



CENTER *for* RURAL AFFAIRS

Amplifying Clean Energy With Conservation

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Photos: Courtesy of Center for Pollinators in Energy



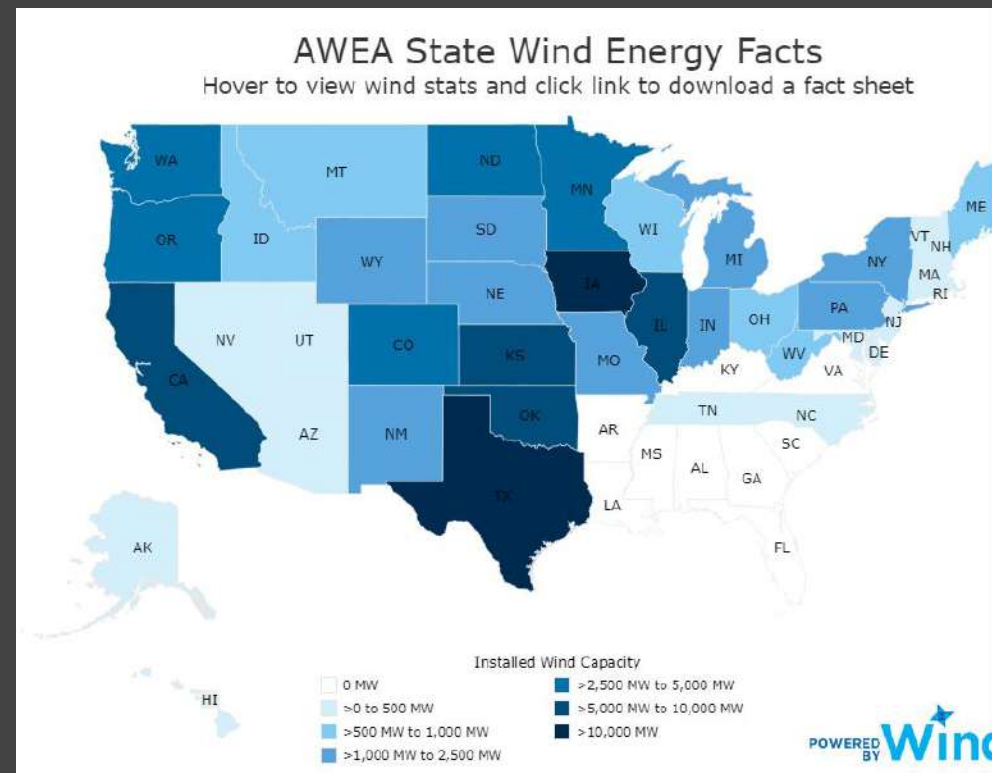
Wind Energy Leads

Iowa and Kansas both generate more than 41 percent of their in-state energy from wind energy.

Approximately 33,619 megawatts of installed wind energy in 2019

Averaging about 14 percent of all electric production.

The wind energy industry directly employs anywhere between 40,011 and 51,000 jobs across the 11 Midwestern states.



Solar is expanding in the region

3 types of solar projects:

1.) Residential 2.) Community-scale 3.) Utility-scale

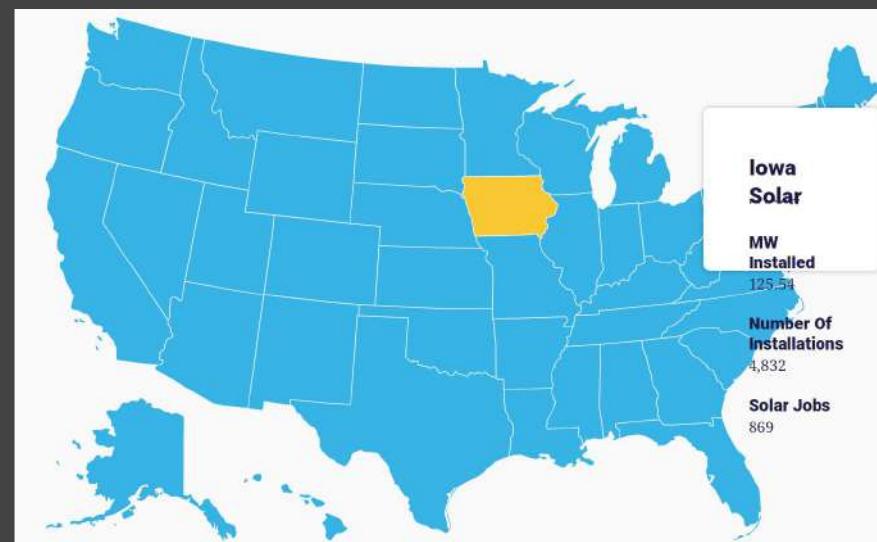
Solar Industry Growth between Oct. 2018 and Oct. 2019:

