The Boone County Planning and Zoning Commission’s (“P&Z”) draft regulations on wind farms are unreliable and P&Z knows or has reason to know that these are designed to ban wind in Boone County. Furthermore, the documents described below (and attached) show these regulations are being sent to other counties to ban wind development there too, based upon the same faulty analysis. The comments are separated into three sections: information showing these setbacks prohibit commercial wind development, information showing that P&Z relies on the unsound recommendations from a witness with anti-wind bias, and information showing that the P&Z Commissioners expressing desire for wind to be developed elsewhere and banned in Boone County.

I. Proposed Setbacks, Alone, Make Commercial Wind Development Impossible

In the course of preparing these regulations, the County’s Resource Management Staff prepared maps to show where wind could be built in Boone County based on setbacks alone.

Exhibit 1:

This a map of Boone County showing the few locations where a wind turbine could be placed and comply with the 1,750 foot setback. Only 20 sites throughout the county would be able to meet the required setback. Notably, this map does not show the additional “buffer” contained in the draft ordinances so these possible locations would be further diminished. In addition, the analysis done by the County does not indicate whether more than one (1) turbine could be installed per identified site. Minutes from P&Z meetings include discussion that siting a single wind turbine would require a property to have nearly 500 acres. A commercial wind farm cannot
be built if regulations require each turbine to have such an large amount of space. Even setting aside other problematic provisions, the setbacks alone in the proposed regulations prohibit commercial wind development in the county.

II. **P&Z Bases its Regulations On Unsound Recommendations From An Unqualified Witness With Clear Anti-wind Bias**

While developing the wind ordinances the Commission relied on the opinions and documents provided by Mr. Eric Lidholm. The documents within this section show that Mr. Lidholm is on the record being against all wind in Boone County. Setting aside his clear anti-wind bias, the opinions and recommendations by Mr. Lidholm are unsound and unreliable. Renew Missouri spoke with the author of one of the documents relied on by the Planning and Zoning Commission who provided a letter explaining why Mr. Lidholm and the Commission and incorrect in their interpretation and application of his work.

**Exhibit 2:**

This is a page of a petition of people who oppose all commercial wind developments in Boone County and which was provided to P&Z by opponents of wind. The document is signed by Mr. Eric Lidholm, an engineer that the Planning and Zoning Commission worked extensively with to develop the regulations, including setbacks, height limitations, and noise limitations.

Despite being aware of Mr. Lidholm’s clear, articulated, anti-wind bias, the documents below show that P&Z relied on his input on many aspects of the draft ordinances and almost exclusively on his unsound and flawed interpretation of a paper to determine restrictive setbacks from structures, property lines, and roads. Beyond developing unreasonable restrictions for Boone County, County personnel have continued to tout him as a reliable expert to other county commissions considering wind development. By relying on Mr. Lidholm’s biased and unsound
recommendations, Boone County has positioned itself to be THE leader of all efforts to ban and obstruct wind throughout the entire State of Missouri.

**Exhibit 3:**

This is a May 1, 2019 email from County employee Paula Evans to P&Z sending along the comments of Mr. Eric Lidholm who states he is an engineer and that he relies on a study to develop the setbacks included in these regulations. The study was attached to the email. He also offers his purported “professional opinion” that setbacks used for occupied structures should be the same as setbacks from property lines. There is no such professional engineering judgement on that matter, it is merely his opinion.

**Exhibit 4:**

This is a chain of emails from April 29, 2021. The initial email is from the Climate and Environment Commission (“CEC”) outlining problems with the wind regulations. Commissioner Janet Thompson emailed County Employee Bill Florea saying “we probably need to sit down and at least internally draft responses to each of these complaints, don’t you think?” This document indicates that Commissioner Thompson and Mr. Florea recognized the proposed ordinances to be problematic and not in line with the recommendations of the CEC.

**Exhibit 5:**

This is an email chain between April 29, 2021 and May 3, 2021 showing that Bill Florea coordinated with Commissioner Janet Thompson to develop responses to the concern raised by the Climate and Environment Commission that the proposed ordinances were unreasonable and would prohibit wind development in Boone County. Commissioner Thompson tells Mr. Florea that she “wasn’t suggesting creating a document/sending it to her/them.” (The CEC) But that she wanted to get “on the same sheet of music” internally to defend their draft regulations. Mr. Florea
relays that he will work on responses and schedule a meeting with the three county commissioners.

**Exhibit 6:**

This is an email dated May 6, 2021 from Bill Florea to Presiding Commissioner Atwill sending him the “talking points” developed by Mr. Florea at Commissioner Thompson’s request. At page 6 of that document, the “talking point” about setbacks says: “The setback was derived from testimony and documentation submitted to the Columbia/Boone County Energy and Environment Commission. The Commission submitted an article published in the journal. Wind Energy, titled *A method for defining wind turbine setback standards.*” That is the article submitted by the anti-wind activist Eric Lidholm. This document establishes the Planning and Zoning Commission relied on Mr. Lidholm to develop and defend their draft regulations.

**Exhibit 7:**

Is an email chain from June 28, 2021 and June 29, 2021 where Bill Florea and Commissioner Thompson send the draft Boone regulations to a county commissioner in Knox County. Mr. Florea tells the Commissioner from Knox that “the setback is based on a peer reviewed journal article” “I’ve attached the article, the highlighting and annotations were provided by Eric Lidholm, PE. Eric is a structural engineer who advised the planning and zoning commission[.]” Commissioner Thompson tells Mr. Florea that she would suggest that he present on wind farms to the Missouri Association of Counties. Its worth re-iterating again, that these regulations and approach to wind development relies on the unsound recommendations of an anti-wind activist. Commissioner Thompson and Mr. Florea rely on Mr. Lidholm to develop and defend their draft regulations but also amplify his unsound and anti-wind recommendations by citing him by name as an expert and send these regulations to other counties.
Exhibit 8

Not only is Mr. Lidholm anti-wind activist, but his interpretation of the study he cites is unsound and not in accordance with best practices. We know this because on setbacks for wind turbines, Mr. Lidholm provided his comments and interpretation of a study authored by Dr. Johnathan Rogers.

Renew Missouri reached out to the author of that Study – Dr. Jonathan Rogers. Dr. Rogers is the CEO of Perisma LLC, and is also the Lockheed Martin Associate Professor of Aerospace and Mechanical Engineering at Georgia Tech. He is a leading aerospace and mechanical engineering researcher with extensive expertise in modeling and simulation, ballistics, optimization, and wind energy. A complete discussion of his qualifications is included in this Exhibit 8.

Renew Missouri provided Dr. Rogers the ordinances and some of the information discussed above showing that P&Z relied on Mr. Lidholm’s interpretation of his study. Dr. Rogers relayed that he was “dismayed that Boone County is using this paper to justify these setbacks in this way.” He explained that the paper is outdated, there are more current assessment methodologies and that the local engineer misapplies the study and offers what amounts to a personal opinion rather than an engineering opinion. Exhibit 8 is a letter from Dr. Rogers discussing these points for the Commission to consider.

III. P&Z Commissioners Do Not Want Wind Developed In Boone County And Developed Regulations that Ban Wind

The documents and sources the Planning and Zoning Commission staff relied on in drafting these regulations reveal a pattern. It’s not just setbacks that are unreasonable. Each component of these regulations is designed to ban any wind in the county in a variety of ways. No one can say that these are reasonable restrictions. The following documents are examples of the steps the Planning and Zoning
Commission took to adopt unduly restrictive regulations with an understanding that it would prohibit wind development in Boone County.

**Exhibit 9**

This document is the minutes from the June 9, 2019 P&Z meeting. When reading the minutes, it is clear that Mr. Lidholm is opposed to wind in Boone County and seeks the maximum restrictions on every component of the regulations. On turbine height he states: “there should also be a cap on turbine height” and “they can use smaller wind turbines.” On sound levels he complains that the draft regulation permitting 65 decibels is too loud and recommended 35 decibels.¹ On structure setbacks he asks the commission to increase whatever they decide even further. He also stated regarding wind development that “he has a problem with someone putting an industrial facility in an agricultural area.”

His ultimate position is summarized in the minutes as: “Mr. Lidholm stated he didn’t see a problem with it never being able to take place because companies are trying to come in and put industrial wind turbines in a very populated county.” And “…it is not our job to make sure they can come to Boone County.” It should be noted that the population in Boone County is largely concentrated in the City of Columbia.

