexible film.

Receiving panels means that portion of the solar energy system that absorbs the solar energy which is retro-fitted or not part of the original structure and typically protrudes from, or is detached from the building transferring the electricity.

Renewable energy means thermal, electrical, or mechanical energy that is produced by the receiving of a naturally replenished power source, such as wind, solar radiation, tidal forces, or flowing water.

Renewable energy accessory structure means a self-supported structure existing solely for the purpose of renewable energy.

Renewable energy accessory structure height means the distance from the ground level where secured to the ground to the furthest point of height. In the case of wind turbine towers, this will also include the highest possible point of any moving parts. In the case of solar panels this will be the highest point of adjustment, if designed as an adjustable system.

Solar energy system means a device or assembly of devices which converts solar energy into a source useful for domestic purposes, such as, but not limited to building heating, water heating, or electricity. This includes inter-connected, non-interconnected, and non-electricity generating systems.

Tower setback means the distance that the wind turbine and all parts thereof, including any guy wires, is from all property lines, measured at the nearest point.

Wind energy system means a device or assembly of devices which converts wind energy into a source useful for domestic purposes, such as, but not limited to water pumping, building heating, water heating, or electricity. This includes inter-connected, non-interconnected, and non-electricity generating systems.

Wind turbine means a device which moves as a result of wind current to produce mechanical or electrical energy. This can include any orientation or design, such as horizontal or vertical.

Proposed Timeline of Events

- Planning & Zoning Commission Workshop (this meeting)
- Open House (March or April)
- Planning & Zoning Commission review of proposals (April or May)
- Planning & Zoning Commission recommendation to City Council (May or June)
- City Council Review of Options (June or July)

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