



Planning for Beyond the Panel

Indiana Chapter,
American Planning
Association





Fresh Energy

Rob Davis

Director, Center for Pollinators in Energy

davis@fresh-energy.org

BeesLoveSolar.org



Solar array, Georgia

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 forcing states and farming communities to grapple with where large renewable-energy projects should be built.

In Connecticut, a state senator has proposed a bill that would discourage the use of farmland for solar projects. Counties in North Carolina and Washington have already imposed temporary restrictions on solar projects, citing the loss of farmland.

tion of Counties.

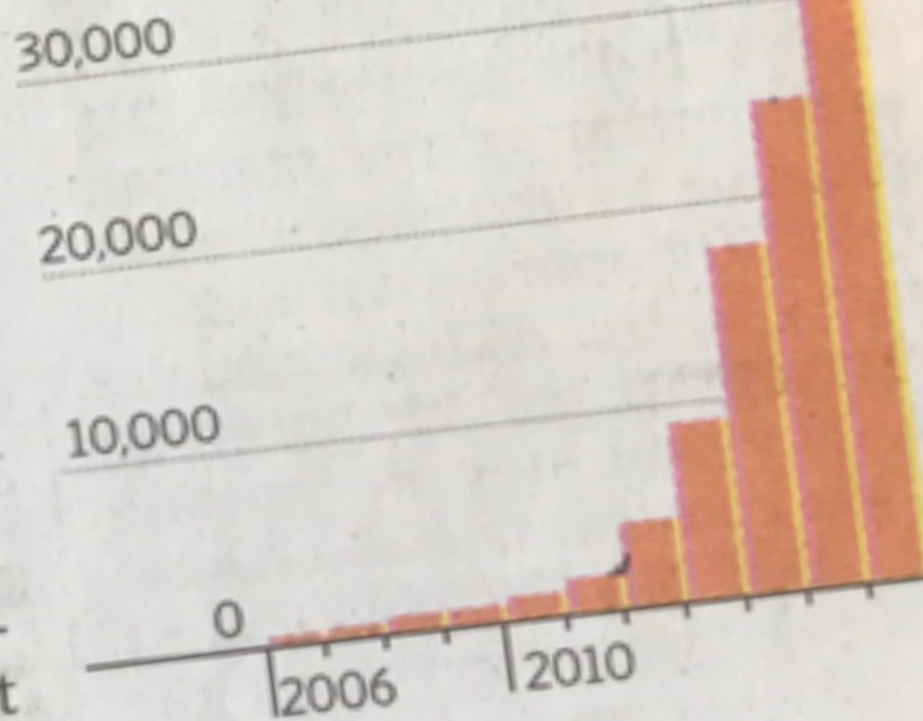
The pressure in rural areas stems, in part, from simple economics. Some farmers are installing solar panels on a patch of their land to help offset energy costs. Other farmers are renting out entire fields to solar companies that can afford to pay premium prices for access to clear fields that don't require much work or money to prepare for a solar project.

"Of course, there can be local tension in terms of what people are used to on the farmland, what people like to see in a rural environment," said Amit Ronen, director of the George Washington University Solar Institute. "But I don't see it as a long-term problem on continuing to ex-

On the Bright Side

U.S. solar power generation in thousand megawatt hours

2016: 36,755



Source: Department of Energy
THE WALL STREET JOURNAL.

North Carolina Clean Energy Technology Center.

But large solar installations don't always sit well with local communities.

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 when he needs access to other farmland, but he also doesn't like being told what he can build on his property.

"From a property rights standpoint, this is a heavy-handed way to say that my property no longer has this development potential simply because of the fact that it's arable land," Mr. Freund said.

Robin Chesmer, managing member of a dairy farm in East Canaan, Conn., said he thinks



Westmill Solar Park, UK
Dr. Guy Parker

A close-up photograph of a field of white daisies with yellow centers. A bee is perched on the center of one of the flowers in the foreground. The background is slightly out of focus, showing more daisies and a large array of solar panels under a blue sky with light clouds. The solar panels are tilted and create a strong geometric pattern of blue and white lines.

Westmill Solar Park, UK
Fresh Energy



Connexus Energy
Prairie Restorations



Minnesota Power: 2 projects
Camp Ripley solar



Green Lantern Solar
Bee the Change



North Star Solar, DE Shaw
Minnesota Native Landscapes
Monarch caterpillar
Photo: Jake Janske