**Exhibit 10**

This is a May 17, 2021 email circulated among P&Z Commissioners. In the text, P&Z Commission member Bill Lloyd expresses his support for the final draft regulations and explains to his peers: “I really don't think there's much room for these things in Boone County” and “there are other, better places for these. I think it should be challenging to approval for these as they have many negative side effects.”

IV. Path Forward

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¹ The Environmental Protection Agency sound guideline is 55 decibels. See https://windexchange.energy.gov/projects/sound
The Commission had an opportunity to work with the abundance of local expertise to develop reasonable regulations to benefit our county. Renew Missouri, RWE, Ameren Missouri, the American Clean Power Association, and Dr. Rogers have represented that they would help. To this point the Planning and Zoning Commission has rejected the input from the experts and relied extensively on the biased personal opinions of anti-wind activists. There are recommendations to ensure wind developments to be a good neighbor that helps benefit Boone County achieve economic and environmental growth in its communities. But, when Renew Missouri went to Resource Management Staff to propose reasonable amendments, our Executive Director was told “Boone County didn't need the extra revenue and these farms should be built elsewhere.”

Reasonable regulations should be adopted in Boone County. To do so, the Commission must:

1. Recognize that the approach and methods taken by Resource Management and P&Z are unsound, flawed and replete with anti-wind, bias. To be anti-wind here is anti-environment, anti-economic development, anti-jobs, and anti-property rights.
2. Recognize that the current proposal is a ban on wind development, and be transparent with the Community if that is what the Commission intends.
3. Reject this ban and direct P&Z to incorporate the amendments proposed by Renew Missouri and other energy experts.
Exhibit 1
Boone County

Potential Turbine Buffers

Parcel*
1,750-ft Radius Buffer
Municipal Boundary
Public Land

*Parcels were dissolved by owner to generate contiguous parcel areas.
Exhibit 2
This petition is for landowners and registered voters in Boone County, Missouri, who want the Boone County Commissioners to know we oppose industrial wind turbine developments.

We, the undersigned, oppose industrial wind turbine developments in Boone County, Missouri:

<table>
<thead>
<tr>
<th>NAME</th>
<th>ADDRESS</th>
<th>EMAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Teresa Frost</em></td>
<td>7999 Cassahaw Creek Harrisburg</td>
<td><a href="mailto:from.t.frost@gmail.com">from.t.frost@gmail.com</a></td>
</tr>
<tr>
<td><em>Doug Bryant</em></td>
<td>2125 N. 14 1/2</td>
<td><a href="mailto:dbryant@emailhost.com">dbryant@emailhost.com</a></td>
</tr>
<tr>
<td><em>Emily Turlington</em></td>
<td>4401 W. Newheiser Rd</td>
<td><a href="mailto:egsegen@gmail.com">egsegen@gmail.com</a></td>
</tr>
<tr>
<td><em>Lynita Little</em></td>
<td>6303 W. W. Hike Rd</td>
<td><a href="mailto:lynita1@centurytel.net">lynita1@centurytel.net</a></td>
</tr>
<tr>
<td><em>Susan Lidholm</em></td>
<td>Bruce Lane, Harrisburg</td>
<td><a href="mailto:slidholm@yahoo.com">slidholm@yahoo.com</a></td>
</tr>
<tr>
<td><em>Eric Lidholm</em></td>
<td>Bruce Lane, Harrisburg</td>
<td><a href="mailto:elidholm@yahoo.com">elidholm@yahoo.com</a></td>
</tr>
<tr>
<td><em>James E. Ballenger</em></td>
<td>9450 McQuitty Rd</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Harrisburg, MD</td>
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<tr>
<td><em>Mary Lou Ballenger</em></td>
<td>9450 McQuitty Rd</td>
<td></td>
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<tr>
<td></td>
<td>Harrisburg, MD</td>
<td></td>
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<tr>
<td><em>Michael Henzl</em></td>
<td>5300 W. Benedict Rd</td>
<td><a href="mailto:henzlm@missouri.edu">henzlm@missouri.edu</a></td>
</tr>
<tr>
<td><em>Jr. Udel</em></td>
<td>11300 North Rd</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Harrisburg</td>
<td></td>
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</tbody>
</table>

*Signature*
Exhibit 3
Please see the attached from Eric Lidholm

Attached is a clean copy of the article I referenced yesterday evening as well as my marked up version (with all of my study notes) for distribution to the P&Z and EEC members.

The basic premises of the article are as follows:

- Current setback standards, based on arbitrary rules of thumb related to tower height or rotor diameter, are inadequate
- 1 in 3,800 turbines can be expected to suffer a blade failure – annually – which equates to about 15 blade failures per year in the USA (based on 15,636 wind turbines in operation in USA)
- Lateral throw distance (of blade fragments) should be the driving force for setback development – not arbitrary rules of thumb
- Smaller blade fragments will fly farther than larger fragments
- The smallest blade fragment evaluated in this article was 20% of the total blade – or about 10 meters long (32.8 feet) – which is a significant hazard
- The tallest turbine in the article was 410 feet tall but the 377 feet tall turbine actually had the farthest calculated throw of 1,935 feet (due to higher blade speed) while the 410 feet tall turbine had a 1,726 feet throw (Table III on page 12 of 15)
  o Please remember – this is for a 20% fragment which is 10 meters in size – a 10% fragment can go farther and is still 5 meters in size. A 5% fragment can go farther yet.
- Rotor over-speed (runaway rotors) were NOT evaluated as the safety mechanisms have greatly improved and the probability of failure of this type is very low now.
- The article used an average wind speed of 8.5 meters per second or 19.0 mph (high wind speeds = greater throw distances and, conversely, lower wind speeds = lesser throw distances).
- Please read the highlighted conclusions in my marked up article.

MY OPINIONS:

- As an engineer, I work with safety factors. Also - engineering design is REQUIRED to protect health, safety and human welfare. I am convinced, after analyzing the article, the current proposed setback standards are inadequate.
- It is also my professional opinion that whatever setback standard is used for distances from occupied structures should also be used for property lines. (i.e. A wind turbine built on my neighbors property should not preclude me from building or developing on my property.)
Exhibit 4
We probably need to sit down and at least internally draft responses to each of these complaints, don't you think?

From: Carolyn Amparan <carolyn.amparan@gmail.com>
Sent: Thursday, April 29, 2021 1:03 PM
To: Andrea Waner <ward2@como.gov>; City Of Columbia Ward1 <ward1@como.gov>; ward3@como.gov; Ian Thomas <ward4@como.gov>; Matt Pitzer <ward5@como.gov>; City Of Columbia Ward6 <ward6@como.gov>; City of Columbia Mayor <mayor@como.gov>; Dan Atwill <DAwill@boonecountymo.org>; Justin Aldred <JAlldred@boonecountymo.org>; Janet Thompson <JThompson@boonecountymo.org>; Wind Farm Regulations Comments <wecod@boonecountymo.org>
Cc: Barbara Buffaloe <Barbara.Buffaloe@como.gov>
Subject: Climate & Env. Commission Input on Boone Cty Proposed Wind Regulations

[External Source] Take caution! This communication originated outside of boonecountymo.org. DO NOT CLICK links or attachments unless they are familiar to you and you feel the content is safe. DO NOT SHARE information with unfamiliar senders.

Dear Columbia City Council, Boone County Commission, Boone County Planning and Zoning,

Please find attached a document of input regarding the proposed Wind Energy Conversion Overlay District and Conditional Use Permit Regulations for Boone County, Missouri that I am submitting on behalf of the Climate and Environmental Commission.

In 2019, the Boone County Commission requested that the Environment & Energy Commission be involved in the discussion about wind energy in Boone County. When the EEC was dissolved and replaced with the Climate and Environment Commission (CEC), the subject was assumed to be transferred to the CEC.

Questions or comments may be directed to this email address or 417-793-8600.

Sincerely,
Carolyn Amparan
Chair
Climate and Environment Commission
Exhibit 5
Good morning Bill,

I will be happy to set this meeting up but I wondered what you might consider “short.” 30 minutes? An hour? I always think it is better schedule for ample time and then everyone is happy when they get out early. Much better than running over the allotted time.

Thanks!  

Owenetta Murray
Boone County Commission
Sr. Administrative Assistant
801 E Walnut Room 333
Columbia, MO 65201
Phone   573-886-4307
Fax   573-886-4311
omurray@boonecountymo.org

Good Morning Ms. O,

Janet asked me to ask you to set up a short work session with the Commissioners. The purpose is to discuss talking points regarding comments, submitted from the Columbia Commission on Climate and Energy, regarding the proposed wind farm regulations.

