Pollinator-friendly Solar

Rob Davis
Center for Pollinators in Energy
Fresh Energy

Vegetation seeded and maintained by Prairie Restorations, Inc
Seeded in Oct. 2014. Pictured in July, 2016.

Wisconsin: late September 2016

SoCore Energy & Prairie Restorations

SoCore Energy & Prairie Restoration

Lazuli Bunting feeds young - Jim Cruce

Ninety-six percent of **terrestrial** birds rear **their young** on **insects**

…and insects thrive on native plants.


Feet
Turfgrass
Maximum root depth 3-6 inches
Native Grasses & Forbs
Common root depth 4-6 feet

MN Corn Growers Association

“The long term health of our pollinators is a complicated issue, but creating habitat is a proven way to increase the likelihood of success. We encourage our members to look for opportunities to add habitat on their farms.

“It makes sense for us to support SF3353 [the standard
for pollinator-friendly solar] because it’s an easy and logical way to add habitat that is so critically needed…”

Dr. Adam Birr, President

Minnesota Corn Growers Association

North Star Solar
100 MW solar array
1,000 acres
Largest single-site array in the Midwest

Pollinator-friendly seed mix from Minnesota Native Landscapes used throughout

	Scientific Name	Common Name	% of Mix	PLS lbs/ac	Total PLS lbs	Seeds/ Sq Ft
Grasses:	Bouteloua curtipendula	Side-Oats Grama	35.00	2.80	2.80	10.23
	Bouteloua gracilis	Blue Grama	12.00	0.96	0.96	14.10
	Carex bicknellii	Bicknell's Sedge	1.50	0.12	0.12	0.75
	Carex radiata	Eastern Star Sedge	1.50	0.12	0.12	1.81
	Carex vulpinoidea	Fox Sedge	1.25	0.10	0.10	2.98
	Koeleria macrantha	Junegrass	1.25	0.10	0.10	7.35
	Schizachyrium scoparium	Little Bluestem	14.50	1.16	1.16	6.39
	Sporobolus cryptandrus	Sand Dropseed	4.00	0.32	0.32	23.51
	Sporobolus heterolepis	Prairie Dropseed	5.00	0.40	0.40	2.35
Forbs:	Achillea millefolium	Yarrow	0.40	0.03	0.03	2.06
	Agastache foeniculum	Fragrant Giant Hyssop	0.25	0.02	0.02	0.66
	Allium stellatum	Prairie Onion	0.50	0.04	0.04	0.16
	Anemone canadensis	Canada Anemone	0.25	0.02	0.02	0.06
	Aquilegia canadensis	Columbine	0.25	0.02	0.02	0.28
	Asclepias syriaca	Common Milkweed	0.75	0.06	0.06	0.09
	Asclepias tuberosa	Butterfly Milkweed	0.75	0.06	0.06	0.09
	Asclepias verticillata	Whorled Milkweed	0.25	0.02	0.02	0.08
	Aster oolentangiensis	Sky-Blue Aster	1.25	0.10	0.10	2.94
	Aster laevis	Smooth Blue Aster	0.75	0.06	0.06	1.21
	Aster lateriflorus	Calico Aster	0.80	0.06	0.06	5.88
	Astragalus canadensis	Canada Milk Vetch	0.75	0.06	0.06	0.37
	Coreopsis palmata	Prairie Coreopsis	0.50	0.04	0.04	0.15
	Dalea candida	White Prairie Clover	3.00	0.24	0.24	1.67
	Dalea purpureum	Purple Prairie Clover	3.00	0.24	0.24	1.32
	Desmodium canadense	Canada Tick Trefoil	1.00	0.08	0.08	0.16
	Helianthus pauciflorus	Stiff Sunflower	0.40	0.03	0.03	0.05
	Monarda fistulosa	Wild Bergamot	0.75	0.06	0.06	1.54
	Liatris aspera	Rough Blazing Star	0.75	0.06	0.06	0.35
	Lupinus perennis	Wild Lupine	0.25	0.02	0.02	0.01
	Penstemon gracilis	Slender Beardtongue	0.40	0.03	0.03	7.05
	Potentilla arguta	Prairie Cinquefoil	0.25	0.02	0.02	1.69
	Pycnanthemum virginianum	Mountain Mint	0.50	0.04	0.04	3.23
	Ratibida columnifera	Long-Headed Coneflower	1.00	0.08	0.08	1.23
	Rudbeckia hirta	Black Eyed Susan	1.25	0.10	0.10	3.38
	Solidago nemoralis	Old Field Goldenrod	0.50	0.04	0.04	4.41
	Solidago rigida	Stiff Goldenrod	1.50	0.12	0.12	1.81
	Verbena stricta	Hoary Vervain	1.25	0.10	0.10	1.03
	Zizia aurea	Golden Alexanders	0.75	0.06	0.06	0.24
Cover Crop:	Triticum aestivum	Winter Wheat		10.00	10.00	

