8/5/25 #4

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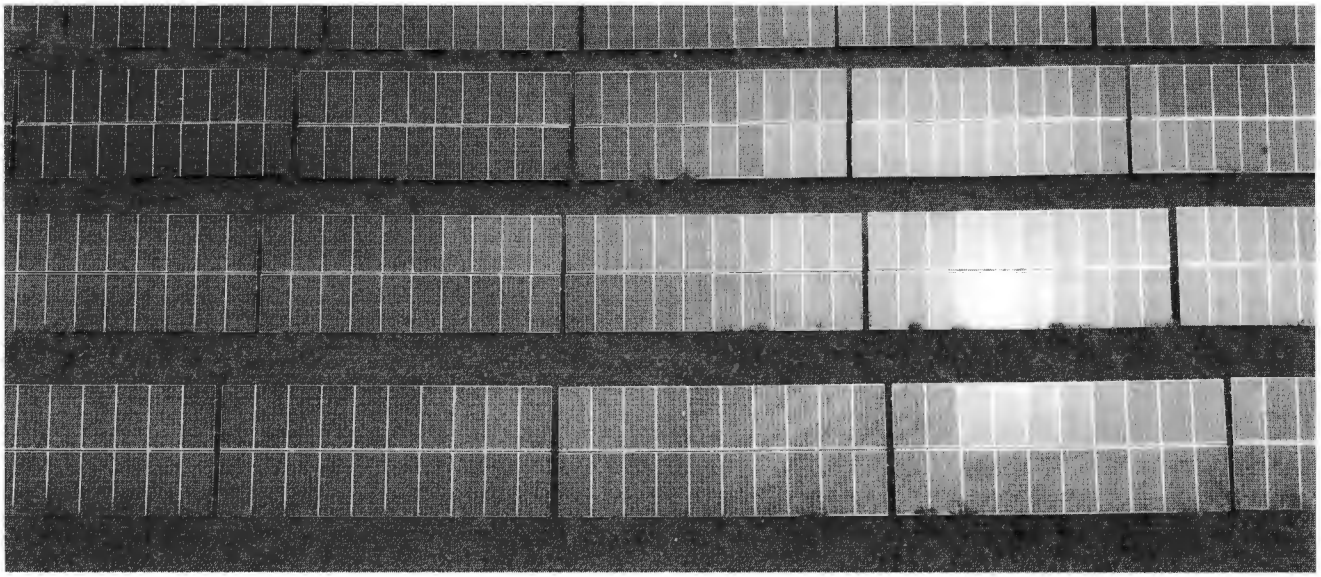
Iowa Environmental Council

IOWA SOLAR SITING RESOURCE GUIDE: A ROADMAP FOR COUNTIES

TABLE OF CONTENTS



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Iowa Environmental Council

INTRODUCTION

Solar at all scales is a growing opportunity in the state of Iowa. From immense growth in the customer-owned solar market to the emergence of utility-scale and community solar projects, Iowa appears to be at the beginning of a solar boom. For counties presented with the opportunity of large-scale solar projects, an important tool to consider is a well-drafted ordinance. A good ordinance will preserve the interests of the county and its residents while enabling developers to build workable, cost-effective projects. Under Iowa's home rule policy, counties have latitude to adopt ordinance provisions related to solar development.

A well-crafted ordinance will take into consideration the jurisdiction of the Iowa Utilities Board (IUB) to approve projects that are 25 megawatts or larger in size.

Solar in Iowa has grown from around two megawatts (MW) in 2012 to about 115 MW today.[1] The first utility-scale projects came before the Iowa Utilities Board for approval in the summer of 2019 with a 100 MW project proposed in Louisa County and a series of projects totaling 749 MW proposed for Worth, Mitchell, and Howard Counties. Multiple projects are in the works and counties around Iowa are preparing for this exciting future.

This guide focuses on siting practices for two types of large solar energy developments: Utility-Scale Solar and Community Solar. We will not focus on personal solar energy systems, such as those used at homes, farms, and businesses to produce electricity for usage on-site.

While large-scale solar development may be in its early days in Iowa, a handful of Iowa counties have already adopted solar ordinances and many of our neighbors in the Midwest have already seen utility-scale development. In addition to existing Iowa ordinances, **we have reviewed the ordinances and best practices from neighboring states and identified specific provisions that local officials can use as a road map for their own ordinances.**

We encourage counties that are considering an ordinance, or updating an ordinance, to use this document as a reference to support the development and adoption of a well-designed ordinance rooted in existing successful practices.

As solar energy gains momentum across Iowa, community solar projects are becoming more common. Cities including Ames, Bloomfield, and Cedar Falls have adopted or are in the process of constructing community solar projects. For many Iowans, community solar projects offer an opportunity to invest in renewable energy without having to construct a system on their own. This type of project allows renters, homeowners and businesses with shaded roofs, and other community members to enjoy the benefits of solar energy while offering an opportunity for utilities to provide a clean source of energy to residents and businesses. This guide includes an addendum of resources for those considering community solar projects.

We encourage counties that are considering an ordinance, or updating an ordinance, to use this document as a reference to support the development and adoption of a well-designed ordinance rooted in existing successful practices.

This document is not legal advice and users of this guide should consult an attorney with specific legal questions.

STATE AND LOCAL BENEFITS FROM SOLAR DEVELOPMENT AND FUTURE POTENTIAL

Iowa has what it takes to be a national leader in solar energy. The state ranks 16th among U.S. states in technical potential for solar energy production, putting Iowa ahead of states such as Florida, Georgia, and South Carolina. A solar photovoltaic (PV) array located in Iowa produces a comparable amount of electricity as one located in Miami or Atlanta, and more than arrays located in Chicago.[2]

Iowa is poised for significant solar development. The rapidly improving economics of solar energy are now driving large-scale projects. A recent report found that the levelized cost of energy for utility-scale solar declined 89 percent between 2009 and 2019.[3] Using ground-mount solar systems to meet five (5) or 10 percent of Iowa's annual electricity needs would require a very small geographic footprint. Using just 21 of Iowa's 55,857 square miles of land for solar PV would provide 10 percent of Iowa's electricity needs.[4] There were 3,294 MW of potential solar projects in Iowa being studied for connection to the grid by the regional grid operator Midcontinent Independent System Operator (MISO) at the end of 2019.[5]

Counties may play a role in solar development by reviewing and approving specific solar projects. County policies that guide review and approval need to strike a balance between concerns expressed by county residents and successful, cost-effective solar development. An ordinance can be a critical part of achieving a balance and seeing maximum local benefits from solar generation.

Solar development offers a number of benefits to county residents and the county itself. These benefits include:

- **Lease or easement payments to landowners.** Payments to landowners provide long-term, stable streams of revenue.
- **Property tax revenue to counties.** Solar arrays generate property tax revenue paid to counties that can support a range of public benefits, including roads and bridges, health services, schools, debt service, and reduced need for revenue from other sources.
- **Replacement tax revenue to counties.** State law provides a defined replacement tax for electric generating facilities to ensure similar tax treatment for potential competitors within the state. The replacement tax revenue to counties may be almost as large as the property tax revenue.
- **Clean energy resources.** Unlike fossil-fuel power plants, solar arrays do not produce air pollutants such as sulfur dioxide, nitrogen oxide, greenhouse gases, particulates, or mercury, thus reducing acid rain, smog, and public health impacts such as pulmonary and heart disease and asthma. Solar arrays also do not use water or produce water pollution in the process of generating electricity or produce hazardous waste that threatens public health, unlike fossil and nuclear power plants.
- **Local economic development.** In 2018, Iowa had nearly 850 jobs supported by the solar

industry.[6] The U.S. Bureau of Labor Statistics found in 2019 that solar installers are projected to be the fastest growing job in the United States through 2026, with the position expected to grow by nearly 105 percent during that time span.[7] There are nearly 100 Iowa businesses involved in the solar energy supply chain.[8] These jobs are located across the state in a range of sectors including manufacturing, installation, and operations and maintenance.