Iowa: 27.3 percent

Nebraska: 21.1 percent

South Dakota: 14.3 percent

Minnesota: 23.9 percent ('19 to '20)

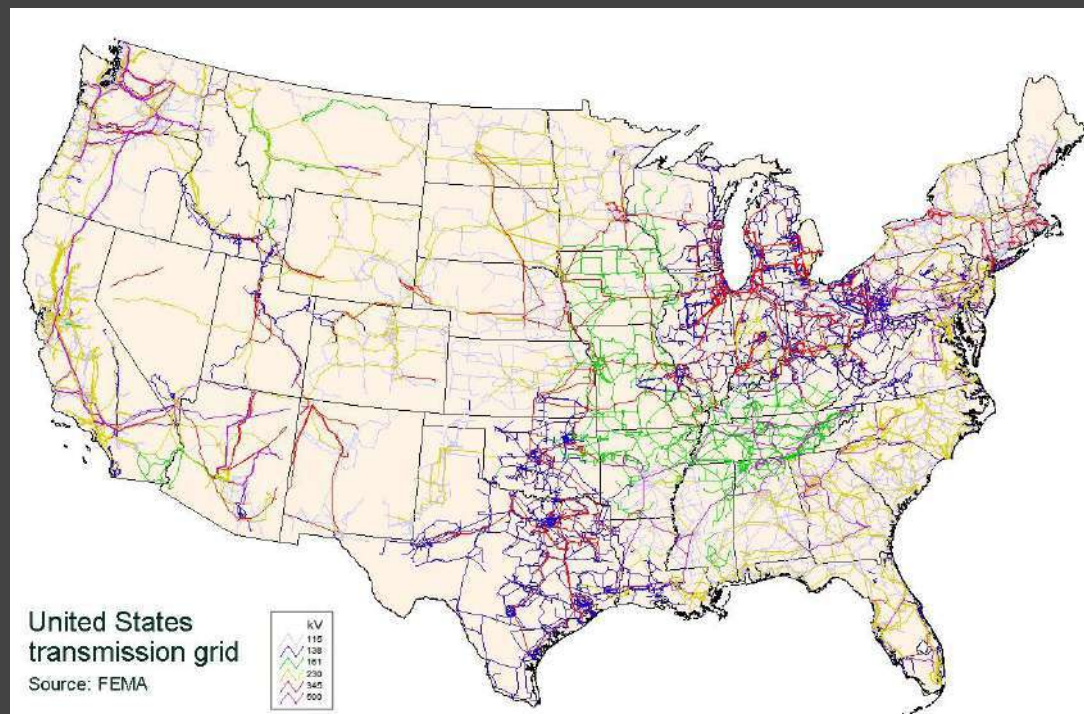


Connecting Renewable Energy to the Grid

To connect new renewable energy generation sources to consumers, transmission lines must be expanded.

More than 600,000 circuit miles of these electric “runways” are established throughout the U.S.,

240,000 of which are considered high-voltage lines (230 kilovolts and greater).



