April 30th Wind Energy Text Amendment Working Group
Meeting Notes

Members of Working Group present:
Cindy Chapman, Bud Dasenbrock, Gary Hellerich, Lucas Nelson, Tony Oberley, Curtis Schwaninger, Greg Schwaninger, Ed Swotek, John Blas, Paul Meints, Dennis Rosene, Joe Wood. Approximately 40 members of the public were also present.

Meeting Summary

Introduction: Steve Henrichsen, Lincoln/Lancaster County Planning Department (LLCP), gave a brief review of the format of the Wind Energy meetings. The main focus is to share information with and receive input from the Working Group Members. Information from all meetings is available on the website. The next meetings in May will focus primarily on the Lancaster County regulations. Gage County group members are welcome to attend those future meetings, but they may also choose to discuss the regulations in their own county. Scott Holmes and Chris Schroeder are here from the Lincoln Lancaster County Health Department to continue presenting information about noise and health. Planning has compiled information about setbacks and regulations in other counties in Nebraska and around the nation for comparison. If there is time, the group can begin review of some preliminary suggestions proposed by Planning. Please hold public comments until the end of the meeting.

Wind Energy and Health (the full PowerPoint presentation is available on the website http://lincoln.ne.gov/city/plan/dev/wind/index.htm):

Scott Holmes, Health Department, stated that at the last meeting, the three panelists were all noise experts who presented information about sound, noise, and audiology. His own credentials include degrees in epidemiology and toxicology and over twenty years experience in the Health Department. He introduced Chris Schroeder who has a Master's Degree in Community and Regional Panning. Health did a long phase comprehensive review of noise issues. The also receive and monitors noise complaints in Lancaster County.

The first study reviewed was conducted by the Mass DEP/DH Panel. The study included an expert panel process which drew epidemiologic evidence from peer reviewed studies as well as all other useful information. This study concludes that there is an association between exposure to wind turbines and annoyance. There is a possibility that they cause some sleep disruptions. And there is insufficient evidence at this time that they directly cause other health problems or disease. It was concluded that infrasound does not affect the vestibular system, though this information may have changed since this study was done. There is no evidence that shadow flicker causes seizures. Ice throw has the potential to cause physical harm and should be considered. They concluded that there should be noise standards, some protection from shadow flicker, restricted use during periods of icing, and public participation should be part of the process for coming up guidelines.

Generally speaking, in industrial and commercial areas a higher noise level is allowed, but in residential areas, that allowable level declines. We found guidelines in other communities more effective when they included allowed decibel levels. Initially, we had 35 decibels at property lines. The more we looked at the issue, the more it seemed appropriate to base the limitations on dwelling units, rather than property lines. We use a metric that is different from others we have seen.

The 2015 Schmidt and Klokker Study was done three years after the Massachusetts study and reviewed the relationship between wind noise and annoyance/sleep disturbance. There was no association with tinnitus, hearing loss, vertigo or headache. It found a tolerable noise level to be 35 decibels. Henrichsen asked for clarification about dose relationships. Holmes replied that most exposure to chemical or other agents function as a measurable dose relationship where if there is a higher exposure, there is a higher response outcome.

In “Understanding the Evidence” by the Council of Canadian Academies, the panel went through a process to identify the weight and summary of a variety of evidence including legal decisions, web pages, reviews and empirical research, in addition to environmental health studies. It studied exposure to external and modifying factors and how mechanisms, how things work in the body and cause physical or mental problems, and adverse health effects such as sleep and annoyance, stress, and actual disease. Noise that intrudes or interferes becomes an annoyance. It is tricky to assess a causal relationship without an actual identified mechanism, though you can identify associations more easily. Causation can be inferred from the strength and consistency of the association. Time sequence is an important factor. This study used International Agency for Research on Cancer to decide reputable, clear criteria for determining causal relationship. That relationship must be observed between exposure and health effects when chance, bias, and confounding evidence can be ruled out. The conclusion was that there was limited evidence of causal relationship between turbines and direct health effects. It is plausible, but at this time, there is simply inadequate evidence. There is sufficient evidence to connect turbines with annoyance and sleep disturbance. Annoyance can cause stress, which can cause sleep loss, creating further stress; this does not mean there is a direct route from turbine noise and cardiovascular disease, for example, but long term exposure to annoyance and stress are contributors to longer term health outcomes.