DEFINITION OF TERMS

Like many areas of technology and regulation, solar siting terminology uses jargon that is critical for local government officials to understand and define in order to create a clear ordinance. The list of terms provided here is not exhaustive, but defines many of the terms counties should consider adding to the definitions section of a solar siting ordinance.

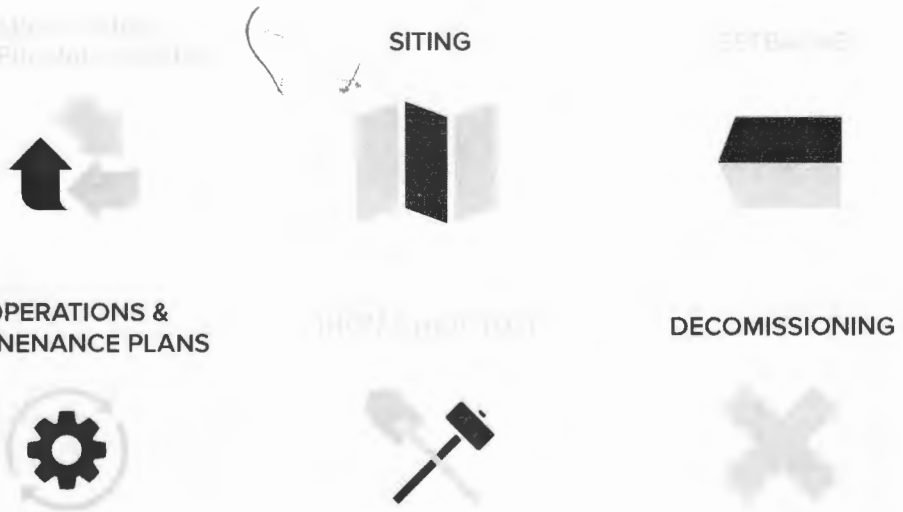
- **Utility-Scale Solar Energy System:** A solar energy system above a certain capacity that is intended to produce electricity to sell into the market, not to directly supply end-use customers. These systems are larger than small-scale residential or business solar installations and many community systems, often covering more land area.

  Note: *If a system is 25 MW or larger, it will need to obtain a siting certificate from the Iowa Utilities Board (IUB). The hearing for the siting certificate will be held in the county where construction is to occur and the county will be a party to the proceeding. Solar energy systems smaller than 25 MW do not require a siting certificate.*

- **Community Solar:** A solar energy system developed by a municipality, utility, or other third party that typically allows community members to subscribe to the project. In Iowa, development of community solar projects is limited to utilities at this time.
- **Easement:** A legal agreement for the use of property for a specified purpose.
- **Feeder circuits/lines:** A power line or network of lines used as a collection system that carries energy produced by a solar energy system to an interconnection point like a substation. Feeder circuits are most often placed underground.
- **Glare/glint:** Light reflected off of a surface.
- **Interconnection:** Link between a generator of electricity and the electric grid. Interconnection typically requires connection via infrastructure such as power lines and a substation, as well as a legal agreement for the project to be connected to the grid.
- **Module:** An individual unit comprised of multiple photovoltaic (PV) cells, with multiple modules used in a solar energy system.
- **Mounting:** The method of anchoring solar energy system modules to the ground or a building.
- **Non-participating landowner:** Any landowner that has not signed a lease agreement for an easement with the project owner or developer, often adjacent to or near the project.

- **Operator:** The entity or individual that operates a solar energy system.
- **Owner:** The entity or individual that has ownership over a solar energy system.
- **Participating landowner:** A landowner who has signed a lease agreement for an easement with a project owner.
- **Residential/small-scale solar energy system:** A solar energy system that is installed at a residence or business to meet the electric demand at the location. These systems are typically intended to offset electricity use for the owner and are not intended to be net generators of electricity.
- **Solar energy system:** A system that converts energy from sunlight into electricity or an additional energy source such as heat.
- **Substation:** A facility that converts electricity produced by a generator like a solar energy system to a higher voltage, allowing for interconnection to high-voltage transmission lines.
- **System height:** The height of a solar energy system, usually referring to ground mounted systems. Total system height is the measurement from the ground to the top of the mounting or modules associated with a system. Counties may also wish to include an additional height definition for ground clearance, or the measurement between the ground and the bottom of modules or mounting.
- **Transmission lines:** Power lines used to carry electricity from collection systems or substations over long distances.

BEST PRACTICES OF SOLAR SITING



SUMMARY OF BEST PRACTICE RECOMMENDATIONS

Our recommendations for solar ordinance provisions to enable responsible solar development and the benefits that come with it include:

Application and approval process. We recommend that counties establish a clear and well-defined application process with a set of known application requirements. Solar projects should be treated either as a permitted use or as a conditional use in established zoning districts. If the application and associated solar development meet the clearly identified conditions, the application and project should be approved.

Siting

- **Zoning districts.** Counties should allow for the siting of utility-scale and community solar in a variety of districts.
- **Site plan and requirements.** Part of the application and approval process may include a plan describing the project in detail as well as a number of site and structure requirements. For projects 25 MW or larger, we recommend that the county accept the Application for a Certificate, required by the Iowa Utilities Board, in lieu of a separate county application.

Setbacks. Counties should ensure that setbacks balance multiple interests and support cost-effective solar development. Counties should also provide for waivers for voluntary reduction in setbacks.

Operations & maintenance plans and land use. To address both short-term and long-term maintenance of a project area, counties may require an operations and maintenance plan and adopt land use requirements.

Infrastructure. Counties may require a pre-construction plan for handling potential impacts to roads and other infrastructure from solar project construction as well as a post-construction review to identify impacts and provide for repairs.

Decommissioning. Counties may require a decommissioning plan as part of the application and approval process to ensure restoration of land once a project is no longer operating.

MAJOR PROVISIONS FOR COUNTY SOLAR ORDINANCES

Successful solar siting ordinances will balance the interests of the county, project participants, and non-participants while allowing for cost-effective development. Ordinances can preserve these interests without imposing onerous restrictions. In order to allow for successful solar development, ordinances should rely on established best practices.

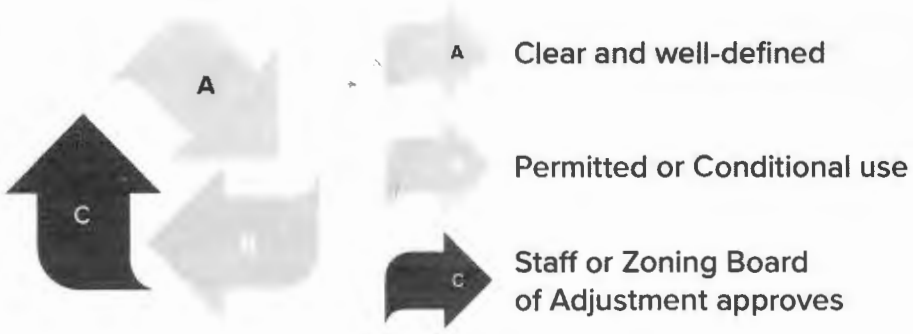
APPLICATION AND APPROVAL PROCESS

Iowa Code constrains to some extent the procedural options available to counties for consideration and approval of large-scale solar. The best practices recommended in this section apply primarily to counties that have adopted zoning and may not apply to counties without zoning.

