

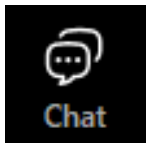
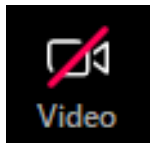
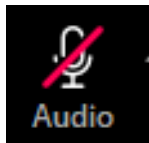
# Large Scale Solar Project Decision-Makers & Criteria

July 25, 2024, Noon to 1pm  
CLUE Summer Webinar Series

*Thank you for joining us! The webinar will begin at noon.*

*For best results, please mute your microphone and turn off your video camera.*

*We will reserve 10 minutes for questions at the end. Please submit questions using the chat box.*



Lynn Markham  
lmarkham@uwsp.edu  
715-346-3879



Center for Land Use Education  
College of Natural Resources  
University of Wisconsin - Stevens Point



Extension  
UNIVERSITY OF WISCONSIN - MADISON

# A little introduction



Lynn Markham  
Land Use Specialist - statewide  
Center for Land Use Education  
[lmarkham@uwsp.edu](mailto:lmarkham@uwsp.edu)

- Educator
- Land use planning & zoning
- Assist local governments and others
- Research assistant: laws, science, policies
- Translate research papers for public



University of Wisconsin  
**Stevens Point**



**Extension**  
UNIVERSITY OF WISCONSIN-MADISON



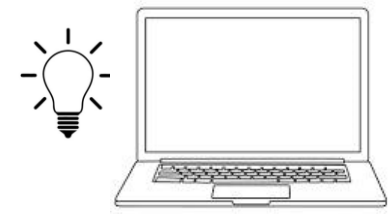
## Key Points

- Why is solar growing?
- State laws about solar: Decision-makers & criteria
  - Spoiler: Local governments have very little say
- Recent solar examples
- Wrap up

Poll 1

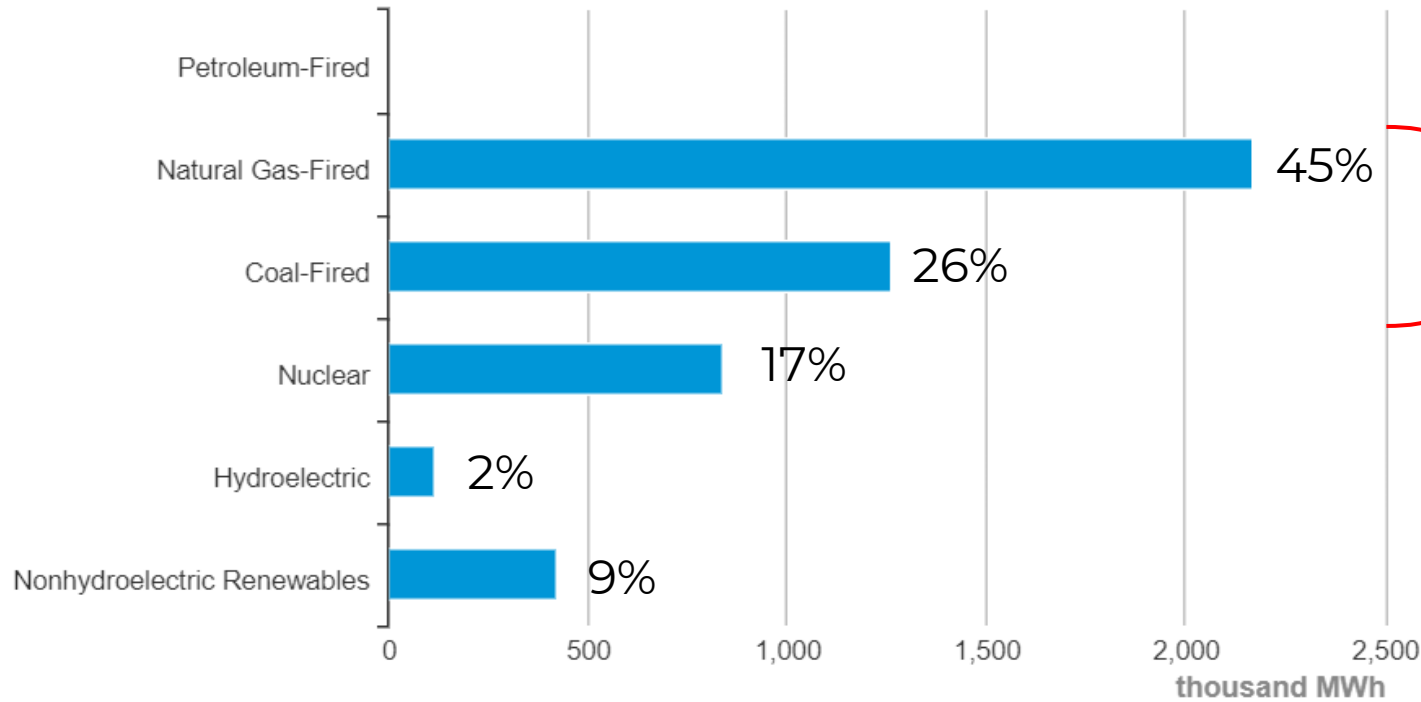


# Current energy sources for WI electricity



Consumption by Source	Consumption by Sector	Production	<b>Electricity</b>	Prices
-----------------------	-----------------------	------------	--------------------	--------

Wisconsin Net Electricity Generation by Source, Feb. 2024 [DOWNLOAD](#)



We all use electricity

71% from fossil fuels

WI has no fossil fuels

Emit greenhouse gases that cause climate change

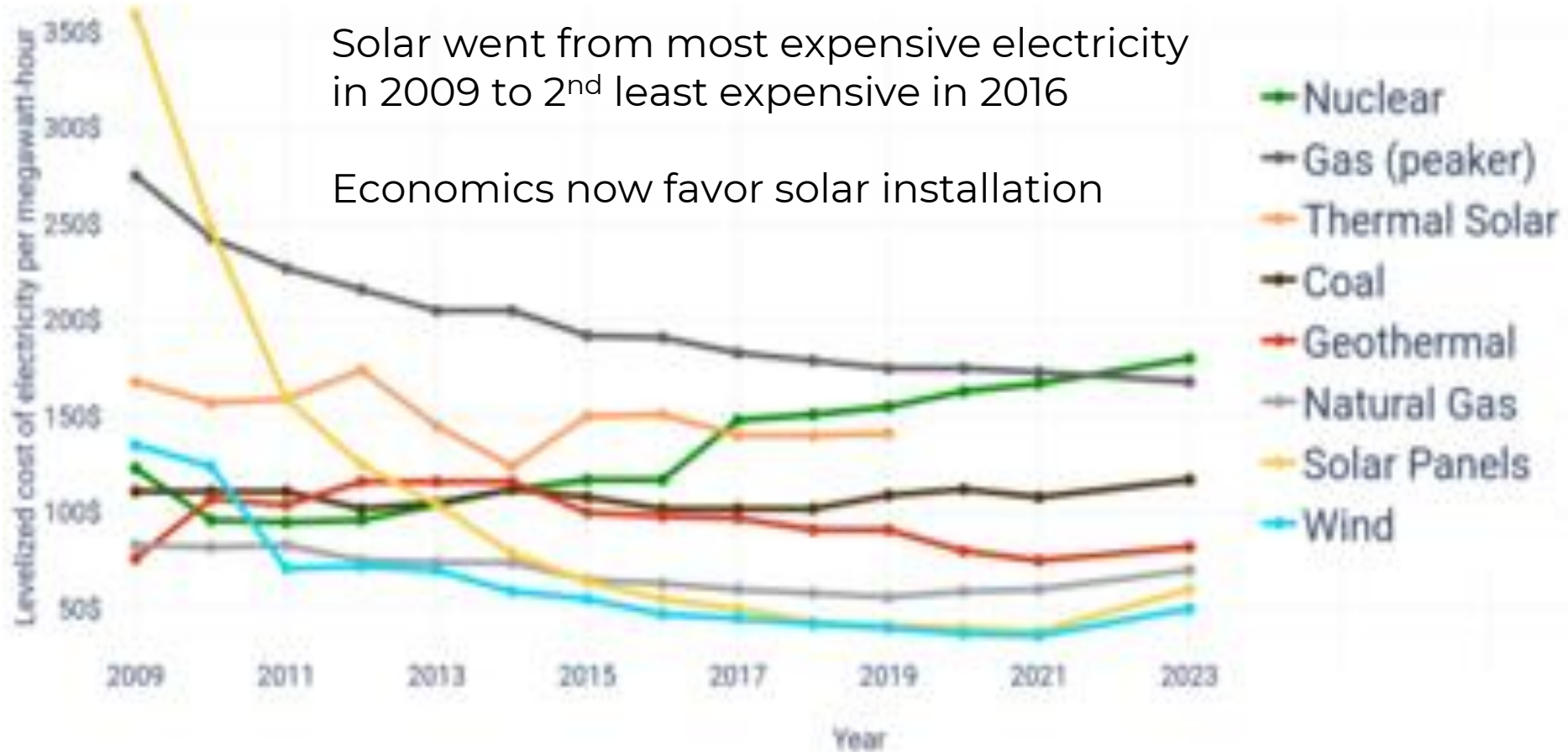
People of WI pay ~\$16 billion per year to import energy



