

FACT SHEET:

NATIVE VEGETATION AND SOLAR PROJECTS IN SOUTH DAKOTA

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 1 megawatt of electricity (enough to power between 100 to 150 homes in South Dakota), utility-scale solar plants may require between 5 and 10 acres of land.² Combining solar projects with perennial native vegetation (including naturalized, non-invasive species) offers an opportunity for project owners to demonstrate their commitment to environmental stewardship.³

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.⁴

Cost

- The extra costs associated with pollinator-friendly solar panels include the original seed and raising the panels from 12 inches to 48 inches off the ground. These changes usually have minimal effect on the overall project budget.⁵ Developers can expect to spend up to three times less on operations and maintenance costs over 20 years when compared to managing turfgrass sites, according to the National Renewable Energy Laboratory.⁶

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.⁷ 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.⁸

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 "What's in a Megawatt? Calculating the Number of Homes Powered by Solar Energy." Solar Energy Industries Association, 2020, seia.org/initiatives/whats-megawatt. Accessed July 2020.
3 "Siting, Permitting & Land Use for Utility-Scale Solar." Solar Energy Industries Association, 2020, seia.org/initiatives/siting-permitting-land-use-utility-scale-solar. Accessed July 2020.
4 "Iowa Monarch Conservation Consortium." Iowa State University, monarch.iastate.edu. Accessed December 2019.
5 Klein, Jesse. "Dual-use solar farms welcome nature back to the land." GreenBiz, June 10, 2020, greenbiz.com/article/dual-use-solar-farms-welcome-nature-back-land. Accessed July 2020.
6 Argonne National Laboratory, produced for the U.S. Department of Energy's InSPIRE Study. Obtained via Personal Communication with Fresh Energy. April 2020.
7 "Habitat How-To." Iowa Monarch Conservation Consortium, Iowa State University, 2019, monarch.ent.iastate.edu/habitat-how. Accessed December 2019.
8 "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.⁹ 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.¹⁰ Striking a balance between quality and height can equalize cost.

Utilizing solar grazing instead of mowing allows farmers to increase and diversify revenues without taking land out of food production and reduces or eliminates the need for mowing at solar sites, reducing emissions and costs.¹¹ However, developers should avoid introducing grazing until the three-year establishment period is over and should follow a robust rotational grazing plan when livestock is introduced to avoid reductions in habitat value.

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.¹²
- › **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.¹³
- › **Years three and four:** Mowing and baling approximately every three years is the preferred management option for solar project sites.¹⁴

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.¹⁵ 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.¹⁶ 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 occurring, mowing may not be in a site's best interest.

- › The clearance between the ground and 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 to help guide action. 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.¹⁷ 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 following page for recommended seed mix.



Sources

- 9 Personal communications, City of Cedar Falls, Oct. 26, 2019; Kertech, LLC, Oct. 30, 2019.
- 10 "Native Seed Program." Iowa Pheasants Forever, 2019, iowapf.net/native-seed-program. Accessed December 2019.
- 11 "What is Solar Grazing?" American Solar Grazing Association, 2020, solargrazing.org/what-is-solar-grazing/. Accessed July 2020.
- 12 "Habitat How-To." Iowa Monarch Conservation Consortium, Iowa State University, 2019, monarch.ent.iastate.edu/habitat-how. Accessed December 2019.
- 13 Ibid.
- 14 "Iowa Monarch Conservation Consortium." Iowa State University, monarch.iastate.edu. Accessed December 2019.
- 15 "Native Seed Program." Iowa Pheasants Forever, 2019, iowapf.net/native-seed-program. Accessed December 2019.
- 16 "Habitat How-To." Iowa Monarch Conservation Consortium, Iowa State University, 2019, monarch.ent.iastate.edu/habitat-how. Accessed December 2019.
- 17 Personal communication, Adam Janke, Extension Wildlife Specialist, Iowa State University, Oct. 8, 2019.