RECOMMENDATIONS:

- **We recommend that counties adopting a solar ordinance first adopt an amendment to their comprehensive plan with a statement about their intentions for solar development in the county, the benefits of investments in solar, and the key considerations around regulating solar siting.**
- **We recommend that county officials prioritize creating a clear application and review process with well-defined steps and conditions for approval. This allows a solar developer to clearly identify the application requirements for a solar project which, if met, will result in county approval of the application. The setback provisions described below would be one of the clear application requirements, while the additional provisions discussed in this document can comprise the balance of those requirements (e.g. decommissioning, site plan, road use plan, etc.)**
- **Any application fees must not exceed the cost of processing the application, including any required inspection.[9]**

PROCESS



COMPREHENSIVE PLAN UPDATE

Iowa code specifies that zoning ordinances and decisions "shall be made in accordance with a comprehensive plan..." [10] (Iowa Code § 335.5). For this reason, we recommend a county looking to attract solar and other renewable energy development first adopt an amendment to align a county comprehensive plan with a county's intentions to attract such development.

EXAMPLE: CEDAR COUNTY

"Goal III. Encourage the creation and use of alternative and renewable energy sources. Objective 1: increase alternative and renewable energy sources in the county.

Strategies: Review and modify the zoning ordinance and other relevant county regulations as necessary to remove barriers to the use of renewable energy systems such as solar, wind, and geothermal."

The County should promote the use of renewable and inexhaustible energy sources over non-renewable energy sources. . ." [11]

OPTIONS FOR SITING

Counties can use various processes to govern solar siting. The two most straightforward options are to make solar systems a permitted use (also sometimes called an "allowed" or "principal" use) in specific zones or designating solar systems as a conditional use (also called a "special use" or "special exception"). In the case of a conditional use, supervisors should define the conditions that the project must meet to be approved.

Solar as a Permitted Use

If a county ordinance designates solar as a permitted use, county staff reviews projects to determine compliance with objective ordinance requirements. County staff would be able to determine objective requirements, such as whether a project meets required setbacks, but would not be able to decide on subjective requirements such as whether a particular project "fits the area." If the project complies with the ordinance, it can move forward. County staff typically issue a building or zoning permit under this approach.

Solar as a Conditional Use

The term "conditional use" in a zoning code usually means that a use may be allowed or permitted in a specified district (or districts) on the condition that certain requirements are met. Conditional use permitting decisions depend on the applicant's compliance with the standards specified in the zoning code as conditions for permit approval. These conditions may be more subjective but the decision criteria must be included in the ordinance. Conditional uses can only be permitted subject to review and approval of a county zoning board of adjustment (ZBA) after a public hearing. The ZBA should base its decision on evidence presented in the public hearing and evaluate the project based on the project's compliance with the conditions in the ordinance. If the conditions are met, the permit should be issued.

Uses permitted on this basis are generally those that a county considers not generally adverse to the public interest, but requiring some special review and precautions as well as an opportunity for public input.

Counties may wish to require the filing of items such as site plans, road use agreements, and decommissioning plans as conditions for approval. These are described in more detail below.

If a county opts for conditional use permitting through the ZBA, we recommend providing applicants with the opportunity for a preliminary review and pre-application process. Iowa law provides that appeals of a final decision of the ZBA go to court for review.[12] Allowing for preliminary review and a pre-application process helps provide applicants with a more predictable process and can minimize the potential for time-consuming or expensive judicial review.

For projects that are 25 MW or larger, the county has the opportunity to state whether the solar energy system meets the county zoning requirements, as a designated party to the Iowa Utilities Board's public hearing held in the county as a part of the single hearing siting process required under section 476A.11 of the Iowa Code.[13]

DESIGNATING ZONING DISTRICTS FOR SOLAR

Counties may allow siting of utility-scale solar in a variety of districts. An easy place to start for solar development in zoning districts would generally be designating business, commercial, industrial, and agricultural districts as eligible for utility-scale projects. After seeing development in one or more of these districts, additional districts could be considered.

Smaller-scale or community solar may be appropriate in more types of zoning districts, including those within or close to residential neighborhoods. This is especially appropriate if participants in the community solar project live in those districts.

EXAMPLES OF DISTRICTS WHERE IOWA COUNTIES WITH ZONING ALLOW SOLAR DEVELOPMENT:

Linn County: Agricultural District, Highway Commercial District, General Commercial District, Industrial District, Critical Natural Resources District

Clinton County: Prime Agricultural District, Agricultural - Recreation District, Highway Commercial District, Rural Support Commercial District, Limited Industrial District, General Industrial District

Louisa County: Agricultural District, Business District, Industrial District

APPLICATION REQUIREMENTS

RECOMMENDATIONS:

- **Project applications should provide essential information to county boards and zoning officials. While some information may be required at the time of application, officials may wish to allow applicants to submit additional information at a later date.**

- **Counties should require appropriate safety warnings and signage at solar facilities.**

County officials should carefully consider whether site and structure provisions are unnecessarily restrictive. Well-established solar zoning guides describe the importance of avoiding inadvertent obstacles in an ordinance's major provisions:

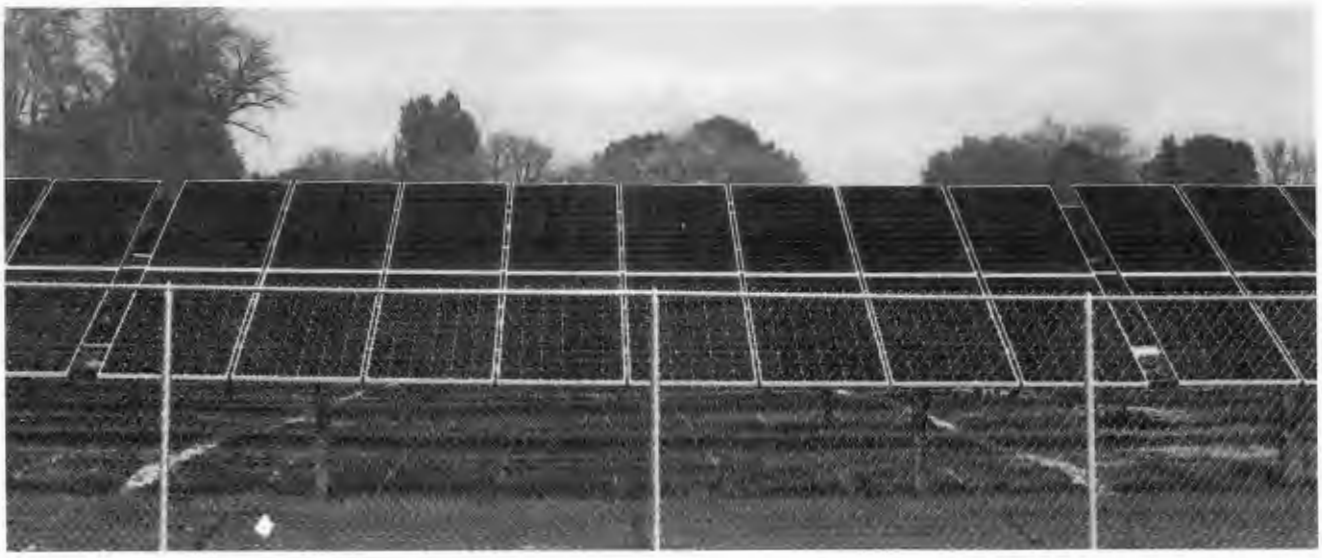
> From the American Planning Association (APA): "Even in cases where zoning codes explicitly address solar energy systems, subtle barriers such as height restrictions, lot coverage limitations, and setback, screening, landscaping, and utility requirements may still impede solar development." [15]
>
> From the Great Plains Institute (GPI): "Limit regulatory barriers to developing solar resources. Ensure that access to solar resources is not unduly limited by height, setback, or coverage standards, recognizing the distinct design and function of solar technologies and land uses." [16]

