



# County of Fairfax, Virginia

## MEMORANDUM

**DATE:** February 11, 2009

**TO:** BOARD OF SUPERVISORS

**FROM:** James P. Zook, Director  
Department of Planning and Zoning *J. Zook*

**SUBJECT:** Possible Zoning Ordinance Amendment Regarding Wind Turbines and Solar Panels

This memorandum is in response to a June 30, 2008 Board request for staff to prepare a Zoning Ordinance amendment that would eliminate possible hurdles pertaining to the installation of wind turbines and solar panels, on residential properties as alternative energy sources in order to help fight global warming. A copy of the Board's request is attached. This memorandum includes an outline of the existing applicable Zoning Ordinance regulations, background information, regulations of other jurisdictions and a staff recommendation.

### Existing Zoning Regulations

Under the current Zoning Ordinance, wind turbines and solar panels are permitted accessory structures on residentially zoned properties provided they serve the residence on the property and are subordinate in purpose, area and extent to the dwelling served. Wind turbines and solar panels may be installed on rooftops or on freestanding poles or towers subject to the following:

#### Rooftop Installations

Under Sect. 2-506 of the Zoning Ordinance, chimneys, spires, cupolas, water tanks, smoke stacks or other similar roof structures and mechanical appurtenances that do not occupy an area greater than 25% of a roof are exempt from the maximum height limitations of the Zoning Ordinance. Wind turbines and solar panels are deemed to be "similar roof structures and mechanical appurtenances" and are therefore exempt from the maximum height limitations of the Zoning Ordinance, provided that no more than 25% of the roof is cumulatively covered with the previously listed features.

#### Freestanding Installations

Wind turbines and solar panels mounted on poles or towers are exempt from the maximum height limitations pursuant to Sect. 2-506, and are subject to the location provisions for freestanding accessory structures. Under Par. 12 of Sect. 10-104 of the Zoning Ordinance, freestanding wind turbines and solar panels are not permitted in a minimum required front

Department of Planning and Zoning

Director's Office

12055 Government Center Parkway, Suite 700

Fairfax, Virginia 22035-5505

Phone 703-324-1325 FAX 703-324-3337



yard (required front setback) and in any front yard on a lot containing 36,000 square feet or less. Freestanding wind turbines and solar panels that are seven feet or less in height can locate in any side or rear yard. Freestanding wind turbines and solar panels that are greater than seven feet in height are not permitted in any minimum required side yard and must be setback a distance equal to their height from the rear lot line.

### **Wind Turbine Specifications**

Wind energy describes the process by which the wind is used to generate mechanical power or electricity. This mechanical power can be used for a specific task, such as pumping water, or can be converted into electricity. In this latter case, the wind turbines use wind to turn the blades, which spins a shaft, which connects to a generator and makes electricity.

Wind turbines fall into two basic groups, the horizontal axis variety, and the vertical axis style, which looks like an egg beater. The horizontal axis wind turbine typically has two or three blades. The three-bladed wind turbine is the most common modern design and is operated upwind, with the blades facing into the wind. A review of various wind turbine specifications shows that freestanding pole mounted or tower mounted wind turbines typically have a rotor diameter anywhere from 12 to 24 feet (the rotor diameter is the cross sectional dimension of the circle swept made by the rotating blades, the rotor includes the blades and the hub, which the blades are mounted to). Rooftop mounted wind turbines are much smaller, having a rotor diameter typically of three feet. The rooftop style are less expensive and generate less electricity than the freestanding pole mounted type and may be able to run a water heater or water pump. The amount of electricity that can be generated depends on the wind speed and the consistency of the winds as well as the capability of the specific wind turbine. Wind speed typically increases with elevation and the higher the wind turbine is positioned the more electricity it can generate. Residential wind turbine towers typically range in height from 34 to 70 feet, not including the blades mounted on top of the tower. Enclosed are pictures of typical rooftop wind turbines and freestanding turbines including both horizontal and vertical or egg beater styles.

According to the literature, wind turbines on residential properties can be designed to connect to and provide power for certain features such as pumps or water heaters. One major provider of wind turbines indicates that their product is designed to be tied into a home's electrical system. Under such a system, the house is powered by the wind turbine when there are adequate winds, and when the wind is not blowing, the home is powered by the electric utility. This company also advertises that, during periods of strong winds, excess electricity can be produced and depending on the utility, the electric meter will spin backwards and credit is given for a later date.