Aurora Solar
Enel Green Power
Photo: Jake Janske



Aurora Solar
Enel Green Power

September 2016



Engie Solar
Prairie Restorations

September 2017



Engie Solar
Prairie Restorations

July 2019



2019
Engie & Prairie Restorations, Wisconsin



Engie, Texas



Denison University,
Photo by Susan Studer King

Before

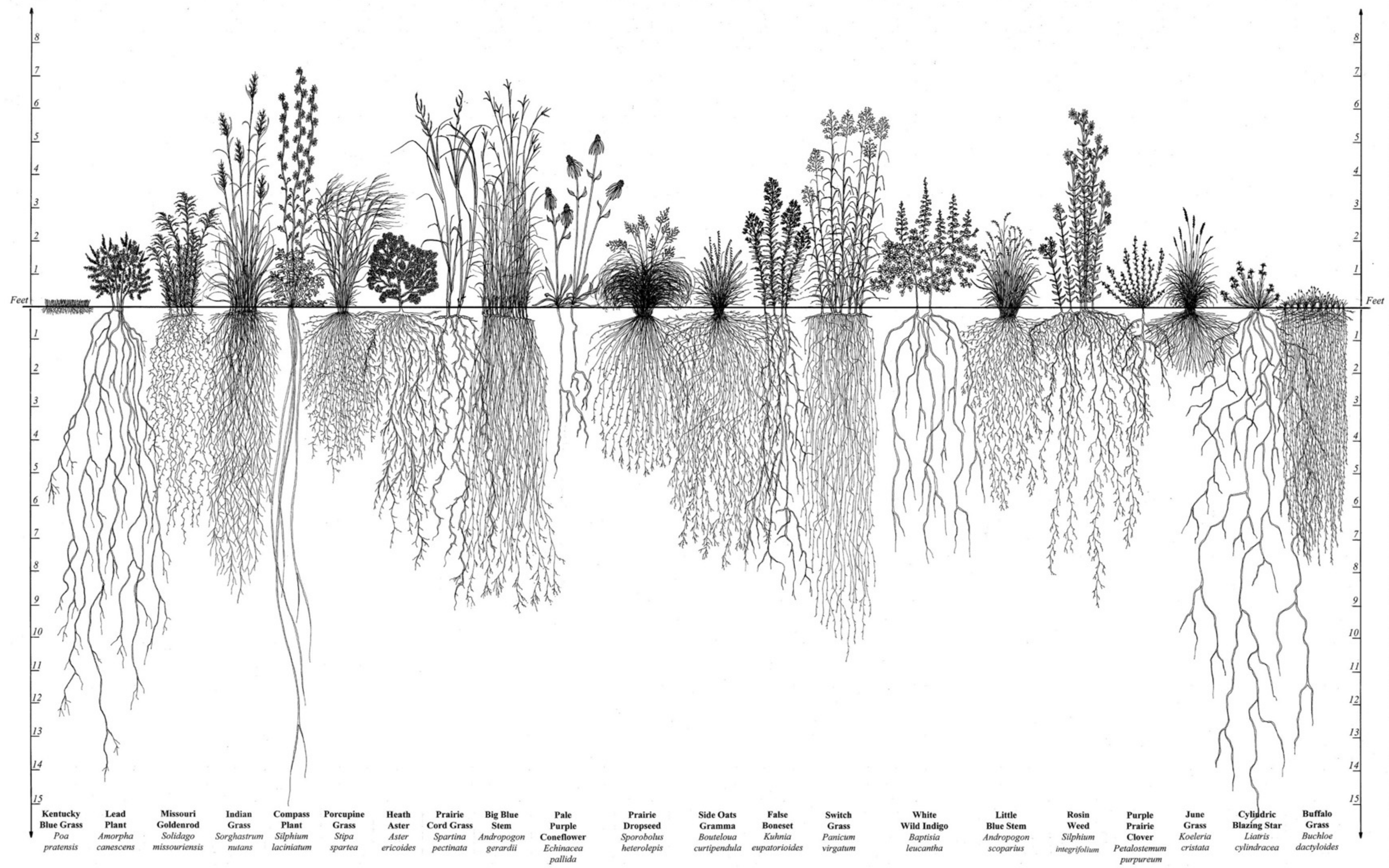


University of Dayton
Before Seeding

After

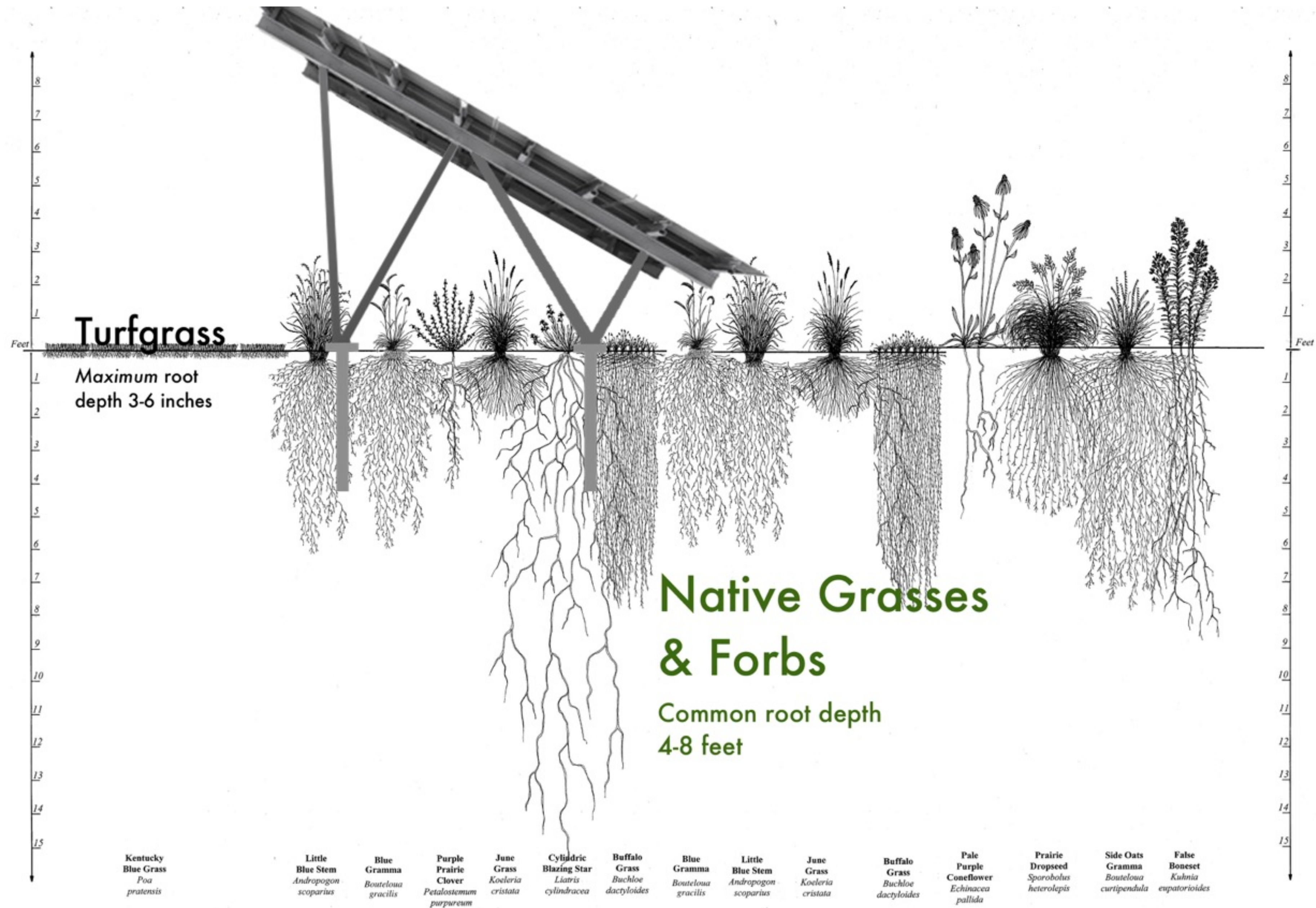


University of Dayton
Photo by Terry Lavy



Root Systems of Prairie Plants

Living Habitats



Solar Site Management for Soil, Storm Water, and Pollinator Benefits