FENCING

To protect the solar array and to provide for safety by preventing entry into a project area, counties may require fencing around the solar array. Both Clinton and Linn Counties use the same language to address fencing requirements:

> A security fence must be installed along all exterior sides of the utility scale solar installation and be equipped with a minimum of one gate and locking mechanism on the primary access side. Security fences, gates and warning signs must be maintained in good condition until the utility scale solar installation is dismantled and removed from the site.[17]

Project developers are required to follow the specific fencing requirements of the National Electrical Code (NEC), which is updated every three years. Currently, the NEC requires a seven foot tall fence;



- **For projects 25 MW or larger, we recommend that the county accept the Application for a Certificate, required by the Iowa Utilities Board, in lieu of a separate county application.**

GENERAL REQUIREMENTS

County ordinances may include a number of site and structure requirements, many of which are discussed in further detail within this document. Some counties may ask for this information as part of a "site plan." Items required in an application for a utility-scale solar energy system may include:

1) Name of applicant.

2) Name of the project owner.

3) Description of the project — number of modules, manufacturer, mounting type, system height, system capacity, total land area covered by the system, and information about associated facilities like substations, feeder lines, battery storage, etc.

4) Legal description of the property where the solar energy system will be located.

5) Map of the project location and the surrounding area.

6) A decommissioning plan outlining the process for system removal—including individual modules and mounting—and property restoration before an easement is returned to a landowner.

7) Evidence of a power purchase agreement or interconnection application for the project.

8) Consultation with or notifications from relevant state and federal agencies showing the project will not be a hazard to wildlife, communications, air traffic, etc.

9) Documentation of easement locations acquired for solar energy systems and associated facilities.

Because the IUB requires similar types of information as part of the Generating Certificate application process, we recommend that for projects above 25 MW, counties accept the information submitted in such an application to the IUB in lieu of a separate application to avoid duplication.

SETBACKS

RECOMMENDATIONS:

- **Property line setbacks should not exceed 50 feet; setbacks from occupied residences should stay within a range of 100 to 200 feet.**
- **Counties should include waiver provisions allowing for the county to waive the mandated setback distance with the consent of the participating landowner and adjacent property owner.**
- **No setbacks should be required if a property line is shared by two participating landowners.**

Counties may choose to put into place setbacks, which specify the required distance of the project from homes, roads or existing rights-of-way, property lines, and other locations. Unlike setbacks for wind turbines, which are intended to address rare but dangerous scenarios such as turbine collapse, there are no safety concerns that point to the necessity of a specific setback requirement for solar facilities. Before putting setbacks into place, counties should consider the issues that a setback is meant to address and whether there is a separate project requirement that may better address it. While some level of setback may be appropriate, officials should carefully consider setback distances and the limits they may place on future development.

Many counties require solar installations to follow the same setback requirements (from property lines and rights of way) as other structures in the zoning district where they are located. Some counties opt for prescribed setback distances from property lines and occupied structures.

SETBACKS FROM RESIDENCES AND PROPERTY LINES

Some counties require specific setback distances between the solar system and property lines of occupied residences.

According to our research, a 50 foot property line setback is included in a number of ordinances from Iowa's neighboring states. A 100 to 200 foot setback for residential dwellings is also common, with some ordinances at 100 feet, some at 150 feet and some at 200 feet. These distances seem workable for developers, participants, and nonparticipants.

Utility-scale solar energy systems are likely to be sited in zones where residential dwellings are uncommon but may occur (agriculture, industrial, commercial). Counties can adopt an occupied structure setback that both reflects the needs and local characteristics of these zones and stays within the 100 to 200 foot range. There is no justification for larger setbacks from a safety perspective and larger setback distances would unnecessarily limit solar development in a county.

We recommend that property line setbacks do not exceed 50 feet from a property line and stay within a range of 100 to 200 feet from an occupied residence.

SETBACKS BASED ON ZONING DISTRICT

Although we recommend counties adopt specific setback distances for solar systems, counties could also choose to follow the minimum setback requirements of the zoning district where they are located, similar to Linn and Clinton Counties.

Since structures or vegetation on neighboring properties may cast shadows onto a solar system, causing a decline in solar panel efficiency, Linn County recommends greater setbacks in lieu of a "solar access agreement." These agreements are discussed in further detail later in this document.

Community solar projects may be appropriate in more types of zoning districts, including those in or closer to residential neighborhoods, especially if participants in community solar live in those districts. For this reason, counties should consider using the setback requirements of the zoning area

where the project is located to govern the solar facility. Further considerations for community solar projects are discussed later in this guide.

SHARED PROPERTY LINES

When a solar array is built across the property line of two participating landowners, no property line setback is required in Louisa County: [14]

> [Solar Farm Energy Systems] to be built on more than one parcel and parcels are abutting, a zero (0) side or rear setback shall be permitted to the property line in common with the abutting parcel(s).

In the case that a property line is shared by two participating landowners, a setback serves no purpose so we recommend this as a best practice.

RIGHTS OF WAY

A county may require a specific setback distance from a roadway. In counties with zoning, we recommend using the right of way setback standards for principal or accessory use structures specific to the zoning district where the project is located. In counties without zoning, we recommend consultation with right-of-way operators to ensure that projects do not disrupt current or planned use.

WAIVERS OR NEGOTIATED SETBACKS

Waivers are an important tool to improve flexibility and allow for the potential for additional land area to become available for solar development. However, providing a waiver is not a substitute for a setback policy that can enable cost-effective solar development.

Louisa County allows for written waiver agreements to be executed pursuant to the specific requirements set forth in the ordinance along with approval by the Zoning Board of Adjustment.

We recommend that counties allow for a waiver of the mandated setback distance with the consent of the participating landowner and adjacent property owner.

ADDITIONAL SITING STANDARDS

RECOMMENDATIONS:

- **Counties should carefully consider whether site and structure provisions are unnecessarily restrictive.**
- **Counties should allow for and encourage the project operator or owner to invest in fencing that facilitates movement of wildlife and pollinators.**
- **Solar access agreements should be facilitated by counties using Iowa Code § 564A.1 to guide their process.**

therefore we do not recommend that counties set their own fence height requirements.

Specific types of fencing may be desirable for reducing impacts to wildlife or limiting aesthetic concerns related to a project. For example, deer fencing may be less visually obtrusive while also allowing for wildlife and pollinators to move through a project area. This practice could soon be deployed in Iowa, as the developers of a large solar project in Howard County have proposed to surround the project area with deer fencing.[18]

County requirements for fencing should be limited because the NEC covers this requirement. However, we do recommend that counties allow for or encourage the project operator or owner to invest in fencing that facilitates movement of wildlife and pollinators.

HEIGHT RESTRICTIONS

The height of solar arrays is typically measured by the maximum tilt of the panels.

In some counties where large-scale solar is a permitted use, the height restrictions of solar arrays match the zoning district where they are located. Counties may also choose to set specific height limitations for solar systems. Counties could consider allowing for less stringent height restrictions if coupled with longer setbacks from neighboring properties. An example is adding two feet to the setback distance for each additional foot of height.[19]

It is important that counties do not set overly restrictive height limitations given ongoing research into potential agricultural co-uses of solar project areas such as livestock grazing and planting underneath panels. There are also no compelling safety reasons for height restrictions.