Over the last few years technological advances have made it more feasible to install wind power generators for individual homes and the newer systems are more efficient and quieter than older wind generators. However, a number of considerations still must be taken into account when determining if an alternative energy source is appropriate. Even though the cost of wind power has decreased dramatically in the past 10 years, the installation costs are high, and provided adequate wind, it may take several years to recoup installation costs. A major challenge to using

wind as a power source is that wind is intermittent and does not always blow when electricity is needed, and depending on the location, wind as a source of energy may not be an option. While noise impacts have been reduced in recent years, noise is still produced by the rotor blades. There may be adverse visual impacts on adjacent properties, and birds are occasionally killed by flying into the rotors.

Not every geographical location is suited for the use of wind as an energy source. A consistent wind, with average speeds of approximately 11 miles per hour is required to make a wind energy system feasible. The U.S. Department of Energy's National Renewable Energy Laboratory has published a wind resource map for the Commonwealth of Virginia. Several areas of Virginia are estimated as having good-to-excellent wind resources, including the Atlantic coast along the Delmarva Peninsula and the Virginia Beach area, the ridge crests in the north central part of the state, and the ridge crests near the West Virginia and North Carolina borders. Fairfax County and its surrounding area are identified by the U.S. Department of Energy as being unsuitable for wind energy development. However, that there may be localized areas in Fairfax County where wind energy development might be feasible on a small scale, particularly when wind energy is combined with solar power.

#### **Other Jurisdictions' Regulations**

Many localities throughout the United States in recent years have been developing wind turbine regulations, including localities in California, Michigan and Texas. The only nearby jurisdictions that have adopted such regulations to date are Carroll County, Maryland and Clarke County, Virginia.

The Carroll County regulations became effective on May 14, 2008 and the main features of its provisions include:

- No more than two wind turbine systems per property and wind turbine systems can not be attached to any building;
- Allows wind turbines with power up to 50 kilowatts and a maximum height of 150 feet in all zoning districts; and
- A wind tower for a wind turbine system must be setback a distance equal to its total height plus an additional 20 feet (to accommodate the rotor) from any road, right of ingress or egress on the property, overhead utility lines and property lines.

The Clarke County regulations were adopted on November 18, 2008 and the main features of its provisions include:

- Allows a wind energy system with power less than 100 kilowatts and consisting of a wind turbine, tower, base and/or associated electronics.
- Allows up to two turbines up to 100 feet in height as an accessory use in any district, and allows three or more turbines and/or turbines greater than 100 feet in height as a special use requiring Board approval.

- A wind energy system must be setback at least equal to the height of the tower plus the blade length from all adjacent property lines
- The minimum distance between the ground and any protruding blades must be 15 feet, as measured at the lowest point of the arc of the blades. The lowest point of arc of the blade must also be 10 feet above the height of any structure within 150 feet of the base of the tower.

Frederick County, Maryland is in the process of developing regulations for both wind turbines and solar collection systems. Draft regulations have been prepared and have been discussed at public work sessions that were held as recently as December, 2008. The proposed regulations include a setback distance equal to its height from all property lines and exempts rooftop wind turbine and solar systems from regulation if less than 10 feet in height. It is anticipated that the proposed Frederick County regulations will be scheduled for public hearings in early 2009.

Given the above stated setbacks, it has been noted by other jurisdictions as well as industry that a property of at least ½ acre is required to accommodate a freestanding wind turbine.

### **Conclusion**

Although the current Fairfax County zoning regulations do not specifically discuss wind turbines and solar panels, the existing regulations accommodate these features on residential properties by exempting them from building height and allowing them in the same manner as either detached accessory structures or rooftop features. After comparing the current Fairfax County regulations with other regulations from both around the country and nearby jurisdictions, the current Fairfax County regulations for freestanding wind turbines are actually more permissive than the other jurisdictions. The one common element of all the other jurisdictions is that they require, at a minimum, that a freestanding wind turbine be setback a distance of its height from all property lines, in order to protect adjacent properties from any adverse impacts of the rotating blades and in the event the structure falls. Fairfax County, however, requires that the structure be setback the distance of its height only from the rear property line. As such, it is conceivable that on a lot greater than 36,000 square feet, a freestanding wind turbine structure could be located in the front yard, as long as it is not in the required front setback, and provided the structure is setback the distance of its height from the rear lot line and is not closer to the side lot lines than the minimum side yard setback.