MANAGEMENT AND CONSTRUCTION, CONTINUED

Selecting a seed mix

- > The South Dakota Habitat Pays program, a partnership between the South Dakota Department of Game, Fish, and Parks and the South Dakota Department of Agriculture, offers cost-sharing programs and other initiatives designed to help create more wildlife and pollinator habitat on private land. Local habitat advisors are also available for consultation as part of the program.¹⁸

South Dakota Game, Fish, and Parks Nesting Cover Program

- Free native seed mix (can be grasses, flowers, or combination of both).
- South Dakota Game, Fish, and Parks will provide 100 percent cost-share for seed and drilling costs, up to \$125 per acre.
- No minimum or maximum sizes.
- Sites can be burned, grazed, or hayed for management purposes only.

South Dakota Game, Fish, and Parks Pollinator Food Plot Program

- Free seed mix of annual flowering plants that bloom throughout the growing season.
- \$20 per acre payment or \$40 per acre if part of the Walk-in Area hunting access program.
- Maximum of 10 acres per 160 acres of land or 30 acres per landowner.

Example native seed mix for South Dakota¹⁹

- > When planning your seed mix, maximum plant height should not exceed the clearance height of the solar system unless a mowing or grazing strategy is being adopted. Additionally, for maximum pollinator benefits, species should be selected that have staggered bloom times.

- *Liatris punctata* (Dotted Blazing Star)
- *Penstemon gracilis* (Slender Beardtongue)
- *Penstemon albidus* (White Beardtongue)
- *Solidago missouriensis* (Missouri Goldenrod)
- *Solidago canadensis* (Canada Goldenrod)*
- *Solidago rigida* (Stiff Goldenrod)
- *Echinacea angustifolia* (Narrow-leaved Purple Coneflower)
- *Ratibida columnifera* (Prairie Coneflower)
- *Symphotrichum novae-angliae* (New England Aster)*
- *Symphotrichum ericoides* (Heath Aster)
- *Symphotrichum laeve* (Smooth Blue Aster)
- *Tradescantia occidentalis* (Spiderwort)
- *Zizia aptera* (Heart-leaved Alexanders)
- *Asclepias speciosa* (Showy Milkweed)
- *Asclepias incarnata* (Swamp Milkweed)*
- *Asclepias verticillata* (Whorled Milkweed)
- *Asclepias viridiflora* (Green Milkweed)
- *Helianthus pauciflorus* (Stiff Sunflower)*
- *Dalea purpurea* (Purple Prairie Clover)
- *Drymocallis arguta* (Prairie Cinquefoil)
- *Rosa arkansana* (Wild Rose)*
- *Amorpha canescens* (Lead Plant)
- *Bouteloua curtipendula* (Side-oats Grama)
- *Koeleria macrantha* (Junegrass)
- *Schizachyrium scoparium* (Little Bluestem)
- *Bouteloua gracilis* (Blue Grama)
- *Erysimum asperum* (Western Wallflower)

**plant may exceed 3 feet in height*

SOUTH DAKOTA RESOURCES:

The resources below can help with planning perennial vegetation projects in South Dakota.

1. South Dakota Habitat Pays: Pollinator Habitat habitat.sd.gov/resources/pollinator-habitat.aspx
2. Pheasants Forever and Quail Forever South Dakota Conservation Reserve Program and Wildlife Seed Mixes pfhabitatstore.com/store/items/SD/
3. Pheasants Forever and Quail Forever Conservation Seed Program Booklet: Rights of Way (including solar farms) monarchjointventure.org/images/uploads/documents/rights_of_way_program_.pdf
4. Living Landscapes in South Dakota: A Guide to Native Plantscaping nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/ndpmcbk7831.pdf
5. An identification guide to Native Pollinator Plants of South Dakota for Managed Landscapes extension.sdstate.edu/sites/default/files/2019-08/P-M-03-2005-2018.pdf
6. South Dakota Natural Resources Conservation Service: Perennial Vegetation Establishment Guide/Range Technical Note #4 efotg.sc.egov.usda.gov/references/public/SD/Range_Tech_Note_4.pdf

Sources

¹⁸ "Pollinator Habitat Assistance." South Dakota Habitat Pays, South Dakota Departments of Game, Fish and Parks and Agriculture, habitat.sd.gov/resources/pollinator-habitat.aspx. Accessed July 2020.

¹⁹ Personal communications, Mary Miller, Samuel H. Ordway Prairie Preserve Manager, The Nature Conservancy, April 23, 2020.