Source: Energy Information Administration, Electric Power Monthly

# Costs of electricity production

Electricity costs according to data from Lazard



# Solar types

- **Community solar** is typically 5 MW (35 acres) or smaller
- MN adopted a law allowing locally-owned community solar in 2013
- MN has over 800 MW (~5600 acres) of community solar installed
- WI community solar bills have not gone forward. Utilities opposed.

Utility solar	Allowed by law? Profitable?
<del>Community solar</del>	<i>Allowed &amp; profitable</i>
Residential solar	<i>Only utility owned allowed</i>
Solar over parking lots	<i>No 3<sup>rd</sup> party financing; low kWh payments</i>
Commercial solar	<i>No 3<sup>rd</sup> party financing; low kWh payments</i>
Local government solar	<i>Profitable due to higher loads; good PR</i>
Solar on brownfields	<i>Allowed &amp; reduces costs</i>
	<i>Limited IRA incentives</i>



## Utility solar

- Commercial solar
- Residential solar
- Local government solar
- Solar over parking lots
- Solar on brownfields



City of Milwaukee former landfill

# Nexamp, Starbucks Partner on Illinois Community Solar Projects

By ~~Kimberly Warner Cohen~~ July 24, 2024



An Illinois Nexamp project currently in operation  
(Source: PRNewswire)

[Nexamp](#) is partnering with Starbucks, who as a long-term renewables purchaser is set to anchor the deployment of 40 MW across six Illinois community solar farms.

The solar projects are expected to serve 1,100 local residents subscribing within the ComEd and Ameren utility territories.

Construction and operation on these projects will include roles for participants in Nexamp's fellowship programs, created through

partnerships with organizations such as City Colleges of Chicago, the Chicago Urban League, Uplift Community High School, 22C and other Future Energy Jobs Act job training

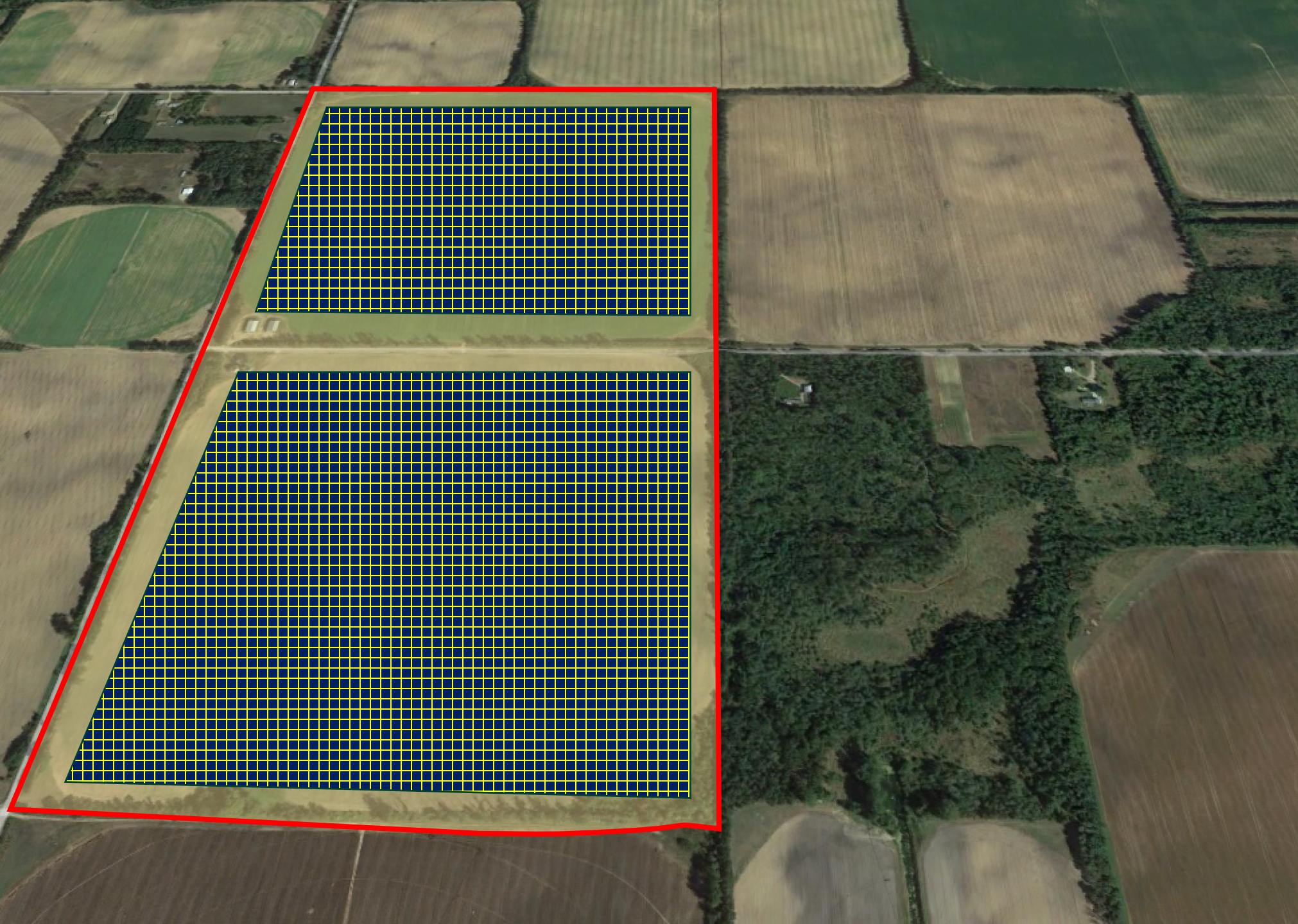
- Community solar allowed in IL
- 6 community solar farms averaging 50-60 acres each = 40 MW
- Starbucks is a partner to get renewable energy credits

## Wisconsin Annual Solar Installations



Current WI energy policies support utility solar  
They do not support community solar or residential solar





# Solar Energy

- 7 to 10 acres per MW
- 80 acres = 10 MW

# Direct Normal Solar Irradiance

National Solar Radiation Database Physical Solar Model

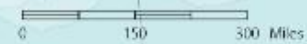
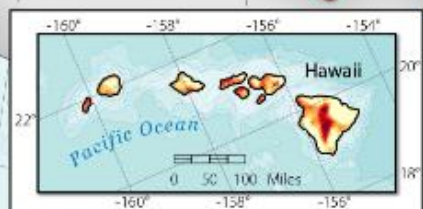
**Solar energy is nearly uniform across WI and Midwest**

**About the Data**

This map provides annual average daily total solar resource data using 1998-2016 data (PSM v3) covering 0.038-degree latitude by 0.038-degree longitude (nominally 4 km x 4 km).