Rob Davis, Fresh Energy

Adapted with permission from Heald Natura, Living Habitats © 1995



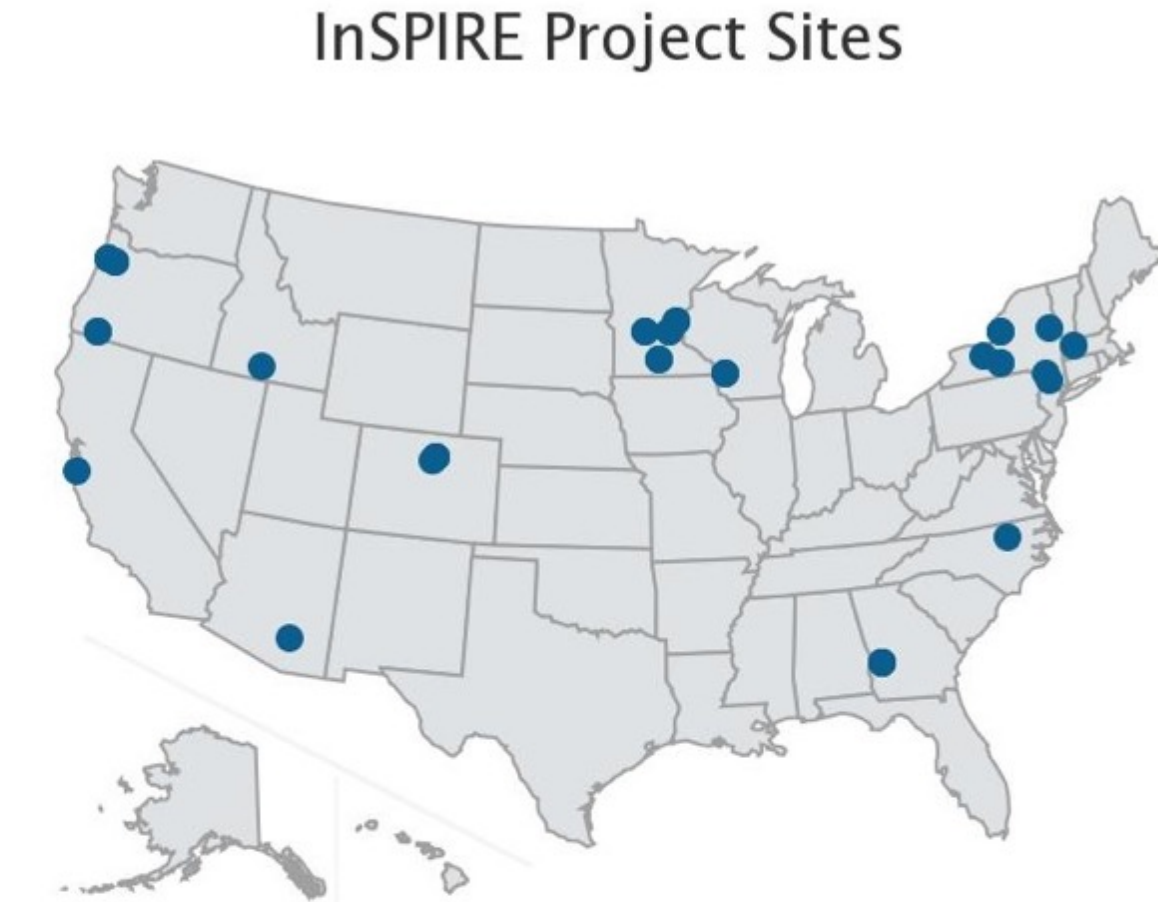
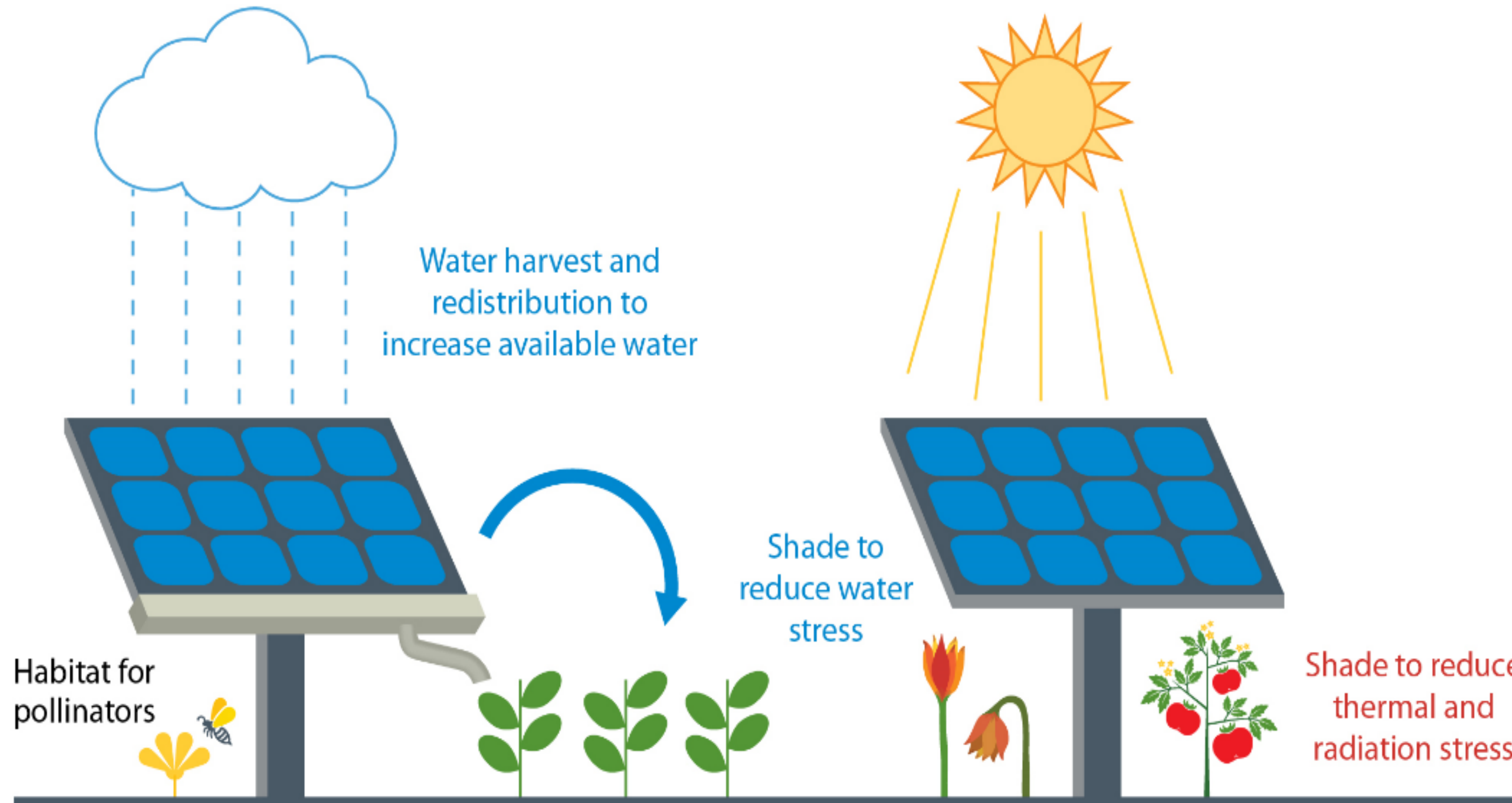
Meeting SunShot Cost and Deployment Targets through
**Innovative Site Preparation and Impact
Reductions on the Environment (InSPIRE)**

Jordan Macknick, Co-Principal Investigator, InSPIRE;
ASTRO Working Group Co-Chair, NREL

Heidi Hartmann, Co-Principal Investigator, InSPIRE,
Argonne National Lab

Rob Davis, ASTRO Working Group Co-Chair,
Fresh Energy

InSPIRE Project Overview



Select from the options below to display all sites using that technology.