Thanks

Bill

Yes please— I just think we all need to be on what CJ calls the same sheet of music!!
Sorry, I misunderstood. Final hearing is tonight, I can get to work on drafting responses to CEC comments after that. I think a meeting is a good idea, should I ask Owenetta to set something up?

From: Janet Thompson <JThompson@boonecountymo.org>
Sent: Thursday, April 29, 2021 3:03 PM
To: Bill Florea <BFlorea@boonecountymo.org>
Subject: RE: Climate & Env. Commission Input on Boone Cty Proposed Wind Regulations

I wasn’t suggesting creating a document/sending it to her/them. Rather, we should be prepared for these questions – as individuals and as the Commission. Perhaps this could be the topic of a meeting with the 3Cs??

From: Bill Florea <BFlorea@boonecountymo.org>
Sent: Thursday, April 29, 2021 2:49 PM
To: Janet Thompson <JThompson@boonecountymo.org>
Subject: RE: Climate & Env. Commission Input on Boone Cty Proposed Wind Regulations

I’m certainly willing to do that if it is how the Commission wants to handle it. But I’m kind of on the fence. If you are willing, I would rather have a discussion about this.

From: Janet Thompson <JThompson@boonecountymo.org>
Sent: Thursday, April 29, 2021 2:05 PM
To: Bill Florea <BFlorea@boonecountymo.org>
Subject: FW: Climate & Env. Commission Input on Boone Cty Proposed Wind Regulations

We probably need to sit down and at least internally draft responses to each of these complaints, don’t you think?

From: Carolyn Amparan <carolyn.amparan@gmail.com>
Sent: Thursday, April 29, 2021 1:03 PM
To: Andrea Waner <ward2@como.gov>; City Of Columbia Ward1 <ward1@como.gov>; ward3@como.gov; Ian Thomas <ward4@como.gov>; Matt Pitzer <ward5@como.gov>; City Of Columbia Ward6 <ward6@como.gov>; City of Columbia Mayor <mayor@como.gov>; Dan Atwill <DAatwill@boonecountymo.org>; Justin Aldred <JALdred@boonecountymo.org>; Janet Thompson <JThompson@boonecountymo.org>; Wind Farm Regulations Comments <wecod@boonecountymo.org>
Cc: Barbara Buffaloe <Barbara.Buffaloe@como.gov>
Subject: Climate & Env. Commission Input on Boone Cty Proposed Wind Regulations

Dear Columbia City Council, Boone County Commission, Boone County Planning and Zoning,

Please find attached a document of input regarding the proposed Wind Energy Conversion Overlay District and Conditional Use Permit Regulations for Boone County, Missouri that I am submitting on behalf of the Climate and Environmental Commission.
In 2019, the Boone County Commission requested that the Environment & Energy Commission be involved in the discussion about wind energy in Boone County. When the EEC was dissolved and replaced with the Climate and Environment Commission (CEC), the subject was assumed to be transferred to the CEC.

Questions or comments may be directed to this email address or 417-793-8600.

Sincerely,
Carolyn Amparan
Chair
Climate and Environment Commission
Exhibit 6
Good Morning Dan,

I have attached two reference documents for this morning’s work session.

Thanks

Bill

Bill Florea, AICP
Director
Boone County Resource Management
801 E. Walnut, Room 315
Columbia, MO 65201-7730
573-886-4330
April 29, 2021
To: Columbia City Council, Boone County Planning and Zoning Commission, and Boone County Commission
From: Columbia Climate and Environment Commission
Re: Proposed Wind Energy Conversion Overlay District and Conditional Use Permit Regulations for Boone County, Missouri

The Boone County Planning and Zoning Commission has set forth a proposed set of regulations to govern commercial wind energy facilities within the County. Public hearings are being conducted through April 29, 2021 collecting input from the public. The Columbia Climate and Environment Commission (CEC) would like to submit the following input to the Boone County Planning and Zoning Commission and County Commission.

The City of Columbia has a mandate established in ordinance 27-106 to achieve 30% renewable clean energy as part of the electricity portfolio by year end 2028. Additionally the City of Columbia has adopted a Climate Action and Adaptation Plan (CAAP) that sets a goal to reduce greenhouse gas emissions for the community 100% by 2060 and a goal to achieve 100% clean, renewable energy for electricity generation by 2035. Therefore, the CEC strongly supports the development of wind energy generation sites in Missouri including Boone County when natural wind resources, technology, and the balance between human needs and wildlife protection make these sites viable. There is a market for wind energy within Boone County. Let’s keep our dollars in Boone County when we can. Let’s create a process that equitably supports local farmers whether they own large segments of land or smaller ones.

In the view of the CEC, the proposed regulations if approved would establish a regulatory environment and permit process that would be so restrictive as to be a ban on commercial wind energy conversion systems (WECS-C) in Boone County.

The CEC offers the following points of concern:

**Permit Process for Wind Energy Conversion Overly District (WECOD) and Wind Energy Conversion Systems (WECS-C)**

*Proposed regulation*

29.1.1 The intent of the Wind Energy Conversion Overlay District is to establish an area or areas where Wind Energy Conversion Systems-Commercial (WECS-C) are allowed by Conditional Use Permit. Interested property owners in the area that is proposed for designation shall instigate the initiative for the designation.

3. APPLICATION STANDARDS FOR A NEW WECS-C

3.2 Limited Number of Applications per Month: 2
3.2.1 Up to three (3) applications from the same project owner may be submitted per month.  
3.2.2 Each application may contain up to two (2) WECS-C that are located less than 1.5 times the minimum spacing distance from each other.  
3.2.3 The Director may allow groups of up to six (6) WECS-C to be included in one application if:  • All towers are in a single cluster.  • Each tower within the group is less than 1.25 times its minimum spacing distance from at least one (1) other tower in the group.  • There is sufficient room on the Planning and Zoning Commission agenda without displacing other items or resulting in an unreasonably long meeting.

Input 29.1.1: The property owners should not be the only ones who can instigate the initiative of the WECOD. The wind energy company that desires to build on a site should be able to handle the application process on behalf of property owners. Appropriate documentation from the property owner or owners indicating their support for the WECOD application process should be submitted at the beginning of the process. Individual landowners can’t bear the expense and effort of preparing these applications. Additionally, cutting the wind company out of the process leaves it at risk of being unable to defend its own interests.  
The statement that property owner must instigate a WECOD application does not prohibit a third party from doing so the property owner’s behalf. The WECOD regulations were modeled on Section 23 of the Zoning Regulations, Character Preservation Overlay District (CPOD). That section includes similar language, requiring a property owner to instigate the process. The purpose of the statement is to clarify that the County will not initiate a process to establish a CPOD or a WECOD.

Regarding the application process for a WECS-C: Why is the project owner required to submit applications for only 2 to 6 wind turbines at a time? The restriction on the number of wind turbines in one application would negate the benefits that could be achieved through economies of scale. If they know they want more wind turbines on a site, it is more efficient for everyone involved to be able to consider the full scope of the project in its entirety including all the associated and extensive documentation like environmental impact studies, visual simulations and traffic plans.  
The full scope of the project is reviewed when the WECOD is established. The CUPs for individual WECS-C apply the information that was generated in the WECOD process to the site-specific level for each WECS-C. There are reasons for limiting the number of CUPs per agenda:  
1. Proposed spacing requirements are 6 times the diameter of the rotor. Assuming a rotor diameter of 250-feet, WECS-C would be spaced by a minimum of 1,500 feet. In a line of 6 WECS-C there would be 7,500 feet between the two on either end. Site conditions will vary greatly over a distance of 7,500 feet.  
   a. Public testimony will vary greatly depending on the location of the WECS-C  
   b. Different permit conditions may be applied to individual towers. Maintaining a clear record will be increasingly difficult as the number of WECS-C per CUP increases.

2. P&Z anticipates that the hearings for the WECS-C will be contentious and time consuming.  
   A reasonable limit on the number of CUPs will ensure that P&Z meetings will be concluded at a reasonable hour and that a wind energy company cannot displace or inconvenience other applicants due to the number of CUPs it applies for on any single agenda.  
The proposed regulations allow up to 3 CUPs per owner per month. Each CUP may include 2, and, under certain conditions, up to 6 WECS-C. That provides a range of between 6 and 18 WECS-C per month.

Proposed regulation  
29.3.1.1 Primary District Area Requirements:
• The smallest component of a Primary District is one-quarter (1/4) Section as defined by the Public Land Survey System. Therefore, when any portion of a lot that is included in a WECOD falls within a one-quarter section, the entire quarter section shall be included in the WECOD.