For more information, visit: <https://nsrdb.nrel.gov>  
Email us at: [nsrdb@nrel.gov](mailto:nsrdb@nrel.gov)

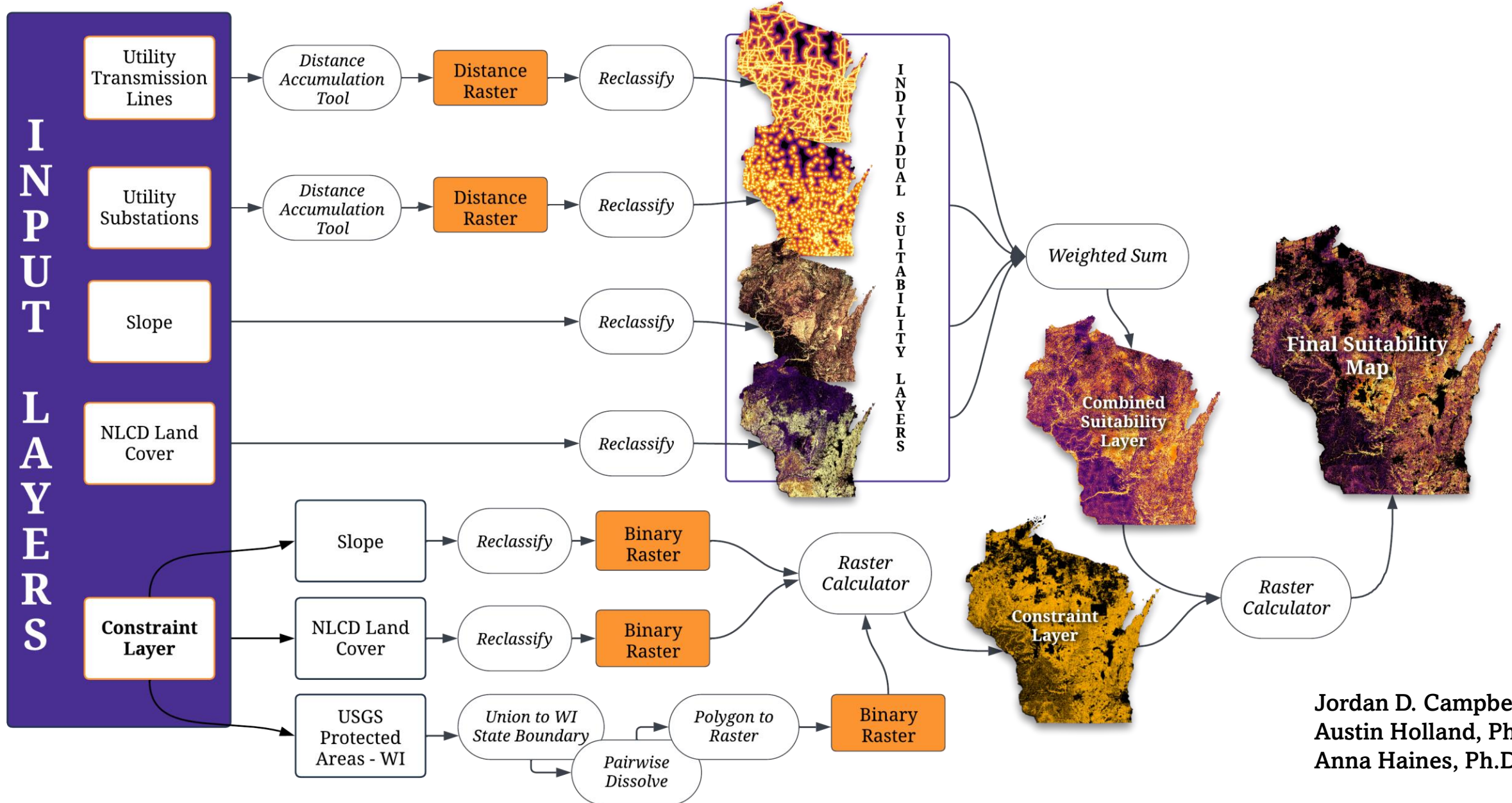
kWh/m <sup>2</sup> /Day
≥ 7.5
7.0 to 7.4
6.5 to 6.9
6.0 to 6.4
5.5 to 5.9
5.0 to 5.4
4.5 to 4.9
4.0 to 4.4
< 4.0



# What does utility solar look like?

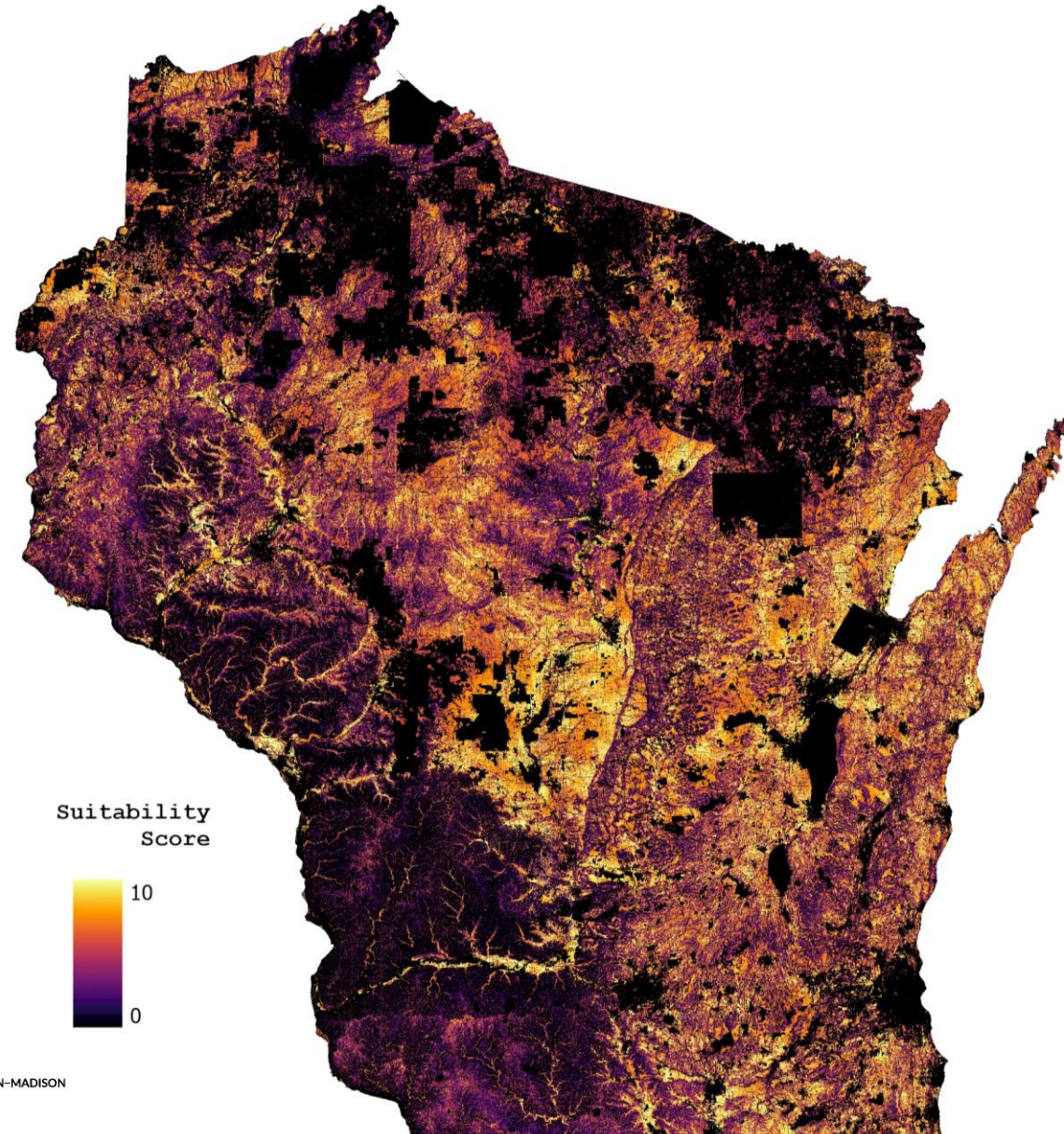


# Solar suitability analysis using GIS



Jordan D. Campbell  
Austin Holland, Ph.D.  
Anna Haines, Ph.D.