SOLAR ACCESS SPACE AND AGREEMENTS

Since solar panel performance relies on the amount of sunlight collected, counties may consider how improvements or new vegetative plantings on neighboring properties could cast shadows onto solar arrays. Developers may want an assurance of continued future access to sunlight to ensure project success over the 25 to 40 year life expectancy.

There are several Iowa statutory provisions that address access to solar energy and are intended to "facilitate the orderly development and use of solar energy." [20] Iowa Code encourages voluntary solar access easements and sets out requirements for easements to protect solar access. The Code also authorizes city councils and county boards of supervisors to establish solar access regulatory boards (or authorize certain existing boards for this purpose).

These regulatory boards have the power to grant solar access easements to properties hosting solar projects in order to protect access to solar energy. The code allows public bodies to include provisions that would compensate the owner of the solar project if shade interferes with the project and/or that would compensate the owner of the easement for maintaining the easement space.[21]

Linn County's ordinance provides for a "solar access agreement" process which is defined as a

"recorded easement which provides continued access to incident sunlight necessary to operate a solar collector." [22]

We recommend counties allow for solar access agreements using Iowa Code § 564A.1 to guide their process.

SAFETY AND SIGNAGE

Projects may be required to post signs that clearly feature the name, address, emergency contact information for the operator, and warnings. Safety requirements typically include clear safety notices to the public, such as high voltage warnings. Louisa County requires the following guidance on signage in its ordinance:

> [Solar Farm Energy Systems] shall provide the following at all locked entrances:
> 1) A visible "High Voltage" warning sign;
> 2) Name(s) and phone number(s) for the electric utility provider;
> 3) Name(s) and phone number(s) for the site operator;
> 4) The facility's 911 address, GPS coordinates; and,
> 5) A lock box with keys as needed.[23]

These requirements are an appropriate best practice.

OPERATIONS AND MAINTENANCE PLANNING

RECOMMENDATIONS:

- **Counties should adopt an operations and maintenance plan designed to avoid negative impacts on the surrounding land, water, and neighbors.**
- **We encourage counties to consider requiring native vegetation to bolster wildlife, soil, and water quality benefits.**

Solar projects are expected to be in operation for at least several decades. To address both short-term and long-term maintenance of a project area, counties may require an operations and maintenance plan as part of the application process. Both Clinton County and Linn County address the same elements in the required operations and maintenance plan:

- Soil erosion and sediment control
- Stormwater management
- Ground cover and buffer areas
- Cleaning chemicals and solvents
- Maintenance, repair, or replacement of facility

In order to monitor compliance with maintenance requirements, Louisa County requires access to a project site:

> The Zoning/Building Administrator and any necessary personnel may enter any property for which a special use or building permit has been issued under this ordinance to conduct an inspection to determine whether the conditions stated in the permit have been met as specified by statute, ordinance and code. Failure to provide access shall be deemed a violation of this ordinance.[24]

NATIVE VEGETATION MANAGEMENT AND GROUND COVER

Utility-scale solar project sites often occupy multiple acres of land and are projected to cover three million acres across the nation by 2030. To produce 10 percent of Iowa's electricity from solar energy, 13,440 acres would need to be occupied by solar arrays, or 0.04 percent of all of Iowa's farmland. This offers an opportunity for project owners to demonstrate a commitment to environmental stewardship by establishing native vegetation on their solar project site(s). Investing in this practice will create habitat for a variety of at-risk pollinators, including honey bees, bumblebees, and monarch butterflies. For local officials considering the creation of a solar ordinance, this section explores a variety of considerations that can inform sound policy.

Historically, there were 28 million acres of native prairie across the state of Iowa; there is less than one-tenth of one percent of that native prairie remaining. Investments in native vegetation on solar project sites can also help restore habitat for wildlife like ring-necked pheasants, quails, and other grassland birds such as the dickcissel or the sedge wren.

Native prairie plants at the Chisago Solar Site, Chisago County, Minnesota, August 2018. Photo credit to Dennis Schroeder, National Renewable Energy Laboratory. Link: https://www.flickr.com/photos/nrel/30733119928/in/album-72157699605466031/

Meanwhile, other important environmental outcomes are also achieved through planting native perennial vegetation such as improved soil health and water quality and carbon sequestration. Importantly, the deep root systems of native vegetation can penetrate the soil surface as deep as 15 feet, allowing for increased soil structure and denitrification of water. Improving soil health and water quality also provides developers with the practical benefits of meeting stormwater drainage permit requirements and reducing erosion on project sites.

After considering the potential positive environmental outcomes, Linn County included a requirement within their solar ordinance to establish perennial vegetated ground cover:

> Ground cover and buffer areas. Ground around and under solar arrays and in project site buffer areas shall be planted and maintained in perennial vegetated ground cover, and meet the following standards:
>
> 1) Top soils shall not be removed during development, unless part of a remediation effort.
>
> 2) Soils shall be planted and maintained in perennial vegetation to prevent erosion, manage run off and build soil. Seeds should include a mix of grasses and wildflowers, ideally native to the region of the project site that will result in a short stature prairie with a diversity of forbs or flowering plants that bloom throughout the growing season. Blooming shrubs may be used in buffer areas as appropriate for visual screening.
>
> 3) Seed mixes and maintenance practices should be consistent with recommendations made by qualified natural resource professionals such as those from the department of natural resources, county soil and water conservation service, or natural resource conservation service.
>
> 4) Plant material must not have been treated with systemic insecticides, particularly neonicontinoids.[25]

The benefits of establishing even small areas of native vegetation have been proven to significantly improve pollinator and wildlife populations while helping developers maintain storm water permitting requirements, reduce erosion, and mitigate land use concerns. However, there are many important considerations for developers who wish to install native vegetation on their solar project site. While these recommendations will not typically be included in an ordinance, county officials should educate themselves on the options available to developers and the factors that influence developer implementation. We have included a short primer on those issues as an Appendix to this document.

INFRASTRUCTURE AND ROAD USE AGREEMENTS

RECOMMENDATION:

- **Counties should put a process in place for assessing and repairing infrastructure before construction begins.**

Solar construction crews will utilize roads in and out of a project site. Counties should have a lesser expectation of road impacts from solar development compared to wind development. To address potential impacts to public infrastructure, counties may adopt a road use plan.

Louisa County has adopted the following requirements for a road use agreement:

> Road Use Agreements. All routes on county roads that will be used for the construction and maintenance purposes shall be identified on the site plan. All routes for either ingress or egress shall be shown. The solar farm developer must complete and provide a preconstruction baseline survey to determine existing road conditions for assessing potential future damage due to development related traffic. The developer shall provide a road repair plan to ameliorate any and all damage, installation, or replacement of roads that might be required by the developer. The developer shall provide a letter of credit or surety bond in an amount and form approved by the appropriate highway authority(s) officials when warranted. The provision of this subsection shall be subject to the approval of the Louisa County Engineer.[26]

We recommend putting a process in place before construction begins that helps clarify for all parties what specific impacts a developer will be held responsible for and what steps must be taken to mitigate potential damage to roads and other infrastructure.

DECOMMISSIONING AND SITE RESTORATION

RECOMMENDATIONS:

- **Planning for the responsibility of decommissioning is a prudent step for a county ordinance. We recommend that counties require a decommissioning plan which defines the obligations of the project developer to remove the solar array and restore the land when the project will no longer be used.**
- **Counties should require the project developer/owner to notify the county of their intent to stop using the facility and that should be the trigger for decommissioning to begin.**

Solar ordinances often include a provision requiring the project owner to take responsibility for and bear the costs of decommissioning at the end of a solar project's life. These provisions ensure the county and landowners do not bear the cost of removing solar arrays.