• A Primary District must include a minimum of four (4) contiguous one-quarter (1/4) Sections.

29.3.1.2 Buffer Area Requirements: The Buffer shall extend 1,320 feet outward from the perimeter of the Primary District.

Input 29.3.1.1 and 29.3.1.2: A primary district should not have to be as large as 640 acres. Wind farms exist that fit six turbines comfortably within 300 acres. By requiring four contiguous one-quarter sections, it is burdensome and inequitable to landowners with smaller properties. Additionally, it would be useful to have less stringent ordinances for a small commercial wind operation versus a large commercial wind operation. Some localities utilize different standards for large and small operations. These proposed ordinances seemed designed for a large operation. Buffer requirements should only depend on the presence of building structures or infrastructure such as homes, barns or public roads and be based on the height of the tower. A buffer standard for the entire boundary of the WECOD seems excessive.

The impacts of a windfarm extend a significant distance from the physical location of the windfarm itself. The purpose of the WECOD is to provide a fair method for a proponent to seek approval of a windfarm, but also give voice to affected property owners. P&Z determined that the 640-acre minimum with the ¼-mile buffer area, combined with the proposed height limitations, is adequate and reasonable to achieve that purpose.

Approval or Summarily Denying an Application

Proposed regulation 29.4.7.2

In cases where the Commission recommends approval of an application, the County Commission will summarily deny the application if the following two conditions occur: (1) the applicant does not appear at the County Commission hearing in person or by representative with the written authorization of the owner, and (2) there is opposition to the application expressed in person at the County Commission Hearing.

Input 29.4.7.2 Item (2):

It is not enough that the landowner-applicant or his/her representative appear. It is the wind company that bears the risk and the burden and would lose its very substantial investment in conducting all the studies and other activities, costs, fees and notices involved in preparing the application. It is extremely unlikely that any landowner, unless it is the developer, will be able to shoulder the effort and expense. The procedure for summary denial should ensure that the company will have full notice and opportunity to appear. Additionally, there should be an opportunity to reschedule or use a virtual meeting should unforeseen circumstances prevent a representative from appearing in person. Nothing in the regulations prevents a wind energy company from appearing on behalf of the property owner if the owner has consented in writing.

The language regarding summary denial is established County policy in Sections 15 F. and 23.3.5.2 of the Zoning Regulations. The P&Z Chair always notifies the applicant of the time and date of the County Commission meeting where the request will be heard. The County Commission always has the option of rescheduling agenda items.

Property Values

Proposed regulation 29.5.1.9 An estimated economic cost/benefit analysis describing the impact of the project on the local and state economy in the following respects:

The impact of the project on existing surrounding property values within the visual dominance zone, as defined, based on studies of any similar projects in similar areas and based upon an opinion from three (3) qualified Missouri real estate appraisers or valuation experts;

Input 29.5.1.9: Basing impacts on surrounding property values on studies of similar projects in similar areas is reasonable. Relying on the opinions of real estate appraisers who may be completely
inexperienced with wind farms seems to be problematic. Additionally, how will the real estate appraisers be selected? What are their qualifications related to experience with commercial wind farms? The model ordinances from other states do not include any regulation such as this one. In a property values study conducted by The Center for Economic Development and Business Research, a part of the W. Frank Barton School of Business at Wichita State University, “the data used included the completion dates of 23 wind projects across Kansas from 2005 to 2015, and county-level appraised rural residential property values for Kansas from 2002 to 2018 for all Kansas counties, excluding the five metropolitan core urban counties, since no wind power projects were completed in any Kansas core urban county during this period.” The conclusion of the study indicated there is not statistically significant evidence that wind power projects either increase or decrease rural residential property values in a county in the three years after their construction. Without these type of statistically valid and comprehensive studies it seems difficult for a real estate appraiser to be able to make a valid appraisal based on data rather than opinion.

**Natural and Biological Resources**

*Proposed regulation*

29.5.1.10 • Documentation that the owner/applicant has followed the United States Fish and Wildlife Service Land Based Wind Energy Guidelines and copies of all resulting studies and recommendations; • Impact on wildlife and wildlife habitat on the site and in the proposed WECOD; • Impact on any endangered or threatened species on the site and in the proposed WECOD; • Impact on flora on the site;

29.7.1 Natural and Biological Resources

29.7.1.1 WECS-C should not be located in areas that have a substantial potential for biological conflicts.

29.7.1.2 WECS-C should avoid large intact areas, at least 640 acres in size, of native vegetation that has not been significantly disturbed by man-made developments such as power lines, gas lines, oil or gas wells, public roads, etc.

29.7.1.3 WECS-C should avoid areas that would interfere with important wildlife migratory corridors and staging areas

**Input 29.7.1.1-29.7.1.3:** The CEC supports the protection and preservation of natural and biological resources as identified in section 29.7.1. The CEC would like to recommend an additional resource for understanding the nature of the land areas within Boone County for use in evaluating potential WECOD applications. The Nature Conservancy created a wind siting map for the Midwest that factors in many environmental concerns. It shows land that could be utilized for wind without significant adverse environmental impacts. The map and reference materials can be found at this link. https://www.nature.org/en-us/what-we-do/our-priorities/tackle-climate-change/climate-change-stories/site-wind-right/?vu=sitewindright

It is not our intention that The Nature Conservancy map would replace the United States Fish and Wildlife Service Land Based Wind Energy Guidelines. As an easy to understand resource it may be helpful early in the siting process.

The wind siting map can be helpful in the decision-making process. After reviewing the map, it appears that there are small areas in Boone County designated as “low impact”.

**Visual Uniformity and Impacts**

*Proposed Regulation*

29.7.2.4 To promote visual uniformity, the rotors, nacelles, and towers of all turbines in an array should appear similar and shall be a shade of white in color.
29.7.2.5 To avoid objectionable density, each turbine shall maintain a minimum spacing of six (6) times the diameter of its rotor from any other turbine.

29.8.3.2 To promote visual uniformity, all turbines at a similar ground elevation shall have the same height from blade tip to the ground.

29.8.3.3 Distinct groupings or clusters of machines shall be limited to no more than 12 machines per cluster. Each cluster must be greater than 1.25 times the minimum spacing distance from another cluster.

29.8.3.11 The maximum height of the turbines shall be 355 feet. Greater height, but not in excess of 400 feet, may be considered on a case by case basis if the applicant can sufficiently demonstrate that the increased height will result in increased energy efficiencies, thereby reducing the overall number of turbines in the project. However, in all cases, due consideration shall be given to the scale of the turbines in relation to the surrounding landscape.

4. APPROVAL STANDARDS FOR A NEW WECS-C

The type, size, height, rotor size, rotor material, color scheme, and noise characteristics of the proposed wind turbine model and tower are similar to all other towers in the same WECOD;

Input 29.7 and 29.8 and 4. Approval standards for a new WECS-C

The color of the wind turbines should be a neutral color but not necessarily have to be white. Sample ordinances and FAA rules Section 13.4.1 allow light grey or white. Forcing a choice of white might limit the technology choices.

The proposed regulations impose a maximum turbine height restriction of 400 feet. Technology in the wind industry continues to change and improve to capture more natural wind resources at higher levels and to improve the productivity of each turbine so that fewer turbines will be needed to produce the same amount of power. These regulations should allow for changes in technology over time without a need to modify the regulations. The median turbine height in the United States is now 420 feet; therefore it would seem reasonable to start off with a greater height in the regulations. In 2019, the average utility-scale wind turbine had a nameplate capacity of 2.55 MW. The average rotor diameter was 121 meters (397 feet), and the average hub height was 90 meters (295 feet), resulting in an average total height of 692 feet; therefore, a maximum height restriction of 400 feet would restrict wind development in the county as it may not be feasible or economical to use smaller turbines.

As technology is changing, it may be reasonable to allow variations between clusters of wind turbines within a WECOD as long as they meet other requirements such as noise characteristics. Additionally, once minimum spacing is met the spacing should be based on the effectiveness and efficiency of the wind turbine performance versus the visual uniformity. The reasons for requiring more distance between clusters than between individual turbines is unclear.

The color of the turbines could include light gray, but that becomes difficult to define. The most important aspect of color is that all turbines be the same in order to limit visual impacts.

The Zoning regulations set height limitations at 35-feet in Agriculture, and 45-feet in Industrial. The proposed regulations allow nearly 10 times that height for WECS-C.

The reason for requiring more distance between clusters it to provide a visual break between clusters.