Species subject to change based on price and availability at the time of planting

Minnesota Power
& Camp Ripley

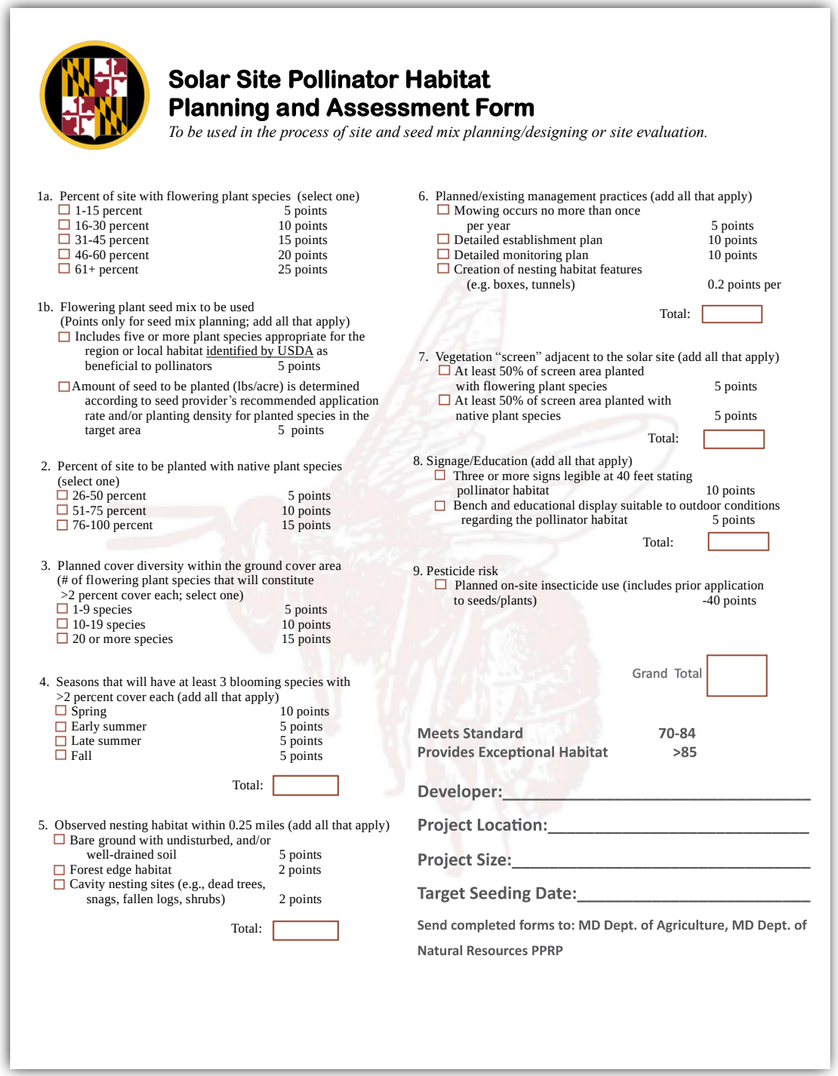
Solar Farm Short Native Mix	Species	PLS/acre	Height(in)
Short height general dry prairie native mix.	Sideoats Grama	3.00	18-30
	Little Bluestem	3.00	18-30
	Buffalograss	3.00	18-30
	Kalm's Brome	0.50	24-36
	Blue Grama	1.00	12-15
	Junegrass	0.25	6-12
	Prairie Dropseed	0.25	18-30
	Grass Total	**11.00**	
	Black Eyed Susan	0.20	18-24
	Purple Prairie Clover	0.20	18-24
	Partridge Pea	0.20	18-24
	Purple Coneflower	0.20	18-24
	Yarrow	0.01	12-18
	White Prairie Clover	0.10	18-24
	Large Flowered Beard Tongue	0.04	12-24
	Butterfly Milkweed	0.05	18-24
	Total PLS/Acre	**1.00**	
	Oats	25.00	
	Total PLS/Acre	**37.00**	

What constitutes “pollinator-friendly” in the context of a solar array?