Coupling Expansion with Conservation



PRAIRIE STRIPS IN THE CONSERVATION RESERVE PROGRAM

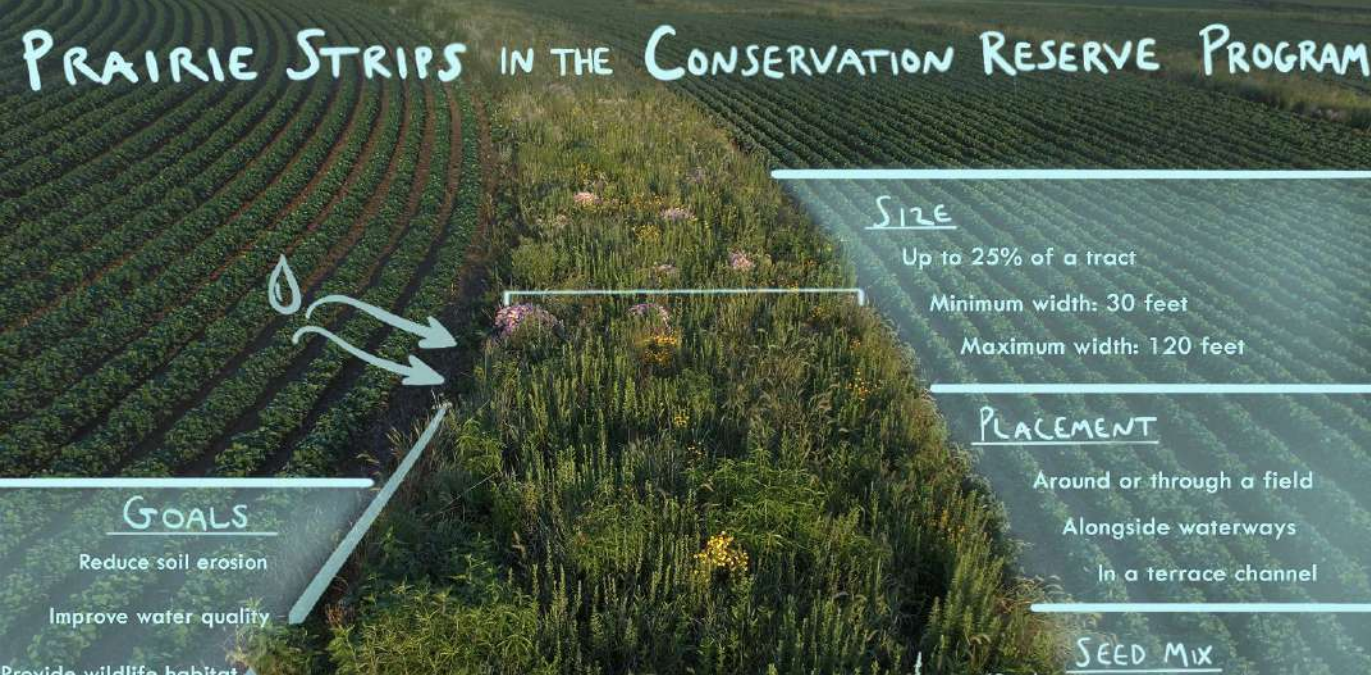
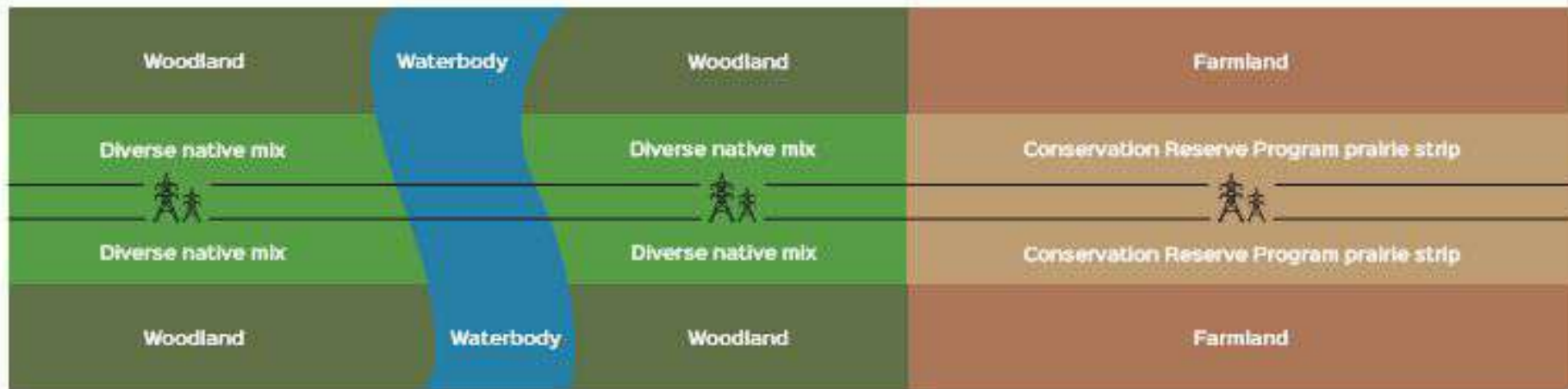