Setbacks

Proposed Regulations

29.8.5.1 Individual wind turbines shall be set back 1,750-feet from all property lines of the single discrete undivided lot of record upon which it is located. Lease, easement, or other ownership interest of adjoining discrete lots does not remove the property lines between discrete lots from which the measurements are made.

29.8.5.2 Individual wind turbines shall be set back 1,750-feet from all public road rights of way.

Input 29.8.5 Setbacks:
Setback requirements are designed to protect a wind turbine’s neighbors in the extremely rare event of a tower failure, blade failure, and ice shedding from a blade. As such, setbacks should be based on health and safety. A setback equal to or slightly greater than the tower height is sufficient to protect public health and safety from the rare event of a tower failure.

A section of a sample ordinance from Pennsylvania is noted below that utilizes setbacks based on turbine height from property lines, occupied buildings and roads. Setback requirements like the one proposed of 1,750 feet would impede wind energy development in the county and unnecessarily restrict landowners and residents who wish to install wind turbines on their land.

The 1,750-feet setback was derived from testimony and documentation submitted by the Columbia/Boone County Energy and Environment Commission. The Commission submitted an article published in the journal, Wind Energy, titled *A method for defining wind turbine setback standards*. The article indicates that setbacks based on tower height and blade radius are inadequate. Turbine blade tip speed is a more accurate measure of predicting blade fragment throw distance. The study calculated throw distance for a 20% fragment for three turbine sizes, 0.66MW, 1.5MW, and 3.0MW. The average throw distance for the 3.0MW turbine is 1,726 feet. The average throw distance for the three turbine sizes is 1,700 feet.

Property owners should be able to agree to waive these setbacks and such waiver should be recorded. Pennsylvania example setback requirements:

“Occupied Buildings (“Occupied Building” means a residence, school, hospital, church, public library or other building used for public gathering that is occupied or in use when the permit application is submitted.)

1. Wind Turbines shall be set back from the nearest Occupied Building a distance not less than the normal setback requirements for that zoning classification or 1.1 times the Turbine Height, whichever is greater. The setback distance shall be measured from the center of the Wind Turbine base to the nearest point on the foundation of the Occupied Building.

2. Wind Turbines shall be set back from the nearest Occupied Building located on a Non-participating Landowner’s property a distance of not less than five (5) times the Hub Height, as measured from the center of the Wind Turbine base to the nearest point on the foundation of the Occupied Building.

B. Property lines: All Wind Turbines shall be set back from the nearest property line a distance of not less than the normal setback requirements for that zoning classification or 1.1 times the Turbine Height, whichever is greater. The setback distance shall be measured to the center of the Wind Turbine base.

C. Public Roads: All Wind Turbines shall be set back from the nearest public road a distance of not less than 1.1 times the Turbine Height, as measured from the right-of-way line of the nearest public road to the center of the Wind Turbine base.”

“Property owners may waive the setback requirements in 9(A)(2) (Occupied Buildings on Non-participating Landowner’s property) and 9(B) (Property Lines) by signing a waiver that sets forth the applicable setback provision(s) and the proposed changes. Any such waiver shall be recorded in the Recorder of Deeds Office for the County where the property is located. The waiver shall describe the properties benefited and burdened, and advise all subsequent purchasers of the burdened property that the waiver of setback shall run with the land and may forever burden the subject property.”

Boone County setbacks are measured from property lines and cannot be overcome by waiver or easement.

**Other Considerations for Commercial Wind Regulations in Boone County**

**Preparing for winter conditions**
Given the recent winter storm energy disaster in the state of Texas and the unpredictable future winter weather as the climate changes, all wind turbines and wind farms in Boone County should be required to be built to operate in winter conditions of temperatures to \(-40\) °F, which is the coldest temperature ever recorded in Missouri. Scientists theorize that the warming conditions in the Artic are causing destabilization in the jet stream resulting in increasingly erratic temperature shifts and extreme weather conditions. 

This could be added to 29.8 Site and Performance Standards

**Why Boone County Needs Local Wind Energy**

We are all energy consumers and we all need to share in being energy producers. If Boone County has viable wind resources to produce electricity, we have a responsibility to allow commercial wind farms within our county. Historically, coal fired power plants and their related air pollution have been located near marginalized communities. As the United States moves through the coming energy transformation, we all need to participate in bearing the burden of energy production for the energy we choose to consume. 8 A diverse set of local and remote energy generation sources will be beneficial for maintaining the resilience of the energy grid and supply for the county despite future extreme weather and natural disasters.

In addition to producing clean, local power, reasonable development can be incredibly beneficial to the economy of our county. Annual income to landowners can reach into the six figures at a time when farming is taking hits from extreme weather and trade wars. There will also be an increase in the property tax base. In Adair County, it is estimated wind farms will bring $32 million in extra property tax revenue over twenty years. This tax revenue will help with schools and infrastructure. Wind and solar farming are also potential revenue generating options to help family farms remain as family farms.

Climate change is already having an impact on the agricultural economy of Boone County. Going forward we can anticipate the negative impacts to farmers and ranchers becoming even more significant. Included below in an excerpt from the Columbia Missouri Climate Action and Adaptation Plan Vulnerability Assessment that describes some forecasted impacts through 2050. However, the impacts after 2050 are forecasted to be significantly worse for farmers and ranchers. Given that greenhouse gases remain in the atmosphere for potentially hundreds of years and the fact that the current concentration of carbon dioxide in the atmosphere at 417 parts per million is already higher than at any time in human history, we can anticipate a further significant deterioration in farming conditions between 2050 and 2100. Wind and solar farms may be a lifeline for our local agricultural community.

**Future impacts of Climate Change in Missouri through 2050**

These conditions noted below will likely apply to much if not all of Boone County. The local agricultural vulnerabilities are submitted as input to substantiate that agricultural property owners need the option to be able to establish commercial wind turbines on their property to receive the financial compensation from energy production. Therefore, the wind regulations should not be so strict as to prevent local landowners being able to participate in the growing market for low-cost wind energy. In 2020, clean energy provided an estimated $8.2 million in state and local property taxes, and approximately $13 million in lease payments to private landowners.

**Excerpt from Columbia Climate Action and Adaptation Plan Open Space and Agriculture Vulnerability Assessment Fact Sheet**

“Average temperatures are expected to increase in Columbia as they will across the Midwest. By 2050, average temperatures will be 4°F higher or even warmer [3]. As temperatures warm, hardiness zones will change. Growers use hardiness zones (1 to 10), which are based on the average minimum temperature in the winter, to determine which plants are most suitable to the local climate. Columbia is currently in hardiness zone 6a (average annual minimum winter temperature of -10 to -5°F) [4].
Between 2000 and 2010, some parts of Missouri went up one hardiness zone level, and in the next 30 years, most of Missouri is projected to be in Zone 7 with an average minimum winter temperature of 1 to 10°F [5]. By 2070, hardiness zones may shift 9
even more as minimum annual temperatures in Missouri may increase by 7 to 11°F or more compared to the 1971-2000 average [6].

“As the climate changes, temperatures will increase in Columbia and change frost timing. It is projected that the last spring frost will happen one week earlier by 2050 than it does today, and the first fall frost will be slightly later [8]. Under these conditions, the timing of the growing season may shift and hardiness zones will continue to change. Farmers may have to adjust planting schedules and change or diversify crop types to adapt to these changes.

**Warmer temperatures, especially during the summer, will likely place more stress on livestock and crops.** Cows, for instance, tend to eat less food and grow more slowly in hotter conditions, and corn yields are projected to decrease with warmer summers [21]. Although longer growing seasons, combined with more carbon dioxide in the atmosphere—which acts as a fertilizer for plants—could increase yields of some crops, long-term agricultural productivity is expected to decline as the cumulative negative impacts of climate change offset these short-term benefits [22].

“**Increasing summer drought could stress crops** and lower the quality and quantity of yields. Farms growing corn may be more vulnerable to drought than soybean and wheat farms, but using drought-tolerant varieties can increase resilience to these conditions [24]. Drier conditions in the summer are expected to reduce soil moisture, which could lower agricultural productivity and increase the demand for irrigation [25]. The availability of water resources for irrigation may become a concern in the future as Columbia’s population grows, especially if there are periods of prolonged drought.

**Spring and fall precipitation is projected to increase** in Columbia [8]. For agriculture, heavier rains during the spring can disrupt planting schedules, make it difficult for crops to become established, and make diseases from fungus or bacteria more likely to occur. Addressing these impacts may require more labor and increase costs to farms.