- Beekeeping
- Co-location of Solar and Agriculture
- Native Vegetation
- Solar-Integrated Greenhouse
- Beneficial Predators
- Dryland Agriculture Co-location
- Pollinator Habitat

Field-based research topics:

- (1) Economic viability of solar-agriculture co-location configurations
- (2) Increasing agricultural yields in arid environments
- (3) Energy, water, and food security in remote, off-grid areas
- (4) Pollinator habitat and ecological services

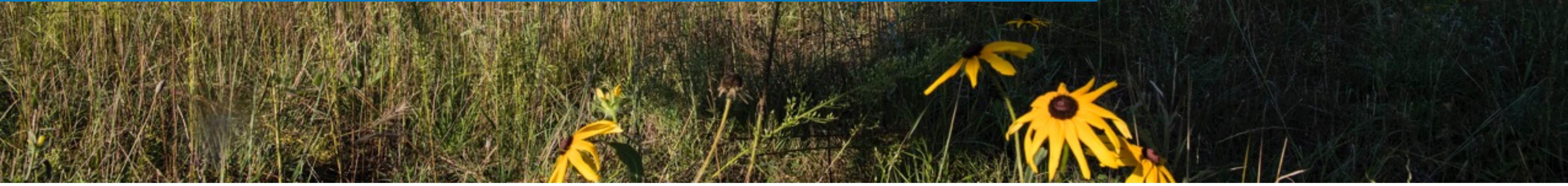
Analytical research topics:

- (1) Satellite imagery analysis of current land groundcover practices
- (2) Cost-benefit analysis of O&M ground cover practices
- (3) Quantification of ecological services of groundcover options

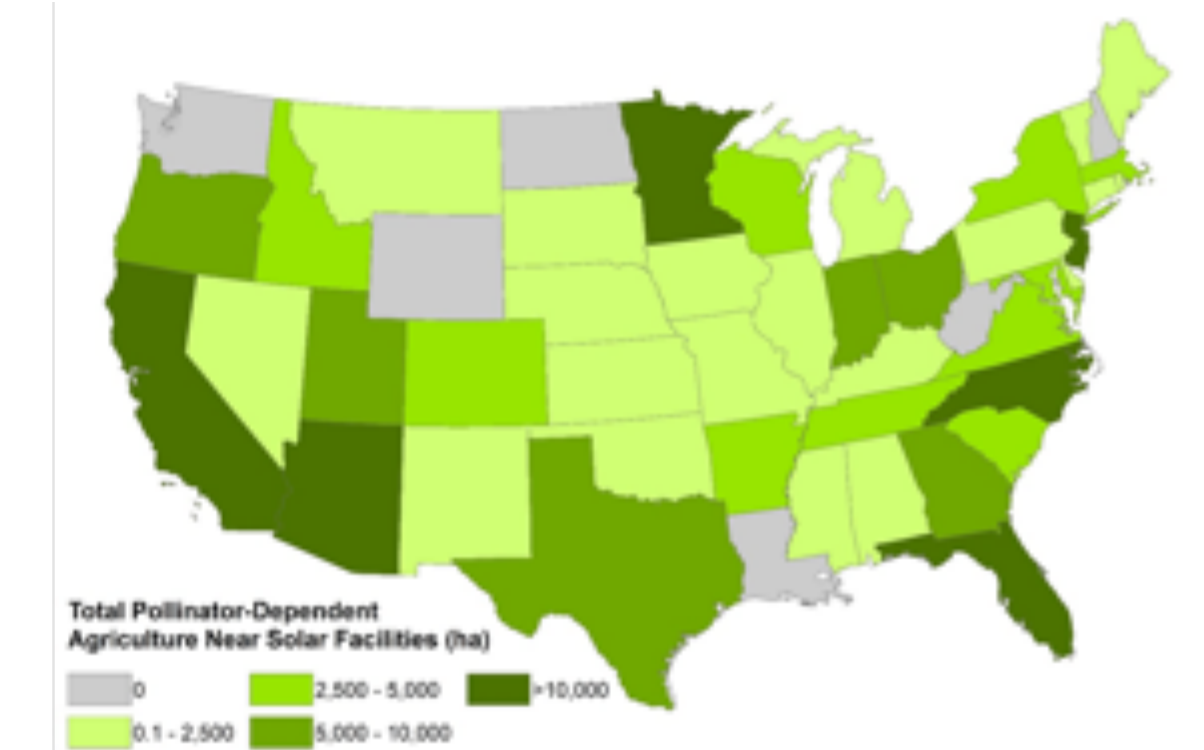
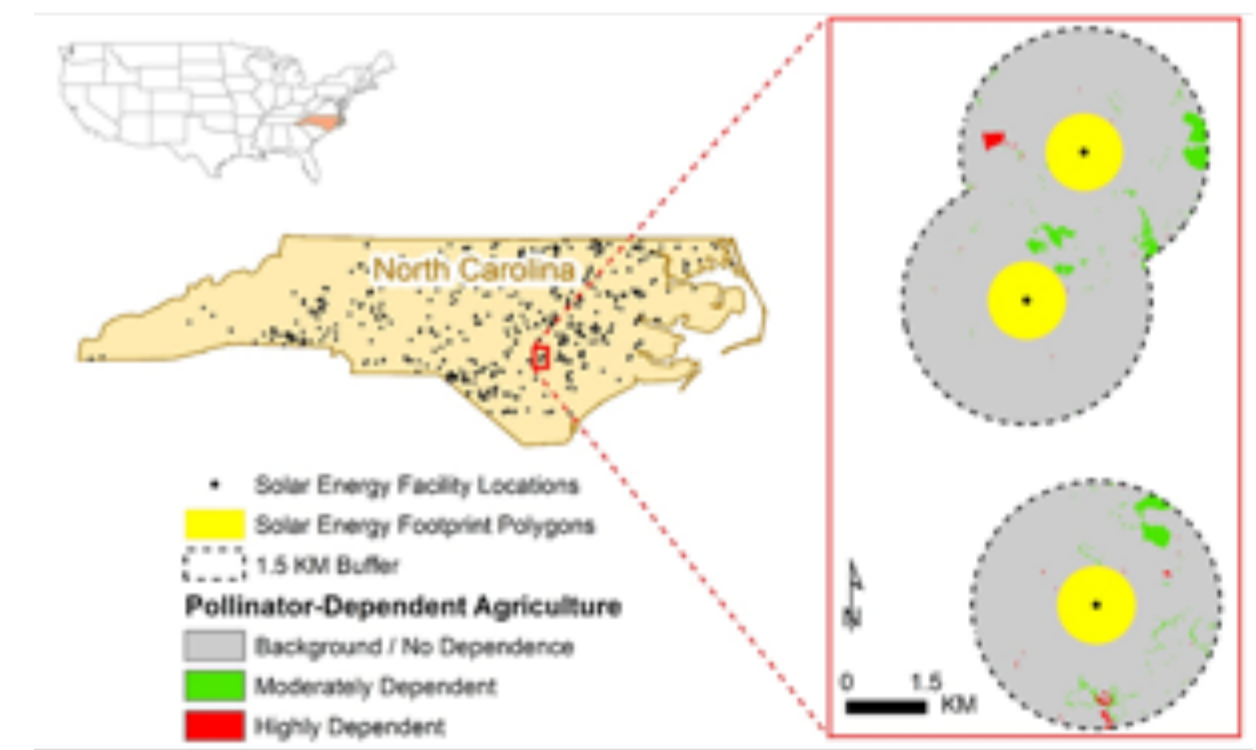




