FACT SHEET:
NATIVE VEGETATION AND SOLAR PROJECTS IN IOWA

Across the U.S., the solar industry is booming. Solar project sites often occupy several acres of land and are projected to cover 3 million acres by 2030.[1] 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.[2]

ADDING PROJECT VALUE

In addition to providing habitat for wildlife and pollinators, investments in native vegetation (including non-invasive, naturalized species) 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.[3]

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. **Per acre in Iowa, $500 to $1,000 is a reasonable range for most projects.**[4,5]

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

Seeding

- Timing is key to success—frost-seeding between Nov. 1 and June 1 is ideal for maximum germination and ensuring stand establishment through a full growing season.[6] August and late summer 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. 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 one-fourth of an inch in the soil. Ideally, native prairie seeds should rest on top of the soil.[7]

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 each seedbed is different and may not need discing—these decisions should be made with a professional to review site-specific information such as existing vegetation, moisture levels, and soil type.

Sources

1 Maltais, Kirk. "Struggling Farmers See Bright Spot in Solar." The Wall Street Journal, Sept. 23, 2019, wsj.com/articles/struggling-farmers-see-bright-spot-in-solar-11569242733. Accessed December 2019.
2 "Real potential, ready today: Solar energy in Iowa." Iowa Environmental Council, iaenvironment.org/webres/File/Program%20Publications/2015_solar_handout.pdf. Accessed December 2019.
3 "Iowa Monarch Conservation Consortium." Iowa State University, monarch.iastate.edu. Accessed December 2019.
4 Ibid.
5 "Native Seed Program." Iowa Pheasants Forever, 2019, iowapf.net/native-seed-program. Accessed December 2019.
6 "Habitat How-To." Iowa Monarch Conservation Consortium, Iowa State University, 2019, monarch.ent.iastate.edu/habitat-how. Accessed December 2019.
7 "Management Overview, Science-Based Trials of Row Crops Integrated with Prairie Strips." Iowa State University, 2019, nrem.iastate.edu/research/STRIPS/content/management-overview. Accessed December 2019.

MANAGEMENT AND CONSTRUCTION

Construction and design

- Being flexible when it comes to the height of a solar energy system is important for project success. 3 to 4 feet tall is widely viewed as the maximum clearance between the lowest edge of the solar panel and the ground without substantially increasing material costs and creating the need for elevation of workers for operations and maintenance.[8] 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, remember that taller native vegetation provides better habitat for wildlife and pollinators.[9] 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 4 to 6 inches soon after seeding, the next two mowings should be at a height no less than 8 inches.[10]

- **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.[11]

- **Years three and four:** Mowing and baling approximately every three years is the preferred management option for solar project sites.[12]

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 such as pheasants and quail.[13] 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.[14] Spot mowing and/or herbicide application could be used during this period if necessary.

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 occuring, mowing may not be in a site's best interest.

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 native to the area, planned management of the site, and more. Consider desired outcomes of the native vegetation, 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. Some species of native vegetation are crucial for pollinators; monarch butterflies only lay eggs on milkweed plants.[15] Bees, adult monarchs, and other pollinators rely on a diversity of flowering plants that have blooms during all periods of the growing season (March to October). See Figure 1 on the following page for recommended seed mix.

Sources

8 Personal communications, City of Cedar Falls, Oct. 26, 2019; Kertech, LLC, Oct. 30, 2019.
9 "Native Seed Program." Iowa Pheasants Forever, 2019, iowapf.net/native-seed-program. Accessed December 2019.
10 "Habitat How-To." Iowa Monarch Conservation Consortium, Iowa State University, 2019, monarch.ent.iastate.edu/habitat-how. Accessed December 2019.
11 Ibid.
12 "Iowa Monarch Conservation Consortium." Iowa State University, monarch.iastate.edu. Accessed December 2019.
13 "Native Seed Program." Iowa Pheasants Forever, 2019, iowapf.net/native-seed-program. Accessed December 2019.
14 "Habitat How-To." Iowa Monarch Conservation Consortium, Iowa State University, 2019, monarch.ent.iastate.edu/habitat-how. Accessed December 2019.
15 Personal communication, Adam Janke, Extension Wildlife Specialist, Iowa State University, Oct. 8, 2019.

FIGURE 1: RECOMMENDED NATIVE SEED MIX FOR A SOLAR PROJECT SITE IN CENTRAL IOWA[16]

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**	
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 Coreopsis	**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		
Pseudognaphalium 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 helanthoides	Early Sunflower		
Desmodium canadense	Showy Tick Trefoil		

Sources

16 Personal communications, Amy Yoakum, Natural Resources Specialist, Story County Conservation, Oct. 23, 2019.