All of these impacts from climate change can place more stress on crops, making them more susceptible to pests and diseases. Recent testing submissions to the University of Missouri’s Plant Diagnostic Clinic suggest that corn, soybean, and wheat are all susceptible to disease, but disease prevalence may fluctuate from year to year and throughout a single growing season as environmental conditions change [26]. The Japanese beetle is one pest of concern. Even the potential benefit of larger yields from higher levels of carbon dioxide may be offset, as these conditions can lower plants’ defenses against Japanese beetle and other insects, ultimately causing more damage than under current climate conditions [27]. Meanwhile, warmer temperatures and increased carbon dioxide may cause insect populations to grow and new types of pests to become problematic. Japanese beetles in particular may be more likely to survive and cause more damage to soybean yields as the optimal time period for feeding on leaves is projected to increase nearly threefold by 2050 [28].

Growers will likely need to plant drought- and pest-resistant crop varieties, implement water conservation measures, use more efficient irrigation strategies, or take other actions to adapt to future conditions. Those with limited resources may need financial assistance to continue their 10
agricultural livelihoods. As climate change impacts may reduce crop yields, farmers in Columbia may face economic challenges. In addition, food production in Missouri, across the U.S., and beyond may decrease, leading to increases in food costs for the Columbia community.”

References
5 MODEL ORDINANCE FOR WIND ENERGY FACILITIES IN PENNSYLVANIA, 3/21/06, https://drive.google.com/file/d/1L6HMJAexxLX481jV9BdlM_th9YtL3i5B1/view?usp=sharing

Citations from Columbia Climate Action and Adaptation Plan Open Space and Agriculture Vulnerability Assessment Fact Sheet
Exhibit 7
Thank you so much, Bill. Just a thought here—if MAC or CCAM should want a presentation on wind farm issues, might you be willing to be on a panel?

From: Bill Florea <BFlorea@boonecountymo.org>
Sent: Tuesday, June 29, 2021 8:16 AM
To: Janet Thompson <JThompson@boonecountymo.org>; knoxcomm@marktwain.net
Subject: Re:

Good Evening Commissioner Glasgow,

This project has been quite a learning curve for us in Boone County. I would be happy to share information with you. We have a dedicated web page at https://www.showmeboone.com/resource-management/WECOD/

There may be more there than you are looking for. I would be happy to have a phone conversation or exchange e-mails with you.

The current draft regulations specify a setback of 1,750 feet measured from the property line or any public right of way to the nearest point on the base of the tower. It does not allow the setback to be waived by a neighboring property owner. The setback is based on a peer reviewed journal article that identifies blade tip speed as the controlling factor for debris throw rather than tower height. Many regulations base the setback on tower height. I have attached the article to this e-mail. The highlighting and annotations were provided by Eric Lindholm, PE. Eric is a structural engineer who advised the Planning and Zoning Commission as a member of the Columbia/Boone County Commission on Energy and Environment.

Please contact me at your convenience with any questions or information that I can provide.

Bill

Bill Florea, AICP
Director
Boone County Resource Management
801 E. Walnut, Room 315
Columbia, MO 65201-7730
573-886-4330

Get Outlook for iOS

From: Janet Thompson <JThompson@boonecountymo.org>
Sent: Monday, June 28, 2021 8:40:43 AM
To: knoxcomm@marktwain.net <knoxcomm@marktwain.net>
Cc: Bill Florea <BFlorea@boonecountymo.org>
Subject: RE:

We are just getting the proposed regulations from our Planning & Zoning Commission and will have three public hearings on them, starting the end of July, so, what we have are just proposed, not final, regulations. I have copied Bill Florea, our Resource Management Director, who has been on the ground floor for this project, on this email in hopes that he can answer any specific questions you have about the proposed regulations and the rationale of the Planning & Zoning Commission in proposing the regulations as they have. Thanks Bill, for any help you can give to Commissioner Glasgow.
Janet

-----Original Message-----
From: knoxcomm@marktwain.net <knoxcomm@marktwain.net>
Sent: Monday, June 28, 2021 7:19 AM
To: Janet Thompson <JThompson@boonecountymo.org>
Subject:

[External Source] Take caution! This communication originated outside of boonecountymo.org. DO NOT CLICK links or attachments unless they are familiar to you and you feel the content is safe. DO NOT SHARE information with unfamiliar senders.

Good morning Janet,
We are currently dealing with a wind developer in Knox County, and we were interested in what Boone County's new zoning regulations were. We are specifically interested in the setback distances. Any information you could pass along would be greatly appreciated. Thanks in advance.

Evan Glasgow
Presiding Commissioner
Knox County Missouri
Exhibit 8
Persimia, LLC
1447 Peachtree St. NE
Suite 300
Atlanta, GA 30309

August 24, 2021

To Whom It May Concern,

The purpose of this letter is to address the wind turbine setbacks proposed by the Columbia/Boone County Planning and Zoning Board. These proposed setbacks state that wind turbines shall be placed no closer than 1,750 ft from property lines and all public roads. According to the Planning and Zoning staff, they relied on an engineering publication from 2012 entitled “A Method for Defining Wind Turbine Setback Standards” as the basis for these recommendations. I am the primary author of that paper.

My paper referenced above was not intended to be used in the way that the P&Z Board used it to decide on actual setback distances. The paper was merely intended to highlight the need for physical modeling to inform setbacks. Furthermore, this paper uses a very incomplete risk analysis methodology that does not reflect current engineering practice. Since this paper was published almost 10 years ago, the industry has developed a more complete risk analysis methodology that includes all relevant factors instead of simply analyzing how far a blade fragment might potentially travel. The singular emphasis on possible maximum throw distance is not a sound engineering way to evaluate risk. Current industry-standard risk assessment methodologies for blade throw must account for a combination of throw distance, the probability that a fragment lands on something of value (house, vehicle, etc.), and modern wind turbine failure rates. The methodology employed by the P&Z Board, as well as by their engineer, is based only on maximum throw distance and ignores these other factors. Thus, their risk analysis process and the resulting setbacks derived from it are not valid in my opinion.

As examples of the way in which the P&Z Board’s analysis is flawed, consider their application of the 1,750 ft setback to public roads. When assessing risk to vehicles on public roads, the traffic density on the road (in terms of number of cars per mile) and the spatial area of a typical vehicle must be considered when analyzing the risk of a vehicle possibly being hit by a blade fragment. The P&Z Board and their engineering consultant did not incorporate these factors and instead based the setback value only on possible lateral throw distance. Their public road setbacks are therefore not based on an objective and accurate assessment of risk.

A second example involves the P&Z Board engineer’s statement as follows: “It is also my professional opinion that whatever setback standard is used for distances from occupied structures should also be
used for property lines. (i.e. A wind turbine built on my neighbors property should not preclude me from building or developing on my property.)” Contrary to the engineer’s statement, this does not constitute a professional opinion, but rather a personal opinion. There is no engineering basis for applying setbacks to property lines versus occupied structures. This statement by the P&Z Board’s engineer should be provided as a personal opinion or preference rather than a professional opinion.

Based on the above, I recommend that the P&Z Board’s proposed setbacks be revised using an updated, wholistic risk assessment methodology that conforms to industry-standard practices. For road setbacks, this should include a spatial analysis that examines the probability of a vehicle impact and compares this risk to standard levels of acceptable risk in the engineering community. For setbacks from structures, a similar approach should be used that includes a spatial analysis of the risk that a possible blade fragment impacts an occupied structure at a certain distance. The resulting setbacks will be grounded in the latest scientific knowledge and conform to engineering standards for risk assessment and mitigation.

Thank you and please do not hesitate to contact me with any questions.

Jonathan Rogers
CEO, Persimia, LLC
jonny@persimia.com

Statement of Qualifications:

Dr. Jonathan Rogers is the CEO of Persimia, LLC and is also the Lockheed Martin Associate Professor of Aerospace and Mechanical Engineering at Georgia Tech. Dr. Rogers is a leading aerospace and mechanical engineering researcher with extensive expertise in modeling and simulation, ballistics, optimization, and wind energy. He has led numerous research projects for NASA, the US Air Force, the US Army, the US Department of Energy, and many other government and industry organizations. Dr. Rogers holds PhD and MS degrees in Aerospace Engineering from Georgia Tech, and a BS in Physics from Georgetown University. He has been the recipient of many engineering research awards including the US Army Research Office Young Investigator Award and the National Science Foundation CAREER award. Dr. Rogers is a leading technical expert in assessing blade throw risk from wind turbines and has worked as an engineering consultant on numerous wind ordinance drafting processes and wind project risk assessments throughout the United States.
Exhibit 9
Commissioners present: Boyd Harris, Rhonda Proctor, Jeff McCann, Greg Martin, Fred Furlong, Bill Lloyd, Steve Koirtyohann (arrived 5:05), Carl Freiling (arrived 5:15)

Energy & Environment Members present: Joe LaRose, Jean Sax, Eric Lindholm

Staff: Stan Shawver, Bill Florea, Thad Yonke, Uriah Mach, Paula Evans

Stan Shawver stated that he received an email from Ken Midkiff who stated he is out of town and Eric Lindholm will present the Energy & Environment Commissions (EEC) recommendation.