# Suitability Model | Results



Estimate

Further in-depth analysis is critical to determine true solar suitability at the local level

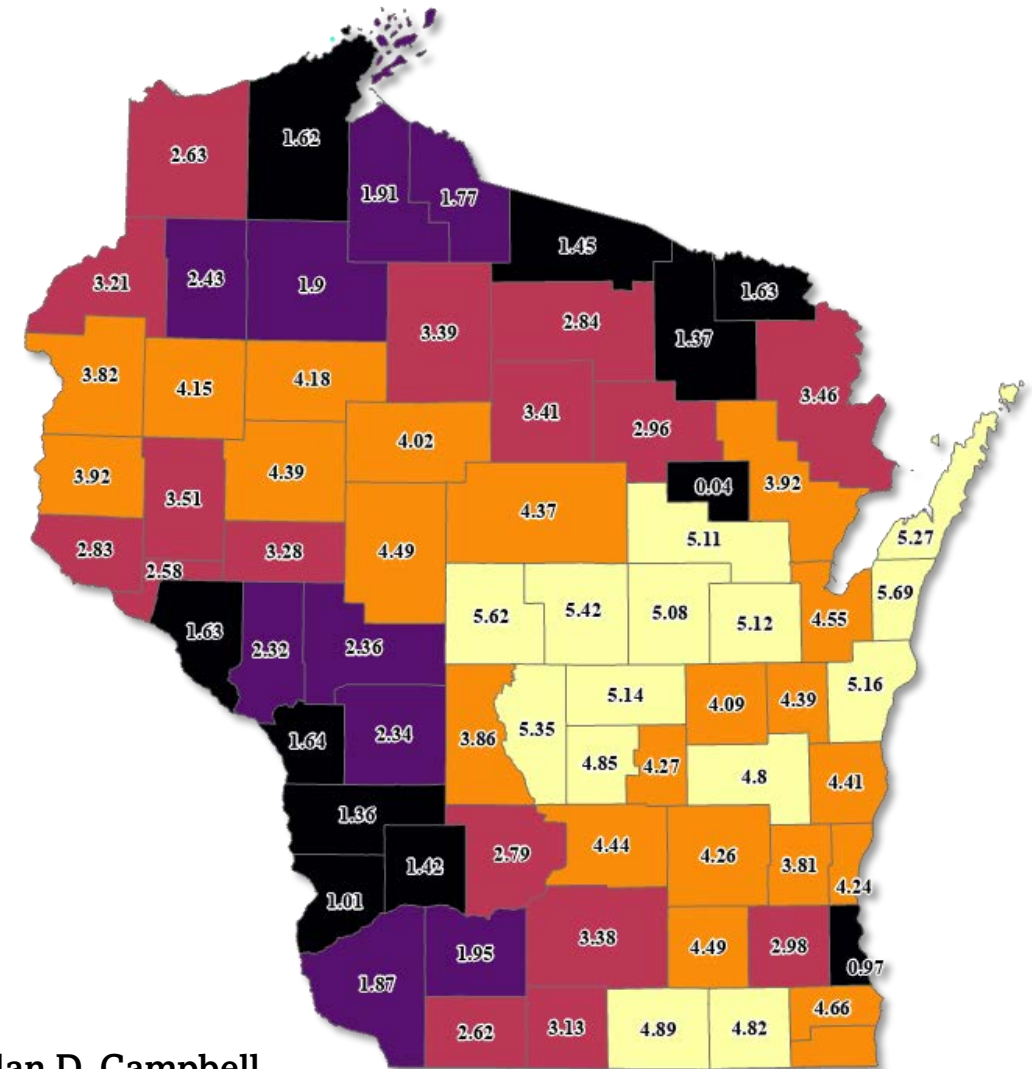
For example, consider cultural resources, threatened and endangered species, and local land use plans

Jordan D. Campbell  
Austin Holland, Ph.D.  
Anna Haines, Ph.D.

# Suitability Model | Results

**Table 6.** Summary statistics by suitability ranking for state of Wisconsin. Calculated using count of 30x30 meter raster cells in each suitability value category. With 7 acres of land needed to produce 1 megawatt (MW)<sub>[2]</sub>, Wisconsin has the potential to produce 303752 MW of energy according to the “highly suitable” (raster values 9-10) ranking of our model.

Suitability Ranking	Area in Sq Miles	Acres	Percent of Total Area (WI)	Megawatts
Not Suitable	2,480.48	1,587,510	4.43%	226,787.14
Less Suitable	11,123.77	7,119,210.29	19.88%	1,017,030
Moderately Suitable	6,465.14	4,137,691.5	11.55%	591,098.79
Suitable	8,476.41	5,424,901.4	15.15%	774,985.92
Highly Suitable	3,322.29	2,126,264.4	5.94%	303,752.1



Jordan D. Campbell  
Austin Holland, Ph.D.  
Anna Haines, Ph.D.

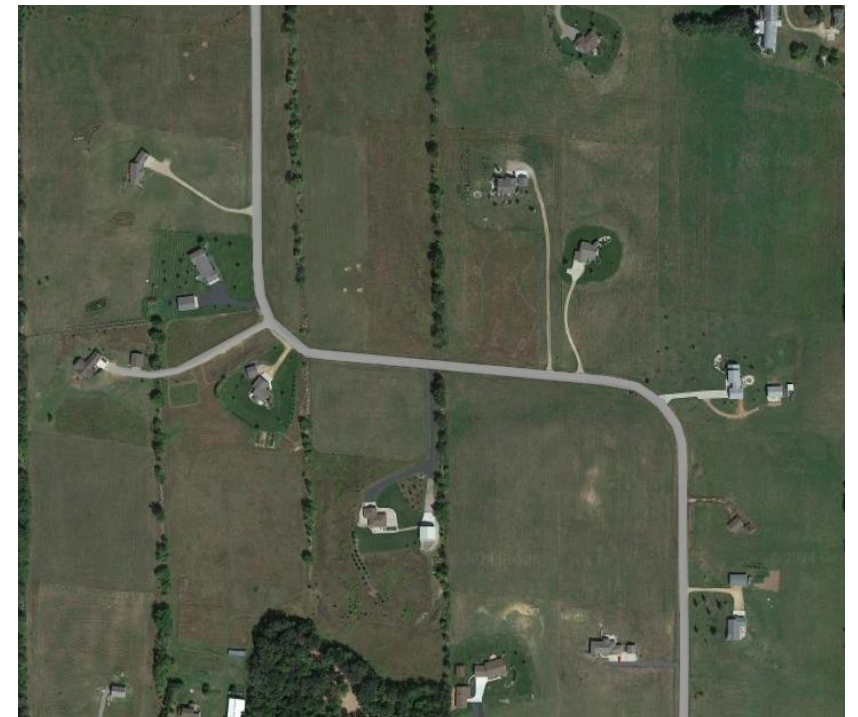
*Mean suitability score by county*

# Land use – solar and cropland








Why do solar developers often choose to locate solar panels on farmland?  
Answer in chat box.

In Wisconsin	
Harvested cropland	~9.2 million acres
Field corn	4 million acres
Field corn for ethanol used in vehicle fuel (energy, not food)	~1 million acres 11% of harvested cropland
Solar installed in 2024 (>50 MW)	~15,000 acres online or under construction (Vickerman, DEIS comments)
Solar to meet clean energy plan	240,000 – 285,000 acres 2 – 3 % of harvested cropland One-quarter as much land as being used for corn ethanol

Cropland acres are also reduced by residential, commercial and industrial development



# Energy generated per acre

Land use	Electricity generated <i>per acre</i> over 75 years	Electricity generated <i>per acre</i> over 25 years	Acres per GWh per year <sup>1</sup>	Reclamation options
 Solar	<b>25.00 GWh</b>	8.33 GWh	3 ( <i>perpetual</i> )	Remove panels or dual-use <sup>2</sup>
 Nuclear (mining)	16.66 GWh	16.66 GWh	0.06 ( <i>only once</i> )	Very high cost (radioactive)
 Coal (mining)	11.11 GWh	11.11 GWh	0.09 ( <i>only once</i> )	Costly (<15% reclaimed)
 Wind	2.90 GWh	0.96 GWh	26 ( <i>perpetual</i> )	Remove turbines or dual-use <sup>2</sup>
 Hydro	2.50 GWh	0.83 GWh	30 ( <i>perpetual</i> )	Drain dam + restoration
 Biomass	0.40 GWh	0.13 GWh	188 ( <i>perpetual</i> )	Replant trees
 Corn ethanol	1.78 GWh	0.60 GWh		