Solar panels typically come with a 20 to 25 year warranty and could be useful for up to 40 years. Depending on the length of a landholder lease, or with a lease extension, projects could be refitted

with new panels once panels have reached their useful life. A county ordinance should include a notice requirement stating that once a developer/owner has determined that the facility will no longer be used, the developer/owner must notify the county of the intent to stop using the facility and to decommission the facility in accordance with the agreed-upon decommissioning plan.

We do not recommend that counties set a time limit for automatic decommissioning, such as no production for one (1) year, because as renewable penetration increases some renewable facilities may be used only as "peaker" facilities on days of extremely high electricity demand. Just because a facility is not producing electricity does not mean it is not being used as a back-up resource by the utility.

The following decommissioning example is from Linn County:

> Decommissioning and site reclamation plan.
>
> a. The application must include a decommissioning plan that describes the anticipated life of the utility scale solar installation; the anticipated manner in which the project will be decommissioned; the anticipated site restoration actions; the estimated decommissioning costs in current dollars; and the method for ensuring that funds will be available for decommissioning and restoration.
>
> b. The applicant shall provide the basis for estimates of net costs for decommissioning the site (decommissioning costs less salvage value). The cost basis shall include a mechanism for calculating adjusted costs over the life of the project.
>
> c. Restoration or reclamation activities shall include, but not be limited to, the following:
>
> 1. Restoration of the pre-construction surface grade and soil profile after removal of structures, equipment, graveled areas and access roads.
>
> 2. Re-vegetation of restored soil areas with crops, native seed mixes, plant species suitable to the area, consistent with the county's weed control plan.
>
> 3. For any part of the energy project on leased property, the plan may incorporate agreements with the landowner regarding leaving access roads, fences, gates or repurposed buildings in place or regarding restoration of agricultural crops or forest resource land. Any use of remaining structures must be in conformance with the regulations in effect at that time.

OTHER CONSIDERATIONS

NOISE

Inverters, the equipment that convert direct current (DC) electricity into alternating current (AC) electricity, can produce a soft sound during the daytime when the solar array is producing energy. Noticeable noise is not a common or expected impact and any noise should be imperceptible to

neighboring properties even without specific noise provisions.

We do not recommend adding standards for noise. Minimum setback requirements should sufficiently address these issues without adding specific, separate provisions for noise.

SCREENING

Some counties have chosen to adopt screening requirements in conjunction with setbacks. Counties should consider if screening requirements would be arbitrary and what, if any, other uses currently require screening. According to the National Renewable Energy Laboratory (NREL):

> While aesthetic requirements are appropriate for historic districts, requiring solar energy systems to be screened from public view adds costs, can cause shading, and may prevent many installations.[27]

We do not recommend that counties adopt screening provisions or requirements.

GLARE

The American Planning Association advises that "[s]ome residents may express concerns that glare from solar collectors will be either a public or private nuisance. However, because they are constructed of dark-colored materials and covered with anti-reflective coatings, new solar PV and thermal systems typically reflect as little as 2 percent of incoming sunlight." [28]

Similarly, a summary of research from the National Energy Research Laboratory states, "Local objections to proposed solar photovoltaic (PV) installations sometimes include concerns that the modules will cause glare that could impact neighbors or aviation. Research on this subject demonstrates that PV modules exhibit less glare than windows and water. Solar PV modules are specifically designed to reduce reflection, as any reflected light cannot be converted into electricity. PV modules have been installed without incident at many airports." [29]

Given how solar panels are constructed, glare or reflected light is not typically a major issue. Counties wishing to address this low-risk potential impact can include a provision in their ordinance, such as Clinton County and Linn County have:

> All solar panels must be constructed to minimize glare or reflection onto adjacent properties and adjacent roadways and must not interfere with traffic, including air traffic, or create a safety hazard.[30] [31]

We do not recommend glare provisions in a solar ordinance. However, local or federal authorities may require a glare study that shows the potential impact to the surrounding area, particularly on infrastructure like airports and roadways. For example, the Federal Aviation Administration (FAA) required the City of Ames to conduct a glare study for its community solar project as a result of its proximity to an airport. If the study indicates that there is potential for glare, a project developer

should submit a mitigation plan for glare produced by a system. Such a study with recommended mitigation is preferable to a blanket screening requirement for solar, which adds unnecessary upfront and ongoing expense.

PRIME FARMLAND

As the development of large-scale solar generation becomes more common, land taken out of production can increase concerns over the impact to prime farmland. To produce 10 percent of Iowa's electricity from solar energy, 13,440 acres would need to be occupied by solar arrays, or just 0.04 percent of all of Iowa's farmland.

While the placement of solar panels may limit agricultural uses for prime farmland, the construction and operation of a solar energy system typically has less impact than other forms of development such as residential or commercial development. Once a system has been decommissioned and removed, farmland can be returned to an agricultural use with minimal reclamation. County officials should consider the potential for combining solar energy systems with other uses that may benefit agricultural operations, such as creating shade for livestock or habitat for pollinators and other wildlife.

We do not recommend any provisions that prohibit solar as a use on prime farmland. If a county already has a provision that prohibits certain uses on designated prime farmland, they may consider adding solar as an acceptable use, especially in conjunction with an additional use like the creation of native prairie or habitat.

CONCLUSION

For counties considering an ordinance for utility-scale solar, a well-drafted and balanced solar siting ordinance is important. Our review of county ordinances across Iowa and neighboring states shows that counties can adopt workable ordinances that enable successful solar development. We have not identified a single model ordinance in any particular county that we recommend in total. Instead, we have identified the strongest parts of different ordinances to include in this paper. Most county ordinances have additional provisions in the adopted ordinances. We have focused on the major provisions critical to the success of an ordinance.

While counties can attract solar development without adopting a specific ordinance, we believe the clarity and predictability that comes from a solar ordinance can be beneficial for the county, its residents, and solar developers.

ABOUT

The primary authors of this paper are Kerri Johannsen, Jordan Oster, and Steve Guyer of the Iowa Environmental Council and Lu Nelsen and Cody Smith of the Center for Rural Affairs. We appreciate the input and guidance provided by county officials, solar developers, colleagues and others as we researched and drafted this paper.

ENDNOTES

1 Energy Information Administration, Electric Power Monthly, Table 6.2B Net Summer Capacity Using Primarily Renewable Energy Sources by State (data from July 2019 as reported in October 2019) at http://www.eia.gov/electricity/monthly/?scr=email.

2 Iowa Environmental Council, *Real Potential, Ready Today: Solar Energy in Iowa.*

3 Lazard Levelized Cost of Energy and Levelized Cost of Storage 2019 at https://www.lazard.com/perspective/levelized-cost-of-energy-and-levelized-cost-of-storage-2019/ (last accessed Nov. 13, 2019).

4 *Real Potential, Ready Today: Solar Energy in Iowa*, Page 13.

5 Midcontinent Independent System Operator, Generator Interconnection Queue at https://www.misoenergy.org/planning/generator-interconnection/GI_Queue/ (last accessed Sept. 18, 2019).

6 The Solar Foundation, Solar Jobs Census 2018 at https://www.thesolarfoundation.org/national/. See also Clean Energy Trust et al, Clean Jobs Midwest at https://www.cleanjobsmidwest.com/state/iowa.

7 Cedar Rapids Gazette, *Solar installers, wind turbine techs fastest growing jobs in the nation (May 17, 2019) https://www.thegazette.com/subject/news/business/solar-installers-wind-turbine-techs-fastest-growing-jobs-in-the-nation-20190517.*

8 IEC supply chain estimate based on IEC research on Iowa solar businesses as well as past publications by the Solar Energy Trade Association and Environmental Law & Policy Center.

