

Cerro Gordo County Planning and Zoning Commission

## Report for Board of Supervisors

Concerning Regulations for Industrial (Utility-scale) Wind and  
Solar and Battery Installations

6-6-2024

This report was written by four of the five Cerro Gordo County Planning and Zoning Commissioners for the Cerro Gordo County Board of Supervisors. It details the methods and findings of the Cerro Gordo Planning and Zoning Commission with respect to regulations for industrial (utility-scale) wind and solar and battery installations. The report follows the Iowa Administrative Code (IAC, or Iowa Code), specifically IAC 335.5, which sets forth policies, considerations, and objectives to be applied in notice, adoption, and distribution of county planning and zoning regulations.

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\* Sections 1 and 2, together, describe the policy and action considerations for the development and approval of any regulations for industrial wind and solar and battery installations. The commission’s assessment of the considerations is set forth in sum of both sections.

Additionally, one Cerro Gordo County Planning and Zoning Commissioner provided a different perspective. This “Dissenting Report” is shared in full after the majority report and starting on page 94.

# THE PROCESS

Cerro Gordo County Board of Supervisors tasked Cerro Gordo County Planning and Zoning Commission to write an ordinance for utility-scale wind, solar, and battery storage. In December 2023, the commission developed a plan to approach this duty with efficiency, transparency, and consistency. We wanted to include the public as part of our collaboration and be up front regarding activities and timeline.

The process and conversations have focused on utility-scale wind and solar. It was important for the commission to figure those out first, since utility-scale battery storage is only relevant in Cerro Gordo County if utility-scale wind and/or solar are deemed appropriate use of land in the county. Items regarding battery storage came up now and again throughout the process and such information is included where appropriate, but this report focuses primarily on utility-scale wind and solar.

The commission invested a significant amount of time and energy into the task of researching the industrial wind and solar industries, as relates to new development in Cerro Gordo County. Our research assisted us in learning and understanding the impact new development may have on our economy, environment, quality of life and more. We relied on three areas that heavily influenced how we went about this task, helped channel our discussions, and guided us as we strived to accomplish the requirements prior to us making our final recommendation. These three areas are:

1. Iowa Code and applicable regulations, considerations, and objectives while grounded in the 10 Smart Planning Principles set by the state of Iowa
2. Comprehensive Plan – consistent with and foundationally based on the North Iowa Corridor Joint Comprehensive Plan recently approved by the CGC Board of Supervisors
3. Public input

All deliberations relating to utility-scale wind and solar installations were conducted in public during official planning and zoning commission meetings. There was extensive public outreach to encourage participation, including public notices, outreach to subject matter experts, outreach to renewable energy companies, extensive public outreach via public input sessions, and numerous commission work sessions open to public observation.

The commission began executing the plan by hosting five public input sessions in the 1<sup>st</sup> quarter of 2024. The locations were spread across the county, held in the communities of Rockwell, Mason City, Thornton, Rock Falls, and Ventura; these locales were chosen specifically to provide geographic diversity to be wholesome in our outreach and offer every citizen a session closer to home. The public input sessions were scheduled well in advance of occurrence and communicated through a variety of methods including the county's website and shareable Facebook posts. These public input sessions could also be accurately referred to as commission listening meetings.

At each public input session, the rules were presented at the start of the meeting, people were held to a consistent standard of following those rules, and public questions were answered to clarify the process and relationship to the draft comprehensive plan that was being considered in parallel. Feedback from people who attended the public input sessions was overwhelmingly positive. Multiple members of the commission felt a shift in the public's energy during public input sessions from hesitant of- to trusting in- the process.

The public input sessions were well attended, with 70, 65, 82, 72, and 53 people at each session, respectively (342 people total). The turnout was more than double the typical turnout for public meetings, which shows the importance of this topic to citizens of CGC.

Each public input session lasted at least two hours. The quantity and quality of what we heard was very good. Citizens gave input on the future development of utility-scale wind, solar, and battery storage installations in the county. Public input was extensive and impressive. The majority of the citizens that spoke were farmers or persons that lived in our rural areas. Some were landowners that did not reside in the county, and others represented developers or local businesses.

During the five public input sessions, in total, 9 people spoke for, 104 spoke against, and 5 spoke in neutrality regarding utility-scale wind and/or solar (8%, 88%, and 4%, respectively). This changes slightly when we look only at unique speakers, in which case 7 people spoke for, 76 spoke against, and 5 spoke in neutrality regarding utility-scale wind and solar (8%, 86%, and 6%, respectively). The breakdown is consistent with what we saw from public input received related to the comprehensive plan; review of that published and unpublished public input resulted in a tally of 3 comments in favor (12.5%) of renewables and 21 comments opposed (87.5%).

The commission listened to public comment, and we seriously considered this feedback when we made our decisions and recommendations. Citizen input was overwhelmingly against additional industrial renewable development in Cerro Gordo County.

Some people believe those in favor did not speak out because:

- "It was a threatening environment."
  - o The commissioners did not witness a threatening environment. Knowing this could be a polarizing topic, we worked hard to be respectful and consistent with all members of the public. In Rock Falls, more than one speaker asked those in favor to speak, to help them (people not in favor) understand the other perspective (in favor).
- "People who are in favor won't take time to speak on it."
  - o It is not clear why this would be. Throughout the public input sessions, there was no definition or idea of path forward. The commission communicated that we were seeking all types of input regarding the topic of utility-scale wind, solar, and battery storage. If people are passionate about something, they are typically eager to speak about it, to share their information and excitement with others. It is unclear why this would not be the case with this. At one public input session, a citizen stated "it frightens me that enthusiastic people aren't speaking at the meetings". The lack of representation from those in favor ended up raising public concern about why people in favor did not speak up.
- "I have an NDA with the developer, so I can't talk about it"
  - o Ranger Power (the developer referenced in the conversation from which this quote was taken) confirmed that leaseholders can talk about anything in the contract except the financials. Additionally, during separate conversations, a commissioner encouraged at least one developer (Ranger Power) and multiple leaseholders to speak and share their perspective with the entire commission; ideas provided include: Why are you passionate about it? Why is it a benefit you believe in?

- “Anyone who didn’t attend or speak at a meeting must be for or neutral toward utility-scale wind and solar.”
  - o One commissioner kept track of county citizens who spoke with them privately rather than publicly about this topic. The count was 2 in favor of and 16 against utility-scale wind and solar (11% and 89%, respectively).

The information collected via these public input sessions and emails from common and additional citizens enlightened Commissioners as to the topics related to utility-scale wind and solar. This foundation provided a list of items to learn about through individual and shared research.

In addition to independent and shared research, as a commission, we were given presentations by county officials, a utility industry representative, a drainage engineer, and other subject matter experts. From these experts, we learned about a variety of topics related to industrial wind and solar including drainage, the county assessment process for wind and solar, the electrical grid, wind and solar installations, and county roads.

We were provided thousands of pages of literature, both for and against industrial scale wind and solar, that we read and discussed. We all conducted research individually and shared information, publications, papers, briefs, and studies. We visited wind and solar utility sites and talked to people about their experiences. Five public listening meetings were held to give stakeholders access to the commission, so that we were informed of their opinions; this also allowed for collaboration and transparency throughout the process.

The public has been welcomed to watch the commission deliberate on how to approach this process, define dates for public input, learn, and determine the path forward. After public input, educational sessions, and independent research, the planning and zoning commission held workshops that were open to the public to share with fellow commissioners what we learned and discuss how it related to our task for the county. This process was important not only to foster collaboration and transparency but also to reassure future users of the resulting documents that we did our due diligence.

The zoning commission gathered and read an extensive amount of information regarding the impact of industrial wind and solar utilities. Much was learned and experienced to bring us to the point of being able to reach a decision. Throughout its considerations and deliberations, the commission has worked in a continuous, publicly transparent, consistent, and deliberate manner.

Although various companies served as examples occasionally throughout the process, the planning and zoning commission is committed to making a recommendation for general policy rather than policy tailored to the way a specific company(ies) operates.

The process we followed to arrive at our recommendation is well documented. Public meetings, agendas, notes, and public sign-in sheets are a matter of record.

To guide commission meetings on this topic, we considered utility-scale wind and solar relative to each item listed in Iowa Administrative Code (IAC) 335.5, including Section 18B, and applicable items in the comprehensive plan. The items contained within these regulations and plan provide the foundation for which the following evidence was gathered.

# THE EVIDENCE

Using the information gathered throughout the process, Cerro Gordo County Planning and Zoning Commission assessed the criteria put forth in IAC 335.5 relative to the impact utility-scale wind and solar would have on Cerro Gordo County. We also considered the purpose of planning and zoning and private property rights. Our findings of evidence are described here.

## Base Information

### Purpose of Planning and Zoning

According to Iowa State University Extension's workshop 'Introduction to Planning and Zoning Workshops for Local Officials':

The comprehensive plan is a statement of policy that directs future land use, while a zoning ordinance is a local law that regulates land use today.

The comprehensive plan guides physical development of the community and serves as the basis for decisions about land use. The comprehensive plan is a statement of policy that:

- Protects/optimizes property values by separating incompatible land uses. The intent is to optimize, not necessarily maximize, property values.
- Provides continuity across time by providing for predictability of future conditions, which encourages investments in property.
- Protects public investments in facilities like roads, sewer, water, and other public facilities, which helps avoid unnecessary investments.
- Protects environmental resources.

Per state law in Iowa, the zoning ordinance and zoning decisions shall be made in accordance with a comprehensive plan. There are different types of zoning that can be used.

In Cerro Gordo County, we practice Euclidian Zoning. The basic objectives of Euclidian zoning are to 1) separate incompatible land uses and 2) protect private property values by grouping similar land uses together and minimizing the negative impacts where incompatible uses exist.

Another type of zoning is a performance-based code, which regulates the location of uses based on performance criteria such as noise, aesthetics, and fiscal impact. Performance-based codes can be difficult to implement due to factors like cost associated with measuring performance and training to learn how to measure performance.

Due to the complexity of utility-scale wind, solar, and battery storage, it is important for Cerro Gordo County to create a thorough ordinance based on the determination of whether or not one or more of these types of use is an appropriate use of land in the county.

- If utility-scale wind, solar, and/or battery storage is determined to be an appropriate use of land, specific rules should be identified and used despite associated difficulties with performance-based code in order to minimize risk and provide clear direction for allowing such

use. Such rules would be important to protect the land, neighbors, and others in the community from the downsides of such installations.

- If clear direction is not provided in the zoning ordinance, there will be risks associated with each request for variance and/or conditional/special use permits related to these multifaceted subjects. Lack of clear direction in the ordinance would also place undue burden on Cerro Gordo County Board of Adjustment volunteers to learn about each application in a short amount of time in an attempt to understand the complex topics of utility-scale wind and solar, for which the planning and zoning commission has had time to consider public input and research thoroughly. As a reference to the processes that could be activated if clear direction is not provided now, specific information related to variances and conditional/special use permits is included in Appendix B.
- If utility-scale wind and/or solar (and associated battery storage) is determined not to be an appropriate land use, the zoning ordinance should specifically state that these installations are not eligible for variances, conditional use, use exception, special use, or special exception.

While considering whether a proposed land use is appropriate or not, a good reference point is a general list of criteria on page 59 of the Iowa State University Extension workshop booklet. This fact sheet is about special uses, conditional uses, and special exceptions, but the criteria can serve as guidance to the planning and zoning commission and Board of Supervisors as we strive to make the right decision about whether or not utility-scale wind and/or solar is an appropriate land use in Cerro Gordo County. In general, the goals are to have the land use be:

- Compatible with the principles and objectives of the comprehensive plan
- Compatible with uses permitted in the zoning district under which it is regulated
- Compatible with existing or planned uses of nearby properties
- Will not endanger public health or safety

## Property Rights

Personal property rights have been a significant consideration throughout this learning and deliberation process. At first glance, it is easy to think “I can do whatever I want with my property.” Upon further consideration, we want to maintain as much of that personal right as possible, yet we know there are rules to follow in order to live as community. This is where zoning comes into play.

The Cerro Gordo County zoning ordinance contains rules that specify how land can be used throughout the county. These rules are defined by zones, declarations of intent, principle permitted uses, accessory permitted uses, special permitted uses, height regulations, yard requirements, lot requirements, and district restrictions.

In the vast majority of cases, people have the right to do what they want with their property. The exceptions occur in cases where the use would impact many, so specific rules are imposed in order to reduce that impact; examples might include salvage yards, waste collection sites, waste to energy plants, sexually oriented businesses, hog confinements, and slaughter houses. Utility-scale wind, solar, and battery storage would also impact many; thus, the reason significant consideration is needed to determine whether

these would be appropriate uses of land in Cerro Gordo County and, if so, what rules would be needed to reduce that impact.

When contemplating a lease, the permitted uses should be a consideration rather than assuming something to be an allowable use of land. Cerro Gordo County's current zoning ordinance allows people to do a variety of things within the applicable zone. General regulations and regulations for areas zoned for agriculture use (A-1, A-2), commercial use (C-1, C-2, C-3), and industrial districts (M-1, M-2) do not identify utility-scale wind, solar, or battery storage as permitted uses. Article 20 identifies Special Uses that may be allowed via Special Use Permit, which is granted by the Cerro Gordo County Zoning Board of Adjustment.

Note: Wind towers have previously been granted special use permits under Article 20 Item J, under guidance to volunteers on Board of Adjustment from the prior zoning administrator that wind turbines are tall like communication towers. According to a current planning and zoning commissioner that previously served on Board of Adjustment, having now learned more about this topic, they are not confident this was an accurate interpretation of the ordinance.

Land zoned for Agricultural use is not traditionally used for industry or other uses, as can be seen on the table on page 61 of the comprehensive plan. The reason for this is because non-agricultural uses can impact ability to carry out the functions that occur in the agricultural district. A few examples of such considerations include arial applications, amount of land needed and available to farm, and likely impact to the county-wide drainage system.

During the ISU Extension workshop previously mentioned, the instructor pointed out that, when developing and using the comprehensive plan and zoning ordinance, it can be difficult to "see the we through the me"; they reminded us that it is important to consider the "we" perspective for community benefit. As you will read about below, utility-scale wind, solar, and battery storage can negatively impact many for the benefit of a few.

## **SECTION 1 – Iowa Code 335.5**

### **Iowa Code 335.5(1)**

Iowa Code 335.5(1) states "The regulations shall be made in accordance with a comprehensive plan and designed to preserve the availability of agricultural land; to consider the protection of soil from wind and water erosion; to encourage efficient urban development patterns; to lessen congestion in the street or highway; to secure safety from fire, flood, panic, and other dangers; to protect health and the general welfare; to provide adequate light and air; to prevent the overcrowding of land; to avoid undue concentration of population; to promote the conservation of energy resources; to promote reasonable access to solar energy; and to facilitate the adequate provision of transportation, water, sewerage, schools, parks, and other public requirements."

### **Comprehensive Plan**

The North Iowa Corridor joint comprehensive plan, which includes the Cerro Gordo County comprehensive plan, has three primary purposes: to provide an essential legal basis for land use regulation, to present a unified vision, and to establish policies to fulfill that vision. The planning and zoning commission's recommendations support and satisfy these three purposes.

Indeed, the zoning commission first recommended a moratorium concerning regulations of industrial wind, solar, and related battery facilities in recognition of the importance of awaiting guidance from the new county comprehensive plan. The moratorium was approved on May 15, 2023 and has been extended until December 31, 2024. Throughout 2023 and into early 2024, county residents and government officials were involved with an extensive updating of the county comprehensive plan in a united effort involving the updating of the comprehensive plans for Clear Lake and Mason City. This historic cooperative effort at the county and city levels directly involved the county planning and zoning commission and underscores the importance of the new county comprehensive plan when considering any new regulations.

Cerro Gordo County has experienced population decline. In order to stop these trends, the comprehensive plan indicates a need to elevate recreation, preserve resources and the character of our land. This is to be accomplished by protecting land and regulating land use to positively impact quality of life. Although there is both support and concern regarding industrial wind and solar development in the county, the comprehensive plan clearly identifies the priority being agricultural production, recreation, landscapes and conservation of natural features and resources. Utility-scale wind and solar are incompatible with agriculture land use or any other of the traditional land use types except limited industrial or heavy industrial.

The comprehensive plan repeatedly emphasizes preservation of natural resources and agricultural land. It discourages large scale proposals and developments that would affect stormwater management, habitat preservation and visual variety of our landscape. In addition, we should discourage proposals that would detract from natural resources, recreation and agriculture production while upholding the rural, scenic style of our county community.

Key themes of the CGC comprehensive plan are:

- Agricultural production as a top priority
- Preservation of agricultural land as a top priority
- Bringing people to the area (tourism, population stabilization)
- Upholding a strong economy (tourism, local spending)
- Protection of natural resources
- Maintaining rural character and quality of life (for county residents and tourists)

The Cerro Gordo County comprehensive plan provides a multitude of statements that inform decisions related to utility-scale wind and solar. The detailed list is included in Appendix A.

The Cerro Gordo County planning and zoning commission acted in careful accordance with the policies and actions set for in the new Cerro Gordo County comprehensive plan (approved on April 15, 2024) to prepare its recommendation concerning industrial wind and solar installations.

To clarify intent as it relates to agriculture, according to Cerro Gordo County's zoning ordinance, agriculture is "The science or art of cultivating the soil, producing crops, and raising livestock." For sake of discussion,

we will follow the definition of crop as, per Merriam Webster Dictionary, “a plant or animal or plant or animal product that can be grown and harvested extensively for profit or subsistence”.

### **Preserve the availability of agricultural land**

Utility-scale wind, solar, and battery storage are in direct opposition to this regulatory design requirement to preserve the availability of agricultural land.

The comprehensive plan set forth many policies and actions designed to preserve the availability of agricultural land. The first sentence of the section on Cerro Gordo County Policies and Actions (at page 161 of the comprehensive plan) states the overall top priority of the plan is “Maximizing agricultural production and preserving farmland are the top priorities.”

The majority of the county that is currently not considered a city, town, wetland, park or earmarked for future development would be defined as “prime” agricultural. The task of preserving this land, its topography, and its availability to remain as agricultural land is specified in Iowa Code. We considered the potential impact by industrial wind and solar on drainage, soil health, wind erosion, and water erosion. We also reflected on the impact to our local economy, next generation land availability, congestion, overcrowding, and character of the area.

Using farmland for solar installations reduces the availability of agricultural land, which is opposite of preserving the availability of agricultural land. Solar installations may be viewed as a way to preserve agricultural land for the future because, some say, it lets the land rest and restore. However, letting the land rest under solar does not preserve the availability of agricultural land because the solar infrastructure locks up the land for the life of the installation; this does not help farmers young or old, because it takes the land out of production for much of the time those farmers and their next generation would be farming.

In order for availability of agricultural land to be preserved, we must also consider soil quality. Proponents of utility-scale solar state that letting the land rest and restore is great for soil quality because you don’t till or apply chemical to the land. However, there is concern about impacts to soil quality during construction, use, and decommissioning for reasons such as compaction, disturbance, additives, and pollution.

Fortunately, current farming practices sustain and restore the land while actively working the land. Healthy soil is in the best interest of farmers, since their livelihood depends on the land. Examples of farming practices that preserve availability of agricultural land while conserving and restoring soil include cover crops, no-till farming, strip-till farming, extended crop rotation, nutrient management practices (fertilizer rate, timing, placement, sourcing), and drainage management.

Another way landowners might use their land is by putting it into U. S. Department of Agriculture’s (USDA’s) Conservation Reserve Program (CRP). This can be seen as similar to growing a native grass mix under a solar installation. An important difference, however, is that CRP keeps land available for agricultural use with conversion possible as soon as the decision to do so is made. In fact, some circumstances cause the USDA to allow such transition even within the CRP contract itself. The cost of changing from CRP back to agricultural land is real, although the cost impact can vary based on market conditions. In comparison, a solar installation is reliant on a long-term lease with infrastructure that keeps the land out of agricultural

production for the life of the lease, which can last for decades (up to 40 years, per Ranger Power, a solar developer).

Agrivoltaics is a concept referenced when people envision solar installations to create energy while using the land for agricultural activity. Common explanations of dual-use agrivoltaics describe bee-hives or grazing sheep under and around utility-scale solar panels. While technically feasible in Cerro Gordo County, these are not the types of agricultural activity driving the county's economy. American Farmland Trust (AFT) adds insight related to issues associated with agrivoltaics in their paper 'Recommendations for State and Local Governments to Advance Smart Solar Policy', stating "Although agrivoltaic arrays may offer a means to keep land in farming and produce solar energy for the grid, for this practice to gain wider use and support a diversity of viable farm operations at scale, economic and workforce challenges would need to be addressed." Agrivoltaics may work well in some areas of the country, but it is not currently practical for use with Cerro Gordo County's local agricultural land, workforce, and economy.

Although utility-scale wind turbines don't take up as much land as utility-scale solar, they do remove available acres from agricultural use. In addition to site land not being farmed, the down pressure created by the blades compacts the soil of nearby land, and has changed productivity from green to yellow on some local productivity maps.

Both utility-scale solar and wind installations can negatively impact the effort to preserve the availability of agricultural land because of the activities related to construction, ongoing maintenance, and decommissioning. Construction and decommissioning activities include moving and compacting the land, which negatively impacts the delicate chemistry of the soil; the outfall from such movement and compaction can be seen on productivity maps of land that has been disturbed. Ongoing maintenance of utility-scale solar and wind installations requires service roads to be developed on the land; not only do the service roads require movement and compaction of soil, they also introduce rock and other foreign materials into the soil which change the soil. Finally, cost effective decommissioning practices leave materials in the ground that can impact soil quality and disrupt use of agricultural and agriculture-related equipment.

Preservation of the availability of agricultural land is important for flexibility related to food production. According to Canada's National AITC (Agriculture in the Classroom) "Journey 2050" video on YouTube, it is predicted that we'll need 60-70% more food by 2050 in order to support population growth, but the amount of land to produce the food will be the same or less than the amount used today. While Cerro Gordo County farmers currently produce a lot of crops for biofuels rather than food, the amount of time to change crop from a biofuels input to food is the amount of time it takes to make a decision of which market to sell to. Similarly, land in CRP can be easily converted back to food in a year or less. Land that is being used for utility-scale wind or solar installations cannot be converted to food production quickly or easily, due to built infrastructure and legally binding leases.

It is easy to see that energy sprawl ("new" land required for energy production) and food production conflict with each other, and demand for both energy and food are expected to increase substantially in future years. On page 16 of the 2016 research article "Energy Sprawl is the Largest Driver of Land Use Change in the United States" by Trainor, McDonald, and Fargione, we learn that "energy sprawl is causing land use change at rates higher than other major drivers, making it the largest driver of land use change in

the United States.” The subsequent paragraph in the article states their conclusion that “all forms of energy production can have significant land use impacts, and that simply dictating particular forms of energy production is inadequate; safe-guards related to siting, mitigation, and energy conservation and efficiency will be required.”

One example of energy sprawl and the conflict with agricultural production is land-dependent solar development that is happening at a time of record prices for agricultural land. Utility-scale solar adds another source of competition for finite agricultural land, driving up prices and placing farmland ownership further out of reach for many aspiring young, beginning, and limited-resource farmers. Utility-scale solar can similarly have significant impacts on the farmland rental market where farmer-renters are often outcompeted. With a 40-year age gap in average farmer ages and looming retirements, minimizing the impact of utility-scale solar development on farmland prices and rental rates is a critical part of keeping farm businesses strong and supporting a more diverse age range of producers.

According to a renewable energy developer, they try to develop as low cost a project as possible, which means close to the grid and on agricultural land. They explained that transmission lines are expensive, so it is good for the development cost to minimize distance. Additionally, agricultural land has qualities that keep project costs low, such as being flat and typically not having a lot of environmental constraints. Low cost or not, development of build utility-scale wind or solar should not take priority over preserving the availability of agricultural land.

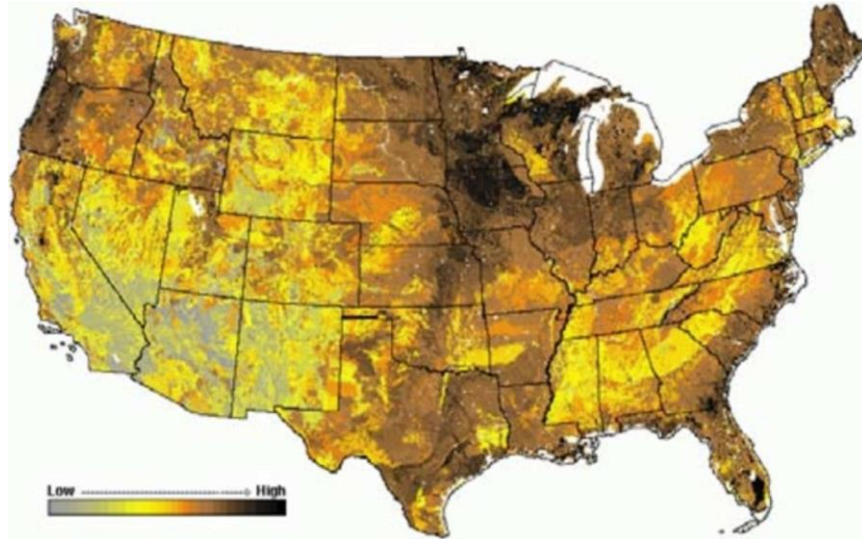
### **Consider the protection of soil from wind and water erosion**

It would be a travesty to lose any of our soil or change its composition, whether the cause is quantity due to erosion; quality due to movement, additives, compaction, pollution; or availability for agricultural production. The chances for any of these contributors likely increase with non-agricultural land use.