Sources at <http://fep.link/g104>

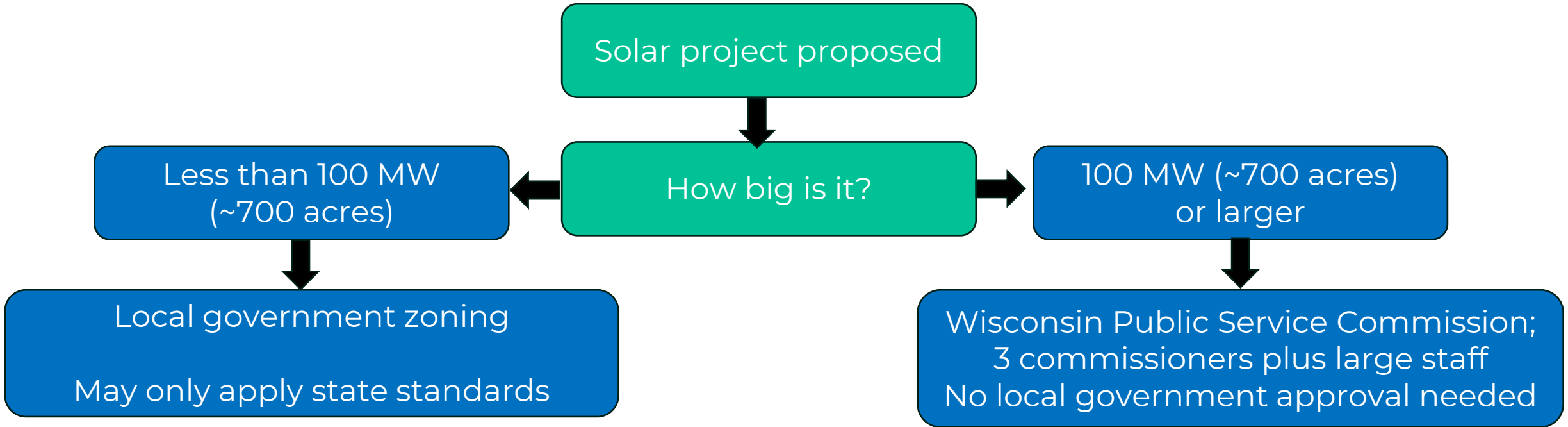
GWh is the same as a million kilowatt hours | <sup>2</sup> reclamation may not be necessary because land can be simultaneously used for other purposes  
 ata was gathered from multiple sources and studies. It was normalized here to be illustrative. Actual project land use varies widely by geography.



# Solar payments to local govts

- In Wisconsin, owners of solar farms greater than 50 MW (~350-500 acres) pay annually into a utility aid fund which is shared with the local governments where the solar farm is located. Annual payment rates are:
  - **\$2,333** per MW to the county
  - **\$1,667** per MW to the township(s)
- These same solar farms are exempt from local property taxes.

# Who makes decisions on large solar projects?



# Local government regulation of solar energy systems

Solar energy system with generating capacity of 100 megawatts or more: **No local jurisdiction** (196.491(3)(i))

For solar energy systems between 300KW and 99 MW, a local jurisdiction can require zoning approval as follows:

**No local government may place any restriction**, either directly or in effect, on the installation or use of a solar energy system **unless** the restriction satisfies one of the following conditions:

1. Serves to **preserve or protect the public health or safety**
2. Does not significantly increase the cost of the system or significantly decrease its efficiency
3. Allows for an alternative system of comparable cost and efficiency (66.0401(1m))

**Beyond these, no other restrictions are allowed.** (*Numrich v. City of Mequon*)

# Requirements used by WI Public Service Commission

(d) Except as provided under par. (e), the Public Service Commission shall approve an application filed under par. (a) 1. for a certificate of public convenience and necessity only if the commission determines all of the following:

4. The proposed facility will not have undue adverse impact on other environmental values such as, but not limited to, ecological balance, public health and welfare, historic sites, geological formations, the aesthetics of land and water and recreational use. In its consideration of the impact on other environmental values, the commission may not determine that the proposed facility will have an undue adverse impact on these values because of the impact of air pollution if the proposed facility will meet the requirements of ch. 285.

6. The proposed facility will not unreasonably interfere with the orderly land use and development plans for the area involved.

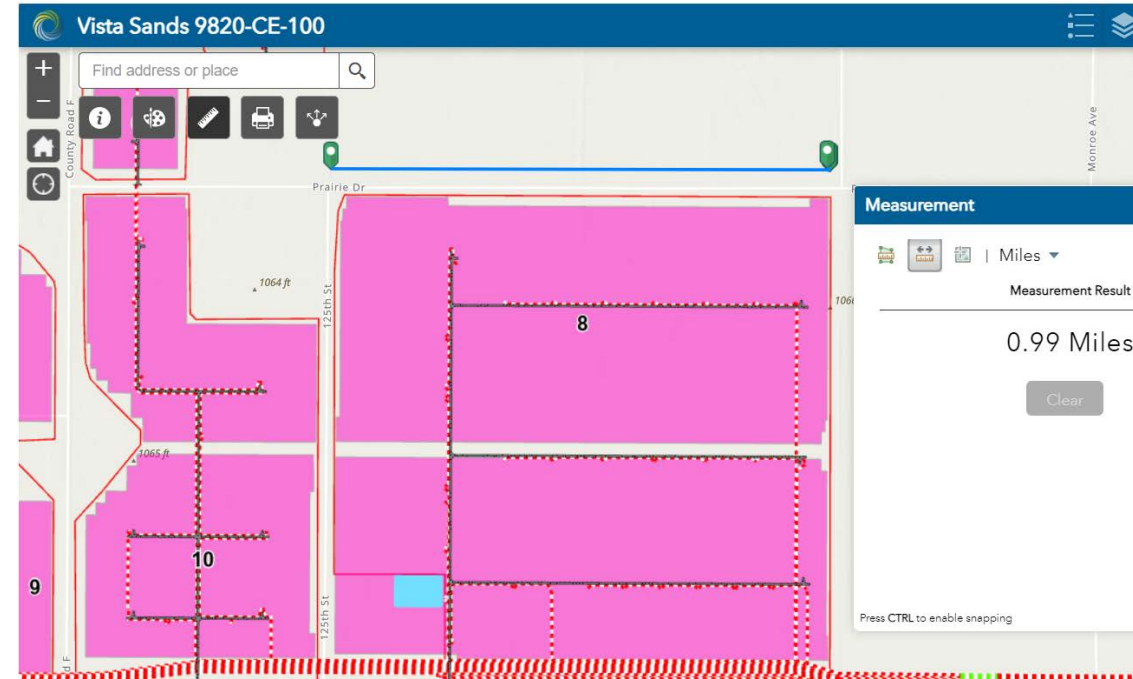
• Wis. Stats. 196.491(3)(d)

Will the WI Public Service Commission give weight to local government land use plans?

Not so far. No land use planners on PSC staff, and no (few?) staff recommendations related to land use plans. Will this change with new PSC commissioners?