Eric Lindholm stated in looking at the ordinances out there it seemed that most of them went by the height of the tower and rotor diameter for the setbacks. The Energy & Environment Commission recommends the following:

Setback from Occupied Structures: The minimum setback for any wind turbine of a wind energy facility from any occupied structure shall be equal to 2500 feet as measured from the nearest edge of the structure to the center of the turbine tower.

Setback from Critical Structures: The minimum setback for any wind turbine of a wind energy facility from any critical structure (roads, electric substations, pipelines, transmission lines, etc.) shall be equal to 2000 feet as measured from the nearest edge of the critical structure to the center of the turbine tower.

Setback from Property Lines: The minimum setback for any wind turbine of a wind energy facility from any non-participating landowner’s property line be equal to 2500 feet as measured from the property line to the center of the turbine tower; except, that a non-participating landowner may elect to sign a waiver to allow any wind turbine or group of turbines of a wind energy facility to be placed up to 1000 feet as measured from the property line to the center of the turbine tower.

Sound Requirements: Except during the event of inclement weather that prevents the operator of a wind energy facility from controlling the noise level of one or more wind turbines that are part of the wind energy facility, any wind turbine or group of wind turbines of a wind energy facility does not exceed a limit at a non-participating landowner’s dwelling of thirty A-weighted decibels (30 dBA) and thirty-five A-weighted decibels (35 dBA) at a non-participating landowner’s property line as determined by a qualified, third-party acoustics expert according to the American National Standard Institute (ANSI) Standard 12.9 and other applicable ANSI standards; and prior to construction of a facility or expansion, a qualified, third-party acoustics expert, selected and paid for by the applicant, makes a baseline determination of preconstruction noise levels, including modeling and enforcement.

Bonding: Prior to the start of construction of a wind energy facility, the applicant for a permit for the construction, operation, or expansion of the wind energy facility, or wind energy facility expansion, establish financial security in the amount of one hundred percent of the estimate of the total cost to decommission and remove the wind energy facility, as determined by an independent consultant selected and paid for by the applicant.

Insurance: Insurance is required on all individual wind turbines and associated facilities and structures.

Mr. Lindholm stated these recommendations were made by the EEC sub-committee, they brought it to the full EEC committee who discussed and passed the recommendation.
Eric Lindholm stated there should also be a cap on wind turbine height.

Stan Shawver asked if a critical structure included roads. Mr. Lindholm stated yes; the County may have a better idea of what a critical structure is.

Eric Lindholm stated that with the recommended setbacks we won’t be worried as much about the flicker; it will be there but not for 2 ½ hours a day.

Commissioner Martin stated the proposed setback from property lines will narrow down how many pieces of property can do this. Mr. Lindholm stated there is an option in the property setback that if the neighbor agrees to it then it can be shrunk down. Chairperson Harris stated the Commission discussed using the property line as the setback and not a structure. Mr. Lindholm stated this is from occupied structures and property lines. Commissioner Martin stated if we set the setback at 2500 feet are we eliminating the option of ever having a wind turbine? Can we do that? Mr. Lindholm stated there is new technology for wind turbines that don’t have the blades, they are more like a barber shop pole; maybe we should be specific where it has a rotor type blade. Jean Sax stated the barber shop design is able to pull wind up the pole. Mr. Lindholm stated right now we are looking at the technology that is available today and we can’t write an ordinance for every possible technology. Commissioner Martin stated he liked the setback but would rather use the property line because with that you can control how close it can be to a structure.

Commissioner Martin stated if he has 500 acres and wants to put a turbine 100 feet from his own house; if there are ordinance that states the turbine has to be 2500 feet from an occupied structure, he wouldn’t be able to do that. Commissioner Martin stated it should be his choice. Mr. Lindholm explained that in engineering we have to do things in consideration of future use, you may not own the house 20 years from now and when someone else buys it they may not be able to occupy the structure; we can only provide guidance and there are going to be exceptions, that is when they ask for a variance.

Joe LaRose stated setbacks from a residence might be more complicated, if it is a rental and the worst were to happen and someone got hurt who wasn’t even the property owner the County might be liable. Commissioner Martin stated he understands that, but he doesn’t want people telling him exactly what he can do with his property. Mr. Lindholm stated he has a problem with someone putting an industrial facility in an agricultural area.

Commissioner Martin stated we should pass an ordinance in a controlled fashion without overreaching and without taking away someone’s personal property rights. Stan Shawver stated if a property owner chooses to have a turbine 100 feet from their home that is one thing but the property next door needs to have that protection and have the turbine a minimum number of feet away from the property line. If the neighboring property owner chooses to build right next to the property line that is their decision but there should be protection for existing neighboring homes. Chairperson Harris stated if there are minimum distances from property lines as well as from existing homes you are never going to be able to accomplish anything. Mr. Lindholm stated he didn’t see a problem with it never being able to take place because companies are trying to come in and put industrial wind turbines in a very populated county; maybe they can use smaller wind turbines. Mr. Lindholm stated his point when he wrote this was having a setback from any occupied structure. Chairperson Harris stated 2500 feet from a nonparticipating persons structure makes sense but if the property owner doesn’t mind having it in their back yard that is up to them. Mr. Lindholm stated that even E.On had a minimum of 1000 feet from a home on their own property.

The Commission discussed the remaining recommendations without issue.

The Commission moved on to discuss the “Wind Energy Conversion Systems, Commercial (WECS-C) General Requirements” document handed out by Mr. Shawver at the last work session. The Commission went through the document line by line. Only the lines discussed are referenced below. Items not listed raised no issues or simple clarifications were made.
Item 2: Mr. Shawver stated there is already a regulation in place, Zoning Regulations 15.A.2 which requires additional notification for any structure more than 200 feet tall, there is an additional notification of 500 feet additional of additional notification added on for each 50 feet of extra height. For a 500-foot tower Resource Management would notify neighboring property owners within 3500 feet of the subject property boundaries.

Page 2. Definitions:

Visual Dominance Zone: Commissioner Koirtyohann stated a wind turbine was going to dominate the landscape and asked if that definition needed to be in the regulations. Chairperson Harris stated he believed the use for that definition is referenced later in the regulations. Mr. Shawver agreed.

Page 3.

Item 5: Commissioner Koirtyohann asked if that item needed to be in the regulations. Mr. Shawver stated they should explain for the record how it would impact them if it is not approved.

Page 4.

Item 7.A: Mr. Lindholm asked the Commission to consider increasing that to whatever the residential structure setback is going to be. Mr. Shawver stated all of the distances and numbers are just a holding place until the Commission decides the particulars.

Page 5.

Item 8. E & F: Commissioner Koirtyohann stated he had a problem with those. That doesn’t have anything to do with health and safety. Chairperson Harris stated in the context of what the Commission looks at in whether it is an appropriate use of the land in that place, what do these items get at? Mr. Shawver stated he believes they are going to provide that as part of their presentation, so we put it in the application as part of the required information so they are providing it. It also puts it on record if it is challenged.

Item 8.I: Chairperson Harris stated under Missouri Statute it should probably say “general certified”. Commissioner Lloyd asked if there was any data that tells us what effect on land values a wind farm has had? Chairperson Harris stated the argument has always been that it will destroy property values even if it is 40 acres of woods in the middle of nowhere and that is not accurate. With regard to power lines, appraisers can’t find evidence that says it negatively impacts property values. Mr. Lindholm stated he was aware of people who were going to build a house in Harrisburg and they found about the proposed wind farm and backed out of the sale because in their words they had planned to build their dream house and that didn’t include a 500 foot wind turbine in the back yard. Mr. Shawver stated you have to be careful of how you use the term “property value”; because one potential buyer backed out it doesn’t mean that the next potential buyer will care if there is a wind turbine. Chairperson Harris stated that puts the burden on the applicant to bring the evidence, it also puts the burden on those who might oppose to bring corresponding evidence.

Page 6.