Given that other jurisdictions' regulations pertaining to wind turbines are more restrictive than ours, it appears that hurdles pertaining to the installation of wind turbines in Fairfax County are not zoning related, but rather have to do with the fact that this area is not best suited for using wind as an energy source. If the Zoning Ordinance were to be amended to specifically address wind turbines, staff would recommend, at a minimum, that freestanding wind turbine structures be setback the distance of their height from all property lines. It is noted that although wind turbines have limited application in Fairfax County, the most practical wind turbine application from a cost and a use standpoint, would appear to be the rooftop style, which along with solar panels, the Zoning Ordinance already accommodates. While further restricting the location of a freestanding wind turbine structure has merit from a safety perspective, given the potential

limited application, the risk of not proceeding with an amendment at this time appears relatively low. That coupled with limited staff resources and a number of existing high priority amendment requests, it is recommended that the wind turbine amendment request be placed on the Priority 2 list of the upcoming 2009 Zoning Ordinance Work Program for future Priority 1 consideration.

If you have any questions or wish to discuss in more detail, please contact either me at 703-324-1325 or Eileen McLane at 703-324-1314.

Attachments: A/S

cc: Anthony H. Griffin, County Executive  
Robert A. Stalzer, Deputy County Executive  
Eileen M. McLane, Zoning Administrator

Therefore, jointly with Supervisor Foust, Chairman Connolly moved that the Board direct staff to create a strategic action plan to preserve permanently all lands currently under A&F designations, and to prioritize for protection the parcels that are most threatened or most ecologically significant. This strategic action plan should employ policies identified in the June 9 staff report, including but not limited to:

- Purchase of Development Rights
- Stream/historical overlay districts
- TDRs (including those obtained through proffers)

Supervisor Foust seconded the motion, which carried by a vote of nine, Supervisor McKay being out of the room.

34.

**EMPOWERING CITIZENS TO FIGHT GLOBAL WARMING: WIND TURBINES AND SOLAR PANELS** (1 p.m.)

With reference to his written Board Matter on the subject, Chairman Connolly said that recently constituents contacted his office to ask about bureaucratic barriers to the installation of residential wind turbines and solar panels on their properties. These devices can play a significant role in reducing greenhouse gas emissions. A residential wind turbine, for example, that costs between \$6,000 and \$22,000 can reduce 200 tons of greenhouse gases and over a ton of other pollutants over its lifetime. Unfortunately, these citizens have encountered a couple of hurdles in their efforts to fight global warming. County Zoning requirements for accessory structures and setbacks would force citizens installing a wind turbine to go before the Board of Zoning Appeals to get approval for a reduction in setback requirements. Although the County provides tax incentives to install solar panels, many Homeowners Associations (HOAs) prohibit the installation of solar panels in their covenants. Because both wind turbines and solar panels can reduce emissions, and because citizens have demonstrated an interest in using these technologies, the County should eliminate red tape that is preventing them from helping to fight global warming.

Chairman Connolly moved that the Board direct staff to:

- Prepare a Zoning Ordinance Amendment to de-classify wind turbines and towers associated therewith as accessory structures and undertake to eliminate hurdles to installing wind turbines.
- Explore legislation for the General Assembly to address HOAs' covenants that prevent the installation of solar panels, and report to the Board's Legislative Committee with recommendations.

Supervisor Foust and Supervisor Hudgins jointly seconded the motion.

Following discussion, Supervisor Gross asked unanimous consent that the Board direct staff to:

- Examine any noise impacts of wind turbines.
- Solicit input from HOAs.

Without objection, it was so ordered.

Following a brief discussion, Chairman Connolly asked to amend his motion to direct staff to also include the proposed amendment on the agenda of the Board's Environmental Committee, and this was accepted.

Vice-Chairman Bulova relinquished the Chair to Acting-Chairman Hyland and asked unanimous consent that the Board direct staff to circulate information on the County's tax incentive program for the installation of solar panels. Without objection, it was so ordered.

Acting-Chairman Hyland returned the gavel to Vice-Chairman Bulova.

The question was called on the motion, as amended, which carried by unanimous vote.

35. **FAIRFAX COUNTY'S FIRST COOL NEIGHBORHOOD (DRANESVILLE DISTRICT)** (1:04 p.m.)