Key Highlight: Pollinator-Friendly Solar



Over 860,000 acres of agricultural land would benefit if existing solar facilities had pollinator-friendly vegetation





PV-SMaRT

Photovoltaic Stormwater Management Research and Testing

U.S. DEPARTMENT OF
ENERGY

Office of **ENERGY EFFICIENCY
& RENEWABLE ENERGY**

SOLAR ENERGY TECHNOLOGIES OFFICE

The Objective

Photovoltaic Stormwater Management Research and Testing (PV-SMaRT)

Megan Day


303-275-3261

Megan.day@nrel.gov



"PV-SMaRT" seeks to reduce balance of system soft costs associated with stormwater infrastructure requirements and improve water quality by developing and disseminating research-based, solar-specific resources for estimating stormwater runoff and best practices for stormwater management and water quality at ground-mounted PV facilities.

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

A photograph of two women sitting in a greenhouse. The woman on the left is wearing a purple cardigan and a colorful patterned scarf. The woman on the right is wearing a dark grey zip-up cardigan. They are both smiling. In the background, there are wooden raised garden beds with various plants, and large windows letting in natural light.

Dr. Karen Oberhauser

University of Minnesota

Dr. Marla Spivak

University of Minnesota

Pollinator-Friendly Solar

Incremental <> Meaningful

*Solar site vegetation that helps bees
and beneficial insects*

Flexible Standard, Vetted by Expert Entomologists

- Percent wildflowers
- Percent native species
- Diversity of species
- # seasons flowering
- Nearby assets
- Signage?
- Management plan?
- Insecticide risk

m BWSR **Solar Site Pollinator Habitat Assessment Form for Project Planning**
For solar companies and local governments to meet pollinator/wildlife habitat certification

1. PERCENT OF PROPOSED SITE VEGETATION COVER TO BE DOMINATED BY WILDFLOWERS

31-45 % +5 points
 46-60 % +10 points
 61+ % +15 points

Total points

Note: Projects may have "array" mixes and diverse border mixes; forb dominance should be averaged across the entire site. The dominance should be calculated from total numbers of forb seeds vs. grass seeds (from all seed mixes) to be planted.

2. PLANNED % OF SITE DOMINATED BY NATIVE SPECIES COVER

26-50% +5 points
 51-75% +10 points
 76-100% +15 points

Total points

3. PLANNED COVER DIVERSITY (# of species in seed mixes; numbers from upland and wetland mixes can be combined)

10-19 species +5 points
 20-25 species +10 points
 26 or more species +15 points

Total points

Exclude invasives from species totals.

4. PLANNED SEASONS WITH AT LEAST 3 BLOOMING SPECIES PRESENT (check/add all that apply)

Spring (April-May) +5 points
 Summer (June-August) +5 points
 Fall (September-October) +5 points

Total points

See BWSR Pollinator Toolbox about bloom seasons

5. AVAILABLE HABITAT COMPONENTS WITHIN .25 MILES (check/add all that apply)

Native bunch grasses for nesting +2 points
 Native trees/shrubs for nesting +2 points
 Clean, perennial water sources +2 points
 Created nesting feature/s (bee blocks, etc.) +2 points

Total points

6. SITE PLANNING AND MANAGEMENT

Detailed establishment and management plan developed (see [example plan](#)) with funding/contract to implement +15 points
 Signage legible at forty or more feet stating pollinator friendly solar habitat (at least 1 every 20ac.) +5 points

Total points

7. SEED MIXES

Mixes are composed of at least 40 seeds per square foot +5 points
 All seed genetic origin within 175 miles of site ([pg.7-8 of Guidance](#)) +5 points
 At least 2% milkweed cover to be established from seed/plants +10 points

Total points

8. INSECTICIDE RISK

Planned on-site insecticide use or pre-planting seed/plant treatment (excluding buildings/electrical boxes, etc.) -40 points
 Communication/registration with local chemical applicators about need to prevent drift from adjacent areas. +10 points

Total points

Grand Total

Provides Exceptional Habitat >85
 Meets Pollinator Standards 70-84

Project Name: _____
 Vegetation Consultant: _____
 Project County: _____
 Project Size: _____
 Projected Seeding Date: _____

Send completed forms, project plans, seed mixes and any communication with pesticide applicators to dan.shaw@state.mn.us

Note: Measurements of percent "cover" should be based on "absolute cover" defined as the percent of the ground surface that is covered by a vertical projection of foliage as viewed from above. To measure cover diversity it is recommended to use plots, and/or transects in addition to meander searches for accurate measurements. Wildflowers in question 1 refer to "forbs" which are flowering plants that are not woody, and are not graminoids (grasses, sedges, etc) and can include introduced clovers and other non-native species beneficial to pollinators.

Public Policy: State & County

- Pollinator-Friendly Solar standards MN, MD, VA, NC, SC, VT, NY, SC, IL, IN, MI, MO, OH
- Pollinator-friendly=conditional approval rather than blanket denial
- Michigan opened 3 million acres of agricultural reserve land only to pollinator-friendly solar projects
- Massachusetts SMART program adder (\$) for pollinator-friendly sites

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Solar-powered pollinators for less than a penny a watt

Ernst Pollinator and Prairie Restorations offer the services, as required by various state scorecards for solar siting, to bring your solar site up to the “pollinator standard”, while also saving money on operations and maintenance over the long term.