Health Canada's study included measuring sleep disturbance with a sleep gauge, stress measured by cortisol concentrations in hair samples, blood pressure and heart rate, self-reporting, and quality of life as measured by a questionnaire. They did not just ask participants, but they measured stress and sleep level by quantifiable means. There were over 1,000 participants. Wind turbine noise is associated with annoyance but there are many factors beyond just the decibel level that contribute to this annoyance. The study does include a statement that “the health impacts of wind turbine noise cannot be comprehensively assessed at this time”, which does not mean there is no data. This study is a different kind of study which is not compiling literature to analyze and compare, but rather, is designed as an epidemiologic study of individual exposed to wind turbine noise. It included 1,200 households and 4,000 hours of actual noise measurements, with lots of modeling based on those measurements. They found noise to be statistically related to several self-reported health events. Turbine noise was found to be statistically related to measured hair cortisol, systolic and diastolic blood pressures. One confusing factor is that the associations were not dependent on a particular noise level or distance from the turbines. What it says is there was an association, but some individuals felt effects at lower noise level, and some had no effects even if exposed to high levels. In conclusion, findings support that some individuals experience long-term high annoyance with wind turbines, and there is a link between long-term annoyance and health. Noise is not the only factor in annoyance. Turbines are not conclusively found to be associated with self-reported sleep disturbance, illness, or perceived stress and quality of life. But again, it is statistically associated with annoyance towards several wind turbine features.

Chris Schroeder stated the percentage of people who become annoyed varies significantly and is associated with sound measured in decibels. That percentage jumps dramatically between decibel levels. At 30 dBs, only 2% of people become annoyed. At 35 dBs, that percentage goes up to 10%. As you increase above that, the percentage of people who become annoyed increases significantly.

Curtis Schwaninger stated that it seems like the studies selected represent only those that state there is no correlation between wind turbines and health issues. There are many studies that say there is a problem. The newest turbines are also much larger and noisier than ones that existed during many of the older studies. Holmes explained that the studies chosen encompass many of those findings. There are individual studies that reach different conclusions, but science is done by taking a broader look and bringing all of that information together. There have been changes in wind turbine technology but there has also been a tremendous amount of study done more recently.

Bud Dasenbrock asked if the studies are saying that we can expect 10% of people in a wind energy area to be annoyed. Holmes said that based on research, there is a highly variable range. It can depend on how much people are opposed to the turbines coming in the first place.

Tom Schuerman asked if the studies compare the health results from smaller turbines to the newest industrial models. Holmes said it should be noted that newer turbines are larger, but generate less noise. It is variable.

Joe Wood commented that ambient noise levels do not stay constant. Holmes agreed that there is noise at all times, at different levels. It is never zero.

Ed Swotek asked what the decibel levels are in a home during normal conversation. Holmes replied that it could be in the 60s. Swotek went on to ask what 35 dBs would sound like. Homes said it is difficult to make that type of comparison because turbine noise is a specific type of noise with modulation, so even if it is fairly quiet, it is more noticeable and potentially more annoying. Modulation has been addressed in many studies and can also vary. You could measure it times of maximum levels, during certain time periods.

Dennis Rosene said that it seems reasonable to come up with a level that would qualify as not causing annoyance. Holmes agreed that the noise must be measured in a way that accounts for the modulation.

Cindy Chapman stated that if there is a certain percentage of people annoyed or harmed, that should determine the criteria, the way it would with any other environmental health hazard. Holmes said many other hazards can be measured in effects per million or ten thousand, etc. With regard to this, there could be heath based issues, annoyance, land use, and many other factors.

Schuerman asked at what level a person would hear the modulating noise. He added that if he hears an annoying sound, like a dripping faucet, he is able to turn the water off. That is not an option in this case. Holmes said that most people would likely hear it between 34-40 decibels. Another issue with noise that is complicated is that we all have different hearing acuities, so for certain levels there could be tremendous differences in what individuals hear. There are also individuals who are highly sensitive to noise disturbances.

Gary Hellerich noted that the time of exposure could contribute to annoyance. Would effects be cumulative, or go away if there were breaks in noise? Holmes said he is unable to answer that question. Joe Wood said the turbines would be anticipated to run close to 40-45% of the time.