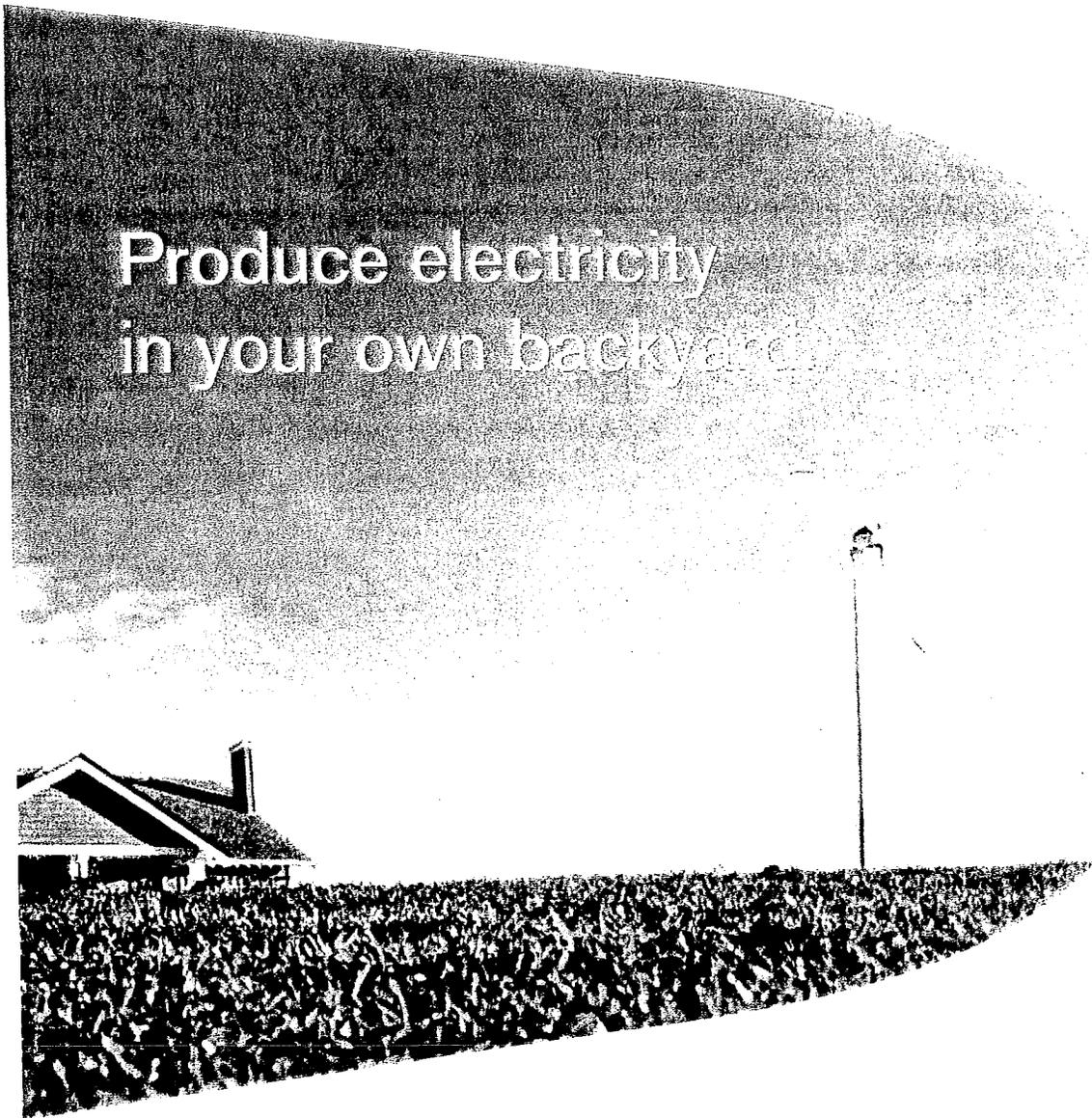
In a Board Matter presented jointly with Supervisor Foust, Chairman Connolly said that over the last six months more than a dozen members of the community met with his office staff and regular County staff to create a Cool Neighborhoods program, which is a template to assist neighborhoods and homeowners to reduce greenhouse gas emissions. Only a month after creating this program, the first community in Fairfax voted to become a Cool Neighborhood. McLean Hunt Estates Civic Association Board unanimously approved becoming a Cool Neighborhood, following commitments by 23 of the 66 homeowners to participate in the program and strive to reduce household emissions by two percent annually.

Accordingly, jointly with Supervisor Foust, Chairman Connolly asked unanimous consent that the Board direct the Office of Public Affairs to invite representatives of McLean Hunt Civic Association to appear before the Board to be recognized as the County's first participants in the Cool Neighborhoods program. Without objection, it was so ordered.