APRIL 5, 2019 **JOHN WEAVER**

BUSINESS

MARKETS

POLICY

PRODUCTS

UNITED STATES



Potential Benefit: slow PV loss/degradation in a warming world

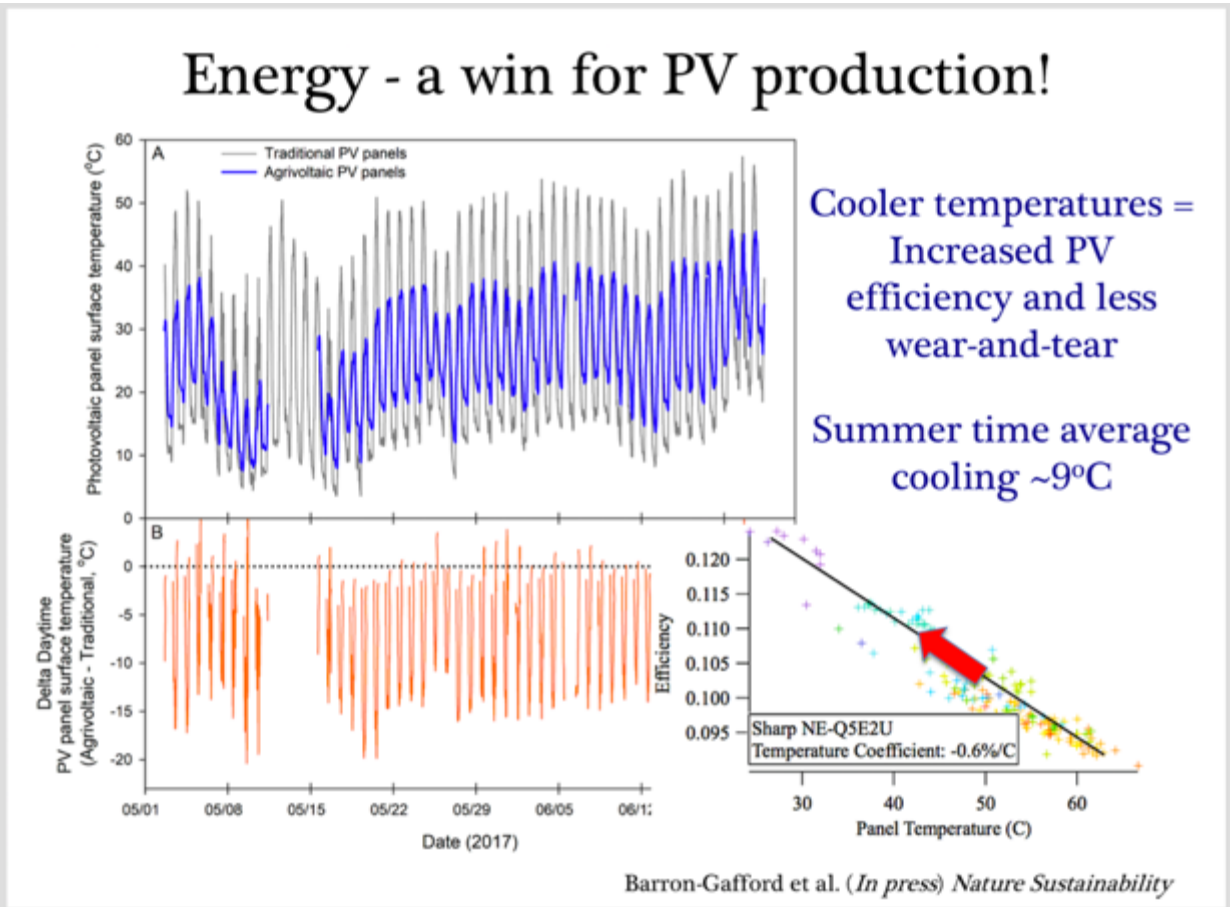
PV efficiency degrades by an average of 0.6% for every 1°C increase in temperature above 25°C (77 F).