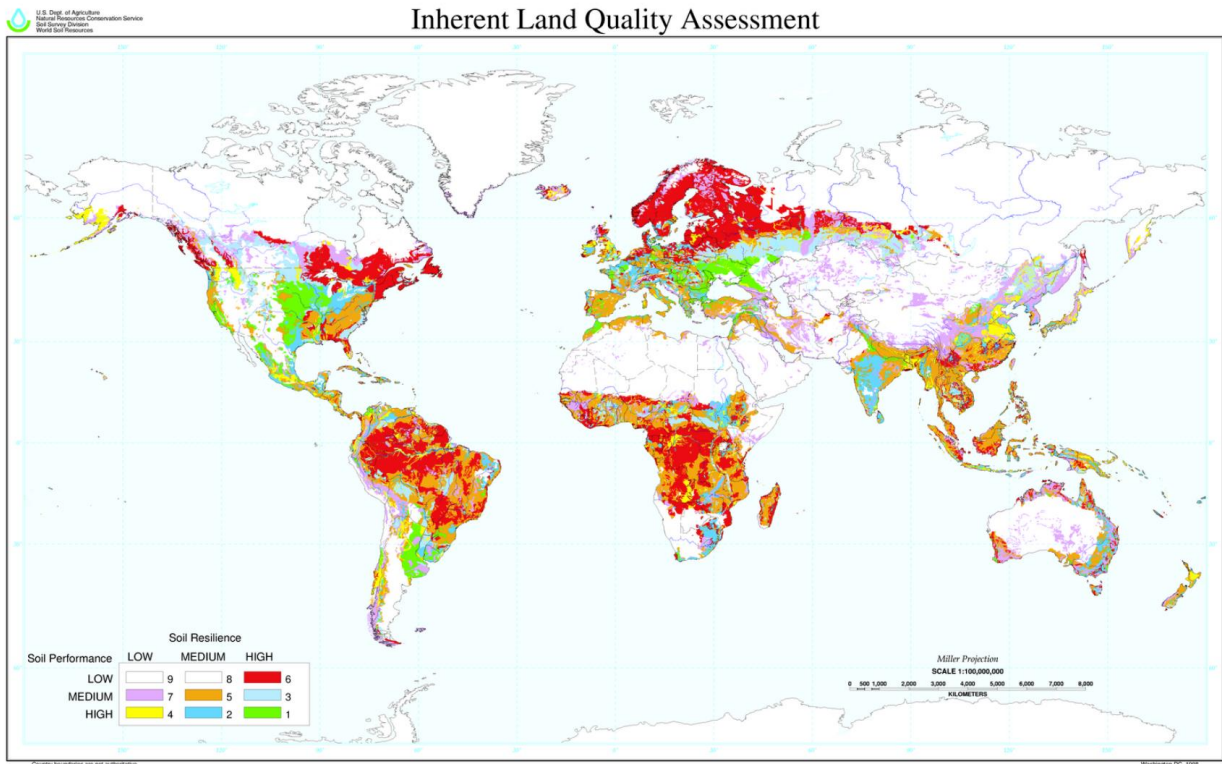
For this point in the Iowa code related specifically to erosion, we need to first understand why it is important to protect the soil in Cerro Gordo County from erosion. The answer is that the dirt we have in this county is precious – it is called black soil.

Approximately 4% of the world’s land is black soil (approximately 7% if ice covered land is not included). According to Food and Agriculture Organization of the United Nations (FAO), black soils have very high fertility, are usually used for intensive agriculture, and are considered the food basket of the world.

The following map from Hargrove and Luxmore, per a paper from the North Dakota State University Extension, shows the soil organic matter content across the contiguous United States. High organic matter is associated with black soils. On this map, you can see Cerro Gordo County has soil that is high in organic matter.



According to USDA, Cerro Gordo County is primarily Land Quality Class 1. Per USDA's NRCS (National Resources Conservation Service), soil classification of Class 1 is used for soils that have slight (rather than moderate, severe, or very severe) limitations that restrict their use. 3.13% of all the land in the world is Class 1. The bright green in this map indicates Class 1 land quality:

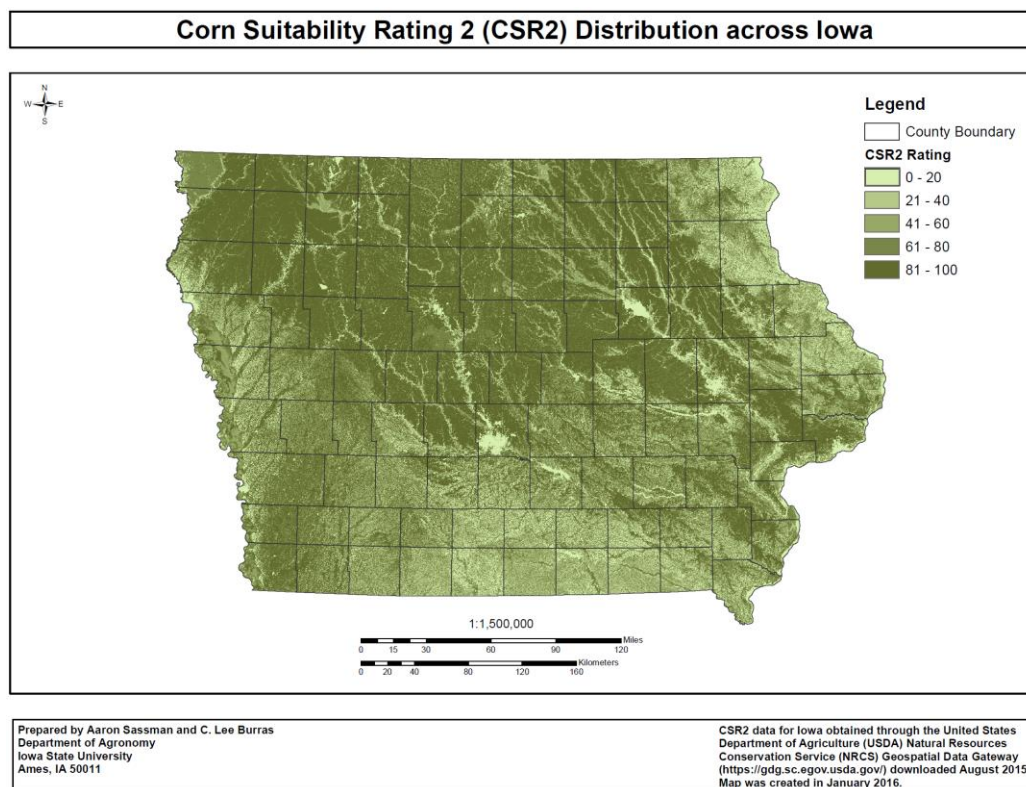


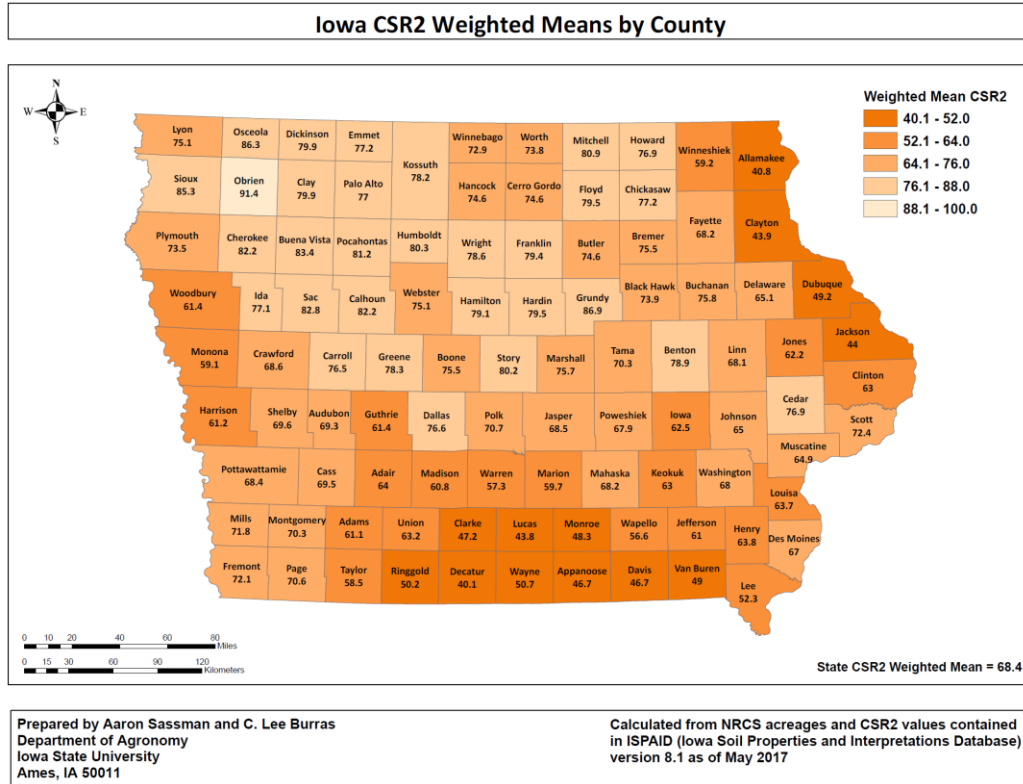
NRCS defines prime farmland as “land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high

yields of crops when treated and managed according to acceptable farming methods, including water management.”

According to USDA’s WebSoil survey, just 4.04% of CGC land is not considered prime farmland or farmland of statewide importance. The 4.04% includes 2.05% that is pits and water. If we subtract pits and water, we learn that 98.01% of the land in Cerro Gordo County is prime farmland and farmland of statewide importance.

CSR (corn suitability rating) and the newer CSR2 are indexes that provide valuable insight into land’s potential productivity. According to the Department of Agronomy at Iowa State University, the average CSR2 rating for Cerro Gordo County is 74.6, and the state average is 68.4. You can see CSR2 distribution statewide in the following two graphics:





No matter the rating, name, or specific percentage assigned, it is certain that the soil in Cerro Gordo County is very special. We do not want to lose it to erosion from wind or water, as no more prime land will be made.

Wind erosion is real, as is farmers’ desire to keep their soil on their land. Minimizing soil erosion is important to keep soil volume and soil nutrients in the field. Grasses planted under solar panels would help with this on passive ground. To minimize wind erosion while also working the land, farmers practice conservation measures such as the utilization of cover crops, no-till farming, and/or strip-till farming.

Water erosion is also real and can be quite complex to minimize. Since Cerro Gordo County land is part of the Des Moines Lobe and Prairie Pothole Region, water management is critical to protect the soil from water erosion. In order to utilize the county’s premier soil to feed and fuel the world, the drainage system must function well.

Drainage is so important that it is a constitutional right in Iowa; the owner on higher ground has a constitutional right to drain downward as long as the drainage is in natural course. Whether on land or within tile, there is no way to shut off drainage; the water simply flows. Iowa Drainage District Association (IDDA) states that according to Iowa law, “The drainage of surface waters from agricultural lands and all other lands or the protection of such lands from overflow shall be presumed to be a public benefit and conducive to the public health, convenience and welfare.” The intent of the drainage code is to protect everyone.

Also because of the importance of drainage, when a farmer considers whether to buy or lease land for agricultural production, they look at the land. In addition to considering soil quality, they look at the literal lay of the land: how does it take water from neighboring lands, and does the water have an outlet?

The planning and zoning commission learned about the drainage system in Cerro Gordo County through public input sessions, research, and Drainage Engineer Tyler Conley. The simple explanation is that underground drainage and open ditches have a job to do, and that job is to drain water.

The drainage system in Cerro Gordo County is established for today's topography and is a web of underground tiles that move water away from farm fields to minimize water erosion. If the drainage system is working properly, it will go unnoticed by most people. If soil gets moved around or tiles get damaged or plugged, the water course and volume of water going to various parts of the drainage system will be impacted. To make the system work properly, landowners must work together.

There are three types of drainage systems that work together to achieve successful drainage in Cerro Gordo County:

1) Private Drainage Agreement

- This is when a group of landowners collaborate to solve a drainage problem privately. They create a private agreement to follow as they work together to make the drainage work for the subject area.
- A nickname for this type of drainage is "Private Tile"
- Private tile uses "mutual drains", which are not an established district and can follow their own creed as set forth by the private agreement
- Mutual drains can hook into drainage district tiles, but there is no record of this connection

2) Drainage Districts - Trustee

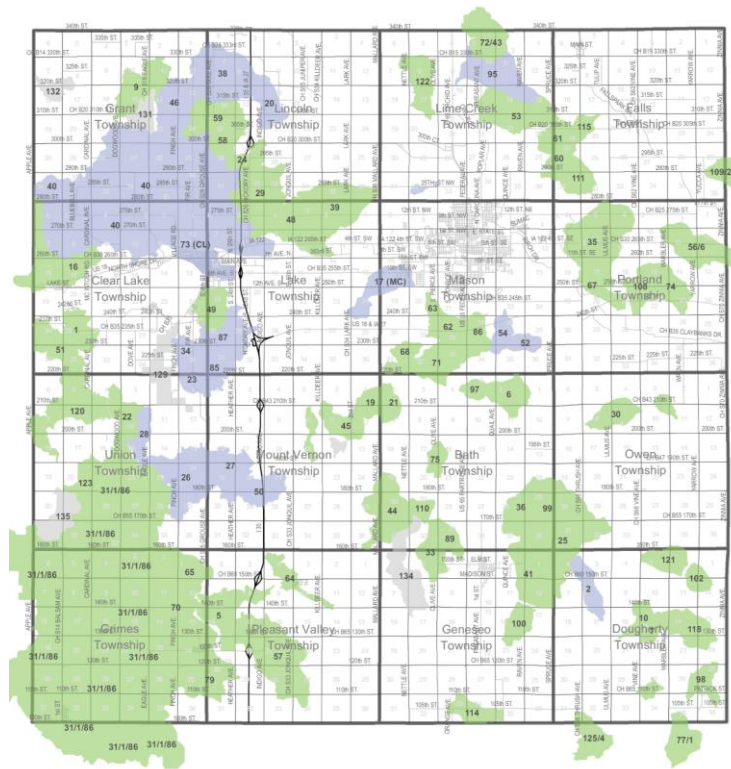
- Per IDDA, drainage districts provide a legally organized means to construct and maintain adequate drainage outlets and levees. They are formed when two or more contiguous landowners petition and gain approval from the Board of Supervisors to create a drainage district. Drainage districts are managed by a Board of Trustees
- For Trustee Drainage Districts, people serving on the Board of Trustees are also benefitted landowners
- Benefitted landowners can stop improvements
- Some drainage districts cross county lines
- A common name for this type is "Drainage District"

3) Drainage Districts – County

- In Cerro Gordo County, County Drainage Districts are the same as Trustee Drainage Districts except that the Board of Supervisors serves as the Board of Trustees. This happens when no benefitted landowners of a drainage district want to serve on the Board of Trustees.
- Even though the county proper does not own this type of drainage district, a common nickname for it is "County Tile"

In all three types of drainage systems, the drainage belongs to the landowners who are members of the drainage district or private drainage agreement. In Cerro Gordo County, there is just as much tile in private drainage agreements as there is in drainage districts. There is interplay between private tile and drainage district tile, which can be envisioned that the drainage districts are like an interstate; private drainage can

get onto the interstate, but the county doesn't know how that happens. The county does have documentation of the established drainage districts, the locations of which can be seen on this map from the county's website:



The location of the drainage tiles is often documented, (MCI, especially with newer installations. Right of ways, easements, and tile facilities are not recorded on property assessments or on "One Call". The auditor's office has a database of the drainage districts. However, private tile and/or older tiles are not in the auditor's database, and they are not always documented. Somewhere, there is drainage tile working hard for the system that no one knows exists.

The majority of tile in Cerro Gordo County is over 100 years old. The age of the current system of clay tile is vulnerable due to deterioration and reliance on existing soil location and soil structure; industrial development creates a great risk. It is important to be alert regarding the drainage system and protect what happens on the soil to not disturb drainage and effect many properties across the land. Despite age, the tile system is relied on for main drainage in the county.

No matter the age or location, if drainage doesn't work, it will cause problems with fields, drain ditches, roads, storm sewers, etc. due to the significant amount of water that relies on a functioning system to drain. Failures cause blocked outlets and more tile failures and can even change intakes to outtakes. A failure in one portion of the drainage system can pressurize the system and cause another issue miles away from the original trouble spot. These problems ultimately cause damage to, or inability to complete, agricultural production.

In order to keep the drainage system functioning properly, several factors need to be considered to minimize risk:

- Protect topography of the land

- Curtail opportunities for damage as a result of heavy equipment use, trees, etc.
- Minimize introduction of hard surfaced areas to limit increased “speed to load” for the system
- Avoid additional load to drain; current tile system is designed to drain the load associated with row crops
- Uphold soil structure
- Maintain ability to access tile for repair or improvement as needed
- Ensure financial responsibilities are fair

It is important to conserve both capacity and access to the system. There have been cases where a failure in the drainage system occurred under a garage or parking lot; this became a very big issue when repair was needed.

There are many risks to the drainage system that become legitimate when considering use of agricultural land for industrial use like, in this case, utility-scale wind, solar, and/or battery storage. Some of the potential risks are:

- Property rights may be forfeited with lease, so how can neighbors work together to solve a drainage problem when one (or more) of the landowners doesn’t have authority over their land?
- Drainage studies and repairs are expensive. Cost of drainage repairs are divided among participants based on a pre-determined schedule. Why should drainage system participants be required to pay for repairs caused by industrial installations?
- If industrial company is willing to pay for anything they caused, how can it accurately be proven who is at fault? For example, there are a variety of reasons drainage issues may not be detected right away; some problems won’t show themselves for a few consecutive wet years.
- Access for drainage study or repair may be hindered due to industrial safety and/or legal reasons.
- What drainage issues will occur if ground stabilization materials/additives are needed to support the industrial use? It makes sense that such action would change the way the ground accepts water.
- If the non-participating fields are impacted by drainage issues, the actual acreage impact of the industrial use will be much more than anticipated.
- Impact to county roads can result from impact to drainage systems.
- Drainage is expensive and needs to be protected. Introduction of more parties to the mix by way of industrial use (wind, solar, and/or battery storage companies, for example) along with the agreements they may have in place with the applicable landowner, can cause confusion as to who is responsible to pay for what, which would take time away from timeliness of the repair.
- Current drainage system is designed for the existing topography, which would be minimally or majorly changed if industrial installations are allowed.
- If the drainage is damaged, the whole district or agreement properties will suffer, and all participants will have to pay for something that was caused by a factor that benefits only one to a few of the members.
- In addition to the drainage system, it is important to recognize that the infrastructure associated with utility-scale wind, solar, and battery storage would increase impervious surfaces which, in turn, would increase the strain on water control.

Responsibility for maintaining and improving drainage districts is owned by the members of a private agreement or drainage district. When a third party is introduced for industrial land use like utility-scale wind, solar, or battery storage, concerns arise, which include an increase in:

- Difficulty for financial and physical responsibilities associated with the drainage system.
- Length of time to identify solution, fix it, and collect payments per the established schedule.
- Disputes occurring between landowners as to whether a repair or improvement is needed, or who should pay.
- Disputes regarding the need to fix an issue or not, since property uses that are not alike are affected by drainage differently.
- Difficulty to repair or improve tile, since infrastructure will be installed on the land (i.e. what if repair is needed to a tile that is under a solar installation).

In an effort to minimize risk and address some of the concerns identified above, a solar developer (Ranger Power), a renewables operator (Alliant Energy) and leaseholders (in individual conversations for the sake of their anonymity) shared the related general plan. Each of the general plans have been researched and considered as follows:

1. Plan: To avoid damaging tile during installation, Ranger Power will use GPS to identify all county tile lines and avoid them. Ranger Power will try to avoid other tile as well. If they damage a tile, they will fix it immediately.
  - o Research and Consideration: GPS locators work for the tile you know about. Since the original drainage system tiles in Cerro Gordo County were installed in the early 1900's, some of the system is working without people knowing tile exists. Additionally, focus on the county tile does not proactively address trustee drainage districts or private tile. It is good that damaged tile would be fixed immediately, but given the state of our existing drainage system, damage to any tile could lead to bigger problems.
2. Plan: To proactively avoid risk to drainage tile, Ranger Power and Alliant Energy said they can reroute the drainage tiles around the utility installation.
  - o Research and Consideration: While this would address the concerns of tiles on the property needing repair during and after installation, it would introduce functionality concerns because of the changes in slope that would inherently occur. Re-routing the drainage system to maintain capacity can be challenging because the drainage system is a gravity-based system. If the route is changed, the slope-to-distance ratio that makes the current drainage system work would also be changed. It would be hard to get the correct compensatory slope because of the relatively flat topography in the county.

In summary, the drainage system in Cerro Gordo County requires a delicate balance of function and cooperation, which highlights the importance for zoning to consider and drive compatible uses. The success of the drainage system in this county is critical to the area.

### **Encourage efficient urban development patterns**

Efficient development patterns are important to utilization of existing infrastructure. Urban development provides places for new families and businesses, which is vital for our county's future. We need to provide an attractive place to live, work, and host visitors.

When it comes to hosting those visitors, the tourism opportunities in Cerro Gordo County stand above many other Iowa counties due to the interesting assortment of features our county contains. To name a few: a lake to enjoy, a rich music history to take in, natural areas to explore, and recreational trails to appreciate. As featured in multiple travel blogs and magazines, Clear Lake, Mason City, and Cerro Gordo

County offer an abundance of unique things for residents and visitors to do. The unincorporated area of the county provides the foundation to welcome people, provide a first impression, and introduce them to the experience that awaits them. The quaint backdrop of the country as part of this foundation is one of the reasons to keep urban development within the city limits.

Additionally, efficient urban development is important so agricultural land doesn't get removed from production in order to make room for urban sprawl.

These reasons can be negatively affected by utility-scale wind and solar. The viewshed of wind turbines or a sea of solar panels changes the feel of the giant county neighborhood. We want attractiveness for vitality, and we need to keep agricultural land in production.

### **Lessen congestion in the street or highway**

Traffic necessary to construct and maintain utility-scale wind and solar storage will impact viability of county roads and cost the county money.

The county road crew and engineering team work hard to maintain the county roads well. Adding high-impact heavy traffic to the roads during construction of utility-scale wind or solar would increase the attention and care needed to maintain the roads and keep track of compliance to road use agreement requirements.

While a road use agreement would specify parameters to minimize risk, there would still be a cost to the county to manage the agreement and road conditions. With the reduction in taxes associated with solar and possibly wind turbines, it is not worth it for the county to assume this risk.

### **Secure safety from fire, flood, panic, and other dangers**

Utility-scale wind, solar, and/or battery storage increase the risk of fire and other dangers like waste disposal, debris management, hazardous material release, aeronautical incidents, flying debris, and severe weather. These possibilities would also introduce the need for strategic training for first responders within Cerro Gordo County and surrounding counties that may be called for mutual aid.

Fire, whether from utility-scale wind, solar, or battery storage, brings additional risk when it is in or near a farm field. Given the open area, falling debris, and the common local breeze, fire can spread quickly. During seasonal harvest, the risk of fast fire increases due to dry fields. Join this with longer response time due to rural location, and a fire emergency can easily become a huge problem. A common practice is to let fires from these sources burn to extinguishment, which increases the timeline and chance for spread to occur.

Specifically speaking, battery storage comes with risk of thermal runaway and fire. Response for this type of emergency is very specific. Local responders would need specialized training and equipment.

Common causes of wind turbine fires are lightning and gear boxes. Common practice is to let the fire burn out on its own, which comes with risks identified above. MidAmerica experienced fires on two turbines in Iowa in a five-year time period; the locations were in Boone County (2018) and Williamsburg (October 2023).

Waste disposal and debris management is another risk that comes with utility-scale wind, solar, and battery storage. Waste and debris can come from a variety of causes including fire, severe weather, and broken equipment. No matter the cause, how shall waste and debris be cleaned up and properly disposed?

Some debris or material escape may be hazardous. Oil from wind turbines can contaminate the ground, as can hazardous materials from broken solar panels. Hazardous materials can absorb into the ground and/or be swept away by stormwater, impacting soil and water quality. How can Cerro Gordo County secure safety from such hazards, especially when the occurrence may happen over time, quickly, and/or within a secured fence?

The thought of severe instances impacting an installation is easy to ignore, because it seems the likelihood of that happening is small. However, anecdotal evidence informs us that hail is more frequent around solar installations. Larger arrays can even create micro-climates that produce disruptive thermal up-drafts that can cause abnormal weather conditions. An increase in occurrences of severe weather was confirmed on Best’s Review, a monthly insurance magazine, in a June 2021 article titled ‘Hail, Wind, and Fire: Extreme Weather Drives Up Rates for Renewable Energy Insurance’ where it states the rate correction was needed “especially as damage from weather events became more severe.” The article describes the damage to installations that has occurred from hail and tornadoes; it also mentions the need for wind turbines in northern states to be equipped with de-icing technology and built-in heating to avoid damage from ice and snow.