FIGURE 2. EXAMPLE OF PRAIRIE STRIPS WITHIN A TRANSMISSION CORRIDOR





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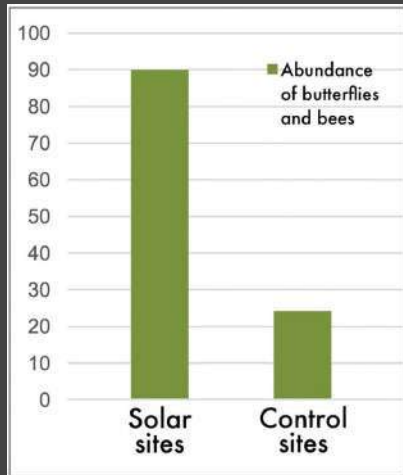
An opportunity for conservation

- ➡ 7 to 8 acres per megawatt for solar energy production according to NREL.
- ➡ To produce 10% of Iowa's energy from solar, 13,440 acres would be occupied. Small in comparison of total farmland (.05%).
- ➡ Habitat for pollinators, like honey bees and monarch butterflies.
- ➡ Wildlife habitat for game birds, like pheasants and quail.
- ➡ Water quality and soil health improvements.

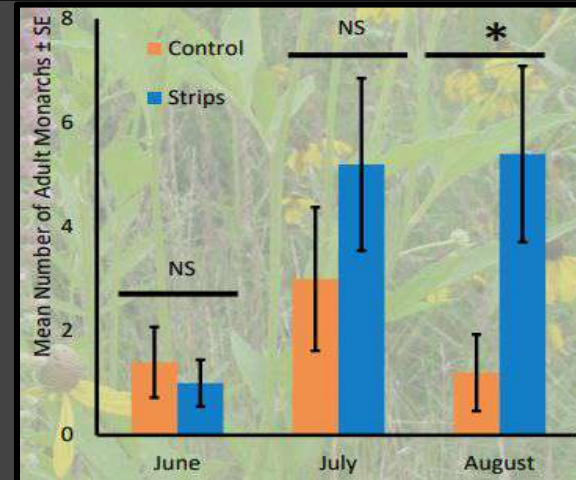


Beneficial environmental enhancements

Native Bees



Monarch Butterflies



Pheasants and Quail

2019 Iowa Upland Wildlife Populations Report:

- Acres of habitat lost between 1990 and 2018: -1,847,000 acres
- Square miles of habitat lost: -2,886 square miles.

Soil and Water Quality

Perennial vegetation offers:

- Nutrient load reductions
- Up to 40% peak flow reduction
- Increases in soil organic matter



Adding project value

A practical, mutually-beneficial investment in renewables.

In addition to the positive environmental outcomes, investing in this practice on solar project sites offer a way for project developers to meet practical goals such as stormwater permitting, erosion control, and building public support.

Other opportunities include:

- Opening up the site for honey beekeepers and honey production.
- Potential for livestock grazing allows for rural development opportunities.
- Cost reductions by reducing mowing needs and building local supply chains.

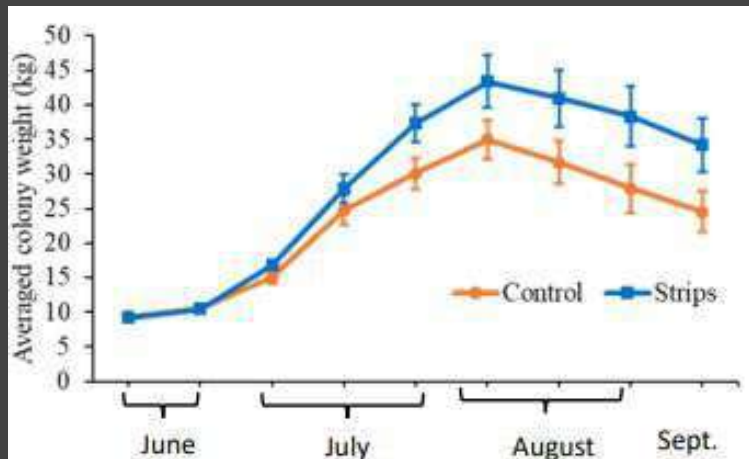


Fig. 2: Honey bee hives at farms with prairie strips were statistically heavier in 2017 and 2018 than hives without a strip (control). Data shown from 2017, 2018, and 2019 ($p = 0.05$).