Known:
Bare ground/gravel
→ Heat island



??
NREL is studying



Known:
Tomatoes under panels
→ 9°C cooling

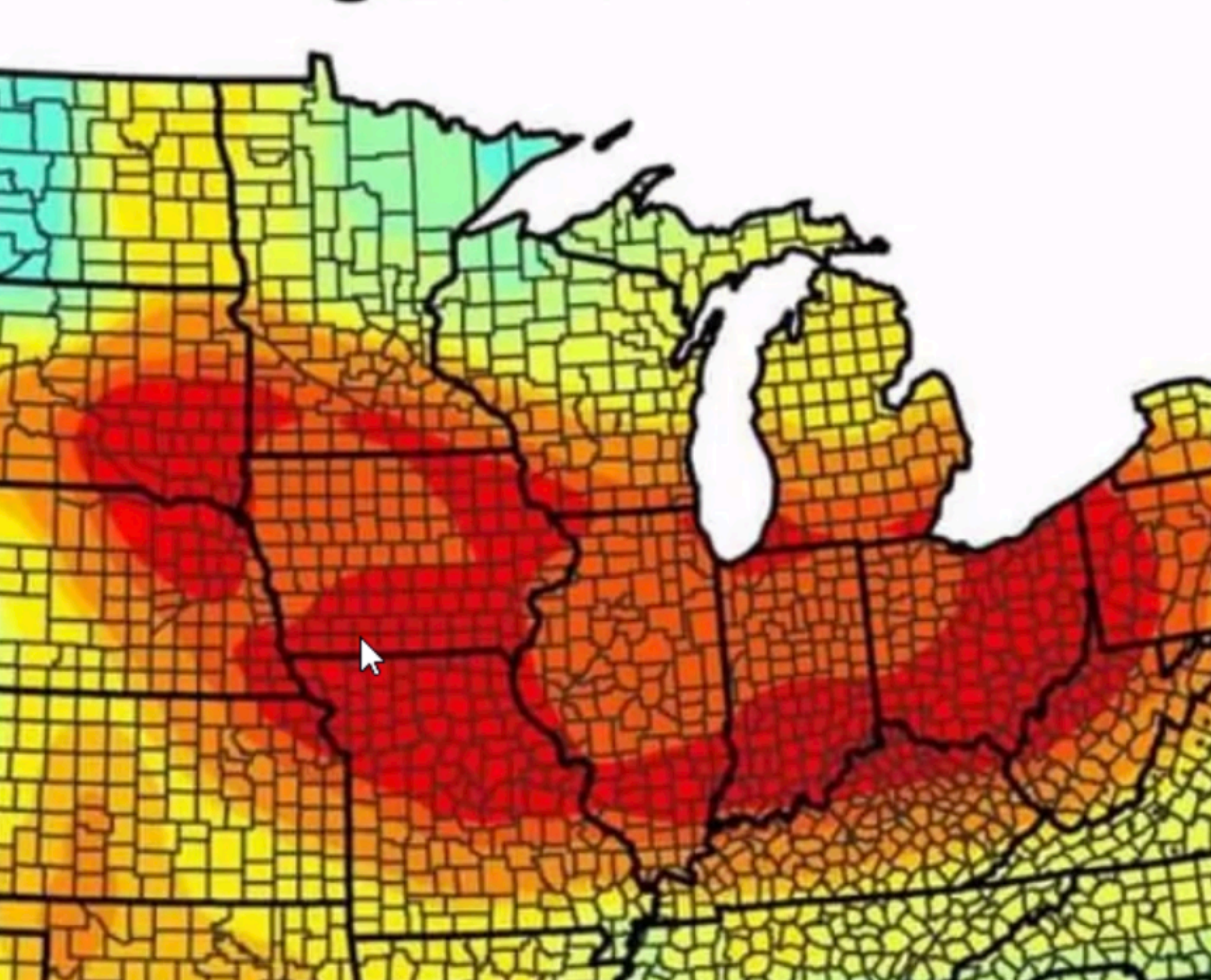
Benefits / Questions / Issues

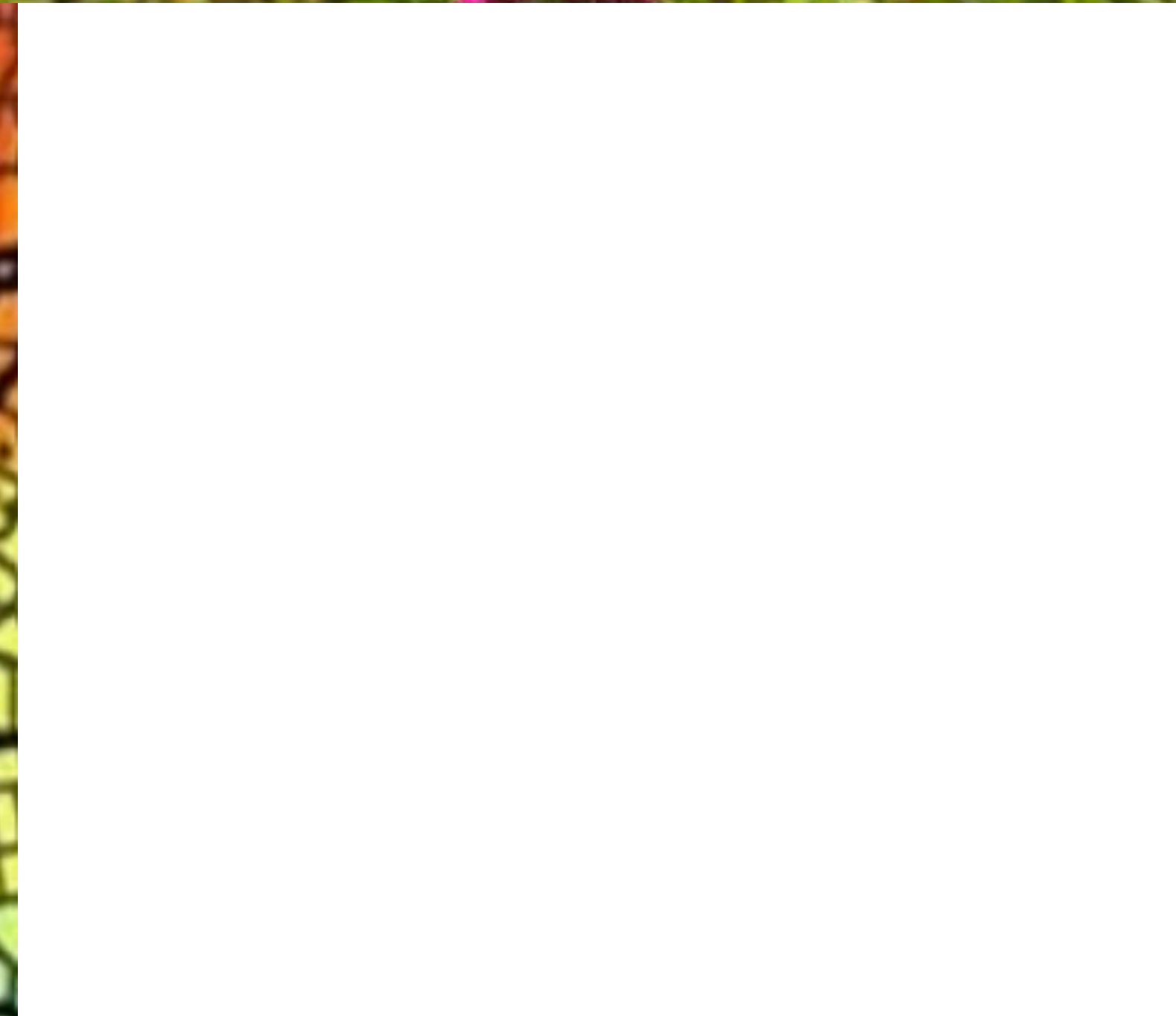
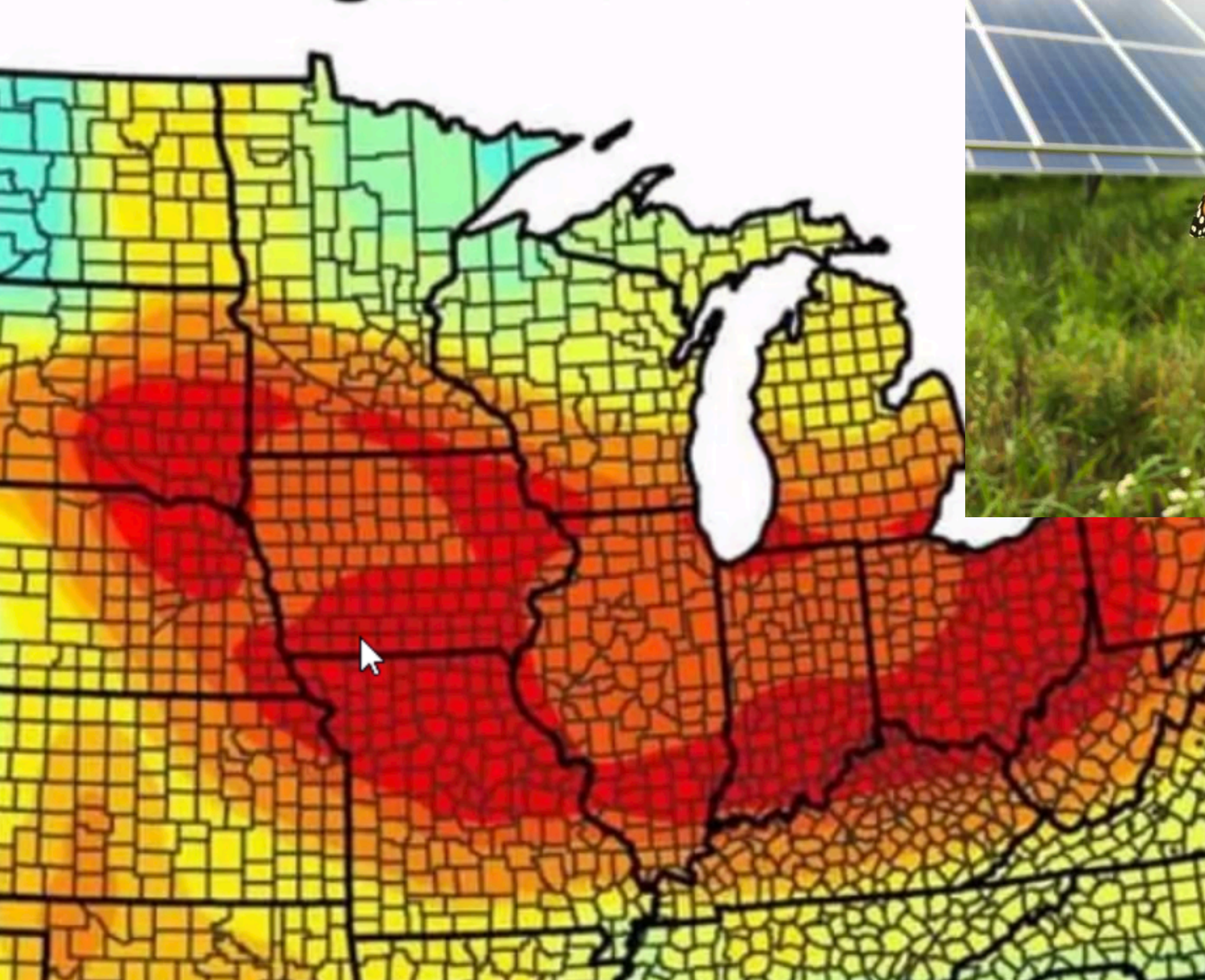
Benefits