# Joint development agreements (JDAs)

- JDAs between solar developer and local governments are **sometimes** signed. Can outline expectations for all. Not required for PSC approval.
- **JDAs may include:**
  - **Road use, weights, repair and payment**
  - **decommissioning financial assurances and timeline**
  - shared revenue payments, defined by WI Statutes
  - Setbacks, fencing height and length, vegetation management
  - Cooperation clauses where local governments agree to not oppose a solar project during permitting by the PSC in exchange for benefits of JDA
- JDA does **not** address location of solar project; which land solar arrays will be built on

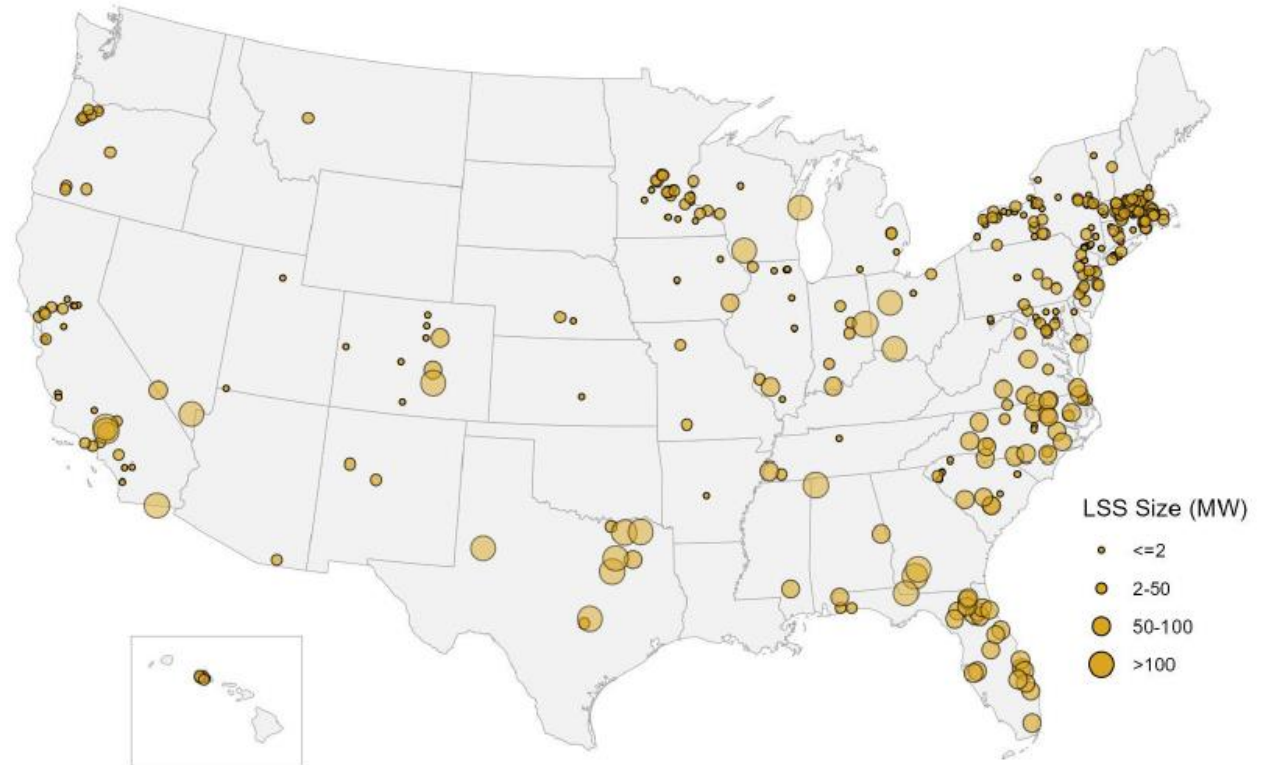


# Public participation & perceptions in solar projects

## Poll 2

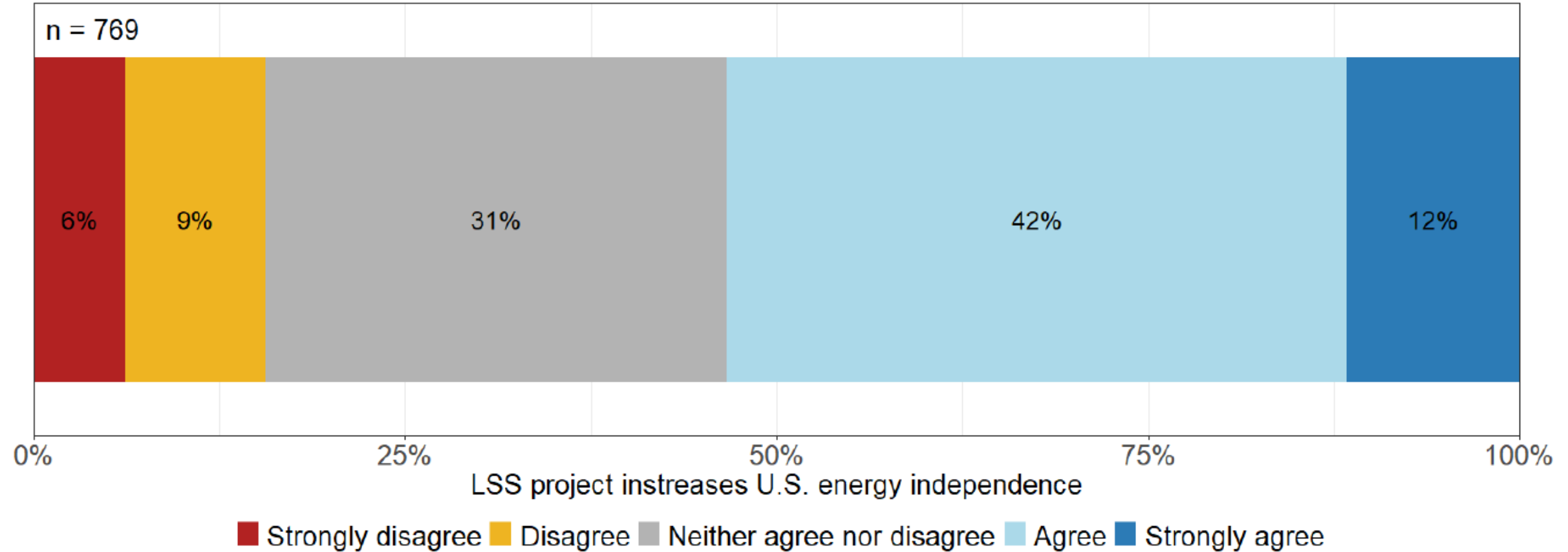


National survey that included 984 people who live within 3 miles of large-scale solar, defined as 1MW or larger

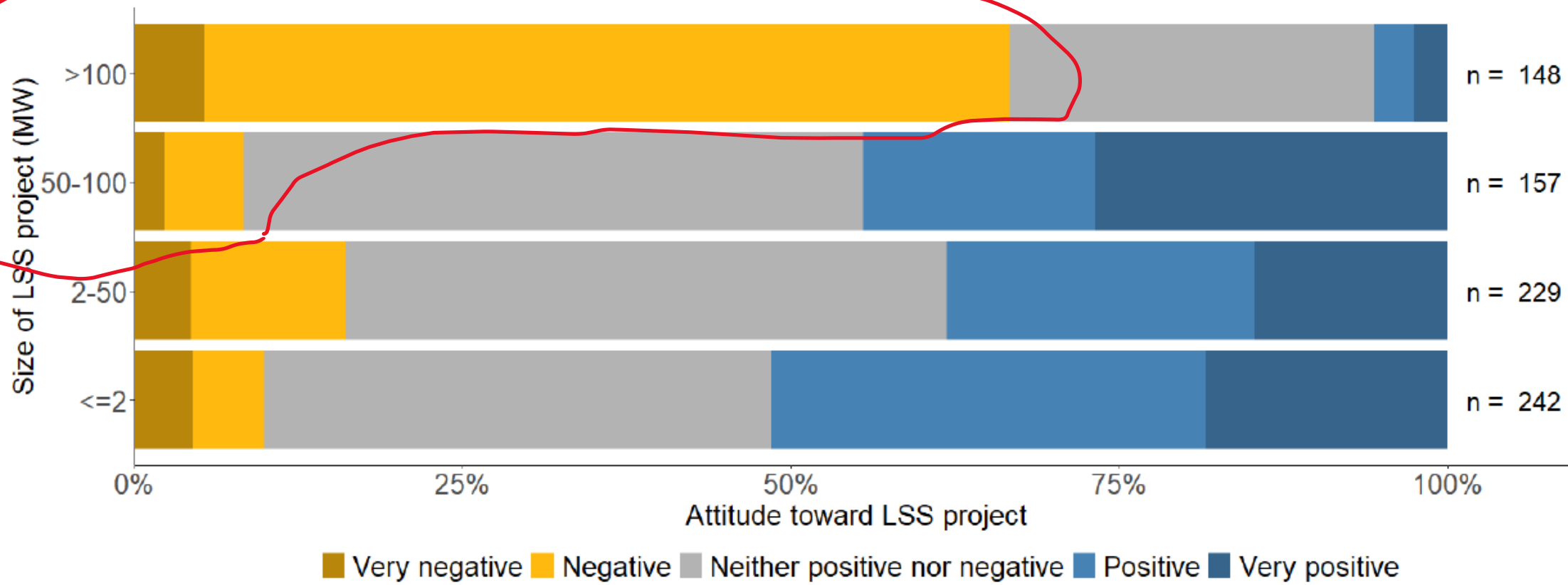


# Most agree that the LSS project increases American energy independence

The solar project increases American energy independence



# Very large (>100 MW) projects elicit substantially more negative attitudes compared to smaller and mid-sized projects



Polychoric Correlation: **-0.20** (weak)