Recent examples of broken solar panels due to weather include Scottsbluff, Nebraska in June 2023 and Needville, Texas in March 2024:



Baseball-sized hail hit this Scottsbluff solar farm Monday at 100 to 150 mph. (Courtesy Photo)



Screenshot from March 22, 2024 report "Needville community concerned about thousands of busted solar panels"

Aeronautical safety must also be considered. Glare from solar panels and height from wind turbines come first to mind. Focusing on the issue of height, there are several conflicts that arise with agricultural use, including:

- Private air strips, which are Sneedville more prevalent than one would imagine. They were not automatically considered during past turbine special use case evaluations; in at least one case, turbines in Cerro Gordo County negatively impacted a citizen's use of their private air strip.
- Crop dusting, which is a common way to plant cover crops. Alternative aerial application methods such as drones and helicopters are not physically capable of doing the job and/or are not cost effective.
- Crop dusting planes, which need room to turn once they cross the property line.
- Airplanes and helicopters, which need visibility to clear turbines, guy wires, etc.
- Flashing lights, which are Sneedville important for Federal Aviation Administration (FAA) safety; they are also distracting to drivers and irritating to residents

Additionally, the Mason City Airport is important to North Iowa, and due diligence is needed to ensure no negative impact is created for incoming and outgoing flights.

Flying parts or debris can hurt someone. This could occur from utility-scale wind, solar, or battery storage during severe weather. Additionally, wind turbines come with risk of blade throw, which is when turbine blade breaks, flies, and lands several feet away from the turbine. Blade throw could severely hurt or kill a person or animal. Although blade throw "doesn't happen often", it does happen. In a span of 29 months, Iowa company MidAmerica had "less than 10" (assume 9) blades that separated or broke from turbines. Out of the 3400 turbines they had during this time, this equates to 0.3%, which seems rare. However, that frequency average is once every 3-4 months. Media coverage of MidAmerica blade throw incidents in Iowa includes Adair County (September 2020), Green County (October 2020), and Webster County (February 2023). Blade throw is a risk that we cannot ignore.

Severe weather is a natural hazard in Cerro Gordo County and includes tornados, hail storms, high winds, derechos, ice. Utility-scale wind, solar, and battery storage can be damaged by such severe weather. If damaged, subsequent safety issues identified above can occur.

These risks also come with additional costs and specific training requirements. Related questions that would need to be considered are:

- What information should be included in the training to thoroughly prepare first responders on specifics related to the emergency risks introduced by utility-scale wind, solar, and/or battery storage?
  - o At first pass, it seems like it would be important to teach responders things like how to: disable power, initiate and complete power bleed, safely enter the security fence, respond to thermal runaway in battery, minimize risk to surroundings, fight field fires that will be more likely and can spread quickly, etc.
  - o Both the basics and the “what if’s” are critical
- Who will teach the first responders in the responding and mutual aid departments?
  - o Training should be provided to staff and volunteer first responders within Cerro Gordo County as well as surrounding counties
- Once a knowledgeable training provider is identified, who will pay for the training?
  - o Training should recur at least annually, to keep first responders engaged in the specialized information and provide opportunities for new responders to learn the information.

Finally, special equipment needed to secure safety from risks associated with utility-scale wind, solar, and battery storage must be provided. The cost of such provision must not fall on the local taxpayers.

The risks and considerations associated with utility-scale wind, solar, and battery storage (as detailed above and in Appendices C and D) are good examples of why it is important to maintain compatible land uses within the county.

### **Protect health and the general welfare**

Health and welfare impacts stemming from utility-scale wind and solar are coming to light after having more time with and studies about such installations. It is important to learn about, understand, and balance the perceived and real risks with the benefits such installations might bring to an area.

Perceived risks are mentioned specifically because, over time, we might learn that they are actual risks, similar to how we learned that lead paint and asbestos are not the miracle materials they were once thought to be. One example of this related to utility-scale wind turbines can be found in Brown County, Wisconsin, where the Board of Health declared an existing wind installation (eight 500-ft tall, 2.5 MW turbines) to be a human health hazard.

Utility-scale solar installations introduce the following risks, for example:

- Hazardous materials
  - o Some modules contain one of more of these materials that can become hazardous waste: silver, lead, arsenic, cadmium, copper, and/or selenium
  - o Hazardous materials can escape if panels are broken; this can cause water quality degradation and soil contamination

- Constituents in solar panels (i.e. lead, cadmium) can be harmful to human health, as addressed later under “Sustainable Design”
- Electromagnetic radiation
  - Can be radiated from solar panels
  - Consequently, the World Health Organization (WHO) recommends maintaining a distance of 1.2 miles from utility-scale solar installations.
  - This raises questions as to the effects on health from the electromagnetic radiation and radiofrequency radiation emitted from additional power lines, solar panels, and inverters associated with utility-scale installations.
- Noise
  - Inverters generate noise from the associated cooling fans
  - Tracking motors also generate noise
  - Inverter noise was heard during the first public input session, when a video from a citizen’s visit to the Assembly Solar installation in Michigan was shown. Ranger Power verbally advised that they learned from that installation and have since changed the layout practices for their installations to move the inverters to the middle of the installation in an effort to reduce the noise impact. A similar layout, with inverters toward the center of each solar plot, was witnessed by a commissioner at Badger Hollow solar installation near Cobb, WI; the constant hum of the inverter noises was easily heard in the distance despite no visibility of the inverter(s) location.

Utility-scale wind turbines introduce the following risks:

- Noise
  - Turbines have many noises that don’t shut off. Some of these noises are from the mechanical operation of the turbine while other noises occur when the turbine is not functioning properly.
  - Infra-noise also occurs when the turbine is in operation. This type of noise cannot be heard, but it can be sensed and sometimes felt.
  - According to ‘A Madison County, Iowa, Cardiologist’s Investigation and Response to the Industrial Wind Turbines in the Rural Residential Countryside Regarding Concerns of Adverse Health Effects and Exploration of the Relevant Accompanying Larger Issues’, by W. Ben Johnson, M.D., there are real health implications from wind turbines, including the fact that noise and infra-noise can cause stress on a person’s body over time.
    - Note: This detailed paper has a lot of well-sited information regarding this cardiologist’s findings from the studying the author has done on the topic.
- Shadow flicker
  - Occurs when wind turbine shadows move due to spinning of the blades.
  - These moving shadows look like a pulse because of the three blades.
  - This effect can cause sleeplessness, migraines, stress, and distraction.
- Pollution
  - Ground pollution from oil leaking onto the ground is possible and was witnessed by a previous wind turbine technician who spoke at one of the public input sessions
  - Water pollution can occur from storm water carrying leaked oil to ground water and/or waterways

- Air pollution can occur from turbine lubricant oil being thrown from blades and blown around. This can have health consequences from oil absorbed in the soil, going into the water, or being breathed in through the air. The area affected can be especially large area because of the nature of diffused spread through the air.
- Interference with medical devices
  - People who wear implanted medical devices like cochlear implants or a pacemaker may have concern due to electromagnetic interference, affects from turbine noise, or other functional interferences.
- PTSD trigger
  - Although there have not been many studies on the relationship between wind turbine impact on PTSD (post-traumatic stress disorder), at a public input session a U.S. Veteran shared images and sound from a malfunctioning turbine. She explained that what we saw and heard is similar to what is experienced in war/attack, and it was a personal trigger for her.
- Radar Interference
  - According to the Federal Interagency report 'Wind Turbine Radar Interference Mitigation Strategy', radar interference can impact air control, weather forecasting, homeland security, and national defense – all of which are important aspect of general welfare.

According to a fact sheet on noise from the World Health Organization's (WHO) Regional Office for Europe, noise is an underestimated threat that can cause a number of short- and long-term health problems, such as sleep disturbance, cardiovascular effects, poor performance in school and work, hearing impairment, etc. The fact sheet goes on to explain that some people are more vulnerable to noise, and nuisance at night can lead to an increase in medical visits.

The Environmental Health Division of the Minnesota Department of Health published a 2009 report on the public health impacts of wind turbines, which include low-intensity noise; sleeplessness and headache are the most common health complaints. These health complaints are often associated with blade noise and shadow flicker. Additionally, it is noted that developers underestimate the noise impact a wind power station will have on adjacent landowners.

According to Iowa State University's Center for Agricultural Law and Taxation (CALT), in a paper titled 'Wind Energy Production: Legal Issues and Related Liability Concerns for Landowners', a court upheld a 2007 case where claims of noise, aesthetical impact on the viewshed, flicker and strobe effect of light reflecting from the turbine blades, potential danger from broken blades, ice throws, and reduced property values were sufficient to prospectively enjoin a nuisance (common law of nuisance). Some people residing within 1.5 miles from a turbine can be impacted by noise.

In January 2019, the Iowa Policy Project, Iowa Environmental Council (IEC), and the University of Iowa's Environmental Health Sciences Research Center made a joint statement claiming that wind turbine noise does not pose a risk to human health. Their conclusion was based on a summary of (primarily two) research papers as described in a paper titled 'Wind Turbines and Health', which deems there is little scientific evidence that sound from wind turbines represents a risk to human health among neighboring residents. The first review was by a panel of experts that stated there was a discounting of health effects from fossil-fuel-based power generation and acknowledged there is sufficient evidence that wind turbines

can cause annoyance but didn't conclude if that was because of sound impact or visual impact of the turbines. The other review was done by MIT and paid for by Canadian Wind Energy Association; this study concluded there is no evidence that people living nearby experience disease outcomes, but they did experience annoyance with turbines or turbine noise. It went on to discuss that annoyance may be less or more if exposed to positive or negative messaging, economic benefit or lack thereof. The paper stated that wind turbines have a net positive effect on health because of risks associated with power produced with fossil-fuels, electricity from wind is a benefit to the environment, and no evidence that wind turbines pose a threat to neighbors.

Upon analysis of this summary from IEC et al, an article on MasterResource (a forum about energy markets and public policy) titled 'Wind Turbine Noise: Real Impacts on Neighbors' raised three concerns with IEC's summary of research summaries:

1. The research used modeled turbine noise levels (averaged over the long term, so it excludes that swish-thump sound of turbine noise emissions) rather than field turbine noise levels. Swish-thump is the amplitude modulation caused by the rotating blades moving through the air, which can vary in excess of 10 dB. Modeling also cannot account for varying atmospheric conditions that promote louder operational conditions, which can produce variations up to 14 dBA over predicted levels. Prediction noise models under-predict the loudest turbine noise levels heard by neighbors at the point when their sleep is interrupted. It is difficult to become accustomed to the uneven sound produced by amplitude modulation, which is greatest with large turbines due to their relatively slow rotation rates.
2. Low-frequency emissions were dismissed, claiming that these levels are too far below the hearing threshold to be consequential. However, five acousticians unequivocally measured the presence of low level infrasonic sound emissions inside a residence in Brown County, WI, throughout the home. The family in that home claimed health effects and eventually moved away. The experts agreed that a wind turbine is a unique source with ultra low frequency energy and that a "new threshold of perception" was needed to assess turbine noise impacts. One study showed individuals that could sense attributes of the turbine emissions without any audible or visual stimulus present; adverse reactions were directly correlated with the power output of the turbine and fairly large changes in power output.
3. Wind industry is heavily involved in a campaign aimed at convincing the public and decision makers that wind turbine noise is safe at any distance. They blame neighbors and their negative attitudes about turbines for their discomfort while avoiding measuring the actual swish-thump of the spinning blades. The campaign also requires dismissing low frequency noise. Larger setback distances are the only way to address low frequency and infrasonic impacts.

One of the interesting aspects of this consideration of land use is that many of the owners interested in development of utility-scale wind or solar do not live near the installation and, therefore, would not be at risk of experiencing issues related to health and general welfare caused by such development.

Another aspect of general welfare to consider is that of the economy. Most will agree that economic progress should not introduce health problems to an area, nor should progress in one industry negatively impact Cerro Gordo County's primary industry.

According to AFT's 'Recommendations for State and Local Governments to Advance Smart Solar Policy', utility-scale arrays can provide some economic benefits to farmer-landowners, but without significant policy and industry changes, such solar arrays will convert hundreds or even thousands of acres of farmland in a community out of production at once. This large-scale loss of land in a community can increase farmland prices and rental rates, displacing farmer-renters who cannot compete with the prices offered by developers, and reducing the viability of the remaining farms and other local supporting businesses.

AFT's paper also explains that farms are often described as "anchor businesses" within rural communities because they support a network of other businesses and services. Direct and indirect impact would be felt by businesses such as farms, seed dealers, local cooperatives, fertilizer suppliers, agronomists, technology salesmen, equipment dealers, machinery repair, tiling, car dealerships, banks, hardware stores, insurance agents, large animal vets, supply providers (fuels, oils, parts), local main streets, hired employees, biofuel plants (who also support a large number of companies like electricians, pipe fitters, electrical supply companies, etc.) and all the support staff (billing, running scale, dumping grain, etc.).

As is implied by the list above, losing farmland will impact the community. Removing 1,000 acres out of agricultural production will take approximately \$715,000 out of the local economy each year. Do this just three times, and a local seed business would need to reduce their sales force by one employee, as shared with the commission by a seed distributor during a public input session.

We can verify negative economic impact by reviewing data from other sources that also show the significant impact agriculture has on our local economy:

- According to the USDA 2017 Census of Agriculture Survey, 21% of Cerro Gordo County residents are employed by ag and ag-related industries. Using the average corn prices of that time (\$3.61/bushel), agriculture added \$726,000,000 (\$726M) of value to the county, generated over \$500,000,000 (\$5M) in wages, and created over \$1,800,000 (\$1.8M) in total ag sales.
- Using data from the 2022 Census of Agriculture County Profile for Cerro Gordo County, we know that the market value of products sold was \$409,098,000 (over \$409M) and total farm production expenses was \$291,399,000 (over \$291M). Taking just 1% of land in Cerro Gordo County (approximately 3200 acres) out of production would result in losses of \$4,090,980 (over \$4M) in farm production: market value of products sold, and \$2,913,990 (almost \$3M) in dollars circulating: total farm production expenses.

Local businesses have been and are investing in the area. The business justifications were most likely based on agricultural land being in production. Examples of these recent and upcoming investments include: new or expanded co-ops (Ventura, Thornton, Burchinal), Golden Grain Energy expansion, Sukup expansion, and building of New Energy Freedom (a biomass refinery owned by New Energy Blue and partnering with Dow).

As you can see, economics are impacted by land use. While a few people would benefit financially from utility-scale wind and solar in Cerro Gordo County, and they may spend that money locally, that gain would not equal the losses realized by the personnel associated with the direct and indirect businesses that would be impacted; this would ultimately negatively affect the county as a whole.

Advocates for utility-scale wind and solar point out that local economic development occurs as a result of these installations. They speak of jobs across the state, local construction jobs, some permanent operations

jobs, and the attraction of companies with renewable energy goals that might locate in Iowa to help achieve their goals. The following data should bring reality to such statements:

- As explained in detail under “Occupational Diversity” later in this report, there is data that tells us for every new position that depends on energy tax subsidies (i.e. wind, solar), at least 2.2 jobs in other industries are eliminated.
- Most of the construction jobs for utility-scale wind and solar installations are held by crews that travel from installation to installation. This makes sense, because they become specialized and can work very efficiently due to their expertise. However, this does not bring permanent jobs to the area.
- There are some permanent operations jobs for utility-scale installations, but not many.
- As detailed later in the section “Facilitate the adequate provision of transportation, water, sewerage, schools, parks, and other public requirements”, Iowa has the capacity to produce 64.7% of the state’s demand using wind; this alone should be a selling point to companies that want to earn or buy carbon credits.

Furthermore, it is fair to consider the other parts of Cerro Gordo County’s economy that make our county unique. In addition to the elite farmland that drives the agricultural impact to the local economy, the county’s economy also benefits from tourism of many types - lake, architectural, musical, outdoor recreation, and as a shopping hub for North Iowa. Tourism is a strong contributor to the local economy, and Cerro Gordo County’s tourism is fueled by the character of the area. Per our comprehensive plan, it is important to maintain and even improve upon, not derate, the character of Cerro Gordo County.

The economic impacts associated with the use of agricultural land and tourism are an example of the importance to consider the big picture. We cannot harm many for the benefit of a few.

### **Provide adequate light and air**

Providing adequate light and air was considered by the planning and zoning commission and determined not to be specific or critical to the consideration of utility-scale wind, solar, or battery storage at this time.

### **Prevent the overcrowding of land**

Installation of utility-scale wind, solar, and/or battery installation would compete with current land use. Similar to what might happen with other types of overcrowding, such competition would result in higher land prices which would increase difficulty for farmers to rent or buy the land for agricultural production.

Additionally, the visual impact of utility-scale wind, solar, and/or battery storage would certainly be noticeable. The change in viewshed and impact to community character can easily translate to the visual overcrowding of land.

We talk a lot about agricultural land relative to wind, solar, and battery storage. The question can and should be raised as to whether or not we could allow these utility-scale installations in Commercial or Industrial areas. Investigating this idea by referencing current and future zoning maps, one can see that the areas identified for commercial, industrial, and even mixed uses are small and already being used primarily for agriculturally related activities such as grain elevators, co-ops, and (future) common ground between Mason City and Clear Lake. Therefore, these areas are likely not conducive to utility-scale wind, solar, or battery storage.

### **Avoid undo concentration of population**

Avoiding undo concentration of population was considered by the planning and zoning commission and determined not to be specific or critical to utility-scale wind or solar at this time. In Cerro Gordo County, per our comprehensive plan, we want to attract people to the area.

### **Promote the conservation of energy resources**

There are a variety of ways to think about this; various considerations are as follows:

True conservation of energy resources comes from using less energy. No matter how the energy is generated, how can Cerro Gordo County promote the idea to use less energy? At a local level, this might be an awareness campaign reminding people of the importance to conserve energy resources. On a larger scale, this is evaluating options by comparing the life cycle analysis of each option. Life cycle analysis evaluates how much energy is needed for the full life of the product (raw material collection, ship the raw materials, manufacture the product, ship the product, use the product, decommissioning, and proper end of life disposal of the product). For example, the amount of energy associated with a utility-scale wind or solar project from “cradle to grave” is much higher than the amount of energy wind turbines or solar panels use during the commonly noticed part of the life cycle, which is use of the product to produce energy.

Another perspective is that of how to use energy. Rather than using energy to build, maintain, and decommission utility-scale wind and/or solar installations, Cerro Gordo County could keep agricultural land in production and allow the farmers to use agricultural technology to get more yield using the same or less energy than they currently use.

One could also look at energy density. Per the book “Power Hungry” by Robert Bryce, the average U.S. natural gas well has a power density of 287.5 hp/acre, while solar PV has a power density of 36 hp/acre and corn ethanol has a power density of 0.25 hp/acre. At first glance, it might seem obvious that natural gas is the best option. However, conservation of energy resources is one reason to consider other options. Similarly, we could say solar is by far the next best option; if 1/3 of our crop land is used for ethanol, we could use that same amount of land for solar instead and increase contribution to renewable energy. Again, there are reasons to consider other options.

- Given that Cerro Gordo County’s economy is driven by agriculture and not energy production, corn ethanol and other biofuels are an appropriate way to utilize our primary industry to contribute to the renewables market despite lower power density. Such land use allows crops to be used as needed when the scales of demand shift between food and renewables, whereas infrastructure necessary for utility-scale wind and solar lock the land use into renewables for decades.
- Additionally, businesses are in place to support the industry and utilize the crops. By contributing to renewable energy with corn ethanol and other biofuels, farmers are able to contribute to the conservation of energy resources while utilizing existing resources of agricultural businesses and precious black dirt while maintaining flexibility regarding how the crops are used over time.
- Based on societal needs and demand-driven markets for energy, commodities, and food, farmers can decide where their crops are most needed; corn or soybeans originally slated for biofuel use could easily be changed to food production. Similarly, land in CRP is relatively easy to change back to agricultural production for energy, commodities, or food as needed. Unfortunately, utility-scale

wind and solar involve built infrastructure and contractual commitments that cannot easily be converted back to using the land for alternative (and currently existing) markets.

Additionally, energy capacity factor is also important to understand. According to the CALT paper referenced in the above section “Protect health and the general welfare”, capacity factor is the after-the-fact measure of the output as a percentage of the nameplate capacity. For example, if the capacity factor of a wind turbine is 30%, it would be accurate to state the data like this: The wind power station can provide power for X number of homes 30% of the time on a random basis. This concept can also be applied to solar; according to a vice president of an interested developer of utility-scale solar, the actual capacity of solar is around 25%.

As you can see, there are many factors to consider when thinking about promoting the conservation of energy resources.

### **Promote reasonable access to solar energy**

The comprehensive plan specifically talks about encouraging private/personal use of solar, which is a smaller scale than utility-scale solar. Examples of this might include placing solar panels on the top of a county garage or encouraging solar panels for on-site use at a public or private building. Whatever the specific use, it is important to realize that access to solar energy comes from direct installations, since the energy from utility-scale solar installations feeds to the grid and will be selected for use based on the daily demand and bid process we learned about from Alliant Energy.

Promoting solar energy on a smaller scale rather than utility-scale is also important to the local economy, since Cerro Gordo County is dependent on agricultural farms and related support. According to AFT’s ‘Recommendations to Advance Smart Solar Policy’, large-scale solar development will be an important part of affordable energy transition, but this type of concentrated land conversion within local farm communities can strain the farms that remain by decreasing land availability, increasing land prices, and reducing the viability of farm support services

### **Facilitate the adequate provision of transportation, water, sewerage, schools, parks, and other public requirements**

Taxes are the fiscal foundation by which adequate provision of public requirements can happen. A strong tax base is needed for Cerro Gordo County to offer, maintain, and improve these necessities.

According to what we learned from the county assessor and information from Great Plains Institute, utility-scale wind and solar are unique in how these assessments and taxations take place.

For a wind energy conversion property (WECP), the tax situation appears to be favorable to the wind companies:

- The land the turbine is on stays classified as agriculture, and the WECP gets classified as industrial
- Per Cerro Gordo County ordinance #23, the property tax stays local and the county uses a “special valuation” of the WECP
  - o This special valuation means the WECP does not get assessed at market value like other industrial properties.

- The WECP is valued on a percentage of its Net Acquisition Cost (NAC) which, per Iowa code, is the “acquired cost of the property including all foundations and installation cost less any excess adjustments.”
  - The taxpayer self-reports the NAC amount, and Cerro Gordo County takes their word for it
- The special valuation schedule does not start until after the entire wind plant is completed and in service for a full year. Once the assessment schedule begins, the assessed value of the WECP is as follows:
  - Year 1 assessment = 0% NAC
  - Year 2 assessment = 5% NAC
  - Year 3 assessment = 10% NAC
  - Year 4 assessment = 15% NAC
  - Year 5 assessment = 20% NAC
  - Year 6 assessment = 25% NAC
  - Year 7+ assessment = 30% NAC
- The assessed value is used to determine taxes, which can get complicated with TIF, rollbacks, etc.
- Property taxes lag the assessment by 18 months.
- In reality, given the lag in the start of the special valuation schedule and the lag in property taxes, one or more turbines could be in use for over two years before a company begins paying the associated taxes.
- If the turbine is removed and replaced, the new wind turbine can start the special valuation process over again (which creates some motivation not to use a turbine to life expectancy). Typically, replacement would result in a higher NAC and therefore higher assessed value and taxes, but there would likely be fewer turbines on which to collect taxes.

Putting numbers to this for wind:

In 2024, the total assessed value of wind turbines in Cerro Gordo County = \$17.5M. Based on associated tax percent gleaned from data from Center for Rural Affairs paper ‘Windswept Fields of Opportunity: Iowa Wind Energy County Tax Impact Studies’ (no copywrite date, but it includes data from 2024), it can be estimated that actual realized taxes are 1.6-2.7% of the NAC. Assuming the higher 2.7% tax to \$17.5M, we can estimate that Cerro Gordo County will receive \$471,878 in taxes in 2024 from the 24 wind turbines we have in the county. Does this amount of money make it worthwhile to consider adding more turbines, when we have enough turbines to produce double the amount of electricity households in all of Cerro Gordo County need?

For a utility-scale solar installation, the tax situation appears to be favorable to the state:

- If the solar installation is generating energy that is consumed by someone other than the owner, shareholder, member, beneficiary, partner, or associate of the person generating the electricity (i.e. energy goes to the grid), it is subject to the replacement tax and is not locally assessed – therefore, not locally taxed. (State assessed = state taxed).
- Additionally, the land under these solar farms, whether owned or leased by the solar energy company, is also included in the replacement tax and is not subject to local property tax. This means the county will lose the property tax revenue from every acre that is under utility-scale solar.

- The tax situation may also be unfavorable to property owners if they have utility-scale solar on part of their property. Any property not under solar arrays and not being farmed will be taxed at the industrial tax rate rather than the ag tax rate.

Additionally, according to Great Plains Institute paper 'Siting Utility-Scale Solar and Wind in Iowa', the state limits property tax levies (the seizure of property to pay a tax debt) on both solar and wind projects, but at different rates and for different lengths of time.