A Flexible Standard

- Percent wildflowers
- Percent native species
- Diversity of species
- # seasons flowering
- Nearby assets
- Management plan
- Insecticide use

- >100 points available
- 70+ for "pollinator friendly"



Solar Site Pollinator Habitat Planning and Assessment Form

To be used in the process of site and seed mix planning/designing or site evaluation.

1a. Percent of site with flowering plant species (select one)
- ☐ 1-15 percent — 5 points
- ☐ 16-30 percent — 10 points
- ☐ 31-45 percent — 15 points
- ☐ 46-60 percent — 20 points
- ☐ 61+ percent — 25 points

1b. Flowering plant seed mix to be used (Points only for seed mix planning; add all that apply)
- ☐ Includes five or more plant species appropriate for the region or local habitat identified by USDA as beneficial to pollinators — 5 points
- ☐ Amount of seed to be planted (lbs/acre) is determined according to seed provider's recommended application rate and/or planting density for planted species in the target area — 5 points

2. Percent of site to be planted with native plant species (select one)
- ☐ 26-50 percent — 5 points
- ☐ 51-75 percent — 10 points
- ☐ 76-100 percent — 15 points

3. Planned cover diversity within the ground cover area (# of flowering plant species that will constitute >2 percent cover each; select one)
- ☐ 1-9 species — 5 points
- ☐ 10-19 species — 10 points
- ☐ 20 or more species — 15 points

4. Seasons that will have at least 3 blooming species with >2 percent cover each (add all that apply)
- ☐ Spring — 10 points
- ☐ Early summer — 5 points
- ☐ Late summer — 5 points
- ☐ Fall — 5 points

Total: ☐

5. Observed nesting habitat within 0.25 miles (add all that apply)
- ☐ Bare ground with undisturbed, and/or well-drained soil — 5 points
- ☐ Forest edge habitat — 2 points
- ☐ Cavity nesting sites (e.g., dead trees, snags, fallen logs, shrubs) — 2 points

Total: ☐

6. Planned/existing management practices (add all that apply)
- ☐ Mowing occurs no more than once per year — 5 points
- ☐ Detailed establishment plan — 10 points
- ☐ Detailed monitoring plan — 10 points
- ☐ Creation of nesting habitat features (e.g. boxes, tunnels) — 0.2 points per

Total: ☐

7. Vegetation "screen" adjacent to the solar site (add all that apply)
- ☐ At least 50% of screen area planted with flowering plant species — 5 points
- ☐ At least 50% of screen area planted with native plant species — 5 points

Total: ☐

8. Signage/Education (add all that apply)
- ☐ Three or more signs legible at 40 feet stating pollinator habitat — 10 points
- ☐ Bench and educational display suitable to outdoor conditions regarding the pollinator habitat — 5 points

Total: ☐

9. Pesticide risk
- ☐ Planned on-site insecticide use (includes prior application to seeds/plants) — -40 points

Grand Total ☐

Meets Standard 70-84
Provides Exceptional Habitat >85

Developer:_____

Project Location:_____

Project Size:_____

Target Seeding Date:_____

Send completed forms to: MD Dept. of Agriculture, MD Dept. of Natural Resources PPRP


Dr. Karen Oberhauser
University of Minnesota
Dr. Marla Spivak
University of Minnesota