[9] *Home Builder's Association of Greater Des Moines v City of West Des Moines*, No. 201/99-2025 & 00-0351, Iowa Supreme Court, May 8, 2002.

[10] Iowa Code § 335.18.

[11] *Cedar County: Comprehensive Plan 2038* (2018), available online at https://www.cedarcounty.org/offices/environmentalhealth/CedarCountyComprehensivePlan_FINALpdf_reduced.pdf (last visited August 1, 2019), at 47.

[12] Iowa Code § 335.18.

[13] Iowa Code § 476A.11.

[14] Louisa County Ordinance Division 115 § 1.03 (C)(2)(b).

[15] American Planning Association, Planning for Solar Energy, Page 53 https://www.solsmart.org/media/APA_PlanningforSolarEnergy.pdf.

[16] Great Plains Institute, *Local Government Solar Toolkit*, Page 2 (2017) https://www.betterenergy.org/wp-content/uploads/2018/03/MinnesotaToolkitFeb2018_Award-Banner_Web-Version_0.pdf.

[17] Linn County Unified Development Code, Art. 6, Sec. 107-117 (H, 4, J); Zoning Ordinance of Clinton County, Iowa, Chapter IV, 4.2.18 (C)(10).

[18] Big Dave Solar Farm, LLC, Transcript from Hearing Held Thursday, November 7, 2019 before the Iowa Utilities Board in GCU-2019-0002, p. 27.

[19] Great Plains Institute, Local Government Solar Toolkit, Page 6 (2017) https://www.betterenergy.org/wp-content/uploads/2018/03/MinnesotaToolkitFeb2018_Award-Banner_Web-Version_0.pdf.

[20] Iowa Code Chapter 564, Iowa Code § 564A.1.

[21] Iowa Code § 564A.7.

[22] Linn County Unified Development Code, Art. 6, Sec. 107-117 (H, 4, A).

[23] Louisa County Zoning Ordinance Division 115, § 1.03 (E).

[24] Louisa County Ordinance Division 115 § 1.03 (C)(18).

[25] Linn County Unified Development Code, Art. 6, Sec. 107-117 (H, 5, C).

[26] Louisa County Zoning Ordinance Division 115, § 1.03 (C)(15).

[27] Day, Megan. "Best Practices in Zoning Solar." NREL, April 21, 2017, https://www.nrel.gov/state-local-tribal/blog/posts/best-practices-in-zoning-for-solar.html.

[28] American Planning Association, Planning for Solar Energy, Page 29 https://www.solsmart.org/media/APA_PlanningforSolarEnergy.pdf.

[29] Day, Megan and Mow, Benjamin. "Research and Analysis Demonstrate the Lack of Impacts of Glare from Photovoltaic Modules." NREL, July 31, 2018, https://www.nrel.gov/state-local-tribal/blog/posts/research-and-analysis-demonstrate-the-lack-of-impacts-of-glare-from-photovoltaic-modules.html.

[30] Linn County Unified Development Code, Art. 6, Sec. 107-117(g-h).

[31] Zoning Ordinance of Clinton County, Iowa, Chapter IV, 4.2.18.

be a transparent bidding process. Information that may be required in a bid includes:

- Price and term for a power purchase agreement between the developer and the municipal utility.
- Estimate of annual electricity production.
- Performance history for the equipment that will be used in a similar environment.
- Project timeline that lays out anticipated start and completion dates for construction as well as an in-service date for the system.
- Previous experience developing similar projects.

  Example: Both Cedar Falls and Ames leased their land to a private developer at little to no cost and allowed them to construct the solar farm so the developer could take advantage of the 30% federal investment tax credit, as municipalities are ineligible. Both cities intend to buy back the project at some point.

- A competitive and transparent bidding process is important for project success.

  Example: The City of Ames included all submitted bids in their report to the city council. Their developer selection was based on the following criteria:

  - Price of a 25-year Power Purchase Agreement and estimated project buyout costs.
  - Annual production estimates.
  - Annual performance estimates.
  - Performance history and reliability of the equipment specified for this project in similar environments.

- Strength and experience of the developer's project team and proven expertise of the project team.
- System and component product warranties.
- Developer's proposed project financing capability and structure.
- Project schedule.
- Experience with building at or near an airport location.
- Notably, the federal investment tax credit began a gradual phase-out in 2020, dropping to 26 percent.

Adding consumer value

Projects may be designed to allow consumers to invest in a community project in various ways:

- Many community projects offer "shares" that residents can purchase. These typically act as a subscription in the project, paid through an additional charge on a monthly electric bill. In some cases, subscribers are credited an amount determined by the utility for energy produced by the project during the given period.
    i. The rate associated with a share should be devised in a transparent manner, clearly demonstrating the method used to determine the total cost to consumers.
    ii. **Example:** The city of Ames charges a $300 cost for a consumer subscription, or "power pack," which is a subscription to one-half of one panel for 20 years. The power packs are expected to return average monthly credits of $1 to $2 for the duration of the 20-year contract. Payback is predicted to take anywhere between 16 and 18 years.
- In other models, consumers are allowed to purchase and own panels that are part of the community solar systems.
    i. This option may allow for consumers to access available tax credits while investing in a community project, often paying a monthly maintenance fee for upkeep of the panel(s).
    ii. In some cases, consumers that choose this option may be credited for the full production of their panel(s) as though they were located behind their electric metering, as is the case with net metered residential solar.
- Community projects often feature a means of unsubscribing or selling back shares/panel(s). This often reduces anxiety associated with subscribing to a project, as residents are not tied to a subscription if they choose to move to a different area.

A CLOSER LOOK: BEST PRACTICES FOR COMMUNITY SOLAR

Community solar is a unique model that often involves the construction of a solar array that is much larger than small-scale or residential solar. Although some states allow for independent development of community solar projects by private industry, cities, and nonprofits, such projects cannot currently be developed in Iowa. Community solar in Iowa can only be developed by or for utilities, including municipal utilities.

Typically, community solar projects incorporate methods for community members to participate in the project in some way through a mechanism such as an investment or subscription with the benefits of the project passed along to subscribers. Some considerations for community solar projects are listed below.

City of Cedar Falls community solar project. Photo courtesy of Cody Smith, Center for Rural Affairs.

Land selection is key for ground-mounted solar

- Land already owned by the project developer, owner, or off-take customer is preferable, as it eliminates the need for new easements and may mitigate several siting issues.
- Several factors contribute to cost efficiency when considering a community solar project:
  - Proximity to high intensity energy users.
  - Strong local demand for electricity, especially produced from renewable resources.
  - Access to the electric grid, allowing for interconnection without building substantial new infrastructure.

- The type of site also contributes to cost efficiency over the long-term—a square or rectangular parcel of land and in-line set-up helps streamline ongoing management like mowing and system maintenance.
- Sites should also have easy access, with limited surrounding development or vegetation that may shade a solar energy system.
- Sites should also ideally allow for expansion of a project if demand from consumers increases over time.
- Example:
    - The City of Ames will site their project on a parcel of land already owned by the City that was being leased for farmland.
    - The City of Cedar Falls community solar project currently occupies eight acres of previously undeveloped city property.

Alternatives to ground-mounted solar

- Large rooftops such as those on manufacturing facilities or big box retailers may be potential sites for community solar projects. These sites reduce land acquisition concerns associated with selecting a site for a ground-mounted solar system while providing the host with some publicity for participating.
- Siting projects in parking lots in the form of a system mounted on canopies that also offers shade is possible, but there are liability concerns around falling ice damaging vehicles during the winter months.