# SKYSTREAM<sup>3.7\*</sup>

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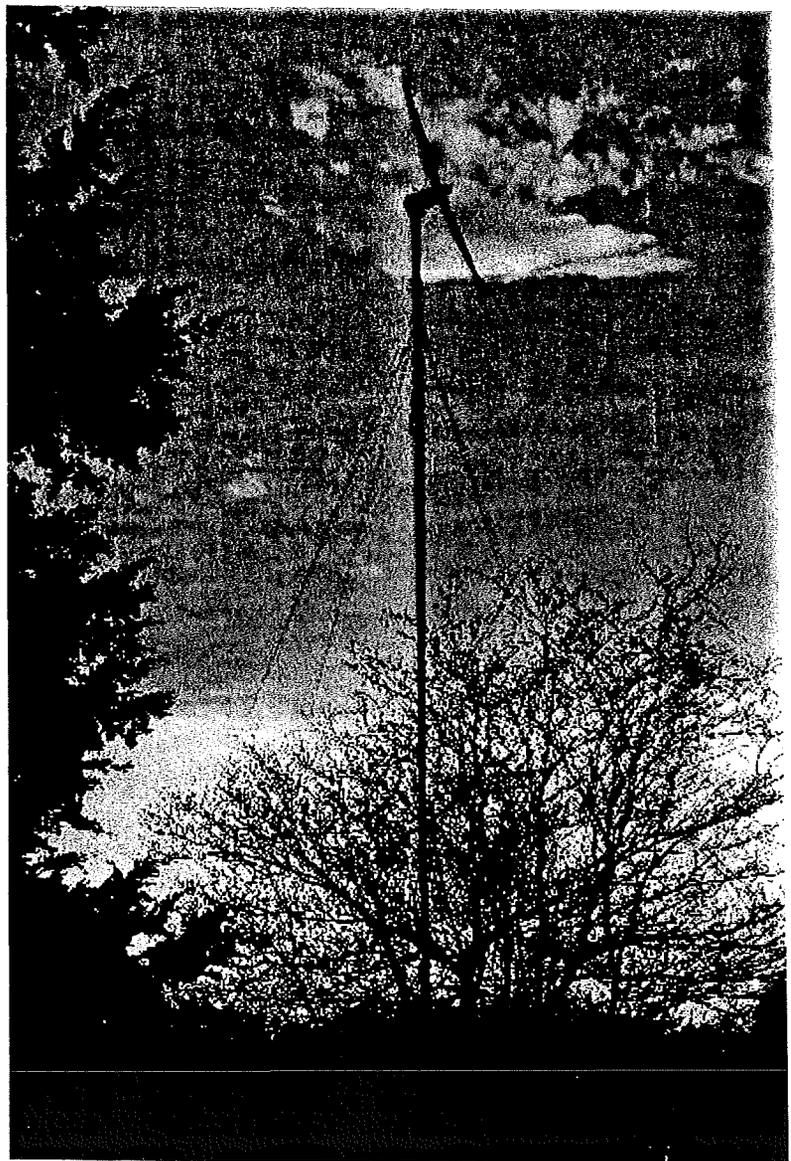


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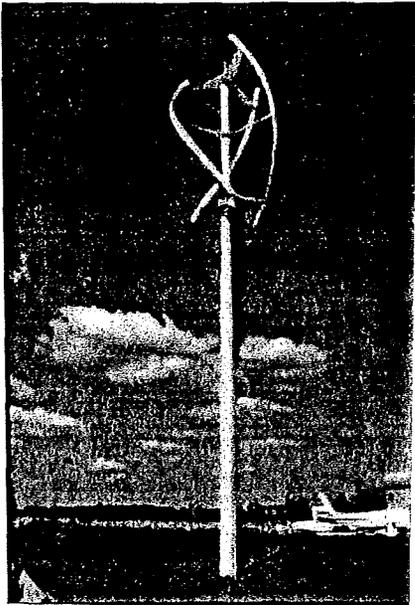
Wind availability maps are published by the US National Renewable Energy Lab. You can get a general idea from these maps if you are living in a state and county with sufficiently high winds.  
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[Ditch the Grid with Quietrevolution's 10000kWh Vertical Axis Wind Turbine](#)  
stored in: [Vertical-Axis Wind Turbine](#)







PHOTOS BY ELIZABETH RAZZI FOR THE WASHINGTON POST