Putting numbers to this for solar:

Property tax income for the county will = \$0 for every acre under utility-scale solar. Even if property taxes were to find their way back to the county, is the impact as great as anticipated? An example from Clinton County is a 1,500 acre project where the county was told they would receive \$18M of tax revenue over the life of the project. Based on what we learned from Cerro Gordo County Assessor, it is not clear how that tax revenue would get back to Clinton County, but the example helps us understand potential impact if tax laws were to change. Assuming the property taxes made it back to Clinton County, with an expected 40 year project life: \$18M over 40 years equates to \$450,000/year for the county, of which only \$350,000/year would be new tax revenue. Going back to the earlier estimation for Cerro Gordo County (1,000 acres = \$715,000 in economy), a solar project of 1,500 acres in our county would cost \$1,072,500 in circulation from farmers expenses, for \$450,000/year in taxes theoretically received.

Overall, the tax aspect of utility-scale wind and solar is not favorable for the county. Loss of tax dollars would reduce the amount of money available for Cerro Gordo County's road system, transportation systems, schools, parks, and other public requirements.

Turning to review of the specific provisions the county must facilitate, we know that the Mason City Airport and the Transit Buses are important means of transportation that depend on property taxes for funding. Public and private schools are located throughout the county; many of our educational institutions are dependent on property taxes. For these and other services, we should not risk loss of property taxes to utility-scale wind and solar installations.

Citizens of unincorporated Cerro Gordo County depend on clean well water. County Public Health helps residents monitor their well water for safe use and drinking. Cerro Gordo County needs to continue with water quality as a priority. With utility-scale wind, solar, and battery storage, there is concern that wells will be contaminated, plugged, or broken. There is a risk of contamination from toxic chemicals leaching into our ground water, from which well water gets pulled. There is risk of plugging, breaking, and/or disturbing wells due to pounding in rock layers (vibration, shifting, changing ground water paths) during construction and decommissioning of utility-scale installations. Water is necessary for life, and our county has really good water now. Is it worth the risks?

Per Federal Law, everyone is entitled to free communication signal. There have been instances where signal is interrupted due to location relative to one or more wind turbines. This should be a consideration as we strive to facilitate adequate provisions of public requirements.

Energy is an important public requirement, and it is important to balance energy sources with respect to available resources. According to [eerscmapp.usgs.gov](http://eerscmapp.usgs.gov), Cerro Gordo County already has 25 wind turbines

with a total capacity of 65.45 MW. California ISO, the nonprofit public benefit corporation that keeps power moving to homes and communities in California and Nevada, published a paper titled ‘Understanding Electricity’, which states that 1 MW is “roughly enough electricity for the instantaneous demand of 750 homes at once”, although the exact number fluctuates based on factors like the season and time of day. Similarly, the available energy generated from utility-scale wind or solar can vary from stated capacity based on variability of wind and sun, respectively. Per census.gov, in 2022, Cerro Gordo County had 22,603 housing units. If wind generation is running full, the area is averaging 1 MW per 750 homes, and the number of housing units has increased by 7% from 2022 to 2024, the wind generating capacity of wind turbines in Cerro Gordo County is more than double the amount of electricity needed by the housing units in this county.

Similarly, according to Iowa Environmental Council’s ‘Iowa Wind Energy Fact Sheet’, updated August 2023, “Iowa is the national leader in wind energy, producing the highest percentage of electricity by wind of any state – 64.7%. Iowa now generates more electricity from wind than any other single source.”

Based on these two data points, it is obvious that Iowa, including Cerro Gordo County, has enough wind turbines. When we combine that information with what we now know about the impacts wind installations have on the availability and quality of land for agricultural production, it is reasonable for Cerro Gordo County to change policy direction and practice regarding wind turbines. At a minimum, this change in direction should shift from issuance of special/conditional use permits to statement of direction in the zoning ordinance based on the determination of whether or not utility-scale wind is an appropriate use of land in Cerro Gordo County.

Fortunately, when it comes to facilitating the adequate provision of public requirements, Cerro Gordo County is already diverse and financially sound.

## **Iowa Code 335.5(2)**

IAC 335.5 (2) states “The regulations shall be made with reasonable consideration, among other things, as to the character of the area of the district and the peculiar suitability of such area for particular uses, and with a view to conserving the value of buildings and encouraging the most appropriate use of land throughout such county.”

### **Character of the area of the district and the peculiar suitability of such area for particular uses**

The character of the area is the over-arching consideration in the county comprehensive plan. In an opening section, the plan speaks directly to the character of the area (at page 11) stating the county’s “appeal becomes stronger when people *experience* the region.” These experiences involve “cultural activities and stories, special districts, and scenery. Leveraging these resources will lead to attracting and retaining people to the region.”

The comprehensive plan notes (at page 14) the county “has a history of robust industries, a plethora of recreational opportunities, and nationally known cultural attractions” and that the location on Interstate 35 gives the county “a large market reach for employment, retail, and tourism.”

The comprehensive plan emphasizes that attraction and retention of residents are said to be the county’s “big challenge.” The plan states (at page 11) “The county must stabilize its trend of population decline. It further states “The region as a whole must pursue actions that can attract people to the area.” To guide such actions, the plan sets forth seven guiding input themes derived from public input during the development of the plan. The character of the area plays a central role in almost all seven input themes:

1. The shared resources of the county are to be enjoyed by all and all jurisdictions must show county-wide unity while working toward their individual plans. Clearly, character of the area plays a leading role when it comes to enjoyment of shared resources and acting together in unity.
2. The visual character of the interstate highway 35 area is critical to attracting residents and businesses. Key ideas are to build positive first impressions including utilization of the long-time music and recreational themes of Mason City and Clear Lake and enhancing the views by building upkeep and enhancement of greenery.
3. Transform the visual character of roads between Mason City and Clear Lake to provide additional opportunities for positive impressions.
4. The county’s recreational opportunities are seen as superior to those in other areas of the state. Building on this unique asset, the plan states stakeholders in the county “should market its recreational assets as its brand.” This establishes recreational assets throughout the county as the basis for communicating the character of the county.
5. Improvement of housing options is seen as the most important barrier to population growth. Housing needs were said to vary across the county involving all income levels and stages of life. This is a county-wide opportunity to support the attractive character of the area.
6. Business conditions are currently good and businesses are calling for a stable influx of employees. Character of an area is well established as an important consideration for new residents.
7. There is support and concern for responding to emerging technologies while considering promotion of sustainability, preservation of valuable agricultural land, and preservation of character throughout the county.

In addition to being part of the input themes, character is included throughout the comprehensive plan. The frequency of mention is a priority signal as to the importance of character to the area.

Character of the area speaks to the attractiveness of the area, what you see and experience, the culture. The character of unincorporated Cerro Gordo County is serene, scenic, and rural; it’s farming, a lake, local values, strong work ethic, and neighborly manners. People live in the “country” to enjoy peaceful, quiet surroundings. The beautiful viewshed is made up of open fields, rural scenery, nature, dark sky, minimal traffic, and the horizon. It feels good to see farmers respect and care for the land while producing crops to feed and fuel the world. A favorite pastime is watching the crops grow and the colors change.

This landscape of the county is enjoyable, a way of appreciating tradition while looking into the future. The rural viewshed means a lot to many, as mentioned by multiple people in the public input sessions. Agriculture has been the view and way of life traditionally and today, and it is important to maintain that

character for future generations. According to one world traveler who spoke at a public input session, farmers from other places in the world visit here to learn about what we do, and they are in awe with what they see.

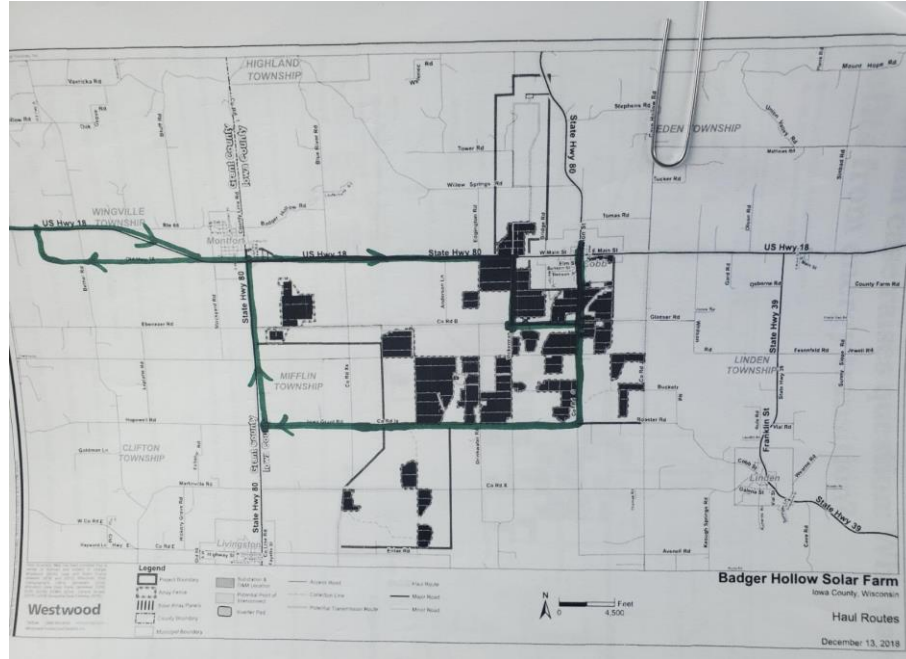
Given the sweeping, peaceful character of unincorporated Cerro Gordo County, making even a small change to country living makes a big difference. Sensitivity to viewshed and sound levels is heightened, because the baseline is open and quiet. People living in the country aren't used to any type of big development, shadow flicker, noise, glare, or flashing lights, like is easily accepted in urban living. In fact, people visit and move to the country to "get away from it all."

Given the extreme distance associated with the viewshed for wind turbines, it is important to imagine trading a view of the horizon or shore with a utility-scale wind installation. One example is the ability to see the flashing red lights of the wind installation in Charles City nightly in Portland. Another example is the change of view that has occurred recently from the historic sea wall in Clear Lake; for visual reference, see pictures of this later in this report.

Similarly, utility-scale solar changes the character of the area. This was witnessed firsthand by a commissioner that travelled to Cobb, Wisconsin, to see the Badger Hollow installation first hand. The gentle wave of fields was interrupted by wind turbines and solar panels, the view completely blocked and changed for the long term. On the way home, the commissioner documented the experience as this:

The magnitude was overwhelming. When the panels were at full and partial tilt (which is most of the time), you can't see below them; you just look out your window and see panels. You don't see horizon unless there is a section of bare land. Mid-day, when the panels were flat, you still can't see the horizon. Instead, you look at the edge of the panels; there are so many rows all you see is the legs, sides and bottoms of panels, and cables. Community members shared their perspectives on it: they are disheartened and disgusted but, for the sake of moving on, have surrendered to the fact that it happened, and now they have to live around it because this is their home. The natural beauty of the area is gone.

For reference, here is the map of Badger Hollow that was used for the trip:



Here are three pictures that show just a sliver of reality around Badger Hollow:





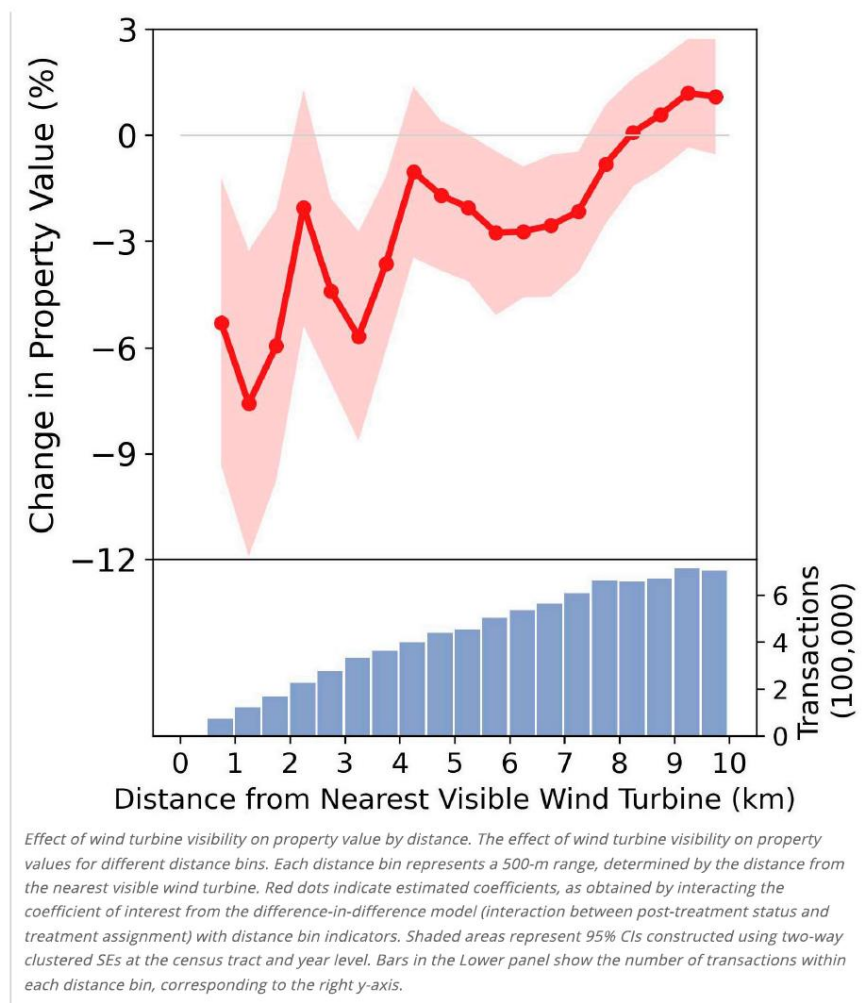
As mentioned earlier, energy companies have expressed desire to locate in North Iowa because of the flat land and infrastructure to take power to its destinations. However, the suitability of utility-scale wind and solar simply does not align with the character of the area. As one person stated during public input, “People can move (away) to a place where there is tall and noise; we choose to live in rural Cerro Gordo County for a reason.”

### **Conserving the value of buildings**

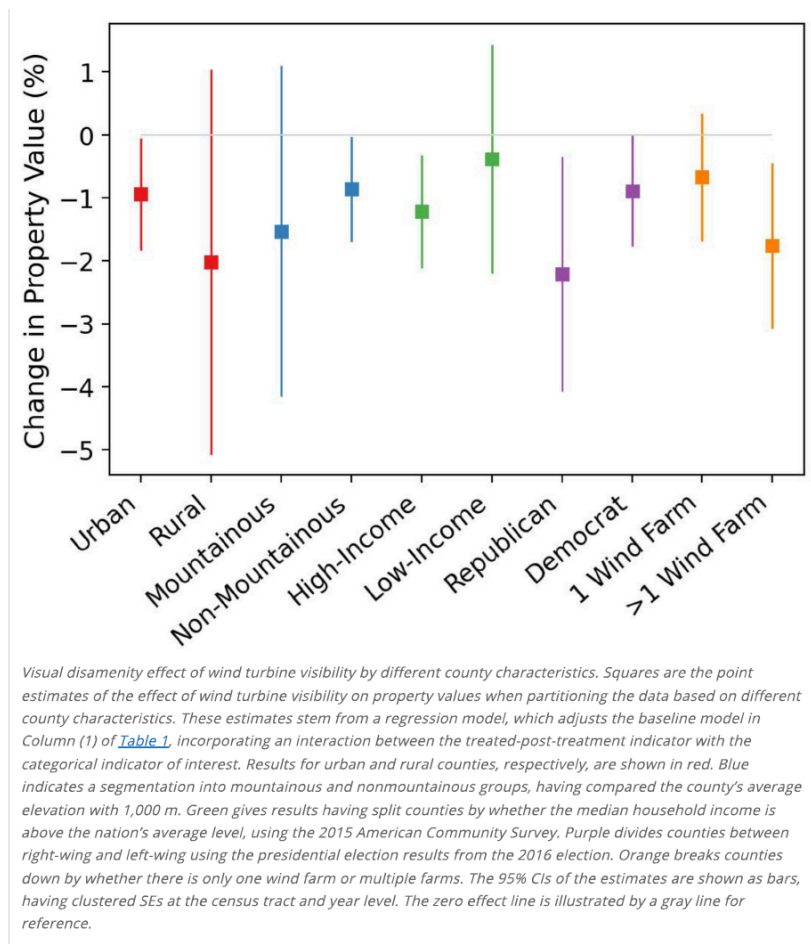
We should consider not just the physical object, but the whole concept in which the building exists, including the value of a building as it relates to viewshed.

The wind industry commonly references a study from Ben Hoen et al titled “The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis.” The study concludes that neither the view of the wind facilities nor the distance of the home to those facilities is found to have any consistent, measurable, and statistically significant effect on home sales prices. It is notable that there is controversy over the methods used to collect and analyze data for this study.

Another research article on this topic stood out to multiple commissioners because it is published on the PNAS (Proceedings of the National Academy of Sciences of the United States of America) website (March 18, 2024) and uses a large sample size for analysis. The article is ‘The visual effect of wind turbines on property values is small and diminishing in space and time’ by Guo, Wenz, and Auffhammer; edited by Heal of Columbia University. According to the results, researchers found that having at least one wind turbine in a home’s viewshed (10 km radius (= 6.2 miles)) reduces the sales price of such a property on average by 1.12%. Researchers also learned that the impact of visual disamenity created by wind turbines may also vary depending on the distance from the nearest visible turbine, as shown on the following chart. The effect is largest in immediate proximity of wind turbines, with the visual disamenity reducing property values by up to 8% within a neighborhood range of 1.5 km (~ 0.9 miles).

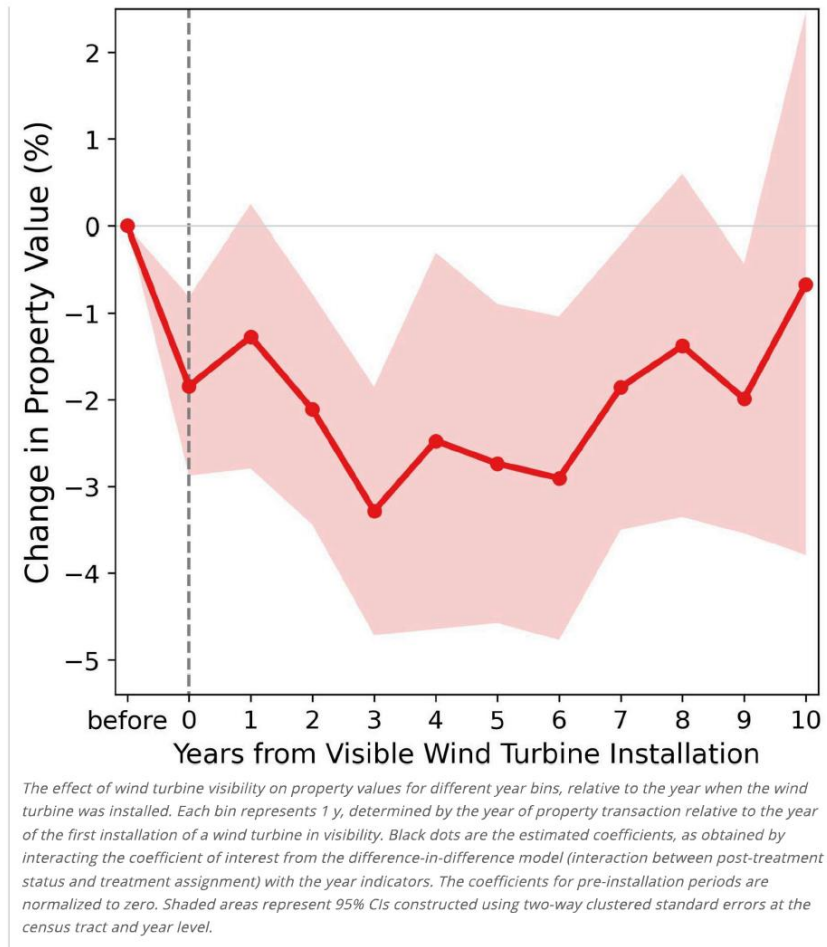


The researchers further investigated whether the visual disamenity effect varies across various dimensions, as shown here:



As you can see, the percent change in property value in rural area is approximately a 2% loss, and areas with more than one wind farm experience a greater loss than the loss realized for an area with just one wind farm.

Additionally, the researchers explored the impact trajectory following a wind turbine installation. In the next chart, you can see they found that the disamenity impact emerges instantly upon the installation, leading to a decline of more than 3% in nearby property values over the following three years. The effect diminishes and then nearly disappears over the course of the next seven years.



The research article acknowledges the decrease in property values might be balanced through compensation. Specifically, “These estimates could also serve as a future basis for calculating compensation to local homeowners for placing a new wind turbine within their viewshed.” Such a statement appears to validate the fact that wind turbines impact property values to the extent that compensation may be appropriate for those affected.

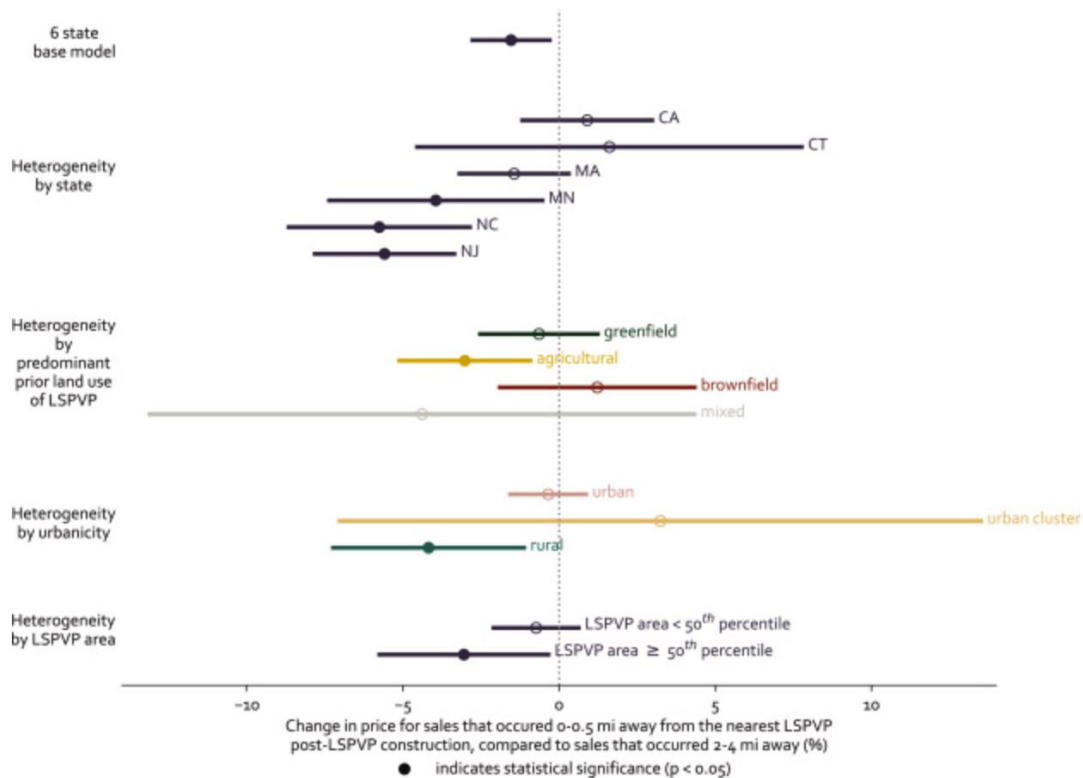
According to the CALT paper referenced in the above section “Protect health and the general welfare”, a wind turbine impact study for Dodge and Fond Du Lac counties in Wisconsin was completed in 2009; it showed that property sales within the turbine area were more sluggish, and the average drop in value was 30%. The study noted that the main influences on value are view, peace and serenity, and the rural environment in general. For those properties receiving income, values remained steady to rising. However, the (negative) impact on value is particularly significant if the area, before development, has particular beauty or is a tourist area.

As for solar, the U.S. Department of Energy Solar Energy Technologies Office funded research by Berkeley Lab to analyze property values and proximity to photovoltaics across six U.S. states. The resulting report ‘Shedding light on large-scale solar impacts: An analysis of property values and proximity to photovoltaics across six U.S. states’ was authored by Elmallah, Hoen, Fujita, Robson, Brunner and can be found in Berkely

Lab Energy Policy Journal 2023. According to the research paper and a March 2023 webinar showcasing this research:

- The median area of the large scale solar photovoltaic projects (LSPVP) considered in the study was 12 acres.
- Base model using all six states in the study (MN, NC, NJ, CA, CT, MA) shows an average reduction in house prices, which lessens farther away from the LSPVP:
  - 2.3% reduction for homes within 0.25 miles of LSPVP
  - 1.5% reduction for homes 0.25-0.5 miles of LSPVP (4% reduction in MN)
  - 0.8% reduction for homes 0.5-1 mile of LSPVP
  - Greater than 1 mile away from LSPVP had a statistically significant effect in MN, NC, and NJ
- According to the heterogeneity analysis they did for this study, negative home price impacts, as compared to homes 2-4 miles away, are measurable in the following scenarios:
  - By state, impact is measurable in MN, NC, and NJ
  - Across all six states, the adverse home sale price impacts are statistically significant for LSPVPs that:
    - are on previously agricultural land
    - are in rural areas (property value saw 7% reduction in MN analysis)
    - are larger, specifically 12-35 acres in size
  - 90% of LSPVPs analyzed for this study were smaller than 35 acres

The next chart shows the change in price for sales that occurred ≤ 0.5 miles away from the nearest LSPVP post-LSPVP construction as compared to the sales that occurred 2-4 miles away. With a 95% confidence interval, it shows that that categories similar to Cerro Gordo County (MN, agriculture, rural) saw losses:



The webinar presentation states that “more research is needed to understand the heterogeneity that we observe with respect to larger, agricultural, and rural LSPVPs in the MN, NJ, and NC contexts. Here, surveys, qualitative research, mixed-methods, and case study-based approaches may indicate how neighbors of LSPVPs engage differently with their nearby solar installation based on its size, land use, or the urbanicity of their home.”