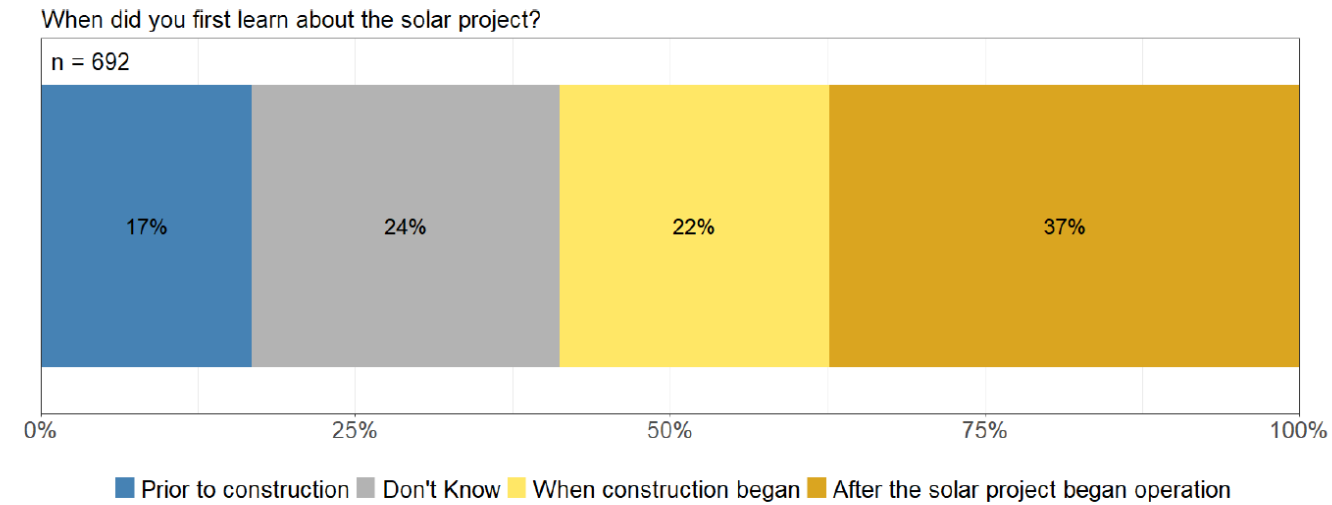
Attitudes around largest projects (>100 MW) are roughly 12:1 *negative to positive*, compared to:

- 5:1 positive to negative for 50-100 MW projects
- 2:1 positive to negative for 2-50 MW projects
- 5:1 positive to negative for 1-2 MW projects



- Solar developers in WI vary greatly in engaging the public:
  - Some have local staff who keep the public informed, answer questions from local residents, and make changes to projects based on public input
  - Others do not have local staff, and information and answer to questions are hard to get; then local residents and governments have little influence
- Difficult for decision-makers (PSC) in WI to engage residents near projects 100 MW or more because PSC is located in Madison, and local governments don't decide
- PSC staff hold one local public hearing near the proposed solar site late in the process. PSC commissioners don't attend; public hearing transcript is given to them.

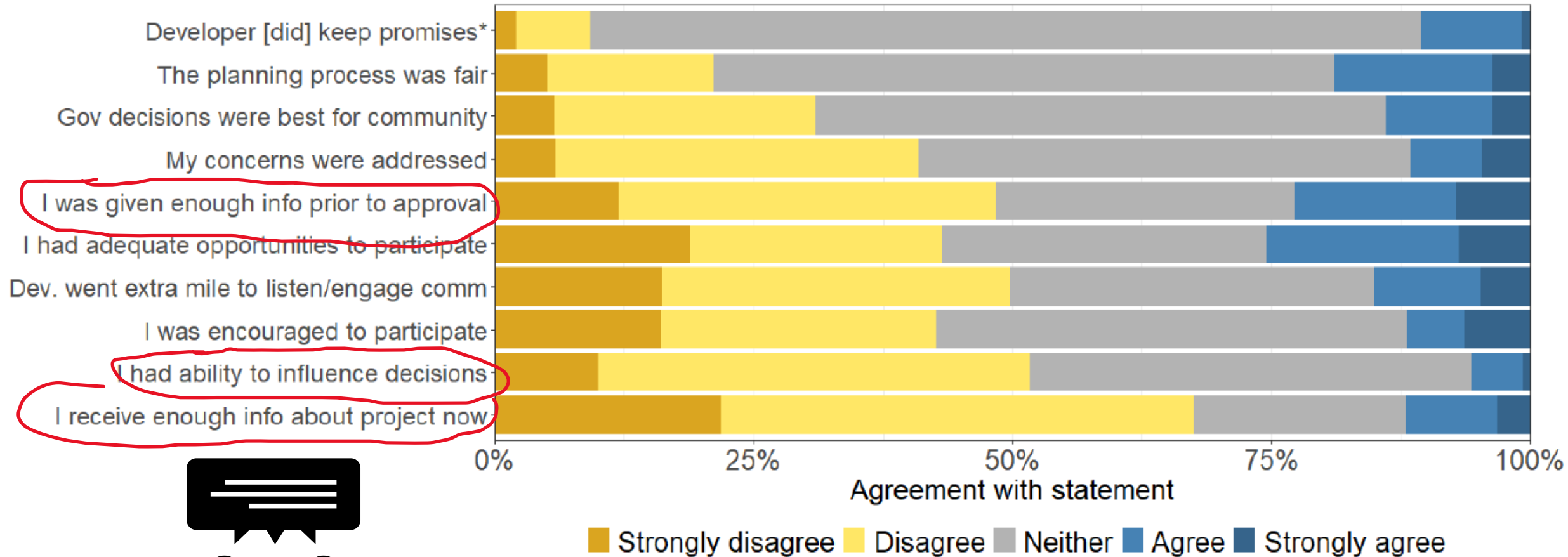
**Only 17% of respondents were aware of the project prior to construction, suggesting room for improvement in planning & community engagement**



Note: Excludes those who moved into the area after project construction

# There are numerous opportunities to improve participation, information provision, and fairness. Respondents want more information about the project after it is constructed