- Community support
- Soil benefits
- Permit approval
- Reduced mower/solar contact
- Reduced grading/stormwater
- Resilient landscaping
- Brand / enhanced reputation
- Reduced litigation risk
- Solar energy performance
- Reduced frost heave risk
- Benefit adjacent crops

Questions

- Burn/fire risk
- OSHA (bee stings, etc)
- Endangered species act
- Seed supply
- Unfamiliarity / training





IndyStar.

'A magical solution': Solar developers planting flowers that could help save butterflies and bees

[London Gibson](#) Indianapolis Star

Published 6:00 a.m. ET Jul. 8, 2020 | Updated 9:06 a.m. ET Jul. 8, 2020



Solar farms with native plants to support pollinators such as bees and butterflies are growing in popularity nationwide and in Indiana. Here, Engie Solar's pollinator friendly solar farm near Downsville, Wisconsin shows what similar projects might look like in Indiana. *Provided By Engie Solar*

Ordinances &
Procurement
drives solar
farm design

Benefit:
*Corporations want pollinator-
friendly solar*

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.

CLIF BAR & COMPANY





EXIT



Benefit:
Co-op utilities want pollinator-friendly solar

*Electric utilities
get pollinator-
friendly solar
when they ask
for it.*



BRIEF

In bid to help bees, Xcel to require vegetation disclosure in solar RFPs



(Credit: Engie Distributed Solar)

Stearns County an environmental innovator

Associated Press

ST. CLOUD, Minn. — Stearns County is the first one in the state to require that solar farms be planted with native grasses and flowers that provide habitat for bees and butterflies, whose declining numbers have prompted widespread concern.

The county board earlier this month approved changes in the county's land-use ordinance that include requiring solar companies to plant pollinator habitat on all solar farms and community solar gardens.

Supporters say the move will provide hundreds of acres of critical habitat for threatened pollinators and will provide a model for other counties amid Minnesota's solar building boom.

Scientists are studying why bees and other pollinators have experienced mass declines. Among the contrib-

flowerless
ack plant di-
use, disease
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representatives
ustry met
ths.

"It was really a ground-breaking process that Stearns



Associated Press

Stearns County is requiring that solar farms use native plants and flowers to provide wildlife habitat. It's the first county in the state with the requirement.

One of those who voiced support for the requirement was Colleen Hollinger Petters, a Collegeville Township resident who also manages public relations for Princeton-based Prairie Restorations.

Leases for solar arrays are typically 20-25 years, Hollinger Petters said. Planting the land in and around new solar arrays with native prairie grasses and flowers will result in thousands of acres of pollinator habitat for the next quarter century, she said.

"It's such a great opportunity, and if we don't push for this, we won't know what we missed," she said.

Many solar arrays are built

blooming throughout the summer between the panels, it makes it a little easier to welcome a solar array into your ag neighborhood where you're used to seeing corn and soybeans," Hollinger Petters said.

There are other benefits as well. Prairie plants have deeper roots that do a better job absorbing rainwater and filtering out pollutants, Ross said. And studies have shown that having a vegetative ground cover reduces the heat the solar panel produces, which increases its production, he said.

Planting a native prairie mix does cost more, about \$800

WE



'14 CIH
618E/525S
CHOP, TRA



'12 CIH
1640E/12
PRO 600, H




'08 CIH
2536/165
TRAP, TRA



**Ordinance:
Welcoming solar investment,
Ordinance:
Welcoming solar investment**

Randolph, Henry Counties Aim To Make Solar Farms Home For Pollinators

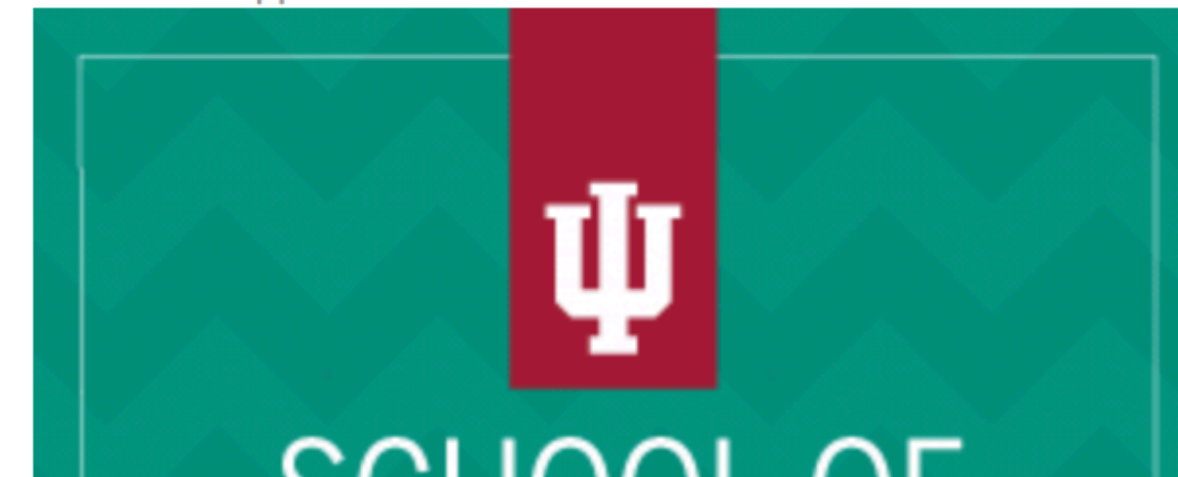
By REBECCA THIELE
Posted July 28, 2020

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**Ordinance:
Welcoming solar investment,
requiring pollinator-friendly
ground cover**

Ordinances &
Procurement
drives solar
farm design



Rob Davis
davis@fresh-energy.org
BeesLoveSolar.org

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