According to the conclusion of the research paper, “Our results suggest that there are adverse property value impacts of LSPVP construction for homes very close to a LSPVP and those predominantly in rural agricultural settings around larger projects. But we find that most impacts fade at distances greater than 1 mile from a LSPVP. In some cases – for homes near large LSPVPs, and in the states of MN and NC – negative effects persist at distances greater than 1 mile but are smaller than they are at nearer distances to a LSPVP. These results suggest that care should be taken in siting LSPVPs near homes in some contexts.”

Additionally, the conclusion continues “... we do see evidence of adverse property value impacts of LSPVPs in the other three states (MN, NC, NJ) in our dataset – including in MN, despite MN having arguably the most restrictive state-wide laws on LSPVP development in high-value agricultural areas of the states in our study area (Bergan, 2021). While our sample for individual states was too small to conclusively explore heterogeneity within states, our overall heterogeneity analysis suggests that adverse impacts of LSPVP development are present specifically in rural areas, where LSPVP displaces agricultural land uses, and where LSPVP installations are larger.”

The data showing a negative impact on property values relative to data sets that are similar to Cerro Gordo County (specifically: close to MN, has agricultural land, is rural, and has a proposed large installation), should be enough to cause concern regarding the impact large scale solar installation(s) would have related to conserving the value of buildings in Cerro Gordo County.

From the findings in the above studies, we can see that, despite general headlines related to a minimal impact on property values, there are in fact a lot of considerations that impact the extent of the decrease in property values related to both wind and solar installations.

Conserving the value to buildings and preservation of character are two reasons why putting utility-scale wind or solar in other districts would also be a challenge to justify.

### **Encouraging the most appropriate use of land throughout the county**

Iowa Code 335.5(2) also directly addresses the importance of character of the area when it comes to consideration of the appropriateness of areas for particular uses and encouraging appropriate use. The largest portion of land in Cerro Gordo County involves agricultural activity.

Agriculture is the most appropriate use of the land in unincorporated Cerro Gordo County, and the quality of the land should be considered. The county is blessed with a large amount of some of the best farmland in Iowa, and this is the basis upon which the county has prospered and will continue to do so. Agricultural activity drives the economic basis of the county and has supported the character of the area and quality of life since the county was established. An example of this foundation was highlighted when, during one of the commission’s educational sessions, the county engineer taught us that county roads were designed to get agricultural products to market.

Accordingly, with respect to appropriate land use, the comprehensive plan (at page 54) states areas of existing farms and crop cultivation “are not proposed for change” and the only other permitted uses are “rural farmstead residences for living and agricultural support functions.”

The comprehensive plan states a clear set of goals for agricultural land. These goals (at page 54) are to “preserve the land for agricultural production and associated functions” and “ensure that agricultural uses contribute to quality of life.” The form and compatibility guidelines only allow for uses that “provide value added agricultural opportunities where appropriate.”

Appropriate land use is summarized in the comprehensive plan with a chart on page 61. Agricultural land use is seen as compatible with one other category, that being Rural Estates. Per Cerro Gordo County’s comprehensive plan, appropriate use of land throughout the county should support agricultural production and tourism.

## **Iowa Code 335.5(3)**

Iowa Code 335.5(3) states “The regulations and comprehensive plan shall be made with consideration of the smart planning principles under Section 18B.1 and may include the information specified in section 18B.2, subsection 2.

### **Section 18B.1 - Iowa smart planning principles**

The 10 smart planning principles are collaboration, transparency, energy efficiency, occupational diversity, revitalization, housing diversity, community character, natural resource protection, sustainable design, and transportation diversity. The application of these principles is detailed on pages 46 and 47 of the comprehensive plan with the understanding that “These principles provide the framework for how and where development should occur and policy decisions should be made.”

#### **Collaboration**

Section 18B.1(1) encourages widespread involvement of governmental, community, and individuals to become involved and provide comment during deliberations of planning, zoning, development, and resource management decisions and during implementation of such decisions. The public entity is encouraged to develop and implement a strategy to facilitate such participation.

The Cerro Gordo County planning and zoning commission accomplished this by encouraging stakeholders to be involved and provide comment regarding utility-scale wind, solar, and battery storage, as explained above under “THE PROCESS.”

#### **Efficiency, transparency, and consistency**

Section 18B.1(2) states that planning, zoning, development, and resource management should be undertaken to provide efficient, transparent, and consistent outcome. Individuals, communities, regions,

and governmental entities should share in the responsibility to promote the equitable distribution of development benefits and costs.

The Cerro Gordo County's planning and zoning commission did this by way of encouraging stakeholders to be involved and provide comment regarding utility-scale wind, solar, and battery storage as explained above under "THE PROCESS."

### **Clean, renewable, and efficient energy**

Section 18B.1(3) states that planning, zoning, development, and resource management should be undertaken to promote clean and renewable energy use and increased energy efficiency.

The planning and zoning commission's considerations included advocating emphasis on use of energy efficient methods by entities within the county. Residents, businesses, and government agencies are seen as potential users of renewable energy devices at a small-scale of operation that would mitigate harm to quality of life factors, loss of agricultural activity, erosion of character, and destruction of farmland associated with the installation and ongoing maintenance of industrial level wind and solar installations.

Additionally, Iowa provides clean, renewable, and efficient energy through existing wind turbines. As stated earlier in the report, Iowa is the national leader in wind energy, producing the highest percentage of electricity by wind of any state. To put that contribution into perspective, Iowa is #26 in size (total area). This ranking has been obtained with the current wind turbines in Iowa; see prior mention of when enough is enough.

Cerro Gordo County also contributes to clean, renewable, and efficient energy through raw material supply and production of biofuels (ethanol, biodiesel). This is being done while maintaining product flexibility. By keeping agricultural land in production, the crops can contribute to clean, renewable, and efficient energy unless/until the crops are needed for another use like food (see aforementioned statistic and explanation under "Preserve the availability of agricultural land"). This flexibility is unique and a powerful resource for Cerro Gordo County.

"Renewable" is often stated as important for carbon footprint reduction. Michael Wang, Senior Scientist at United States Department of Energy's Argonne National Laboratory stated in a press release dated May 24, 2021, that "With the increased total volume and the reduced CI (carbon intensity) values of corn ethanol between 2005 and 2019, corn ethanol has resulted in a total GHG (greenhouse gas) reduction of more the 500 million tons between 2005 and 2019. For the United States, biofuels like corn ethanol can play a critical role in reducing our carbon footprint."

Companies want to sell carbon credits from us. Reducing tillage and/or using cover crops increases carbon credits. Cerro Gordo County participates in carbon reduction via agricultural production on elite soil. We capture a lot of carbon in a small footprint. Studies have shown that growing 160 acres of corn is essentially carbon neutral; with a higher yield, the crop becomes a net carbon sink. Cerro Gordo County doesn't need to have utility-scale wind or solar to contribute to carbon reductions

Utility-scale wind and solar developers are drawn to Cerro Gordo County because of flat land, access to the grid, and tax incentives. We learned from an Alliant Energy representative that energy companies that feed

the grid want to balance how they make energy; they consider the cost to produce, consumer demand, and grid demand.

We have the power we need. Power companies are required to produce enough power to cover the usage in their area of coverage. According to the Alliant Energy representative we learned from, the Emery plant in Cerro Gordo County produces more than enough energy; it is a plant that exceeds expectations. Even though the capacity is here, power generated in the county is not necessarily used here because it goes onto the grid.

The benefit for Alliant to use renewable energy is to keep costs down, since theoretically you can produce wind and solar energy for less money than that from natural gas; however, one should consider whether or not this takes into account all costs throughout the life cycle of these technologies. Approximately half of Alliant's power capacity is already from renewable sources. According to the Alliant representative, energy customers haven't seen a price reduction because other expenses keep going up; no data was presented to confirm or correct that statement.

According to the Midcontinent Independent System Operator (MISO) Reliability Imperative Executive Summary, weather-dependent resources such as wind and solar lack certain key reliability attributes that are needed to keep the grid reliable every hour of the year. Emerging technologies such as long-duration battery storage, small modular reactors, and hydrogen systems may someday offer solutions to the reliability issue, but they are not yet viable at grid scale. Traditional power plants need to keep running, as MISO needs reliable power, not variable power.

Proponents of utility-scale wind and solar are concerned that if we don't allow land to be used for utility-scale installations, the supposed need to convert to non-fossil power generation will not go forward. This is not the case. There is an abundance of land in the United States that would be better suited for these installations. If utility-scale wind and solar make sense for the developers, they will find a place to put it. It does not have to be in a location where it would take premier land out of agricultural production.

We support and encourage private installations of renewable energy technologies to produce clean, renewable, and efficient energy for personal use. Using such energy on the spot is quite different from putting it on the grid.

Cerro Gordo County is not backed into a corner. We have wind. We have biofuels. We have the Emery generation plant. And technology is ever changing.

## **Occupational Diversity**

Section 18B.1(4) states that planning, zoning, development, and resource management should promote increased diversity of employment and business opportunities, promote access to education and training, expand entrepreneurial opportunities, and promote the establishment of businesses in locations near existing housing, infrastructure, and transportation.

Agriculture drives our economy and needs a diverse set of businesses for support and services including but not limited to: seed sales, equipment sales, co-ops, grain processing plants, mechanics, bankers, doctors, dentists, medical staff, lawyers, schools, retail stores, car dealerships, and restaurants. While these

businesses depend on the agricultural economy, they also provide diversity of employment for people not working directly in the agricultural industry.

Utility-scale wind and solar do not offer many local employment opportunities. Construction crews for development tend to be brought in from other locations, which can cause problems since the workers are not invested in the area.

According to the CALT paper referenced in the above section “Protect health and the general welfare”, for every new position that depends on energy tax subsidies (i.e. wind, solar), at least 2.2 jobs in other industries are eliminated. This is in direct opposition to the Cerro Gordo County comprehensive plan, which guides us to increase job opportunities.

It is also important to keep in mind the impact character of the area has on occupational diversity. If we lessen the attractiveness of the area, there will be a negative impact on occupational diversity.

Some landowners want to use lease income from utility-scale wind and/or solar as a way to diversify their portfolio. Another way this could be accomplished while maintaining agricultural land for agricultural production is to sell the land to someone that wants to farm it, and then invest those earnings in a diversified investment portfolio. It is worth mentioning this option because the prime farmland in Cerro Gordo County comes with ag-focused responsibility. Most farmers are willing to take the risks associated with farming in order to uphold their profession, tradition, and economic impact. As one farmer stated, “Farming is a business. You have good years and bad. Plan accordingly.”

## **Revitalization**

Section 18B.1(5) states that planning, zoning, development, and resource management should facilitate the revitalization of established town centers and neighborhoods by promoting development that conserves land, protects historic resources, promotes pedestrian accessibility, and integrates different uses of property. Remediation and reuse of existing sites, structures, and infrastructure is preferred over new construction in undeveloped areas.

To facilitate revitalization as described, we must consider topics addressed elsewhere in this report including at a minimum: character of the area, preservation of agricultural land, protection of soil from wind and water erosion, historical information, and appropriate uses of land per zoning regulations.

## **Housing Diversity**

Section 18B.1(6) states that planning, zoning, development, and resource management should encourage diversity in the types of available housing, support the rehabilitation of existing housing, and promote the location of housing near public transportation and employment centers.

One really enjoyable part of serving on the planning and zoning commission is seeing someone sell off an acreage with a home, so the home can be used and we don’t see many derelict properties. We enable those decisions and advance diversity in housing. It is important to keep that rural housing appeal, which could be negatively impacted by utility-scale wind, solar, and battery storage.

## **Community Character**

Section 18B.1(7) states that planning, zoning, development, and resource management should promote activities and development that are consistent with the character and architectural style of the community and should respond to local values regarding the physical character of the community.

Cerro Gordo County's comprehensive plan (at page 47) states the county "will preserve and enhance the unique characteristic across the county" by (1) conserving rural county character and functionality, (2) directing new development toward existing municipal centers, and (3) enhancing the qualities of new developments.

Additional evidence can be found above under "character of the area," which aligns with community character.

## **Natural resources and agricultural production**

Section 18B.1(8) states that planning, zoning, development, and resource management should emphasize protection, preservation, and restoration of natural resources, agricultural land, and cultural and historical landscapes, and should increase the availability of open spaces and recreational facilities.

These considerations have been central to determining potential harm from the installation and ongoing maintenance of industrial wind, solar, and battery facilities. The comprehensive plan (at page 47) states the county "will protect and steward the environment and natural resources" by (1) honoring each area's unique natural heritage, (2) protecting water quality, (3) encouraging development that identifies and preserves natural resources, (4) promoting the importance of natural resource conservation through the development of water, bike, and pedestrian trails, and (5) maintaining floodplain land.

In addition to the information related to natural resources, agricultural production, cultural (character) and historical landscapes discussed elsewhere in this report, it is important to mention a reasonable comparison: people would not consider allowing utility-scale wind or solar to be installed on Clear Lake. This makes sense, as it would take away a natural resource people use for recreation. Similarly, if utility-scale wind or solar were to be put on black soil, it would take away a natural resource layers of people depend on for their livelihood.

The premier natural resource in Cerro Gordo County is our black soil. It has taken thousands of years to form and is finite. For utility-scale wind and solar installations, it is common practice to move and add materials to soil. The addition of foreign materials to the soil is done for reasons of fill and stabilization; such additives change soil composition. Moving the soil disturbs the soil profile and changes the land's productivity; current examples in the county were shown during public input, where crop production on disturbed areas is one-half to one-third the yield of the undisturbed areas in the same field. Alternatively, healthy soil supports sustainable crop production, improves water quality, sequesters carbon, and helps farmers adapt to changing weather by increasing water filtration and water holding capacity.

While this report primarily focuses on the human, cultural, and land impacts of utility-scale wind and solar, it is also important to consider protection of the flora and fauna of Cerro Gordo County. Construction activity in fields can disrupt the life cycle of the soil micro-organisms and terrestrial invertebrates by moving

and inordinate amount of the top 12 inches of soil. Additionally, it is known that installation and/or use of utility-scale wind turbines and solar arrays have negative impacts on wildlife. Arguments can be, and often are, made as to why these negative impacts on fauna aren't as bad as other things; our purpose is not to solve that debate but rather raise awareness that flora and fauna are silent contributors to life in Cerro Gordo County and should be considered.

## **Sustainable Design**

Section 18B.1(9) states that planning, zoning, development, and resource management should promote developments, buildings, and infrastructure that utilize sustainable design and construction standards and conserve natural resources by reducing waste and pollution through efficient use of land, energy, water, air, and materials.

The comprehensive plan (at page 47) details this principle stating "infrastructure and development" in the county "will use logical methods to promote efficiency and longevity." Character of growth, preservation of environmental sustainability, and financial sustainability are key considerations throughout this report.

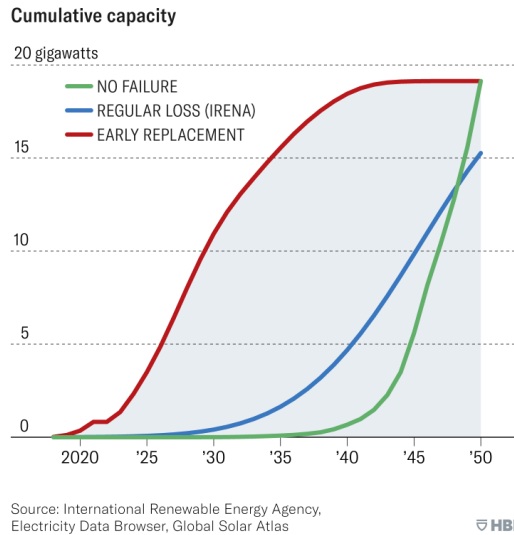
End-of-life for utility-scale wind and solar installations will generate waste. The amount of waste will be significant, the recycling industry for these types of waste is in infancy, and some of the waste will most likely be hazardous due to constituents in solar panels and batteries. Getting rid of the waste will take extra use of land and energy. We can conserve natural resources not just by reducing waste but by not introducing materials that will become waste in 10-30 years.

For perspective, we can think about the amount of material used to construct a large wind turbine which includes almost 1 million pounds of steel and 6,000 cubic yards of concrete. According to a 2021 Harvard Business Review (HBR) article 'The Dark Side of Solar Power' by Atasu, Duran, and Wassenhove, experts expect more 720,000 tons worth of wind-turbine blades will end up in U.S. landfills over the next 20 years.

The HBR article also shares that tax subsidies and improved conversion efficiency of panels has improved since 2011; production costs (and subsequently, prices) have sharply declined as a result of manufacturing innovation. Such "Economic incentives are rapidly aligning to encourage customers to trade their existing panels for newer, cheaper, and more efficient models." As a result, replacement of solar panels before end-of-life is happening more often than expected. This can be seen in a graphical representation of HBR's research for residential installations:

### The Solar Trash Wave

According to our research, cumulative waste projections will rise far sooner and more sharply than most analysts expect, as the below graph shows. The green “no failure” line tracks the disposal of panels assuming that no faults occur over the 30-year life cycle; the blue line shows the official International Renewable Energy Agency (IRENA) forecast, which allows for some replacements earlier in the life cycle; and the red line represents waste projections predicted by our model.



If early replacements occur in residential installation per HBR’s model shown above, such replacements can produce 50 times more waste than anticipated in just four years, which translates to around 347,000 tons of waste. The amount of waste would be much larger if utility-scale panels were included in the analysis.

Recycling is a good idea but may be cost prohibitive. According to the HBR article, the cost to recycle one solar panel is estimated at \$20-\$30, whereas disposing a solar panel in a landfill costs \$1-\$2.

The landfill cost for a solar panel does not include those that are classified as hazardous waste. Solar panels have contents that aren’t good for the environment. Per a fact sheet from South Carolina Department of Health and Environmental Control, referenced on EPA’s website, solar panel waste can include heavy metals such as silver, lead, arsenic, cadmium, copper, and/or selenium that may be classified as hazardous waste. Additionally, this fact sheet tells us that solar panels contain the rare elements gallium and indium. Why put equipment containing these materials on agricultural ground and risk contamination of our premier soil?

According to EPA’s website, “EPA is developing a proposed rule to add solar panels to the universal waste regulations and to add tailored universal waste standards for lithium batteries. EPA is working on this rulemaking in part in response to a petition submitted by a broad coalition of industry associations to regulate solar panels as universal waste.” It is interesting that the EPA is doing this in response to industry associations. Universal waste regulations streamline the hazardous waste management standards for certain categories of hazardous waste that are commonly generated by a wide variety of establishments to

promote the collection and recycling of these wastes and ease the regulatory burden on the waste generators. Today, universal waste includes some types of used lamps, batteries, pesticides, and mercury containing equipment.

Primary components of a solar panel are silicon, metal, and glass, but some of the metal is can be hazardous. Per EPA's website, specifically end-of-life for solar panels, "some of these metals, like lead and cadmium, are harmful to human health and the environment at high levels." While "high levels" can be subjective, the sheer size of utility-scale solar installation increases the likelihood of having high levels in a specific area. Drawing conclusions from an example in Calhoun County, Michigan, River Fork Solar has an installation on 1800 acres that uses more than 500,000 panels. Are we ready for volumes larger than that in Cerro Gordo County?

Components and disposal are two considerations in the bigger picture of life cycle analysis, which is an important environmental consideration of sustainability because it looks at the inputs and outputs through the entire life of a product including raw material collection, shipping of the raw materials, manufacturing the product, shipping the product, using the product, decommissioning, and end of life disposal.

Life cycle analysis assumes use of equipment for full expected life, which is not always reality. For example, because of the current incentives related to the assessment process of wind turbines, businesses have a vested interest to repower after 10 years to start the timetable over. This is not a sustainable incentive structure, nor does it encourage use of a turbine for the designed useful life of 30-40 years.

Another piece of sustainable balance is the consideration of the manufacturing process. According to Yale Environment 360, one type of solar panel is amorphous silicon thin-film solar photovoltaic cells. Different types of photovoltaic cells may be manufactured using different processes, but this type of photovoltaic cell is manufactured using nitrogen fluoride, "a chemical that is 17,000 times stronger than carbon dioxide as a cause of global warming". This example is raised to emphasize the need for balance that is innate to sustainable design. True sustainability is the practice of assessing and striving to balance the impact a decision will have on society, finances, and the environment.

## **Transportation Diversity**

Section 18B.1(10) states that planning, zoning, development, and resource management should promote expanded transportation options for residents of the community. Consideration should be given to transportation options that maximize mobility, reduce congestion, conserve fuel, and improve air quality.

The airport is an important mode of transportation for North Iowa. Decisions made regarding utility-scale wind, solar, and battery storage need to respect the airport overlay district and other factors associated with air travel and aviation in general.

Radar interference is a concern that has been raised relative to utility-scale wind. According to a paper from the US Department of Energy's Office of Energy Efficiency & Renewable Energy titled 'Federal Interagency Wind Turbine Radar Interference Mitigation Strategy' (August 2023), with new technology and deployments of more and larger wind turbines, "wind development is more likely to present conflicts with radar missions. The growth driving this increase in wind-radar conflicts will impact air traffic control, weather forecasting,

coastal sea-surface surveillance, homeland security, and national defense missions if not mitigated.” There is a working group attempting to address the challenge of wind turbine-radar interference.

Utility-scale wind and solar would interfere with the safety and quality of county roads. Although road use agreements could minimize impact, such a path would require additional effort from county staff even though the full burden should be on the land uses causing the extra effort.

Mobility systems (roads, primarily) are to “move traffic efficiently while positively adding to the character of surroundings.” Character of the area is again a key consideration in this report, further demonstrating the importance of development impact on the quality of life and the advancement of the overall success of the county.

## Section 18B.2(2) - Local comprehensive planning and development guidelines

Per Section 18.2(2), the county shall consider the smart planning principles under section 18B.1 (see analysis above) and may include the following information, subsections a through m, when developing or amending other local land development regulations.

Cerro Gordo County’s planning and zoning commission reviewed the items from 18.2(2), which resulted in the following assessment:

Most of items listed in Section 18.2(2) have been analyzed and documented as evidence above or in the comprehensive plan. Such items include public participation, primary characteristics of the county, geography, natural resources, natural hazards, types of employers and industry, labor force, housing, transportation, educational resources, cultural and recreational resources, current land use, future development guidance, housing character and demand, storm water management, solid waste disposal, transportation, economic development, preservation and protection of agricultural and natural resources, governmental facilities to meet the needs of the county, county heritage and quality of life, natural and other hazards, drainage districts, and public services, and programs.

Additional considerations per Section 18.2(2) include historical information about the county, population, demographics, and political and community institutions:

### **Historical information about the county**

Cerro Gordo County has deep roots in agricultural heritage. People settled here because of the black soil, and they stayed. Multiple generations have been farming the land, and this county is home to many century farms that have been in the same family for over 100 years. People came here because of the land, and that land’s black soil continues to be the primary resource in the county.

Tourism also has a rich history for Cerro Gordo County. In the early 1900’s, families would take the train from Chicago to Mason City to catch the electric railroad to Clear Lake; they would stay in a variety of hotels that were on the lakeshore to enjoy the summer in North Iowa. Tourism continues today with The Surf Ballroom, Music Man Square, Frank Lloyd Wright and FLW-inspired architecture, the lake, NIACC Performing Arts, snowmobiling, hunting, bicycling, and other outdoor attractions.

Historical landscapes can still be enjoyed today: farming, open prairie, peaceful, quiet, a front row seat to nature, and the natural horizon.

Finally, drainage regulations are especially important in Cerro Gordo County because the county is part of the Des Moines Lobe and the Prairie Pothole region. Drainage rights have been part of the Iowa Constitution since 1908. Many of the drainage tiles in this county were installed by hand over 100 years ago. Drainage is as important now as it has been historically.

## **Population and Demographics**

Although this topic is covered in the comprehensive plan, many people talked about this during public input. Their message is worth sharing here:

Rural Cerro Gordo County consists of land owners that have strong work ethic and a purpose of keeping things going for the next generation. People in Cerro Gordo County are aging; it is important to think about the youth for their future, the future of the county, and the future of agriculture. Decisions today impact tomorrow.

Farm kids get recruited away from Iowa because of their excellent problem-solving skills and strong work ethic. To keep them here and contributing to our local economy as they know best, the young generation of farmers needs land to farm. For landowners who own land solely for rental income, perhaps they can create a win-win situation by renting or selling the land to a young farmer; the exchanged money can be enjoyed by the property owner and their next of kin, while the exchanged land can be utilized by a farmer to continue agriculture production for current and future generations.