Schuerman noted that infrasound could also have negative health consequences. Holmes said the Health Canada study looked at both of those factors.

Schuerman questioned why he and his neighbors should be subjected to these potential risks if many more years of data are needed to conclusively answer these types of questions. Holmes agreed that it is true that there needs to be years of studies to conclusively determine if there are chronic health problems associated with turbines. Schuerman reiterated that he does not want to be part of a long term health study, essentially against his will.

Setbacks in Other Communities:

Henrichsen said there are two handouts about setback regulations in other areas. These were put together for informational and comparison purposes only. One focuses on Nebraska counties that include commercial wind energy guidelines in their ordinances. We did not include information on communities where there are only small turbines, like ones that might be installed in a yard. Unlike the study presented by Health staff, which is a statistical study, this is simply informational. Many counties appear to take regulations from other counties and the basic format is repeated or looks very similar, with some adjustment to account for local preference. For example, Holt County had very similar regulations to Hitchcock, but they have very different setbacks and decibel levels. Many appear to have a setback of one mile, but there is no reason given as to why that distance was chosen. The second handout is again, just for reference, and it shows how regulations have been handled nationwide. It simply tries to summarize setbacks and various concerns.

Chapman wondered which of the counties actually have commercial wind farms. Henrichsen said that he did not know, but much of this language was added within the last ten years, because this was a topic that simply wasn't being addressed until recently.

Paul Meints asked if a tour of the Steele Flats was still a possibility. Henrichsen said that a formal group tour was not possible at this time. A map has been made available to give people a general idea if they want to go out on their own. The site is 65 miles from downtown Lincoln. There are distances listed on the map so people can get a general idea of what the setback distances would mean. This does not tell what the noise levels would actually be, but it provides perspective of the visual impact.

Swotek asked if an alternative would be to visit the LES towers. Wood stated that he does not believe those would provide a fair comparison because they are aging towers.

Schuermann said he visited Steele Flats and took sound readings with his phone and the graph peaked at the low end. Holmes said that the meters on phones are not capable of providing reliable scientific readings. The tools used to measure sound take thousands of measurements over time.

Hellerich asked if experts were consulted in creating the current rules. Henrichsen replied that neither he nor the county planner were involved in that process. Holmes said that those guidelines came from the Health Department and were based on the studies available at that time, and that is how the 35 decibel level was chosen. Setback distances and decibel levels essentially achieve the same thing; you could have greater setbacks, but then the allowable decibel level might be higher.

Meints noted that the longer setback eliminates the risks from ice throw and shadow flicker, the visual annoyance, and allows for a higher decibel levels.

Henrichsen said that the final handout was a discussion draft which addresses many of the points covered in the meetings. These are intended to be discussion points that could help to form recommendations when it comes to time to put the ordinance together over the summer. The next meeting will be a time to hear the thoughts of working group members. The working group has many viewpoints. If there is a lot of agreement or disagreement about certain points, that is certainly something we will pay attention to. He opened the meeting up for comments from the public.

<u>Open for Comments and Questions from Public on Matters Discussed This Evening:</u>

- Since sound dissipates with distance, it seems appropriate to have noise and annoyance levels combined with the setback discussion. Many of the Nebraska county setback examples are in significantly less populated areas than Lancaster County.

- It would be important to have a spec sheet from turbine manufacturers to understand the specific turbines being used and exactly what manufacturer recommendations are, and then base the setback distance on that information.

- It is unfair to set a setback level that you know will likely annoy a certain percentage of the population.

- If 20% of people get sick or annoyed, that is not protecting everyone, everywhere. Rural citizens deserve as much protection as those in Lincoln. If the science is not settled, do not make the people living near wind farms guinea pigs.

- Exposure to high noise levels and infrasound could have a different effect on the sensitive ears of children.

- The wind turbines help with plant pollutants.
- There is no guarantee that the energy produced by the turbines will remain in Nebraska.

Conclusion:

In answer to a question, Henrichsen stated that wind farms are privately owned and developed. They can sell power to a public power operation, though that is not a requirement.

Holmes stated in order to compare negative health effects of coal vs. wind turbines, a full health impact analysis would be required. No decisions have been made yet in terms of levels. The goal is to listen to people, hear these conversations and concerns, and then make decisions about what is appropriate.

The meeting concluded at approximately 8:27 p.m.