ALBRIGHT	●	ECKLUND	●	JOHNSON, B.	●	MELIN	●	RUNBECK	●
ALLEN	●	ERHARDT	●	JOHNSON, C.	●	METSA	●	SANDERS	●
ANDERSON, C.	●	ERICKSON	●	JOHNSON, S.	●	MILLER	●	SCHOEN	●
ANDERSON, M.		FABIAN	●	KAHN	●	MORAN	●	SCHOMACKER	●
ANDERSON, P.	●	FENTON	●	KELLY	●	MULLERY	●	SCHULTZ	●
ANDERSON, S.	●	FISCHER	●	KIEL	●	MURPHY, E.	●	SCOTT	●
ANZELC	●	FLANAGAN		KNOBLACH	●	MURPHY, M.	●	SELCER	
APPLEBAUM	●	FRANSON	●	KOZNICK	●	NASH	●	SIMONSON	●
ATKINS	●	FREIBERG	●	KRESHA	●	NELSON	●	SLOCUM	●
BACKER	●	GAROFALO	●	LAINE	●	NEWBERGER	●	SMITH	●
BAKER	●	GREEN	●	LESCH	●	NEWTON	●	SUNDIN	●
BARRETT	●	GRUENHAGEN		LIEBLING	●	NORNES	●	SWEDZINSKI	●
BENNETT	●	GUNTHER	●	LIEN	●	NORTON	●	THEIS	
BERNARDY	●	HACKBARTH	●	LILLIE	●	O'DRISCOLL	●	THISSEN	
BLY	●	HALVERSON	●	LOEFFLER	●	O'NEILL	●	TORKELSON	●
CARLSON	●	HAMILTON	●	LOHMER	●	PELOWSKI	●	UGLEM	●
CHRISTENSEN	●	HANCOCK	●	LOON	●	PEPPIN	●	URDAHL	●
CLARK	●	HANSEN		LOONAN		PERSELL	●	VOGEL	●
CONSIDINE	●	HAUSMAN	●	LUCERO	●	PETERSBURG	●	WAGENIUS	●
CORNISH		HEINTZEMAN	●	LUECK	●	PETERSON	●	WARD	●
DANIELS	●	HERTAUS	●	MACK	●	PIERSON		WHELAN	●
DAVIDS		HILSTROM	●	MAHONEY	●	PINTO	●	WILLS	●
DAVNIE	●	HOPPE	●	MARIANI		POPPE	●	YARUSSO	●
DEAN, M.	●	HORNSTEIN	●	MARQUART	●	PUGH	●	YOUAKIM	●
DEHN, R.	●	HORTMAN	●	MASIN	●	QUAM	●	ZERWAS	●
DETTMER		HOWE	●	MCDONALD	●	RARICK	●	SPEAKER	●
DRAZKOWSKI	●	ISAACSON	●	MCNAMARA	●	ROSENTHAL	●	DAUDT	

Unanimous support from Minnesota's Republican House of Representatives

Organic Valley launches community solar partnership to be 100 percent renewably powered by 2019

Farmer-owned cooperative will become the largest food company in the world to source all its electricity from renewable resources within the decade.

Additionally, the community solar partnership will adopt pollinator-friendly solar standards as part of Organic Valley's commitment to animals, people and the planet. Rather than being planted with turf grass or covered in gravel, the installations will incorporate pollinator-friendly habitat into the design.

Once complete, these meadows, filled with native flowering plants and grasses, will create as much bee and butterfly habitat as if 30,000 families were to each plant six-by-twelve-foot pollinator gardens.

The business case for pollinator-friendly solar sites

Steve Levitsky, Brian Riddle, Dennis vanEngelsdorp and Albert Todd
Monday, May 15, 2017 - 1:30am

Steve Levitsky
Vice President, Sustainability
Perdue Farms

Dept of Energy / NREL
Innovative Site Preparation and Impact Reductions on the Environment (InSPIRE)
Site preparation costs and impacts

Site preparation costs for utility-scale solar projects are expected to account for 20% of utility-scale PV installed costs in 2020.

Reducing site preparation costs via low-impact site development can lead to cascading reductions in other environmental-related costs and risks.