The foundation of success for rural Cerro Gordo County is about neighbors helping neighbors. Unfortunately, we start losing this neighborly foundation when land is not owned by people living on or near the property. Acceleration of this risk occurs when potential development creates secrets. While maintaining a low profile may be good for competitive reasons, it is not how the general population of rural Cerro Gordo County operates, as it builds distrust in the neighborhood and drives wedges between neighbors that used to help each other.

## **Political and community institutions**

Much of development for renewable energy installations is tied to government subsidies. While subsidies, grants, and tax benefits can change with political administrations, the leases (and installations, if they occur) would be here for decades.

For the items listed in Section 18.2(2) but not specifically discussed above, the county planning and zoning commission determined there not to be an immediate priority associated with such considerations as it relates to utility-scale wind, solar, and battery storage.

## **SECTION 2 – Comprehensive Plan pages 160 and 161**

Cerro Gordo County's comprehensive plan sets forth a specific and detailed array of policy considerations for renewable energy opportunities (at page 160, letters A through L):

### **A. Zoning regulations are to be based on Iowa Code to reflect impact mitigation and management based on scale and location of proposed facilities.**

Considering carefully the matter of scale, utility-scale energy system installations would easily be the largest items in county. Typically, many wind turbines and solar panels are installed in utility-scale facilities. Thus, the matter of scale is a key consideration for both wind and solar installations.

Wind turbines are large and becoming even larger. According to the U.S. Department of Energy, the average rotor diameter of a newly installed wind turbine in 2022 was 430 feet. This is longer than a football field and twice the wingspan of a 747 airplane. The average hub height (ground to rotor) was 322 feet. With a total average height of 537 feet, the latest turbines are just a few feet short of the Washington Monument.

For further perspective on scale, Figure 1 shows the total height of the Hawkeye turbines that were installed west of Clear Lake in 2019. Total turbine height is calculated by adding one half of the rotor diameter to the hub height. In Figure 1, the turbine height and overall rotational size is compared to a) the height of Mason City's downtown Brick and Tile Building and b) the average size of a typical two-story four-square home.

Note that the turbine scale is 5 times that of one of the largest and most admired buildings in the county (the Brick and Tile Building) and 15 times larger than the average two-story home of the historic four-square design. Clearly, such installations are inappropriately over scale and damage the existing attractive character of any area in which they may be placed. As discussed earlier in this report, impact on character of the area is a consideration stressed throughout Iowa Law and the Cerro Gordo County Comprehensive Plan.

**Figure 1.**

Comparison of Brick & Title Building to Hawkeye Turbines Installed near Clear Lake

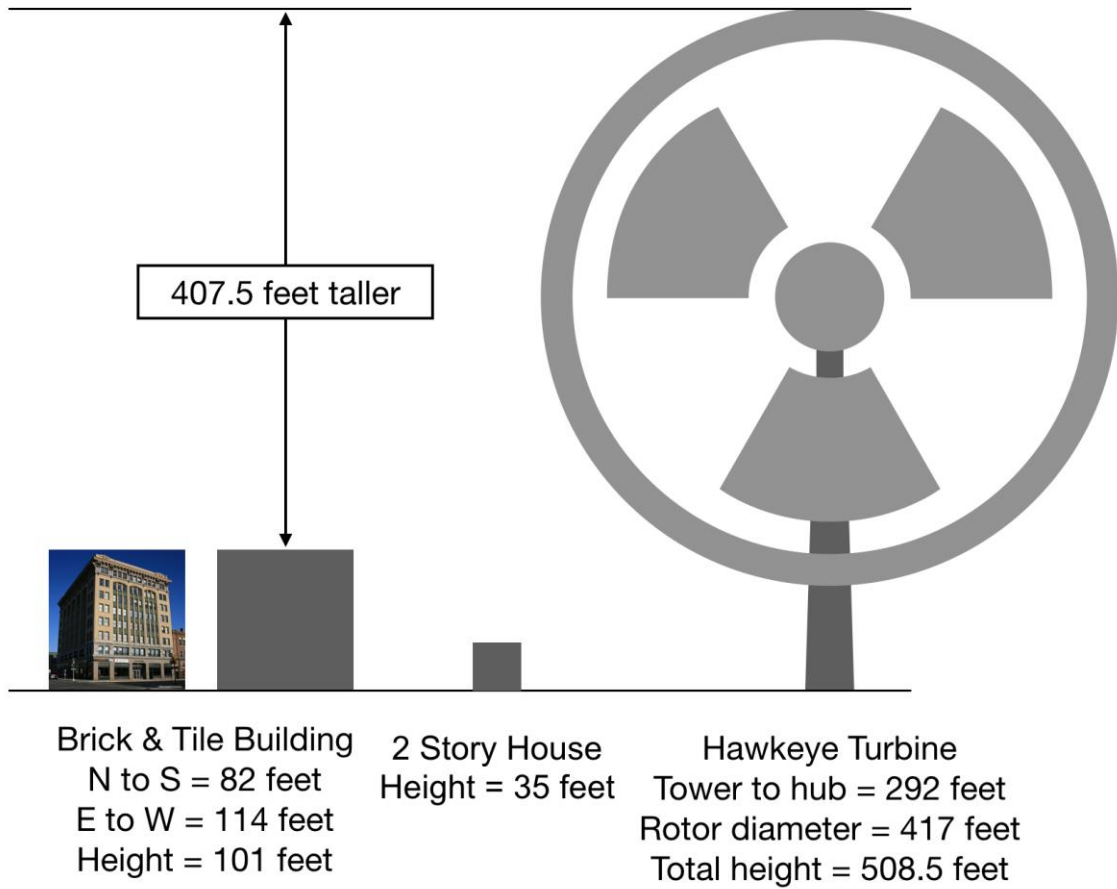
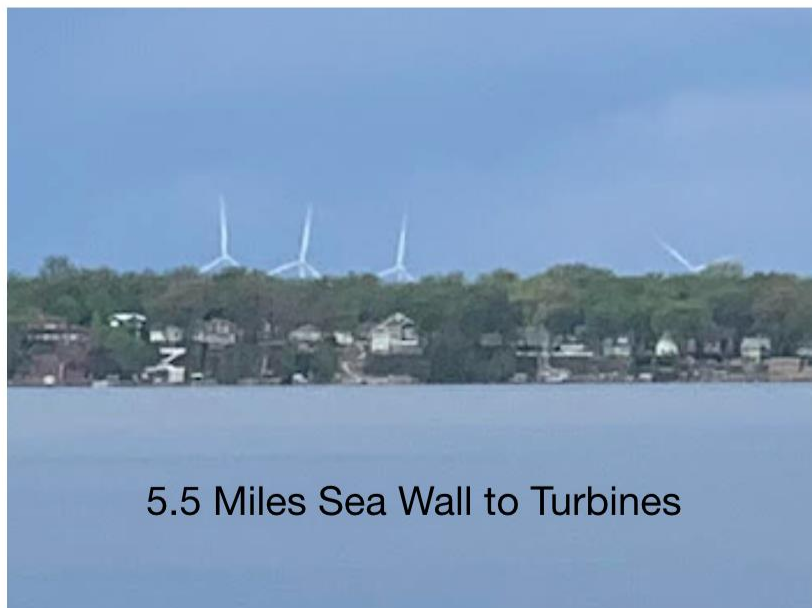
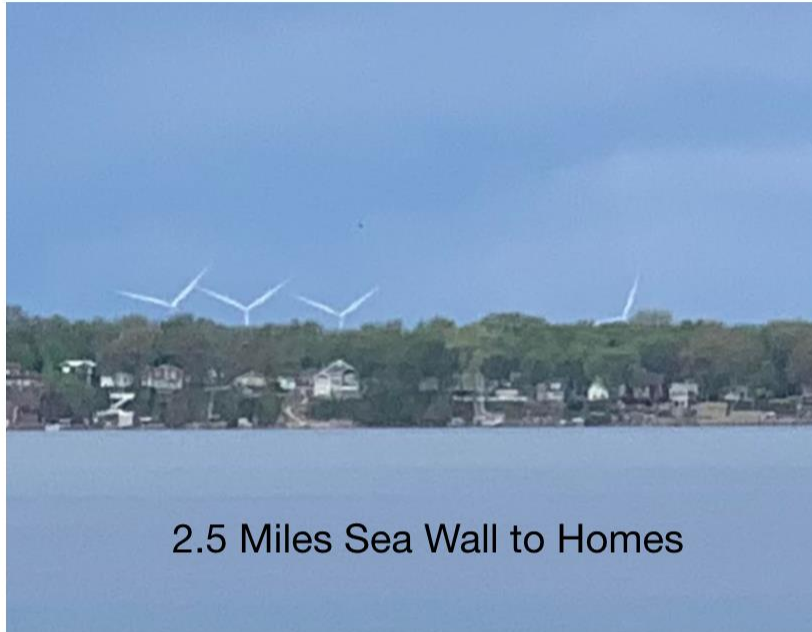


Figure 2 shows how the Hawkeye Turbines are seen by residents and visitors looking westward from the Clear Lake Sea Wall. This is one of the most historic places and vistas in the county and the state. People have been coming long distances to this historic area for its beauty and quality of life for about 150 years. Turbines of this scale are clearly destructive of scenic views and appreciation of the natural environment, and hence damage the existing attractive regional character of the county.

**Figure 2.**

View From Sea Wall at Clear Lake City Park - May 8, 2024



Utility-scale solar installations call for very large tracts of land and invoke considerations of scale and location. Solar energy sites consist of many solar panels and substantial support equipment. The support equipment includes inverters needed to convert direct current (DC) to the grid which uses alternating current (AC) in order to enable long distance current transmission. Support equipment may also include substantial battery storage systems that enable DC current to be stored so that inverters may produce AC current at night time or on cloudy days. An industry rule of thumb is that it requires about 7 acres to support 1 MW (megawatt) of solar power. Space is needed between rows of panels to allow for servicing. Utility-scale operations can easily occupy thousands of acres, sometimes in a patchwork pattern. These installations may begin at one level of scale and expand over a period of years. The largest industrial solar installation in the U.S. is in northwest Indiana and comprises 13,000 acres.

To add perspective, according to public record, a developer of utility-scale solar has at least 3,628 acres leased in Cerro Gordo County under the name River City Energy, LLC. According to Clear Lake’s Chamber of Commerce website, the surface area of Clear Lake is 3,684 acres – a mere difference of 56 acres. There are recent reports of another solar developer contacting landowners as well.

Figure 3 shows an arial view of the 127.5 MW Clenera LLC solar installation near Wapello in Louisa County, Iowa. Claimed to be on “almost 800 acres,” the installation consists of 318,00 bifacial solar panels, single axis trackers, and 34 inverters. In 2021, Clenera is said to have subcontracted with Renewable Energy Systems (RES) to construct the installation in six months.

**Figure 3.**





Accordingly, both industrial wind and industrial solar installations involve serious considerations concerning scale and location that would substantially damage the natural rural farm character, quality of life, and scenic natural beauty of any area within Cerro Gordo County. The immense over-scale realities of such installations strongly support the conclusion that they are not an appropriate use anywhere in the county.

**B. Ensure residences and roads are appropriately buffered. (Note that ensure means guarantee.)**

Buffering applies to both visual and auditory considerations and can be applied as mitigation when buffering methods genuinely serve as buffers as opposed to modest decoration. Turbines can destroy otherwise scenic views which are essential to the character of an area and are destructive of the quality of life. Because of their scale, they are difficult or impossible to disguise or shield from the public, especially those living nearby. Solar installations are much lower in height. However, they cover large tracts of land or a patchwork of neighboring acreages and are capable of substantially changing the scenic character of an area.

Turbines are noted for making noises that disturb the quality of life for those living and working nearby. These sounds are produced by the blades moving through air and gears within the turbine hubs. Setbacks can be established in an attempt to mitigate this issue, but sufficient setbacks conflict with what turbine companies regard as economically and managerially feasible.

Solar installations produce noise from inverters and the tracking motors that position the panels toward the sun. Tracking motors are said to produce sounds at levels ranging from about 60 to 90 decibels depending on motor size. Inverters produce sounds at levels ranging from 65 to 105 decibels. Inverters with fans produce the highest sound levels. Solar installations also make use of medium and high voltage transformers which can also produce sound.

Sound/noise is a challenging issue to mitigate requiring expert use of sophisticated measurement devices and extensive knowledge. This involves study of conditions where a noise increases the sound level to a noticeable level over the ambient sound level. In rural areas at night the ambient sound level is said to be about 29 decibels, while industry recommended standards for turbine noise are often twice that level. Sound level does dissipate with distance; however, the facts are that the human threshold of hearing is such that sounds that displace particles of air by only one-billionth of a centimeter can be noticed. Hence the continuing frustration of the public.

Accordingly, both industrial wind and industrial solar installations involve serious considerations of any possibility for reasonable mitigation of both visual and auditory disturbances of the quality of life and character of the area. The difficulty of successfully buffering installations of such a massive scale can clearly jeopardize many policy and action priorities in the comprehensive plan and point to such installations as inappropriate uses in the county.

**C. Support small-scale consumer renewable energy.**

Small scale solar power installations are finding wide-spread use by consumers, businesses, and agricultural operations. These are of a substantially smaller scale and, therefore, can be attractive forms of renewable energy as recommended in the comprehensive plan. This is an approach to renewable energy that avoids the conflicts with the comprehensive plan presented by the extreme scale of industrial-level wind and solar installations.

**D. Incorporate renewable energy sources into public facilities.**

Small scale wind and solar installations are a means to reduce the cost of maintaining various public facilities, enabling these resources to be used to advance the comprehensive plan.

**E. Avoid large expanses of facilities affecting stormwater, habitat, and visual variety.**

Because of their massive scale, industrial wind and solar installations could interfere with long established water flow patterns over land throughout the county, interfere with wildlife, promote growth of undesirable species of vegetation, and destroy the character of visual and scenic variety essential to the goals of the comprehensive plan. These considerations add to the conclusion that industrial wind and solar installations are not an appropriate use within the county.

**F. Avoid installations that take up large portions of potential growth areas.**

Both industrial wind and solar require substantial if not massive land acreage and would be inappropriate uses near any growth area over-powering the character of any new development.

**G. Discourage facilities that detract from cultural resources, recreational opportunities, or agricultural production.**

The previously described risks and negatives concerning industrial wind and solar traverse each one of these considerations to the extent they can negate most of the priorities set forth in the comprehensive plan. These considerations give additional great weight to the conclusion that industrial wind and solar installations are not appropriate land uses anywhere in the county.

**H. Limit utility-scale renewable energy installations in residential growth areas, along major arterial roads, and prime agricultural land.**

This consideration underscores the difficulty of finding reasonable locations for industrial wind and solar installations. Their size and scale make them obstacles to the quality of life, agricultural production, recreational activity at parks and on trails, and regional character anywhere in the county. Successes in all these considerations are among the leading priorities, leading again to the conclusion that industrial wind and solar installations are not appropriate land uses in this county.

## **I. Ensure property and soils can and will be returned to original conditions.**

The use of the instruction to *ensure* return to *original* conditions underscores the overarching priority for protection of agricultural production stated repeatedly in the county comprehensive plan.

Operators of wind and solar installations appear reticent to take such a consideration as seriously as it is set forth by the comprehensive plan. For example, at one public presentation by an industry spokesperson, the planning and zoning commission heard the speaker minimize this issue claiming vast constructions of concrete could remain under the surface of the soil with any responsibility for restoration ending around four feet depth. Importantly, the spokesperson stated it would be too costly to fully restore the land and involve as much destructive activity as the original construction of the site required.

Soil restoration involves replacing soil that has been removed or disturbed with soil having the same qualities that were removed or damaged. This also involves activities such as decompaction, restoration of the original terrain elevations, and replacement of damaged drainage tiles. Critical to these efforts is restoration of organic matter in the soil. North Dakota State University experts indicate soil areas with previously higher levels of organic matter “take seven to ten or more years to see a change.”

Soil protection and restoration was one of the highest priorities of the members of the public who came forward to attend the five commission outreach meetings. It was also extensively considered by the planning and zoning commission members. Any such protection and restoration efforts will be challenging for both industrial wind and solar energy facilities. Wind turbines require massive foundations; and, as shown earlier in this report, solar arrays can easily disturb land over thousands of acres.

Figure 5 shows the massive nature and scale of the footings required for a recent turbine installation (photo shown to the commission in a March 20, 2024 presentation by Alliant Energy). The photo shows the reality of the massive scale of the excavation, the amount of steel reinforcement, and the amount of concrete placed in the soil for a recent turbine installation in Iowa. Note the scale of the workers, as well as the size of the equipment, use of reinforcing steel, and amount of concrete required. These facilities are not easily installed or removed when discarded.

**Figure 5.**



Figure 6 shows the scale of the cranes required for a recent turbine installation (photo shown to the commission in a March 20, 2024 presentation by Alliant Energy). The photo further demonstrates the extreme scale of the equipment and turbine materials involved the installation and removal of wind turbines currently in use in parts of Iowa. The soil compaction can be extreme.

**Figure 6.**



All these considerations concerning protection and restoration of property and soils reveal substantial uncertainty that property and soils and terrain can ever be restored to original conditions following the installation of industrial wind and solar facilities. Consideration of the massive land and soil disruptions, the damages made to soil conditions for some of the world's most productive soil, and the difficulties of finding success with even seemingly reasonable restoration attempts to restore soil to the stated standard of "original conditions", leads to the conclusion that industrial wind and solar facilities are not appropriate land uses in this county.

**J. Encourage or require concurrent land uses.**

Agricultural uses concurrent with industrial wind and solar installations are a possibility to support public acceptance, yet the need for continuing access to these installations for routine operation, maintenance, repairs, and updating lead to doubts about the reality of such efforts in everyday application.

**K. Consider requiring impact studies for large-scale facilities.**

A substantial range of highly detailed impact studies must address numerous concerning considerations.

An important consideration for an impact study would be to prevent any damage to the vital and extensive system of drainage tiles that extend throughout the county in many complicated patterns. Maintenance of these tiles is essential to the productivity of agricultural operations throughout every portion of the county. An expert on the Cerro Gordo County tile system spoke to the zoning commission for over two hours explaining the complicated process for maintaining the tiles in good working order.

Some tiles are county responsibilities, some are maintained by groups of neighboring farm operations, and many are maintained on individual farms. However, they are all inter-connected so as to carefully guide water from one farm to another, eventually reaching a stream outlet. It was stated that the most substantial portion of the tile is privately maintained and, in many cases, the exact tile locations are not known. Indeed, much of the tile in the county was put in place over 100 years ago and is particularly fragile when disturbed.

Industrial wind and solar companies normally subcontract boring and excavating work needed for their extensive underground cables and therefore this is seen as a high risk situation involving cutting and collapsing of essential tile systems. Any work of this kind must involve a detailed ascertainment study to document tile locations and conditions in advance of any construction activity to avoid tile damage and to document and guide needed restoration.

Impact on county roads should be studied in advance, detailing the roadways needed for the heavy earth moving equipment, cement trucks, cranes, heavy items such as towers, turbines, blades, transformers, inverters, batteries, wiring and structural steel, worker transportation, and all the other needed resources. Continuous transportation of a large inventory of heavy items with large trucks presents serious risks for the condition of essential county roads and soil compaction of fields when moving off-road.

Information from a recent turbine installation in Texas illustrates the need for detailed advanced review of all construction activity impact on the county. The *Amarillo Globe News* reported that 100 truckloads of crane parts were necessary to install one turbine in Randall County, Texas. They further reported this was “quite an ordeal” calling for eighty (80) concrete trucks that delivered 772 cubic yards of concrete and 20 trucks that delivered turbine parts.

The abilities of wind and solar installation ground foundations and above ground structures to withstand storm wind forces should also be studied. There were 72 tornadoes in Iowa in 2023, about 20 more than normal. In 2020, a derecho storm crossed the state with winds reaching 140 mph. Recently, an EF1 tornado along with golf ball size hail struck Mason City on April 12, 2022 damaging several commercial buildings. Solar panels are said to have wind resistance to 140 mph. Turbine blade “throw-offs” do occur, but this is said to be rare. However, the safety risks are such that these issues should be studied.

The National Weather Service (NWS) says radar is “the most valuable tool to detect precipitation.” The NWS also says “turbines can block a significant percentage of the radar beam.” The NWS further says “Wind farms can significantly influence velocity and spectrum width data, which can cause bad data sampling of rotating storms and false storm motions.” Iowans depend on local television radar reports for accurate real-time storm warnings. Airplanes, particularly commercial airlines, rely on radar and sophisticated radio tracking beams when landing and taking off from Mason City Municipal Airport. Clearly, this concern calls for very careful study to be certain of the local risks.

Additionally, significant impact studies must also focus on (a) sound impact of turbines and solar installations, (b) potential visual scene and character disruption by wind and solar installations, (c) assessment of visual disruption due to flicker shadow effects of turbines, (d) assessment of glint and glare effects from solar panels, (e) detailed plans for removal (decommissioning) and complete site restoration, and (f) assessment of the most effective farmland restoration standards, procedures, and methods for wind and solar facility locations. These are truly massive projects requiring close oversight.

Following any impact study comes the matter of ensuring compliance by the energy facility owners and all subcontractors. Maintenance and repairs should be completed promptly and completely, within a specified time period, and with a guaranteed agreement. Indeed, road maintenance seems destined to become a serious matter and perhaps any installers with heavy equipment and loads should work with a system of advance payments to the county to ensure road safety by enabling the county to have resources ready at the time need. Surety bonds must be utilized throughout to ensure compliance.

#### **L. Create an evaluation system to protect the most productive farmland.**

Were it not for the considerations such as prohibitive scale, destruction of the county character, and interference with quality of life, such an evaluation system could be a reasonable means of mitigating some of the negative effects of wind and solar installations on agricultural production. However, as documented previously in this report, the conflicts with almost all the policies and actions of the comprehensive plan lead to the conclusion that industrial wind and solar installations are not appropriate on any farmland in the county regardless any farmland rating system.

Cerro Gordo County's comprehensive plan also specifies five additional policies and actions to consider (at page 161, numbers 1 through 5):

**1. Provide for public input, listen to what is communicated and set public policy based on local input.**

Throughout its process considering regulations for industrial wind and solar installations, the planning and zoning commission has reached out extensively to members of the public in the county to come forward with recommendations and concerns. Five public listening meetings, each over two hours in duration were held in accessible locations throughout the county. For all meetings, four or more commission members were present. Commission members unable to be present for these meetings were listening via telephone.

Over 70 individuals attended each of the first four meetings, and over 50 attended the fifth and last meeting. The national average attendance for such meetings on renewable energy installations is said to be about 25. Accordingly, four county meetings were three times larger than the national average and the last meeting was two times larger, underscoring the importance of this topic to the public in this county. During their individual remarks, each limited to 5 minutes, members of the public offered reasoned personal perspectives on the risks and opportunities of industrial renewable energy installations.

Virtually all of the speakers presented well thought out comments. Indeed, a number of speakers presented detailed remarks and submitted carefully prepared documents. Many spoke from personal experience. There was only one small moment of agitated comment during these meetings. There was an overall atmosphere of reasoning and appreciation for the opportunity to call attention to specific issues concerning wind and solar installations.

The comments showed substantial public concern about the loss of valuable agricultural land. They noted a variety of risks. How much of the world's most productive soil will be taken out of production? How much soil will be made unusable or destroyed by wind and solar installation construction and maintenance work? Will this construction and maintenance work interfere with the ongoing agricultural activity that sustains the county?

Many highly expert farmers pointed to risks concerning the vital drainage tile structure that extends throughout the county. Drainage tile systems are linked together in a detailed fabric throughout the county. What happens on one field can easily disturb or even shut down connected tiles on nearby fields. These tiles can be easily disturbed by crushing weight from above, vibration, and siltation. Tile systems can be easily destroyed by drilling, boring, digging, and compaction by heavy equipment. Placement and construction of transmission lines can also destroy tile. Fully functioning drainage tiles are absolutely necessary for productive agriculture throughout the county.

Those who farm the land showed keen awareness of how water flows over the land. Even moderate rainfall can lead to substantial flows of water. Concerns were often expressed about how wind and solar installations can alter the level and shape of terrain leading to unfortunate consequences for neighboring fields and farms. Knowledge of flood plains is critical for successful farming in this county.

Many spoke to the importance of essential farm to market roads. They noted gravel or lighter surfacing materials that are challenging to maintain in current circumstances. They asked how will the many heavy trucks with loads of concrete, metal materials, turbine towers, blades, and solar panels affect the condition of these rural roads? What about the weight of the earth moving equipment and cranes? What will be the

cost of repairing these necessary roads after construction activity? Who will pay these costs? What about continuing noise and dust from construction and operational activities?

Many expressed concern for the pace of technological progress and the possibility that wind and solar installations will be abandoned as the nation turns to new ideas. They ask how will these installations be decommissioned and removed? Can the once valuable agricultural land be restored? How quickly will operators restore damaged and inoperable turbines?

Many expressed concern for wildlife. Turbine blades are seen as endangering bird species such as the eagles that frequent the county. Many participants at the listening meetings spoke to this issue. At one meeting a county resident who had previously worked in turbine maintenance spoke of the oily conditions within some turbines calling attention to the possibility of outcomes such as oil particle “throw off” from turbine blades.