With this practice, developers & communities add value to their projects for the entire community.





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Planning for success

Incorporate native vegetation into initial planning to allow for a holistic consideration of all factors:

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),
- Gather quotes for a native seed mix.
- List of retailers in the region from Tallgrass Prairie Center at UNI:
 - [2020 IOWA SEED AND SERVICE PROVIDER LIST](#)

Planning for this practice at least one year in advance allows for holistic consideration of all factors.



Evaluating costs and benefits

When considering total project cost, there are some key variables.

- Key variable: Project size and acreage.
- Management options may change with project size.
- Important consideration: Though up-front costs may be steeper, reduction in overall costs can be realized.



Per acre in Iowa,
\$500 to \$1,000 is a
reasonable range
for most projects.



Considering project design & construction

Being flexible when it comes to the height of your project is important for ensuring success.

- 3 to 4 feet between the lower, tilted edge and the ground is widely viewed as the maximum solar panel height without substantially increasing material costs and creating the need for elevation of workers for operation and maintenance.
- 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 implement "strategic mowing" techniques.
- Accounting for management methods can help determine project site design.
- "Deer fencing" is less obtrusive to wildlife movement and fits project character.



Striking a balance between vegetative quality and project height can equalize costs.



Selecting a seed mix

The height of the solar panels is a primary consideration when selecting a seed mix.

Other factors to consider include:

- Project location,
- Soil type and moisture,
- The species of vegetation native to the area,
- Planned management methods for the site.

Setting goals for your project can guide outcomes.

- Wildlife habitat: Evaluate the ratio of grasses to forbs; a seed mix closer to 30 percent grasses and 70 percent forbs.
- Pollinators: A diversity of flowering plants that bloom during the entire growing season.
- Monarchs: Butterflies only lay eggs on milkweed plants.

FIGURE 1: RECOMMENDED NATIVE SEED MIX FOR A SOLAR PROJECT SITE IN CENTRAL IOWA⁶

Short species prairie seed mix for medium-dry soils in central Iowa			
Botanical name	Common name	Botanical name	Common name
Wildflowers (forbs)		Trees, shrubs, vines	
<i>Asclepias tuberosa</i>	Butterfly Weed	<i>Ceanthus americanus</i>	New Jersey Tea
<i>Baptisia alba</i>	White Wild Indigo	<i>Rosa arkansana</i>	Wild Rose
<i>Chamaecrista fasciculata</i>	Partridge Pea	<i>Amorpha canescens</i>	Lead Plant
<i>Coreopsis lanceolata</i>	Lance-leaf Coreopsis	Grasses, sedges, rushes	
<i>Coreopsis palmata</i>	Prairie Coreopsis	<i>Bouteloua curtipendula</i>	Side-oats Grama
<i>Dalea candida</i>	White Prairie Clover	<i>Carex brevior</i>	Plains Oval Sedge
<i>Dalea purpurea</i>	Purple Prairie Clover	<i>Koeleria macrantha</i>	June Grass
<i>Drymocallis arguta</i>	Prairie Cinquefoil	<i>Schizachyrium scoparium</i>	Little Bluestem
<i>Eryngium yuccifolium</i>	Rattlesnake Master	Sun exposure: full	
<i>Euphorbia corollata</i>	Flowering Spurge	Soil moisture: medium-dry	
<i>Liatris aspera</i>	Button Blazing Star	Recommendation for medium-dry soils in Central Iowa.	
<i>Pedicularis canadensis</i>	Wood Betony		
<i>Penstemon digitalis</i>	Foxglove Beardtongue		
<i>Pseudognaphalium obtusifolium</i>	Sweet Everlasting		
<i>Rudbeckia hirta</i>	Black-eyed Susan		
<i>Ruellia humilis</i>	Wild Petunia		
<i>Solidago speciosa</i>	Showy Goldenrod		
<i>Symphotrichum oolentangiense</i>	Sky Blue Aster		
<i>Tradescantia ohiensis</i>	Ohio Spiderwort		
<i>Verbena stricta</i>	Hoary Vervain		
<i>Zizia aurea</i>	Golden Alexanders		
<i>Asclepias syriaca</i>	Common Milkweed		
<i>Symphotrichum ericoides</i>	Heath Aster		
<i>Symphotrichum pilosum</i>	Frost Aster		
<i>Gentiana alba</i>	Cream Gentian		
<i>Helianthus annuus</i>	Early Sunflower		
<i>Desmodium canadense</i>	Showy Tick Trefoil		