Site Preparation Practice	Cost Contribution	Estimated Reductions
Geotechnical Investigation	2.6% (0.7%)	0% - (25%)
Clearing and Grubbing	4.3% (1.2%)	25% - 90%
Soil stripping and stockpiling	1.5% (0.4%)	20% - 90%
Grading	4.2% (1.2%)	50% - 90%
Soil Compaction	1.9% (0.5%)	50% - 75%
Foundation for vertical support	22.1% (6.3%)	2% - 5%

Cost contribution values represent percent of total civil works costs; values in parentheses represent total installed capital costs for 100MW utility-scale PV

Other Cost Categories	Expected Impact
Land Acquisition	5-10% reduction in land requirements
Permitting	1-5% reduction in permitting costs
O&M for weed control	2-7% reduction in O&M
Degradation	1-3% improvement in annual panel degradation
Efficiency	1-3% improvement in efficiency due to temperature impacts


about
75%
of the world's
crops depend on
pollinators

Pollinator Habitat Benefits Agriculture

- Economic analysis of wild pollinator contribution to 10 major crops.
- In nearly all cases and especially for tomatoes, blueberries, melons, cucumbers, squash, apples, peaches, and bell peppers,
- Gross revenues increase directly because of the installation of pollinator habitat—and that's even after subtracting out implementation costs.

http://bit.ly/BeesCrops

Solar array, Ohio

Photo: Janelle Patterson, *Marietta Times*

RICHARD BEAVEN FOR THE WALL STREET JOURNAL

Energy from more than 1,200 solar panels powers Benjamin Freund's 650-acre dairy farm and home in East Canaan, Conn.

Solar Projects Sow Tension

As panels supplant crops on more farms, states weigh limits on big renewable fields

By Joseph De Avila

The boom in solar energy is

tion of Counties.

The pressure in rural areas stems, in part, from simple economics. Some farmers are installing solar panels on a patch of their land to help offset energy costs. Other farmers are renting out entire fields to solar companies that can afford to pay premium prices for access to clear fields

On the Bright Side

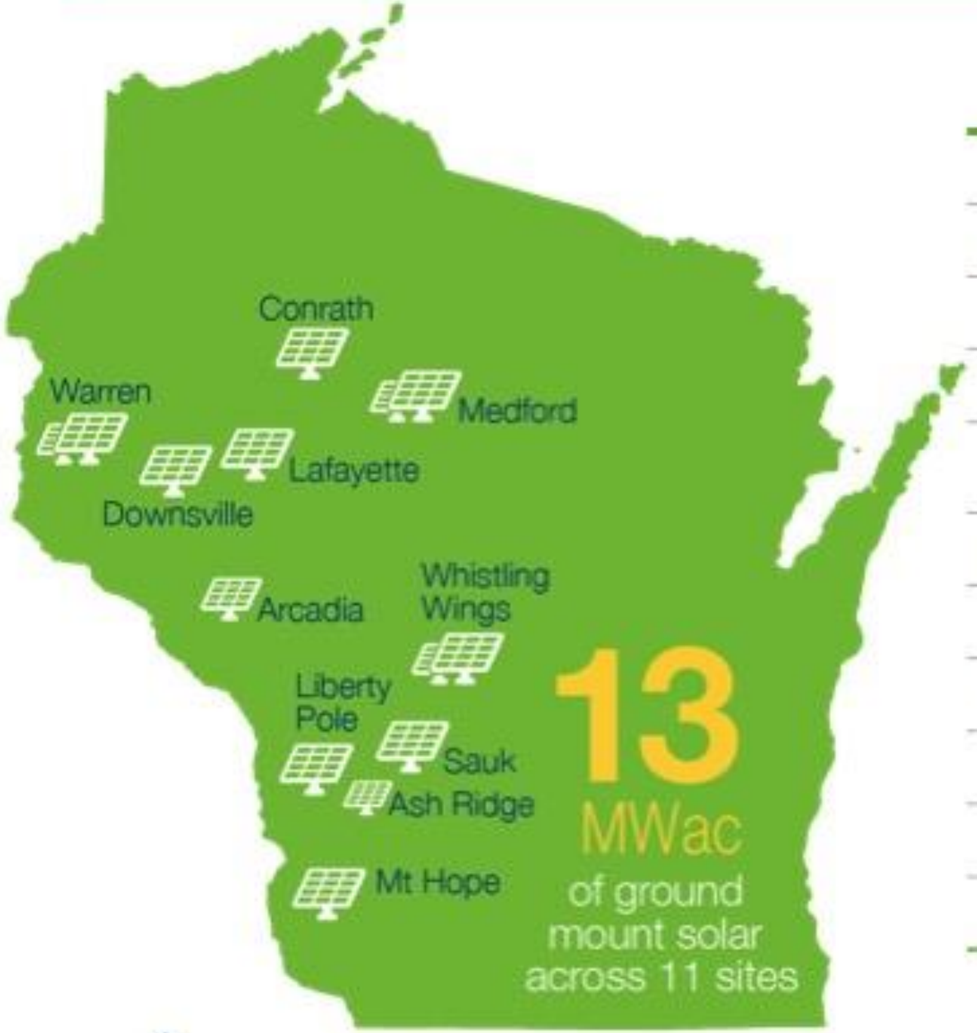
U.S. solar power generation in thousand megawatt hours