Many expressed concern about highly disturbing effects of noise from turbines and solar power inverters. There were doubts expressed concerning the willingness of turbine and solar operators to effectively resolve noise issues. There was also substantial concern about the disturbing effects of turbine shadow flicker. It was pointed out that this can be highly distracting at certain times even to the point of becoming a traffic hazard especially on the busiest highways. The bright nighttime warning lights for each turbine were seen as hugely interfering with quality of life and the enjoyment of evening tranquility.

Many spoke to the beauty of nature and the Iowa countryside. They emphasized the importance of the character of the county and quality of life. They expressed regrets that wind turbines and vast solar installations would distort the visual experience and the sounds of nature in the fields, forests, and riversides they deeply enjoy. The negative effects of energy installations on the property values of nearby property owners was often questioned.

Throughout all five public meetings the participants were very much in earnest, offered reasoned comments, and were highly appreciative that all five zoning commissioners were involved and listening carefully.

## **2. Maximizing agricultural production and preserving farmland are the top priorities.**

Given all the findings of the previous considerations, particularly the matter of scale leading to loss of productive agricultural acres, the likelihood of damage to essential tile systems, soil compaction risks, heavy loads damaging essential roads, and loss of regional character and quality of life supporting the welfare of rural and urban residents alike make it more than clear that industrial wind and solar facilities anywhere in the county would seriously undermine both of these top priorities.

## **3. Uphold rural and scenic style of the county. Maintain rural character and quality of life.**

As detailed previously in this report, these policy considerations were addressed clearly and often in the comprehensive plan and were voiced passionately by many at the public meetings. Industrial wind and solar installations are almost universally seen as destructive of the rural and scenic style of the county, the rural character of the county, and the quality of life throughout the county. Many people spoke of the

peace and tranquility they find by living in rural areas of the county. Many spoke of how the existing turbines in the county alter they countryside and destroy views from their homes. They spoke of the bright tower lights at night that give a dissonant industrial character to the otherwise natural and tranquil rural areas.

#### **4. Emphasize preservation of natural resources and agricultural land.**

The importance of these two related policy considerations is repeatedly stated throughout the comprehensive plan. These considerations were also repeatedly emphasized by members of the public speaking at all five commission public listening meetings.

Industrial wind and solar involve massive construction efforts that, when completed, profoundly intrude into the long standing natural ecology of the county and conflict with the efforts of the Iowa DNR and county conservation authorities to bring needed improvements to the county's habitat and land. Industrial wind and solar installations are also non-agricultural industries operating at scales which take substantial agricultural land out of production, thus competing with the productivity of agricultural land.

These two considerations have been discussed at length in many sections of this report and both considerations point to the incompatibility of industrial wind and solar installations anywhere in the county.

#### **5. Explore internet broadband to rural areas.**

Broadband access in rural areas of the county might be seen as a policy that does not apply to industrial wind and solar installations.

Just as the county needs farm-to-market roads, it also needs the "information super highway" to provide for full access to information about farming and farm markets as well as all the other content that adds to quality of rural life. Accordingly, this consideration clearly underscores the importance of all policies and actions in the comprehensive plan designed to maintain the quality of life and success for rural residents.

The evidence described above leads us to the following recommendation.

# **THE RECOMMENDATION**

Overall, the comprehensive plan is a robust and detailed document showing Cerro Gordo County to be a historically prosperous county that is carefully considering and planning its future in a manner that brings the county, its cities, and its citizens together in a united vision and plan for the future.

The members of Cerro Gordo County's planning and zoning commission were fully and extensively involved in public outreach, information gathering, and consideration of all aspects of the county comprehensive plan. All commission members were also fully involved in the analysis and deliberation done by the commission. Thus, the commission specifically addressed all the identified considerations relating to the appropriateness of the placement of industrial wind and solar and battery installations within the county.

As explained throughout this report, Iowa Code provides the criteria framework, and the Cerro Gordo County comprehensive plan is very clear on its goals and considerations. The comprehensive plan included a detailed array of considerations that apply directly to industrial wind and solar and battery installations. The public comment on this matter was also overwhelmingly clear and consistent. These considerations must be applied and relied on to determine what is an appropriate use of land.

Accordingly, nearly all required and recommended considerations come together in a mutually reinforcing and conclusive manner to strongly support the recommendation that, in their current state of art, industrial wind and solar and battery installations are not an appropriate use of land in Cerro Gordo County. Therefore, no utility-scale wind nor solar nor battery installations are to be approved anywhere in Cerro Gordo County.

There are some people in the county who will be disappointed by this recommendation. Sometimes people can be confused about their rights to use their land in any manner they choose. However, there is no such thing as unconditional uses. The county comprehensive plan guides the welfare of the entire county and is to be relied upon for such matters.

Appropriate places for industrial wind and solar and battery installations exist elsewhere. However, according to the considerations stated in the county comprehensive plan they are not found in Cerro Gordo County. In this county, the priorities are maximizing use of valuable agricultural land the nation needs for food, biofuels, and bio-based products and services. In this county, the priorities are sustaining the population by providing for quality of life for residents and visitors, serving as one of the state's leading places for recreation, preservation of natural resources, protection of some of the most valuable agricultural land found in the world, and preservation of the scenic character of the area.

That said, we do support small-scale clean, renewable energy owned and operated by private citizens, businesses, school systems and government agencies on their land. These small-scale point of use installations will not have the negative impact on community character, natural resources, agricultural land protections nor economy as compared to the impact of industrial scale utilities.

We recommend to the Cerro Gordo County Board of Supervisors that a regulation be written to prevent any permits from being approved for new industrial wind or industrial solar installations in Cerro Gordo County. This includes the need for the zoning ordinance to specifically state that utility-scale wind and solar (and associated battery storage) installations are not eligible for variances, conditional use, use exception, special use, or special exception.

# APPENDICES

## APPENDIX A – Public Input and Official Workshops

Meeting	Date	Time	Location	# of People Signed In
Comp Plan Joint Planning Committee	9/22/22	4:00 PM	Law Enfcmnt Cntr	12
Comp Plan Listening Session	10/17/22	1:30 PM	Virtual	8
Comp Plan Joint Planning Committee	11/10/22	4:00 PM	Law Enfcmnt Cntr	12
Comp Plan Community Roundtable	12/7/22	5:00 PM	Surf Ballroom	# not avail.
Comp Plan Community Roundtable	12/8/22	5:00 PM	MC Public Library	23
Comp Plan Public Design Workshop	1/25/23	Noon	MC Public Library	21
Comp Plan Public Design Workshop	1/26/23	Noon	MC Public Library	14
Comp Plan Public Design Workshop	1/26/23	4:00 PM	MC Public Library	14
Comp Plan Public Design Workshop	2/8/23	4:00 PM	CL Wellness Cntr	10
Comp Plan Public Design Workshop	2/9/23	Noon	CL Wellness Cntr	24
Comp Plan Joint Planning Committee	2/9/23	4:00 PM	CL Wellness Cntr	12
Comp Plan Public Design Workshop	3/7/23	4:00 PM	Rockwell	# not avail.
Comp Plan Joint Planning Committee	4/13/23	4:00 PM	Virtual	12
Comp Plan Public Open House	11/13/23	Noon	Courthouse	10
Comp Plan Public Open House	11/13/23	4:30 PM	NIACOG	10
Comp Plan Public Open House	11/14/23	4:30 PM	CL Wellness Cntr	6
Renewable Energy Public Input Session	1/16/24	6:00 PM	Rockwell	70
Renewable Energy Public Input Session	2/1/24	6:00 PM	Mason City	65
Renewable Energy Public Input Session	2/7/24	6:00 PM	Thornton	82
Renewable Energy Public Input Session	2/13/24	6:00 PM	Rock Falls	72
Comp Plan County P&Z Workshop	2/15/24	4:00 PM	Ventura	0
Renewable Energy Public Input Session	2/15/24	6:00 PM	Ventura	53
Comp Plan County P&Z Workshop	2/19/24	4:00 PM	Courthouse	5
Comp Plan County P&Z Public Hearing	3/7/24	4:00 PM	Courthouse	27
Renewable Energy Workshop: Speaker Presentations, questions from attendees were allowed	3/19/24	3:30 PM	Courthouse	5
Renewable Energy Workshop: Speaker Presentations, questions from attendees were allowed	3/20/24	3:30 PM	Courthouse	4
Renewable Energy Workshop	4/17/24	4:00 PM	Courthouse	4
Renewable Energy Workshop	4/18/24	4:00 PM	Courthouse	3
Renewable Energy Workshop	5/2/24	4:00 PM	Courthouse	# not avail.
Renewable Energy Workshop	5/29/24	4:00 PM	Courthouse	8

## APPENDIX B – Applicable References in CGC Comprehensive Plan

Per IAC 335.5, regulations shall be made in accordance with a comprehensive plan. Cerro Gordo County’s comprehensive plan, adopted April 15, 2024, provides a multitude of statements that inform decisions related to utility-scale wind and solar installations. The following list highlights such items.

Note: the list does not include information found on pages titled “Policies and Actions Preview”, since additional detail is contained on the related pages that follow within each of those sections of the plan.

Page	Comment
8	Three primary purposes of comp plan to guide decision making: provide an essential legal basis for land use regulation, present vision, establish policies necessary to fulfill that vision
8	Introduces Iowa Smart Planning Principles (Iowa Code 18B)
11	States planning input themes for the document. 1) Experience “begins with getting people off the highways to explore area’s amenities such as cultural activities and stories, special districts, and scenery.” 2) Big Challenge is “stabilizing its trend of population decline”. To help with this, the region “must pursue actions that can attract people to the area.” The plan then offers details for related themes on pages 12-13.
13	Elevate recreation as a signature feature. There are unique opportunities to be marketed as a brand. Consider proposal impact on recreation.
13	Adapt to new technologies. There is both support and concern about industrial wind and solar while “promoting sustainable practices and preserving valuable agricultural land and character”
14	Economy, “tourism and local spending are critical components of an economy that supports public projects, local businesses, and image of the North Iowa Corridor.”
14	Land atlas, there are “opportunities to improve the function of land uses in the North Iowa Corridor and areas to protect and preserve from change.”
21	Economy snapshot. During development of the comprehensive plan, it was questioned why agriculture was not included as an employment industry in Figure 1.11; RDG answered that the information source is the American Community Survey, in which agriculture is not an included category.
22	2023 Land Use map shows preponderance of land use in the county is agriculture
24	North Iowa is rich in environmental resources. Rivers, wetlands, forests, and lakes cater to recreational interests, while rich soil provides the foundation for local agriculture production. “With these resources come constraints on developable areas to protect these features”.
24	Minimize development where slope greater than 8 percent.
24	Preserve native vegetation
24	Individual site assessment often needed to verify water resource conditions. The entire county is drained by a widespread network of flood plains (watersheds)
26	Local roads are not shown on the map, although they “comprise the largest percentage of street mileage” in the county.
27	Important local airport serves at least 3,500 passengers each year.
28	NW, NE, and SW quarters of county have substantial park space which is deemed “a substantial contributor to the quality of life.”
31	County alone has 3,190 acres of park land.

46	Smart Planning Principle: Collaboration - Make decisions in a transparent and collaborative manner, which requires action such as providing opportunities for input from all citizens and affected entities.
46	Smart Planning Principle: Clean, renewable, and efficient energy - Prepare to evaluate new energy sources that bring value and coordinate with local assets, which requires evaluating alternative energy sources in infrastructure, public facilities, and private developments that save costs, are more efficient, and improve the environment; researching and planning for technological energy advancements appropriate in urban and rural development; and balancing decisions related to such technologies with existing attributes, attractions, and priorities such as agricultural production, recreation, and landscapes.
47	Smart Planning Principle: Community Character - Preserve and enhance the unique characters across the county, which requires conserving rural county character and functionality with respect to agricultural production
47	Smart Planning Principle: Natural Resources and Agricultural Protection - Protect and steward environment and natural resources, which requires priorities such as honoring each area’s unique natural heritage, encouraging development that preserves natural resources, and maintaining flood plain land while emphasizing food production
50-51	The future land use map shows the vision for growth and development; this stems from economic trends, environmental conditions, and public input. The future land use map shows the business of the county is agriculture.
54	<p>Agriculture areas on future land use map</p> <ul style="list-style-type: none"> <li>- Areas with existing farms and crop cultivation are not proposed for change in most unincorporated areas; the term “most” is likely in place to account for the current agricultural area that is part of the future “Common Ground Area” described later in the plan.</li> <li>- Goals are to 1) preserve land for agricultural production and associated functions and 2) ensure that agricultural uses contribute to quality of life. The agricultural designation can also act as a holding zone for city extension.</li> <li>- Form and compatibility guidelines include:             <ul style="list-style-type: none"> <li>o Minimization of “noise, glare, and hazards that would impair the quality of open space.”</li> <li>o Preservation as passive open space</li> <li>o Discouragement of urban encroachment</li> <li>o Allowance of value-added agricultural opportunities where appropriate, such as agri-tourism</li> </ul> </li> </ul>
57	<p>Industrial / Utilities areas</p> <ul style="list-style-type: none"> <li>- Uses include a range of industrial enterprises, including those with significant outdoor operations</li> <li>- Goals include 1) providing well-functioning settings for a range of industrial enterprises that support the local economy and 2) buffering higher impact industrial uses from residential neighborhoods</li> <li>- Form and compatibility guidelines include:             <ul style="list-style-type: none"> <li>o Ensuring truck traffic and transportation capacity are adequately addressed in siting</li> <li>o Establishment of operational standards that consider traffic, noise, lighting, and air quality</li> <li>o Inclusion of heavy landscaping screening, large buffers, height limitations, and strict ambient noise requirements next to park and open space uses</li> </ul> </li> </ul>

60	<p>County Growth Tier</p> <ul style="list-style-type: none"> <li>- Development policies should encourage conservation of natural features, preservation of prime agricultural land, and development next to existing infrastructure</li> </ul>
61	<p>Land Use Compatibility Guide shows agricultural land is not seen as compatible with uses other than parks and open spaces.</p>
63	<p>Ag/Rural: Balance existing and new types of agriculture. Consider various factors when transitioning from crop production to other agricultural uses. <i>Note that agriculture uses do not encompass energy installations (reference definition of agriculture as stated in the CG County Zoning Ordinance).</i></p>
71	<p>Create favorable brand image as place to live and work</p>
108	<p>Use county roads to build environmental diversity and visual appeal</p>
130, 131	<p>Expand access and use of parks and trails</p>
148	<p>Preserve the character of rural subdivisions. The primary objective for future housing and neighborhoods in the unincorporated area is to maintain rural landscapes</p>
149	<p>Even in consideration of rural new residential development, it is important to limit reductions in agricultural production</p>
160	<p>Evaluate and plan for context sensitive opportunities to incorporate renewable energy that saves costs, is more efficient, and improves the environment.</p>
160	<p>Using renewable energy in some public facilities helps defray utility costs in the long run and adds a visible display of efforts to preserve the environment</p>
160	<p>Each jurisdiction should tailor their policy for small and large scale renewable energy projects based on the context of their community.</p>
160	<p>Policy and regulatory considerations for incorporating renewable energy opportunities include:</p> <ul style="list-style-type: none"> <li>- Adopt zoning regulations according to Iowa Code that reflect impact mitigation and long-term management based on scale and location of proposal</li> <li>- Ensure that residences and roads are appropriately buffered</li> <li>- Support small-scale consumer renewable energy</li> <li>- Evaluate and plan for opportunities to incorporate renewable energy sources into public property</li> <li>- Avoid large expanses of facilities that affect stormwater management, habitat preservation, and visual variety</li> <li>- Avoid installations that would take up large portions of potential growth areas</li> <li>- Discourage facilities that would detract from cultural resources, recreational opportunities, or agricultural production</li> <li>- Limit utility-scale renewable energy facilities in residential growth areas, along major arterial streets, and on prime agricultural land</li> <li>- Ensure property and soils can and will be brought back to original conditions after energy use leaves</li> <li>- Encourage or require concurrent land uses with wind and solar energy installations</li> <li>- Consider requiring fiscal, cost of services, environmental, habitat, migration, aviation, or other impact studies for large scale facilities</li> <li>- Create an evaluation system to protect the most productive farmland from development</li> </ul>
161	<p>Maximizing agricultural production and preserving farmland are the top priorities.</p>
161	<p>Aside from the shared policies and actions (related to Infrastructure &amp; Public Facilities), the County should focus on maintaining quality services and anticipating future technologies that may create more efficient systems.</p>

161	Encourage collaboration: Provide opportunities for public input, listen to what is communicated, evaluate risks versus benefits, base policies on local input
161	Promote conservation of energy resources: Maximizing agricultural production and preserving farmland are the top priorities. In addition to providing food, local agriculture is a key contributor to renewables like ethanol and biofuels.
161	Preserve community character and quality of life: Uphold the rural, scenic style of the unincorporated county community. Promote activities and development that respond to local values regarding the physical character of the community. Maintaining rural character and quality of life for county residents will also be appealing to tourists as they travel to the North Iowa Corridor for a peaceful and unique stay.
161	Emphasize preservation of natural resources and agricultural land: Natural resources provide opportunities for people to experience a positive connection with the outdoors. Agricultural land provides farmers with a means to produce crops and livestock that feed society and contribute to renewables. Responsible use and preservation and natural resources and agricultural land drives the North Iowa Corridor economy through direct and indirect spend.

## APPENDIX C – The Basics of Variances and Special Use Permits

There are considerations associated with the intent and practice of zoning variances and conditional/special uses. After extreme research and consideration, Cerro Gordo County’s planning and zoning commission recommends that the zoning ordinance not allow utility-scale wind nor utility-scale solar nor utility-scale battery storage in Cerro Gordo County. Variances and conditional/special uses are tools that one or more parties could request in an effort to challenge this recommendation. By fully understanding these options, the zoning ordinance can be written to fully execute the intent of the commission’s recommendation. Thus why the following information is included here.

According to Iowa State University Extension April 2024 workshop course book ‘Introduction to Planning and Zoning Workshops for Local Officials’ prepared by Gary Taylor and Luke Seaberg:

### Variances

Variance to the zoning ordinance requires proof that an unnecessary hardship will result if the zoning regulations are enforced. The intent of the variance standard is to prevent the property from being worthless as zoned; if you can make money off the property, it is not worthless.

According to the fact sheet on page 61, the landowner must satisfy all three parts of the test to be granted a variance: 1) the land in question cannot yield reasonable return if used only for purpose allowed in that zone, 2) the plight of the landowner is due to unique circumstances and not to general conditions in neighborhood, and 3) the use to be authorized by variance will not alter essential character of locality.

The fact sheet on page 61 continues by stating that the Iowa courts have established several guidelines for assessing whether the above-listed criteria have been met:

- Lack of a ‘reasonable return’ may be shown by proof that the owner has been deprived of all beneficial use of his land. All beneficial use is said to have been lost where the land is not suitable for any use permitted by the zoning ordinance.
  - o It is not sufficient to show that the value of land merely has been depreciated by the zoning regulations, or that a variance would permit a landowner to maintain a more profitable use.
  - o It is not sufficient to show mere inconvenience to the applicant.
- Problems common to several properties do not constitute ‘unique circumstances.’ The appropriate response is through a zoning amendment, not wholesale application of the discretionary power of the board of adjustment.
- The ‘unique circumstances’ must not be created by the landowner’s own actions. For example, a landowner cannot build a house to fill the building envelope of a lot and then seek a variance to put a porch or deck on that house that will violate a setback.
- When a landowner purchases property, he or she assumes the circumstances created by the previous landowner.
- A variance that alters the ‘essential character of the area’ is beyond the authority of the board of adjustment to grant. The board cannot grant a variance that, in effect, constitutes a zoning amendment. Factors to consider in determining whether a variance will alter the ‘essential character of the neighborhood’ include the degree of variation from district regulations, the size of the parcel, and the parcel’s size and character in relation to the size of the district.

A variance should protect a landowner's property right, not grant a landowner a special privilege unavailable to other landowners.

### **Conditional/Special Uses**

Conditional/Special Uses are used to make sure slightly-out-of-character uses can be made to fit with surroundings.

The unnecessary hardship standard does not apply to conditional/special uses; rather, the standards in the zoning ordinance apply.

On page 59 is a list of criteria that are typical to a zoning ordinance for granting special exceptions. In general, with the imposition of conditions, the special exception will be:

- Compatible with the principles and objectives of the comprehensive plan
- Compatible with uses permitted in the zoning district under which it is regulated
- Compatible with existing or planned uses of nearby properties
- Will not endanger public health or safety

## APPENDIX D – Weather and Insurability Risks for Industrial Wind and Solar Installations

*John Eighmey, notes for May 29, 2024 Zoning Commission Meeting*

Recent storms in Iowa have drawn attention to risks concerning industrial level wind and solar installations. On May 21, ten tall wind turbine towers were “snapped like twigs” by strong winds in central Iowa. Six of the turbines were owned by MidAmerican Energy and four by Vestas Wind Systems. One of the turbines went down with a large fire (a possible lightning strike but the fire might also have been caused by internal forces such as turbine overheating).

This video image was taken in Adams County by television station KCCI-TV.



Many of the Cerro Gordo County Comprehensive Plan considerations for industrial wind and solar applications are relevant to the damage risks caused by such wind and solar installations. They are the considerations involving safety of the public, repairing roads, protecting agricultural land drainage systems, potential harm to wildlife, character of the county, contamination of food agricultural producing land, and restoration of any damaged agricultural land.

Insurance companies have a unique and specialized perspective about any industry where they are to offer insurance. Insurance companies need to be fact based, grounded in reality, and highly analytical about business risks and possible financial outcomes arising from damages.

Accordingly, what do insurance companies report about risks involving industrial wind and solar installations?

On May 23, 2024 the *New York Times* published an article on the recent Iowa tornadoes that destroyed the 10 wind turbines. Complete turbine “knockdowns” are said to be “unusual.” The article points to solar installations as a larger problem when it comes to severe storms. The *New York Times* quotes the CEO of GCube Insurance, Fraser McLachlan, who states “When it comes to extreme weather and renewable energy, the larger problem is the vulnerability of solar panels to hailstorms.”

The *New York Times* quotes McLachlan “To reduce costs, panels have become larger over time, and the glass has become thinner, making it more likely to crack when hail strikes. That’s happening as more solar panels are being installed in the hail-prone Midwest — and as the frequency and severity of hail increase.”

McLachlan notes that the industry standard hail risk mitigation strategy is to change the panel angle so panels are less exposed to direct hits. However, he further stated tipping the panels “creates a new problem: those panels start to act like sails, catching the winds that often accompany hail, increasing the risk of blowing away.”

McLachlan’s company, GCube Insurance, is a global specialist insurance provider to utility-scale renewable energy projects. In December, 2023 the company published a report on weather risks for solar installations. The report is titled “Hail No! Defending Solar from Nature’s Cold Assault.” The entire report is available only to the company’s insureds and brokers. However, the report was reviewed in some detail by *Insurance Business Magazine* on December 7, 2023.

What key findings were reported?

1. For this company, “hail-related claims now average approximately \$58.4 million per claim, constituting 54.21% of total costs incurred from solar loss claims.” — Considering the matter of scale, these would be substantial sums in any industry, and particularly substantial in the context of Cerro Gordo County.
2. Several factors were said to contribute to the “vulnerability of solar projects.”
  - a. “inadequate hail risk models” — This references inadequate use of historical local weather data and latest forecasting models.
  - b. “ineffective mitigation strategies” — This references less than desirable effectiveness of methods to strengthen panels and arrays, as well as possible effectiveness of protective devices such as hail “catchment nets.”
  - c. “limited and expensive insurance coverage” — Per the Smart Planning Principles set forth in the Code of Iowa, this leads to questions regarding the sustainability of an industry without ready access to needed insurance coverage.
  - d. “an uncertain funding environment” — This suggests an industry in the midst of some larger difficulties raising further questions concerning sustainability.
3. Despite the safety risks, there are efforts to reduce costs through use of “larger, thinner, and more fragile glass panels.” — Such actions to reduce operating costs simultaneously act to increase damage risks. This further indicates an industry under significant financial pressure.
4. In pursuit of other objectives, some companies are selecting “locations with higher hail risk.” — It appears as though states such as Iowa offer more ready access to an infrastructure of transmission lines and open land and are therefore being considered despite such considerations as weather hazards or valued productive agricultural land.

5. In an attempt to mitigate hail damage some support companies are offering methods such as “catchment nets.” — These are essentially large rows of nets arrayed like tents covering the rows of panels. Such scale enlarging structures could substantially increase the visibility and appearance of industrial solar installations leading to considerations of threats to the character of the area, upholding the rural and scenic style of the county, and the possibility of adequate buffering. Further relevant considerations involve possibilities of entrapping migrating and local wildlife such as birds and Monarch butterflies. The major county transmission line is positioned north to south serving as a virtual flyway for birds and flying insects. Industrial solar installations could straddle these transmission lines with nets acting as unfortunate choke points.

Further illustrating the risks, there was a dramatic hail damage incident in 2019 that underscores the importance of considering how severe weather relates to large solar installations. In May, 2019 a severe hailstorm struck the 1,500 acre Midway Solar Project near Midland, Texas. According to the *Houston Chronicle* more than 400,000 panels out of the 685,000 site total installation were damaged or destroyed with insurance losses exceeding \$75 million.