Prepared by Story Co. Conservation.



Seeding project vegetation

Timing of seed placement is key to success.

A site may take time to establish aesthetic native vegetation. To establish the needed firm seedbed, conventional methods include disking at least twice, and cultipacking, although this is dependent upon the conditions of each site.

Seeding methods can include:

- Broadcast
- Drill
- Hand-broadcast

Native grass seeds need good seed-to-soil contact.

Best practices:

- Signage that says, “Pollinator habitat in progress” can mitigate public concern.
- Each seedbed is different and may not need disking—these decisions should be made with a professional to review site-specific information such as existing vegetation, moisture levels, and soil type.
- Using a cover crop at the construction site could help you stabilize the soil prior to the seeding of your native mix if there are concerns about delays.



Image via Tallgrass Prairie Center

**Frost-seeding
between Nov. 1
and June 1 is ideal
for maximum
germination.**



Managing project sites

Every site is unique and all timelines should be adjusted to the needs of a project.

Pollinator-friendly solar will require more management on years 1 through 3, but will eventually require minimal disturbance.

- **Year one:** Regular mowing (three to four times). The first mowing should be at a height of 4 to 6 inches soon after seeding, the next two mowings should be at a height no less than 8 inches.
- **Year two:** With a successful planting, years subsequent to establishment provide the opportunity for less maintenance, needing only an occasional disturbance to encourage desirable species.
- **Years three and four:** Mowing and baling approximately every three years is the preferred management option for solar project sites.

Timing impacts wildlife and pollinators

- After year two, avoid or minimize mowing between April 1 and Aug. 1 to reduce impacts during the nesting season of upland birds.
- Delaying mowing to late September facilitates a more welcoming habitat for migrating pollinators such as monarch butterflies.
- Spot mowing and/or herbicide application could be used if necessary.

Design and plan for a project that requires minimal mowing after establishment.



Promoting this practice in your community

Cities, counties, and states can work together to promote this investment in conservation.

Community solar projects are prime for this practice:

- Many communities are adopting community solar projects which provide a practical way for cities to invest in conservation while meeting clean energy goals.
- Schools with solar projects can use this as learning opportunity to educate students on the importance of pollinators and wildlife.

Counties may have unique authority to promote investments in native plantings on solar project sites:

- Requiring a vegetation management plan can give the county input on species planted, site management, and other related criteria.
- Example: Linn County, Iowa
“...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...”

Minnesota Habitat Friendly Solar Program:

State code says:

- **“an owner of a solar site implementing solar site management practices may claim that the site provides benefits to gamebirds, songbirds and pollinators only if the site adheres to guidance set forth by the pollinator plan provided by the Board of Water and Soil Resources.”**
- **Counties reference the standards set forth by this state board in their ordinances, requiring developers to adhere to those standards.**



Additional Resources

There are a variety of resources available to help you establish this practice.

[Iowa Monarch Conservation Consortium](#)

[Prairie STRIPS project at Iowa State University](#)

[Tallgrass Prairie Center at the University of Northern Iowa](#)

Local partners including:

- County conservation boards, natural resource districts, etc.
- Soil and water conservation districts
- State agriculture and natural resources agencies (IDALS, IDNR, etc.)
- Natural Resources Conservation Service (NRCS)
- University extension and outreach professionals

[Pheasants Forever](#)

[Iowa Solar Siting Resource Guide: A Roadmap For Counties](#) - Recorded [Webinar](#).

Leveraging local partners can help demonstrate collaboration and ensure project success.

QUESTIONS?

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