whelming opposition," said Mr. Scanlon. The county denied the application.

Benjamin Freund, who has a dairy farm in East Canaan, Conn., in recent years installed more than 1,200 solar panels on a patch of his land and on top of his dairy barn. The generated power offsets his entire $6,000 monthly energy bill.

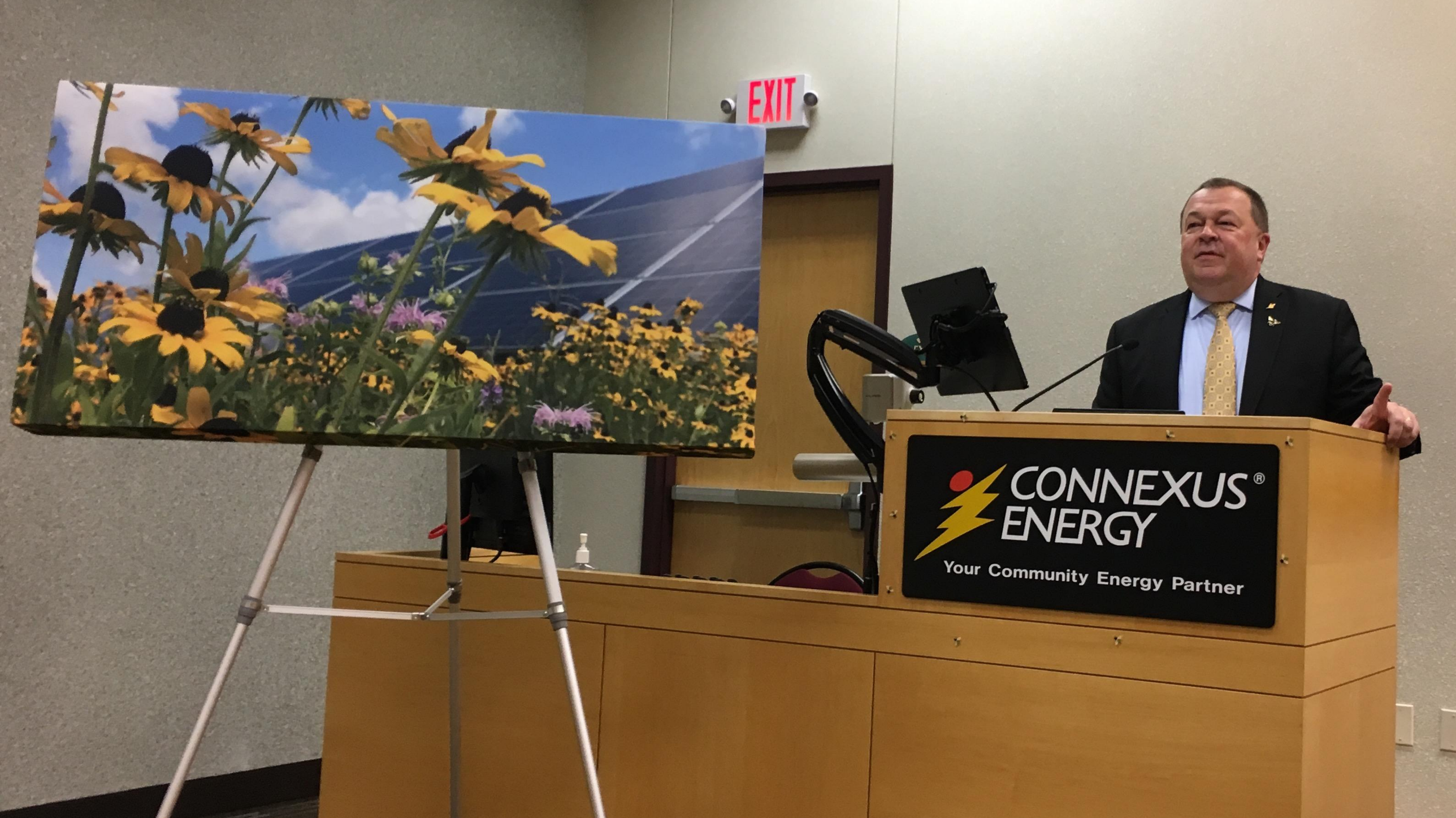
He said he doesn't like competing with solar companies