This is a photo of the Midland hailstorm damage taken by *Fox26* in Houston.



The panels in the Midland photo shown above appear to be near the 60-degree angle said to be “safer” from hail damage. This is also the angle about which the earlier quoted insurance company executive observed “those panels start to act like sails, catching the winds that often accompany hail, increasing the risk of blowing away.”

Also, notice the large area of pooling water to the left in the photo. Consider the potential to spread any substances that may be washed from the panels.

Also illustrating the risks, in June, 2023, a smaller 14,000 panel solar installation in Scottsbluff, Nebraska was hit by a significant hail storm. 13,650 panels were destroyed by what was said to be softball sized hail. A senior performance engineer stated “The panels weren’t rated to that high an impact.”

This GenPro Energy Solutions photo shows the damaged Scottsbluff panels.



The insurability of industrial solar installations has been a long-standing industry problem, suggesting the protracted severity of this problem and further questioning industry sustainability. Almost 15 years ago a U.S. Department of Energy report stated “Insurance premiums make up approximately 25% of a PV system’s annual operating expense.” Pointing to sustainability of the overall energy production goals of any installation the report further stated “PV developers report that insurance costs (premiums) comprise 5% to 10% of the total cost of energy from their installations, a significant sum for a capital intensive technology with no moving parts.”

The solar industry sustainability conditions pointed out by the U.S Department of Energy continue today. On March 23, 2023 Norton Rose Fulbright, a large global law firm serving large-scale companies, published an article written by an insurance industry analyst. In the article titled “Rising Solar Insurance Premiums and Shrinking Coverage,” the analyst stated “Recent history shows new areas being affected that have previously been spared catastrophic hazard losses. The middle of the country has been hit particularly hard by wind and hail. From Texas and Louisiana up to North Dakota and Minnesota, a drastic rise in claims will make it more difficult to secure coverage in the future.”

This leads to questions about performance standards for solar panels. The international standards for solar panels are created and published by the International Electrotechnical Commission (IEC). Hail resistance is covered by IEC standards 61215 and 61646 which test panel resistance to pelting by “up to 11 individual strikes” of “lab-produced” 25mm hail (essentially one inch).

In the United States solar panel standards are provided by Underwriters Laboratories (UL). In 2017, UL 6173 was developed as a standard applying to electrical, mechanical, thermal, and fire safety. There does not appear to be any UL standard for storm damage. Accordingly, the international IEC hail resistance standard is referenced in the United States.

In May, 2023 television station KCCI-TV reported that since 2003 there were “a whopping 3,300 reports of severe hail” in Iowa. The largest reported during this time period were 5.5 inches in diameter in Hancock County and Story County in 2004. The 2014 derecho storm in Iowa produced 3 to 4 inch hail in Calhoun County and 3.5 inch hail in Warren County. The Iowa hailstone record appears to be 7 inches held by Scott County for a September, 1959 storm. In 2022, Iowa ranked was ranked 7th nationally for hail claims by State Farm Insurance.

Clearly, in Iowa, there is significant risk of hail storms capable of generating hail stones larger than the 25mm (one inch) industry standard for a small amount (up to 11 individual 25mm object strikes) of lab-simulated hail directed on solar panels. This points to the importance of all Comprehensive Plan considerations that relate to hail damage and the possible use of hail mitigation devices such as “catchment nets.”

Accordingly, the CG County Comprehensive Plan sets forth a number of considerations that should be evaluated in terms of the weather related risks of industrial wind and solar installations. These specific and detailed array policy considerations for renewable energy opportunities are set forth as items A to L on pages 160 and 161 of the comprehensive plan.

A. Zoning regulations are to be based on Iowa Code to reflect impact mitigation and management based on scale and location of proposed facilities.

Industrial wind and solar installations are generally located in open areas that expose the equipment to the full force of nature and its potential for severe weather. Solar installations in particular are vulnerable to the direct pounding damage from large hail and the forces of strong winds that could blow loose items such as solar panels for substantial distances risking substantial property damage and even cause deaths were the panels to strike a person. Insurance company analysts regard hail mitigation methods in this industry as “ineffective”.

B. Ensure residences and roads are appropriately buffered. (Note that ensure means guarantee.)

Buffer usage should be extended to consider devices and methods needed for protection of the public from possible flying objects as well as from the visual effects of installations such as “catchment nets” on county character and the county rural and scenic lifestyle.

C. Support small-scale consumer renewable energy.

Small scale equipment and installations are much more manageable when it comes to weather damage risk mitigation.

D. Incorporate renewable energy sources into public facilities.

Again, small scale equipment and installations are much more manageable when it comes to weather damage risk mitigation.

E. Avoid large expanses of facilities affecting stormwater, habitat, and visual variety.

The annual incidence of heavy rainfall and extreme storms can be predicted. Reasonable predictions of stormwater flows should be made given exacting knowledge of any terrain alterations. Drainage tile systems must be documented so has to successfully manage stormwater runoff from wind and solar installations. Additionally, it should be recognized that hail mitigation strategies for such as large scale “catchment nets” could introduce significant harm to wildlife and unsightly views impinging on the visual variety of the county.

F. Avoid installations that take up large portions of potential growth areas.

Industrial level solar installations can easily encompass 1,000 to 3,000 acres. Given the large scale of land use by solar installations particular cautions should be taken to locate them safely away from any areas of habitation. Beyond the issues of character of the county, and conflicting uses of land, the potential for flights of panels to “sail away” in storm conditions underscores this important safety consideration to keep any such installations far away from people.

G. Discourage facilities that detract from cultural resources, recreational opportunities, or agricultural production.

Substantial amounts of agricultural land in the county are used for food production. There is a concerning potential for storm conditions with turbine or panel damage to unleash lubricants and other undesirable substances onto farmland. Further, these substances could possibly reach underlying drainage tiles and thereby be conveyed to other connected drainage tile systems in the county. The potential for leaching chemicals throughout a system of drainage tiles may seem remote, but given consequences and the many unknowns in this industry still must be taken seriously.

H. Limit utility scale renewable energy installations in residential growth areas, along major arterial roads, and prime agricultural land.

Industrial wind turbines and solar panel installations are of a truly large scale covering huge amounts of land. These three major considerations lead to the conclusion there is no appropriate land in the county where industrial wind and solar facilities would not seriously impinge upon one or more of these considerations simultaneously.

I. Ensure property and soils can and will be returned to original conditions.

The fiery turbine “knock down” in Adams County points to the risk of soil contamination from burning turbine lubricants. The related consequences of solar panel fires should also be addressed.

J. Encourage or require concurrent land uses.

Concurrent land uses may be restricted due to requirements of hail mitigation devices such as “catchment nets.”

K. Consider requiring impact studies for large-scale facilities.

Applicant wind and solar companies have a “**duty to warn.**” This stems from the fact that wind and solar companies apply advanced technologies on vast industrial scales for which knowledge and expertise is held largely by the companies themselves and closely related suppliers of expertise and needed resources. This knowledge is not necessarily possessed by local government officials or by the general public. As such a condition of “**unfairness in the marketplace**” exists and obligates the wind and solar companies to inform and warn local officials and the general public concerning what is known about risks relating to the relevant considerations of the Comprehensive Plan and to the public welfare.

Given this condition of **imbalance of knowledge between the companies and the public**, for any application for a permit, there should be a detailed impact study concerning risks to the public and county resources. This includes information needed by the general public, by government officials, and by the relevant land owners so they may make fully informed decisions about participating with such projects.

L. Create an evaluation system to protect the most productive farmland.

An impact study would usefully focus specifically on this issue so risks are effectively managed in accord with the productivity of farmland.

## **Conclusion**

This examination of storm related hazards through the perspective of insurance providers has revealed substantial concerns about the sustainability of industrial wind and solar installations. Insurance providers have acute skills for evaluating risks. In the industrial wind and solar industries, the weather hazard risks have been shown to be extensive and severe. Insurance claims have been substantial and insurers have revealed numerous risks regarding choice of locations and equipment design. Serious questions have been raised about the financial sustainability of these novel technologies placed in areas of known weather hazards by companies employing challenging and novel corporate structures.

Indeed, industrial-level wind and solar businesses are clearly operating in developmental technical and financial environments with many challenges and unknowns. Given the substantial damage and safety risks, this industry is not ready for installations near where people live and work. The risks of flying objects and the potential for them to be lifted substantial distances underscores the need for truly substantial distancing of such facilities. Also, the consequences for the proper use of agricultural land have been shown to be neither positive nor even neutral. The consequences for habitat and wildlife are negative.

As with the conventional protocol for appraising any potential land sale, the county must ask applicant companies "Do you have any risks to disclose?" The answers from an applicant company must be specific, written, supported by publicly available and credible evidence, and on the public record. Thus far the publicly available information from sources such as insurance companies is not favorable to this industry.

Indeed, given this complex and financially challenged industry, with its novel corporate arrangements, there seems little reassurance that either a company or its insurance supplier may continue to exist at the future moment when weather related damages must be addressed and remedied at the local level.

## APPENDIX E –

# Risk Considerations for Industrial Solar Panel Chemical Leaching

*John Eighmey, notes for May 29, 2004 Zoning Commission Meeting*

### Types of Solar Panels

There are two major types of silicon solar panels: monocrystalline and polycrystalline. Monocrystalline silicon cells are the premium level with highest efficiency, polycrystalline cells use less expensive silicon fragments and are less efficient. Together, both silicon types are said to have an 85 percent share of the PV market. Of the two types of silicon panels, polycrystalline is said to be the dominant type, accounting for 97 percent of the silicon portion of the total solar panel market.

### Silicon Solar Panels



Monocrystalline



Polycrystalline

### Panel Sizes

Commercial solar panels have 72 solar cells and measure about 78 inches long by 39 inches wide by 2 inches deep. They are placed in 2 inch metal frames. Panels produce between 350 and 400 watts of power. Monocrystalline panels weigh about 49 pounds with a lifespan of about 45 years, while polycrystalline panels weigh about 45 pounds with a lifespan of 35 years.

### Solar Cell Sizes

Individual solar cells are about 6 inches by 6 inches. For monocrystalline panels, the cells are formed into bars and cut into wafers. For polycrystalline panels, fragments of silicon are melted together to form the wafers. This melting process gives the polycrystalline panels the blue colorization shown in the photo above. Refer to <https://ases.org/monocrystalline-vs-polycrystalline-solar-panels/> for a very interesting explanation of the cell and panel manufacturing process.

## **Chemical Contents of Solar Panels**

The average amount of lead in a polycrystalline solar panel with 72 solar cells is said to be about 15 grams. See <https://extension.psu.edu/solar-panel-components-safety>. Accordingly, a solar panel installation with 300,000 panels would include about 4,500,000 grams (or about 10 pounds) of widely dispersed lead.

Now, of course, solar panels contain many more substances than lead. But, lead is a useful exemplar because its toxic consequences are well known.

## **Peer Reviewed Study**

Rigorous studies of potential environmental issues are scarce when it comes to solar panels. Reassuring voices are everywhere, but little factual information based on accepted research methods has been made available to the public.

However, a published peer reviewed article bears directly on this subject. The researchers report testing real solar cells and based their work on the U.S. Department of Energy toxicity leaching test procedure.

Panthi, Bajagain, An, and Jeong, "Leaching potential of chemical species from real perovskite and silicon solar cells," *Journal of Process Safety and Environmental Protection*, Volume 149, May 2021, Pages 115-122.

This study can be found at <https://doi.org/10.1016/j.psep.2020.10.035>.

The researchers examined the leaching potential of various solar cells including monocrystalline, and polycrystalline silicon solar cells under what was described as "worst-case natural scenarios." Real solar cells were said to be used. The EPA standard toxicity characteristic leaching procedure (TCLP) was used to analyze the leachates to determine the concentrations of major chemicals.

The TCLP test results from broken monocrystalline panels revealed certain metals leached at relatively high levels: aluminum at 182 mg/L, nickel at 7.7 mg/L, and copper at 3.6 mg/L. The results from broken polycrystalline panels indicated the release of 43.9 mg/L of copper and 6.6 mg/L of lead, both of which are higher than the EPA toxicity test (TCLP) limits.

Accordingly, this recent peer reviewed study found chemicals can be released into the environment during solar panel disposal or following damage during natural disasters such as major hailstorms. The polycrystalline panels (the most widely used type of silicon panel) were reported as releasing copper and lead at levels over the EPA limit for the standard TCLP toxicity test.

## **Risk Considerations**

It has been shown that large hail can strike a solar panel shattering or cracking the surface exposing the cells inside. There is a significant risk of hail storms in Iowa and they can at times be severe. Moreover, insurance companies are known to be concerned about increasing severe storm damages to industrial solar installations reaching from the Texas gulf coast northward into Minnesota.

Solar panels also age over their lifespans and in the upper Midwest may also encounter crack inducing stress factors such as freeze-thaw cycles, sometimes on a daily basis.

Recall that last year's hailstorm near Wapello County, Iowa destroyed 13,650 out of a total of 14,000 solar panels at the Scottsbluff, Nebraska industrial solar installation (97.5 percent). A GenPro Energy Solutions photo is shown below.



Per the research study described above, it seems reasonable to consider that rainwater from dramatic local storm events could leach (wash) toxic chemicals such as lead from damaged solar panels. Once on the ground, this now toxic rainwater might flow over the terrain to neighboring fields. Or, the water might seep into the ground and possibly enter a drainage system. Where might any drainage tiles carry toxic water? Local drainage tile systems are interlaced and widespread.

Clearly, a county whose many years of success has been made possible by an abundance of prime agricultural land should not take unknown risks with its future. Crops from lead tainted ground are not likely to be rated as food grade.

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The first article listed below is the one cited in this report. Several additional peer reviewed published articles offer supporting information as noted below.

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**Note:** The researchers employed a jet of deionized water at various pH acidity settings. They stated “High amounts of toxic heavy metals are measured in the leaching solutions. Two module pieces with a size of 5 × 5 cm<sup>2</sup> are enough to exceed the WHO (World Health Organization) limits of drinking water for Cd (cadmium) after only one day of leaching in acid as well as neutral solutions. For Pb (lead) it takes also only one day of leaching in acid solutions to exceed the WHO limit.”

3. Seth A. Robinson and George A. Meindl, “Potential for leaching of heavy metals and metalloids from crystalline silicon photovoltaic systems,” *Journal of Natural Resources and Development*, 2019.

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**Note:** This study examined intact modules and stated “It is possible under operating conditions that PV panels can leach toxic elements if water penetrates into the modules through damaged areas, such as cracks in the module glass or through defective laminations.”

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**Note:** The researchers stated “With leachable concentrations of Pb (lead) as high as 9.3 mg/L, 1.4 mg/L, 6.7 mg/L in the TCLP, SPLP, and pH static test respectively, the indiscriminate disposal of broken solar panels at any stage of their life cycle was observed to be hazardous.”

## APPENDIX F – Supplemental Resources Related to Industrial Wind and Solar Installations

*John Eighmey, notes for May 29, 2024 Zoning Commission Meeting*

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# Dissenting Report

**Utility-Scale Renewable Energy Ordinance Report to the Cerro Gordo County Board of Supervisors– Dissenting Opinion**

Jon Caspers, Member

Cerro Gordo County Planning and Zoning Commission

May 29, 2024

**Introduction**

At its meeting on May 2, 2024, the Cerro Gordo County Planning and Zoning Commission (PZC) conducted a workshop to discuss the development of a report to the Cerro Gordo County Board of Supervisors (BOS) related to renewable energy. During the workshop, each of the Commissioners expressed their opinion whether utility-scale renewable energy installations were an appropriate use in Cerro Gordo County. Four (4) of the Commissioners stated that they believed such installations were not an appropriate use of land in Cerro Gordo County. Contrary to the opinion of the majority, I stated my opinion that such installations were an appropriate use.

This report is written as a dissenting opinion to the PZC’s majority report to the BOS.

**Background**

On Thursday, May 4, 2023, the PZC considered a proposed ordinance that would “impose a moratorium for the county in accepting new applications or issuing permits for utility-scale wind energy conversion systems (CWECS, generally wind turbines), solar installations, or battery storage installations as regulated under the Cerro Gordo County Zoning Ordinance”. The proposed moratorium, if adopted, would be effective for a period of fifteen (15) consecutive months from the date it becomes effective.

The reason for the moratorium, described in the Administrator’s meeting memo, was as follows: *“In July 2022, the county began the process of developing a new Comprehensive Plan jointly with the cities of Mason City and Clear Lake. The county intends to develop a high-level vision, goals, objectives, and policy pertaining to renewable energy to provide guidance for the future as a part of the plan that would be implemented with potential Zoning Ordinance amendments following as applicable. As a result, the county requires time to complete the process to develop the plan, conduct further study, and conduct any potential revision process to the ordinance to implement*

*the plan. The purpose of the proposed ordinance would be to provide the needed time to conduct those activities.”*

I voted against the proposed ordinance, citing, among other concerns, the fact that moratoriums are generally bad public policy, cause undue harm to many of the parties and tend to be extremely difficult to remove or terminate. Despite these concerns, the PZC approved the proposed moratorium and recommended approval to the BOS. The BOS adopted the ordinance at a public hearing on May 15, 2023.

Prior to the moratorium, utility-scale renewable energy projects were considered and permitted as a Special Use under Article 20.2(J) by the Cerro Gordo County Board of Adjustment (BOA).

The PZC first began consideration of a potential revision to the Zoning Ordinance to regulate wind energy conversion systems (C-WECS) at its regularly scheduled meeting on November 7, 2019 (over four years ago). In his meeting memo, the Administrator stated *“I am seeking your input on the type of requirements a possible revision should include and the elements we should consider. We will hold a public hearing in the coming months, but at this point, I would like to take extra time to research appropriate regulation and consider how other counties regulate wind farms.”*

The PZC was provided with numerous documents at the meeting, including three county ordinance examples. In addition, the Administrator’s meeting memo provided background information for discussion of setbacks, noise, shadow flicker, safety, road and infrastructure impacts, decommissioning, and setbacks.

The PZC had further discussions about the potential revision to the Zoning Ordinance at its next regularly scheduled meeting on December 5, 2019. The Administrator’s memo for the meeting summarized the discussions at the November meeting and presented additional topics for further discussion.

After these two initial meetings in late 2019, the PZC had no further discussions about an ordinance to regulate C-WECS until the sudden proposal for a moratorium on May 4, 2023.

## Findings

With the adoption of the moratorium on May 15, 2023, property owners in Cerro Gordo County temporarily, until the moratorium is lifted or expires, lost the right to participate in and enjoy the benefits of any utility-scale renewable energy project. Now, with their decision on May 2, 2024, the majority of the PZC members are seeking to permanently eliminate this property right for landowners in Cerro Gordo County.

The majority report of the PZC mentions property rights as a “significant consideration” but then proceeds to dismiss the importance of these property rights in favor of addressing other concerns by prohibiting the construction of utility-scale renewable energy installations. Concerns cited include preservation of farmland, drainage, noise, shadow flicker, safety, environmental contamination, property values, interference with neighboring farm operations, and other factors.

Instead of prohibiting utility-scale renewable energy installations in the County, a much better course of action would be to preserve landowner’s individual property rights by developing a well-constructed ordinance to allow these installations. The concerns cited by the majority report of the PZC can be addressed by mitigations required by the ordinance. The following listing, while not comprehensive, gives examples of how a well-drafted ordinance would protect the County and its residents while still enabling developers to build workable, cost-effective projects.

### Mitigation Examples:

- Noise: The ordinance can specify limits on the noise level from the installations. Noise can also be addressed by other mitigations such as setbacks, equipment requirements, buffers, etc.
- Preservation of farmland: The ordinance can provide specific requirements for installation design and operations that preserve farmland to the maximum extent possible.
  - For solar installations, the ordinance can prohibit the grading of land to protect future productivity upon decommissioning.
  - Technological advancements in the design and efficiency of wind turbines have led to major improvements in energy production for a given amount of farmland taken out of production by the turbine. The ordinance can also require restoration of the land upon decommissioning.
- Drainage: Drainage issues can be addressed with specific requirements for placement of installations, mapping and benchmarking existing drainage lines, and maintenance requirements.
- Property values: Negative effects on property values can be mitigated by:
  - Effective setback and noise level requirements.

- Permitting installations as a Special Use with conditions set by the BOA and only allowing installations in designated zoning districts.
- Requiring an operations and maintenance plan designed to avoid negative impacts on the surrounding land, water, and neighbors.
- Requiring best management practices (BMPs) to serve as minimum standards that developers must follow as a condition for receiving a permit while possibly incentivizing other beneficial BMPs.

### **Benefits of Renewable Energy**

Renewable energy sources like solar and wind produce little to no greenhouse gases during operation, reducing the carbon footprint. Unlike fossil fuels, renewable energy technologies generate energy without emitting pollutants such as sulfur dioxide, nitrogen oxides, and particulate matter, which contribute to air quality issues and respiratory problems. Renewable energy sources are abundant and naturally replenished, unlike finite fossil fuels. Utilizing renewable resources helps preserve natural ecosystems and reduces the extraction and consumption of limited resources.

By relying on locally available renewable resources, the U.S. can reduce its dependence on imported fossil fuels, enhancing national energy security. Renewable energy sources have lower operational costs and are less susceptible to price volatility compared to fossil fuels, resulting in more predictable and stable energy prices over time. Investment in renewable energy infrastructure can stimulate economic growth, particularly in rural areas where many renewable resources are located.

Reduced air and water pollution from renewable energy sources can lead to public health benefits, decreasing healthcare costs and improving quality of life.

In summary, renewable energy offers a sustainable, clean, and economically viable solution to meet growing energy demands while addressing environmental concerns and enhancing well-being.

### **Benefits of Specific to Solar Installations**

Solar photovoltaics (PV) energy is highly efficient from a land-use perspective. Looking at total energy generation from corn to account for useful by-products of ethanol production used as

animal feed, solar PV generates 14-17 times more gross energy per acre than corn produces.<sup>1</sup> This highly efficient use of land for energy production greatly contributes to the preservation of farmland.

Solar installations offer the opportunity to establish native perennial vegetation on project sites that provide numerous benefits, including:

- Reduced erosion.
- Improved water absorption and water quality.
- Reduced chemical use and chemical runoff.
- Improved soil structure and tilth.
- Improved pollinator habitat.
- Increased carbon sequestration.

Solar installations are also extremely effective in the protection and preservation of farmland. Because farmland used for solar installations can be returned to agricultural production after the site has been decommissioned, the use of farmland for solar installations should be viewed as a temporary use. For those concerned about the loss of farmland for food production, the free market is an excellent tool to determine the best use of available farmland. When demand for crops increases, more acres will gravitate to agricultural production. Similarly, when demand for electricity increases, more acres will be used for solar installations.

Studies indicate that the effectiveness of renewable energy is highest and service intermittency is minimized when complementary renewable sources are utilized and geographically distributed.<sup>2</sup> In Iowa, wind speeds tend to be high in the winter and spring when solar energy is less available, and lowest in the late summer when solar radiance is plentiful.<sup>3</sup> Iowa currently generates a higher proportion of its electricity from wind than any other state (58% in 2021), but solar is well under 1%, about one tenth the national average.<sup>4</sup> In terms of balancing our energy portfolio, mitigating

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<sup>1</sup> Mathewson, P. and Bosch, N. 2023: Corn Ethanol vs. Solar Land Use Comparison. CleanWisconsin. <https://www.cleanwisconsin.org/wp-content/uploads/2023/02/Corn-Ethanol-Vs.-Solar-Analysis-V3-12-compressed.pdf>

<sup>2</sup> Jurasz, J., and Beduco, A., 2022: Complementarity of Variable Renewable Energy Sources. Academic Press, Cambridge, MA. 713 pp.

<sup>3</sup> Takle, E. S., and R. H. Shaw, 1979: Complementary nature of wind and solar energy at a continental mid-latitude station. Int. J. of Energy Res., 3, 103- 112. <https://doi.org/10.1002/er.4440030202>

<sup>4</sup> U.S. Energy Administration. State Profile and Energy Estimates: Iowa. <https://www.eia.gov/state/analysis.php?sid=IA> [accessed July 20, 2023]

climate change, and reaping the benefits of complementary renewable sources, Iowa is under-invested in solar.<sup>5</sup>

### **Summary and Recommendation**

Many counties in Iowa have adopted some type of ordinance to guide renewable energy development. The experience of these counties, the various ordinances they have adopted, and other information sources could be used by Cerro Gordo County to similarly guide renewable development.

Banning the development of utility-scale renewable energy in the County, aside from disregarding landowner's property rights, would cause undue harm to many of the parties involved. Cerro Gordo County should move forward with the development of a well-crafted renewable energy ordinance that will protect the health, safety, and well-being of the County and its residents while enabling developers to build workable, cost-effective renewable energy projects.

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<sup>5</sup> Schnoor, J., et al., 2023: Iowa Climate Statement 2023: It's Time to Tap Iowa's Vast Solar Energy Resources. Center for Global and Regional Environmental Research. [https://ehsrc.public-health.uiowa.edu/wp-content/uploads/2023/10/Iowa-Climate-Statement\\_2023.pdf](https://ehsrc.public-health.uiowa.edu/wp-content/uploads/2023/10/Iowa-Climate-Statement_2023.pdf)