Community involvement in site selection is crucial

- A robust cost-benefit analysis is recommended prior to proposing a community solar project.
- Officials should be sure to engage with a wide range of stakeholders to determine if there are other plans for a selected site or the surrounding area that may impact a future solar energy system.
- Once a project has been proposed, there should be opportunities provided for community members to attend meetings or open houses that allow them to learn more about the project and ask questions.

Development and project ownership

- Leasing city land to a private developer and entering into a Power Purchase Agreement can reduce project costs by allowing the developer to take advantage of federal and state tax credits.
- If a municipal utility is seeking a private developer for a community solar project, there should

Best practice: A site may take time to establish aesthetic native vegetation. Signage that says "Pollinator habitat in progress" can mitigate public concern. Keep in mind that each seedbed is different and may not need discing or plowing—these decisions should be made in consultation with a conservation professional to review site-specific information such as existing vegetation, moisture levels, and soil type.

MANAGEMENT AND CONSTRUCTION:

Construction

Being flexible when it comes to the height of a solar energy system is important for project success. A seed mix should include plants that don't reach a peak height that could shade the low, tilted edge of ground-mounted solar energy systems unless developers plan to use strategic mowing or livestock grazing (i.e. sheep) to avoid interfering with project efficiency.

Best practice: Although project managers may have to strip-mow to maintain project efficiency, it is important to remember that taller native vegetation provides better habitat for wildlife and pollinators. Striking a balance between quality and height can equalize cost.

Management

Year one: Regular mowing (three to four times) during the first growing season prevents weeds from shading out seedlings and going to seed. The first mowing should be at a height of four to six inches soon after seeding; the next two mowings should be at a height no less than eight inches.

Year two: With a successful planting, years subsequent to establishment provide the opportunity for less maintenance, needing only an occasional disturbance and limited mowing to encourage desirable species.[IX]

Years three and four: Mowing and baling the plant residue approximately every three years is the preferred management option for solar project sites.[X]

Timing impacts wildlife and pollinators

After year two, avoid or minimize mowing between April 1 and August 1 to minimize impacts during the nesting season of upland birds such as pheasants and quail. Delaying mowing to late September facilitates a more welcoming habitat for migrating pollinators such as monarch butterflies, as the highest population of Monarch eggs is often found on milkweed plants in late July and early August. [XI] Spot mowing and/or herbicide application could be used during this period if necessary to control invasive plants.

Best practice: Every site is unique and all timelines should be adjusted to the needs of a project. Experts suggest evaluating the ratio of native species to weeds and invasive vegetation before making mowing and other management decisions. If native vegetation is struggling to establish a strong stand, mowing is likely necessary; if the opposite is occurring, mowing may not be in a site's best interest.

APPENDIX: NATIVE VEGETATION MANAGEMENT FOR SOLAR - ADDITIONAL CONSIDERATIONS

Across the U.S., the solar industry is booming. Solar project sites often occupy several acres of land and are projected to cover three million acres by 2030.[I] To produce 10 percent of Iowa's electricity from solar energy, 13,440 acres would need to be occupied by solar arrays—offering an opportunity for project owners to demonstrate their commitment to environmental stewardship.[II]

While the full detail included below may not be appropriate for inclusion in a solar ordinance, we hope it can serve to inform policymakers about the developer considerations which accompany the adoption of native vegetation on solar project sites.

INCREASING PROJECT VALUE:

In addition to providing habitat for wildlife and pollinators, investments in native vegetation on solar project sites provide ancillary benefits such as improved soil health and water quality, while also sequestering carbon.

PLANNING, COST, AND SEEDING:

Planning

Planning at least one year before the seed goes into the ground is recommended. This provides adequate time to reach out for technical assistance, review and select a site, determine the existing dominant vegetation (if any), conduct two or more herbicide applications to suppress existing vegetation if needed, and gather quotes for a native seed mix.[III]

Cost

When considering total project cost, the key variable is the number of acres that will be established. Depending on project size, different management approaches may be necessary.[IV] **Per acre in Iowa, $500-$1,000 is a reasonable range for most projects.**[V]

Best practice: Include native vegetation in the initial planning process of a project. Incorporating this desired outcome into the process will allow for a holistic consideration of all factors including soil characteristics, construction, management, establishment, and more.

Seeding

Timing is key to success—frost-seeding between November 1 and June 1 is ideal for maximum germination and ensuring stand establishment through a full growing season.[VI VII] August and late summer plantings should be avoided as a stand won't have enough time to establish before cold temperatures. To establish the needed firm seedbed, conventional methods include discing at least twice and cultipacking, although this is dependent upon the conditions of each site.[VIII] Seeding methods include broadcast, drill, and hand-broadcast techniques. Native grass seeds need good seed-to-soil contact and should be planted no deeper than ¼" in the soil. Ideally, native prairie seeds should rest on top of the soil.

SELECTING A SEED MIX:

The height of the solar panels is a primary consideration when selecting a seed mix. Other factors include project location, soil type and moisture, the species of vegetation that are native to the area, planned management of the site, and more. Consider which desired outcomes the native vegetation is intended to achieve such as providing wildlife habitat, increasing pollinator populations, or reducing erosion. Developers should aim for a ratio of grasses to forbs when selecting a seed mix.

Best practice: Wildlife generally responds more to structure of vegetation (the ratio of grasses to forbs) than specific plant species; a seed mix closer to 30 percent grasses and 70 percent forbs is recommended for upland nesting birds.[XII] Some species of native vegetation are crucial for pollinators; monarch butterflies only lay eggs on milkweed plants. Bees, adult monarchs, and other pollinators rely on a diversity of flowering plants that provide blooms during all periods of the growing season (March to October).

Figure A shows a recommended native seed mix for a solar project site in central Iowa: [XIII]

FIGURE A

Short species prairie seed mix for medium-dry soils in central Iowa

Botanical Name	Common Name	Botanical Name	Common Name
Wildflowers		Trees, Shrubs, Vines	
Asclepias tuberosa	Butterfly Weed	Ceanthus americanus	New Jersey Tea
Baptisia alba	White Wild Indigo	Rosa arkansana	Wild Rose
Chamaecrista fasciculata	Partridge Pea	Amorpha canescens	Lead plant
Coreopsis lanceolata	Lance-leaf Coeopsis	Grasses, Sedges, & Rushes	
Coreopsis palmata	Prairie Coreopsis	Bouteloua curtipendula	Side-oats Grama
Dalea candida	White Prairie Clover	Carex brevior	Plains Oval Sedge
Dalea purpurea	Purple Prairie Clover	Koeleria marcantha	June Grass
Drymocallis arguta	Prairie Cinquefoil	Schyzachyrium scoparium	Little bluestem
Eryngium yuccifolium	Rattlesnake Master	Sun exposure: full	
Euphorbia corollata	Flowering Spurge	Soil moisture: medium-dry	
Liatris aspera	Button Blazing Star		
Pedicularis canadensis	Wood Betony		
Penstemon digitalis	Foxglove Beardtongue		
Psuedognaphalium obtusifolium	Sweet Everlasting		
Rudbeckia hirta	Black-eyed Susan		
Ruellia humilis	Wild Petunia		
Solidago speciosa	Showy Goldenrod		
Symphyotrichum oolentangiense	Sky Blue Aster		
Tradescantia ohiensis	Ohio Spiderwort		
Verbena stricta	Hoary Vervain		
Zizia aurea	Golden Alexanders		
Asclepias syriaca	Common Milkweed		
Symphyotrichum ericoides	Heath Aster		
Symphyotrichum pilosum	Frost Aster		
Gentiana alba	Cream Gentian		
Heliopsis helianthoides	Early Sunflower		
Desmodium canadense	Showy tick trefoil		

Courtesy of Story County Conservation