Dairyland Portfolio Seed Mixes — Acreage Summary



Project	Total Acreage	Dry-sandy Seed Mix	Dry-mesic Seed Mix	Mesic To Wet Seed Mix
Warren	16.4		14	2.4
Downsville	9.5		4.5	5
Arcadia	7.51		7.51	
Lafayette	8.87		8.87	
Whistling Wings	10.81	10.81		
Ash Ridge	5.4		5.4	
Mt Hope	10.6		10.6	
Liberty Pole	9.3		6	3.3
Sauk	8.56		8.25	0.31
Medford	15.93			15.93
Conrath	7.87			7.87
Total	**110.75**	**10.81**	**65.13**	**34.81**


RENEW WISCONSIN
Presents
Clean Energy Goes Mainstream
RENEW Energy Policy Summit
MONONA TERRACE
DPC Solar Project
Pollinator Gardens at Solar Projects
DAIRYLAND POWER
COOPERATIVE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CONNEXUS®
ENERGY
Your Community Energy Partner

Connexus Energy
Performance Characteristics:
1. Visual appeal
2. Maintenance free for existing grounds crew
3. No loss of solar performance
4. Ecological services highlighted in company marketing materials

Seeded and managed by
Prairie Restorations, Inc.

Newsletter

Connexions

A member update.