Item 9.I: Commissioner Koirtyohann stated he believes the FAA deals with that; the county won’t be able to supersede their requirements. Chairperson Harris stated no, but we need to know they’ve met that requirement, it will part of their application.
Regarding the Natural and Biological Resources, Chairperson Harris asked the Energy & Environment Commission if they had looked into any of the environmental conditions. Joe LaRose stated he hasn’t been able to contact Fish & Wildlife.

Item 5: Commissioner Koirtyohann asked what is considered objectionable density. Commissioner Furlong stated he had read somewhere that they wanted 1000 feet between turbines so one doesn’t interfere with the other. Commissioner Koirtyohann believes it should be a set number rather than stating “adequate”. Commissioner Martin asked if anything was found as to how many turbines were placed per square mile? Chairperson Harris stated there is some reference to that stating how close they can be and believes they are self-regulating on how close they want them. Commissioner Martin stated if the criteria are set at 2500 from property lines how many turbines could be contained on the property? Mr. Shawver explained that if you have a 2500’ setback from property lines it would require about 573 acres per structure.

Item 6: Commissioner Koirtyohann stated he believes the electric lines should have to be buried and leave the rest of the section out. Mr. Shawver stated “violate other guidelines/standards, violate applicable law” should be left in just in case there is a law or standard that says they can’t be buried. Chairperson Harris stated we could strike the economically feasible one. Mr. Shawver stated the wording can be changed to “shall be buried”.

Items 2, 3, 4 Soil Erosion & Water Quality: Commissioner Koirtyohann asked how item 2 is defined and on item 3 are they talking about roads in the work site? Mr. Shawver stated they are talking about the access drives and roads internal to the property. Commissioner Koirtyohann asked how item 4 is defined. Mr. Lindholm stated they are going to have to have a crane pad at every tower site; the cost of that will be self-regulating. Chairperson Harris asked if item 3 needed better specificity regarding access roads and roads internal to the project. Mr. Shawver stated yes. Thinking in terms of subdivisions and private roads we want to make sure they are wide enough that emergency vehicles can get past if there is a vehicle broken down. Mr. Lindholm stated those are construction roads. Commissioner Martin asked about staging areas where the company stores their equipment and turbines before they are constructed; is there a time frame or will a permit be required to do that? Chairperson Harris stated they will probably rent some piece of land to store everything until the project is complete. Commissioner Martin stated he is concerned about storing these items for however long it takes to complete the project; the neighboring property owner may not like looking at all of that and having the construction vehicles coming in and out. Mr. Shawver stated the zoning regulations do provide for construction related activities but we should tighten that down for this because we are talking 20,000 acres so logically they will want to store things around, we should make sure they provide screening and have reasonable access hours; in theory they could have a staging location on property where there won’t be a tower.

Item 1.2: Commissioner Koirtyohann stated noise can be an issue but I don’t see how that section will be enforced. Mr. Lindholm stated decibel meters are cheap and there is equipment where you can do long-term sound studies. Commissioner Freiling stated when you are talking about industrial use in a residential zoning, the Commission should err on the side of residential use. Commissioner Koirtyohann stated with complaints you get into the issue of the wind blowing in one direction and it is noisy and the next day the wind is blowing a different direction and it isn’t noisy; how many trips will you have to make out there? It states an acoustical study will have to be performed by an independent acoustical consultant; that will not work with a neighbor who will call Resource Management to complain and it will be a nightmare for staff. Mr. Shawver stated that does become a concern, but you can’t just require a study every time there is a complaint. Mr. Shawver stated staff doesn’t like to go out to check noise complaints. There are some uses approved in the past where staff has had to investigate noise; most of the
Complaints are regarding weekends and evenings because that is when neighboring property owners are home. You can’t expect a sound investigator to get out to the site every time a complaint is made. Commissioner Freiling asked about monitors being set on the sites to measure sound. Mr. Lindholm stated when he read about sound ordinances the studies done to establish a base sound before a wind turbine is placed, they would do three-month studies; the sound ordinance put on the turbines wouldn’t be quieter than what already existed at the site. Mr. Lindholm stated he is sure there is something available for monitoring noise. Commissioner Koityohann asked how you determine if it is feasible? Chairperson Harris stated the EEC came up with 35 decibels and the draft recommends 65 and 50, we have to be careful that we don’t set a number that is blatant unachievable. Mr. Lindholm stated 65 decibels is a vacuum cleaner; that is loud. Chairperson Harris stated item 2 states “upon receipt …. of a complaint”, that is saying every time there is a complaint; that section will need to be reworded. Commissioner Koityohann suggested “the department determines to be a reasonable complaint”. Chairperson Harris stated we may need to revisit this item later.

Commissioner Lloyd left the work session at 6:05 PM.

Page 9.

No items discussed.

Page 10.

Item 3. Chairperson Harris stated item 3 is what was discussed earlier regarding how close the towers can be to each other. Mr. Lindholm stated E.On had proposed one at least every 100 acres. Mr. Shawver stated if we require 2500 feet from a property line, we are talking 573 acres of ground for one turbine. Chairperson Harris stated they are going to argue that it is too restrictive. Mr. Lindholm stated their complaint would fall flat because this is a safety issue. Chairperson Harris stated if your regulations only allow one turbine for every 573 acres that may get challenged. Mr. Lindholm stated the wind farm is proposing to come to Boone County; Boone County is already the way it is so they have to change for us, and we are trying to be accommodating but it is not our job to make sure they can come to Boone County.

Item 11 Chairperson Harris asked about the maximum height. Mr. Shawver stated that number is a place holder until the Commission determines the maximum height.

Page 11.

Chairperson Harris stated item 1 should go on page 8 for consistency with the rest of that subject.

Mr. Lindholm stated under safety there should be a number 3 for occupied structures. That should be the primary one because they will be there all the time.

Page 12.

Under decommissioning Chairperson Harris stated the last sentence indicates 3 feet. Commissioner Koityohann stated it should be at least 4 or 5 feet. Chairperson Harris stated it should be increased.

Page 13.

Item 2: A single permit for constructing the entire project won’t work because we are looking at individual conditional use permits for each turbine.

Review Complete.
Mr. Shawver stated the next work session is scheduled for June 13, 2019, that is the regular work session to discuss the items on the Planning and Zoning Commission agenda, there are nine plats on the agenda, in addition staff will need time to create the new draft for wind farm regulations.

Chairperson Harris stated it makes sense to wait for staff to create a draft and then have a work session dedicated to that review.

Mr. Shawver stated we are proceeding in a timely manner, but we also want to be efficient and fair. Items brought up tonight such as 573 acres, is that significant or not? As Mr. Lindholm stated, they are coming here. Chairperson Harris stated you also don’t want to create a regulation that sets you up for a court challenge that you know you can’t win; you have to balance both sides. Commissioner Furlong stated regarding the 573 acres, what if the landowner behind him is participating in the project, should that setback still be 2500 feet from the property line? Mr. Lindholm stated the EEC recommended adding a variance process for that. Mr. Shawver stated the EEC suggested if you can get a neighboring property to give a waiver from the setback then you can infringe on them. Mr. Shawver stated his discomfort with that is that you are allowing private deals between property owners and the County doesn’t want to be involved with private deals, it is better for the County to have a particular setback number.

The next work session is scheduled for Thursday, June 13, 2019 at 4:30 pm. Per the Commission, proposed wind farm regulations will not be discussed. The next work session to discuss Wind Farm Regulations will be Tuesday, June 25, 2019 at 5:00 PM.

The work session adjourned at 6:23 pm

Meeting notes prepared by Paula Evans, Administrative Coordinator, Boone County Resource Management
Exhibit 10
All,

I don't think I'm going to make it Thursday night.

I will leave you with a couple of thoughts though.

I typically lean toward less regulation vs. more. However, on the issue of wind farms in Boone County, I like the basic product we've put together for regulating wind farms. I really don't think there's much room for these things in Boone County with its density and hilly nature. There are other, better places for these. I think it should be challenging to get approval for these as they have many negative side effects. I know those in favor of wind farms think the benefits outweigh the potential costs. I don't agree.

For what it's worth,

Bill

On Mon, May 17, 2021 at 8:12 AM Paula Evans <PEvans@boonecountymo.org> wrote:

Good morning everyone!

Hopefully you all received the three emails from Bill on Friday which contained the public comments we received during the comment period for the Wind Farm Regulations. If you did not receive them please let me know as we will be discussing these at the regular meeting on Thursday, May 20th. Please let me know whether you will attend, and if so, whether in person or by phone/video.
Thanks!

Paula Evans
Boone County Resource Management
801 E Walnut, Room 315
Columbia, MO 65201
(573) 886-4330
(573) 823-4285 After Hours