CONNEXUS® ENERGY

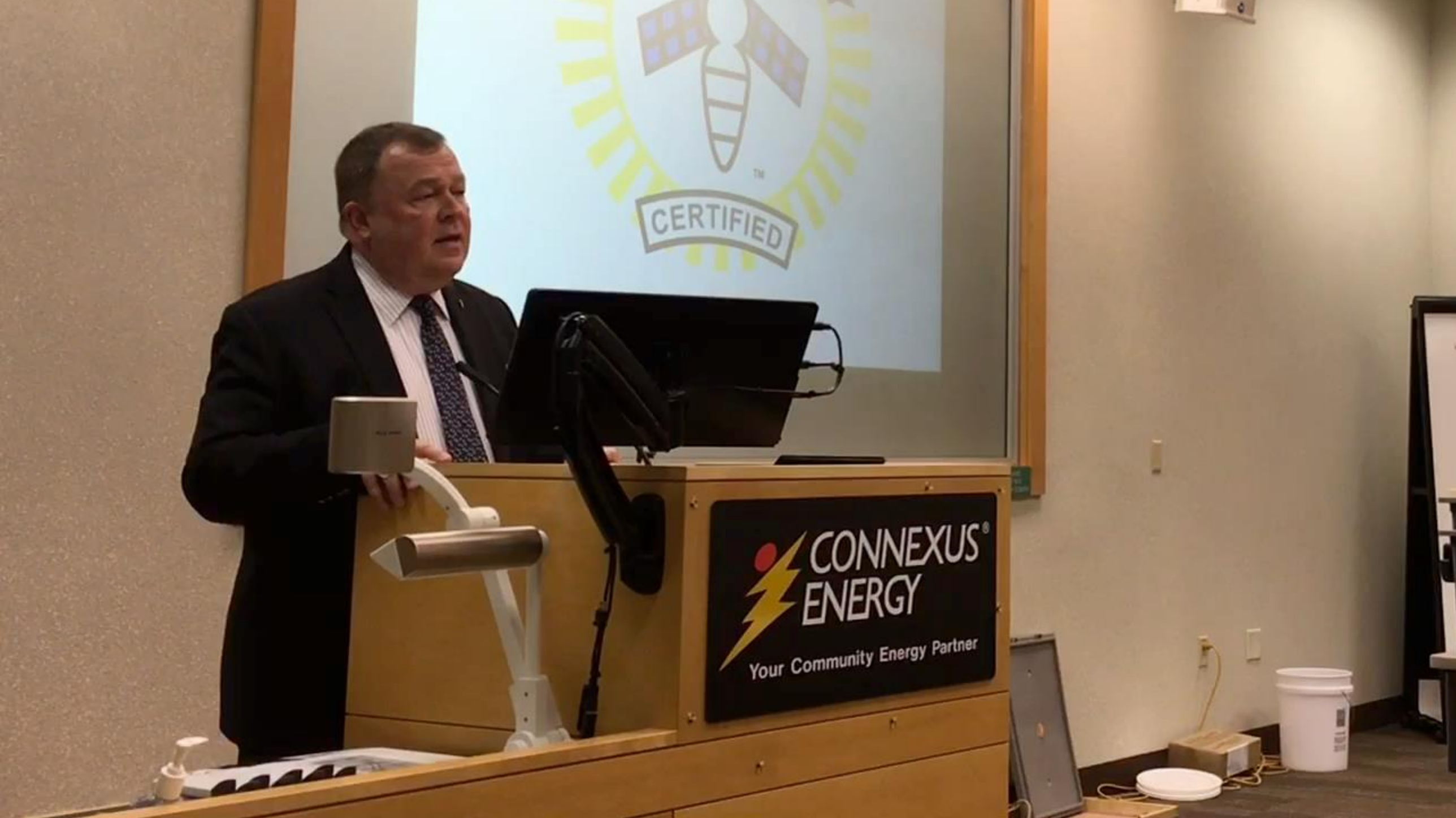
September 2016

Pollinator haven at Connexus solar garden

For honey bees and butterflies, it doesn't get much better than the pollinator-friendly habitat found in Connexus Energy's community solar garden. Recently, Fresh Energy, with the help of Prairie Restoration, assessed our site, and we received a perfect 100 score on the Solar Site Pollinator Habitat Assessment. That means our solar garden not only provides solar energy for our members, but it also provides exceptional habitat to help struggling pollinators.

What is pollinator-friendly habitat?

Pollinators, such as honey bees, butterflies, hummingbirds, and bats, assist plants in reproduction by transferring pollen. This allows the plant to produce berries, nuts, and other foods important to the survival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May 2017
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THE
BUZZ
around
pollinator-friendly
solar plants
ALSO INSIDE: 15 TRENDS KEEPING THE U.S. ON TOP OF ITS SOLAR GAME


RAW HONEY US GRADE A FANCY
HONEY
BOLTON BEES
NET WT 13.5 oz (382.5 G)
SOLARW
This honey is part of a bigger circle that Connexus Energy, a member-owned electric cooperative, has created.
By building one of the largest community solar gardens in Minnesota, Connexus Energy overturned the typical idea that solar fields are located in barren surroundings. They planted a picturesque garden with an abundance of pollinator-friendly flowers.
The SolarWise solar garden is not only beautiful to visit, it is a perfect environment for bees to flourish. Such harmony as the bees are making their honey, the solar panels are generating renewable electricity.

Beekeepers Sweeten Solar Sites With the 'Tesla of Honey'

NATIONAL GEOGRAPHIC

martha stewart

modern farmer

Smithsonian

Sustainable Brands

International Business

Times

Star Tribune

St. Paul Pioneer Press

Crain's

Brainerd Dispatch

Fargo Forum

Park Rapids Enterprise

CTN Coon Rapids


Minnesota
Honey Producers
Association
Honey from Minnesota's
pollinator-friendly
solar arrays.
Brian


Solar Honey
Swirl
ice cream
MHPA
Minnesota
Honey Producers
Association

In 2016…

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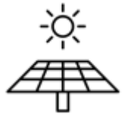
Pollinator-Friendly Solar

>2,350 acres



0.014 percent of farmland

Equivalent to

>1.4 million
6’x12’ pollinator gardens

By end of 2018…

>188,000 acres

0.067 percent of farmland

Would be equivalent to

>100 million
6’x12’ pollinator gardens

Rob Davis

Center for Pollinators in Energy

Fresh Energy

@Robfargo