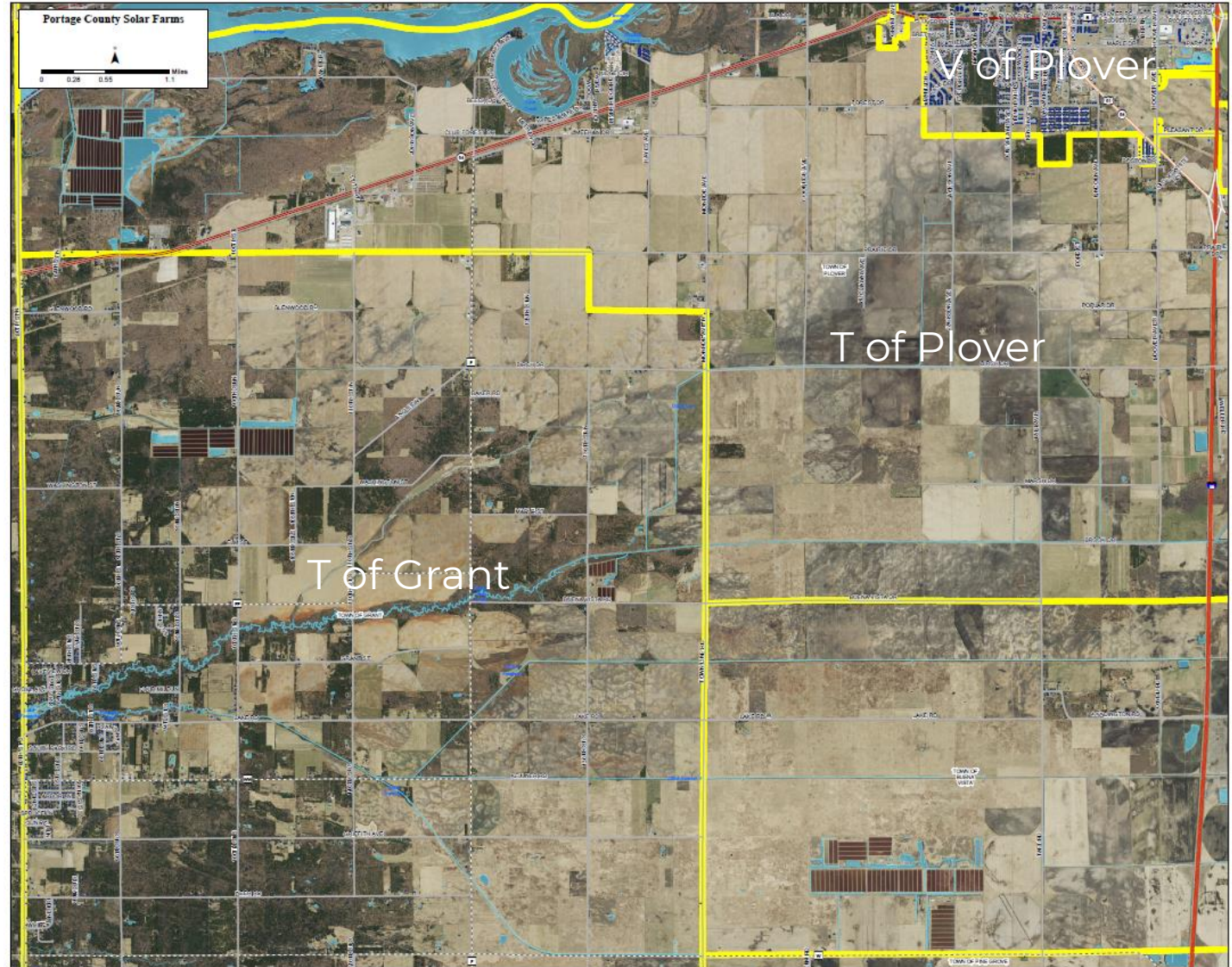
Perceptions of planning process fairness (n = 306-316)



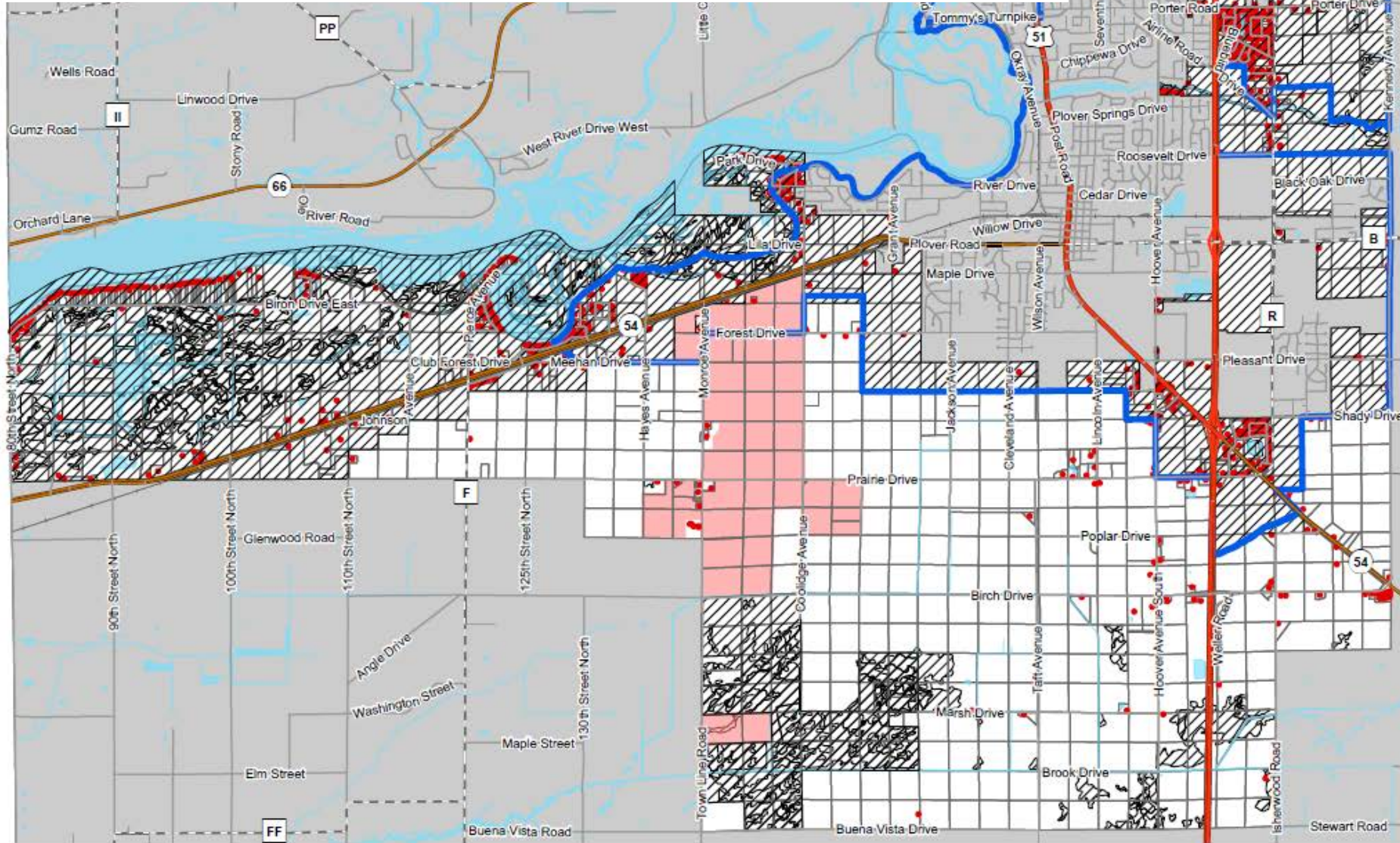
\* This item was reverse-coded from how it appeared in the survey instrument to aid interpretation

# Southwest Portage County

- Mostly rural towns
- Lots of agricultural land
- Central Sands with many center pivots
- Wisconsin River, trout streams, and wetlands
- Public and wooded land in the south
- Large transmission line runs along Hwy 54

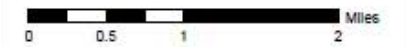


- Potential Future Solar Area for 100 MW or greater (white)
- Areas Excluded from Solar Energy Projects (hatched) include:
  - 20-year planning boundary of city urban area sewer service plan
  - Industrial/commercial area with infrastructure



Map 8.2A  
Future Land Use Regarding  
Solar Projects 100 MW or Greater

- ▨ Areas Excluded From Solar Energy Projects
- Potential Future Solar Area
- Sewer Service Area Boundary
- ▭ Existing Solar Project Boundary
- Structure Locations



Source: Town of Plover (2023)  
Portage County Planning & Zoning (2023)

Adopted:

## Town of Plover Comprehensive Plan



Portage County  
Planning & Zoning  
1462 Strongs Ave.  
Stevens Point, WI 54481

# T of Grant solar overlay

July 2023 – February 2024

- Portage Solar (2100 ac) already approved by PSC
- Town heard many landowners (1000s of acres) had signed solar leases for a new project (Vista Sands)
- Town of Plover had already adopted solar overlay
- Try to do something so Town of Grant has a say?
- Requested assistance from Extension & T of Plover
- Held Town meeting in Grant about developing a solar overlay map to take to PSC to show the town's wishes; Town residents voted unanimously to develop map
- T Plan Commission & public developed solar overlay map and rationale based on many discussions over 8 months, July 2023 - Feb 2024
- Map & rationale are part of Town Comprehensive Plan – a guidance document, not a regulation
- Not specific to Vista Sands; applies to all future solar
- First solar overlay map adopted unanimously by T Board, Oct 2023 and approved by Po Co Bd
- Second solar overlay map adopted unanimously by Town Board Feb 2024, not approved by County Board

# T of Grant solar overlay

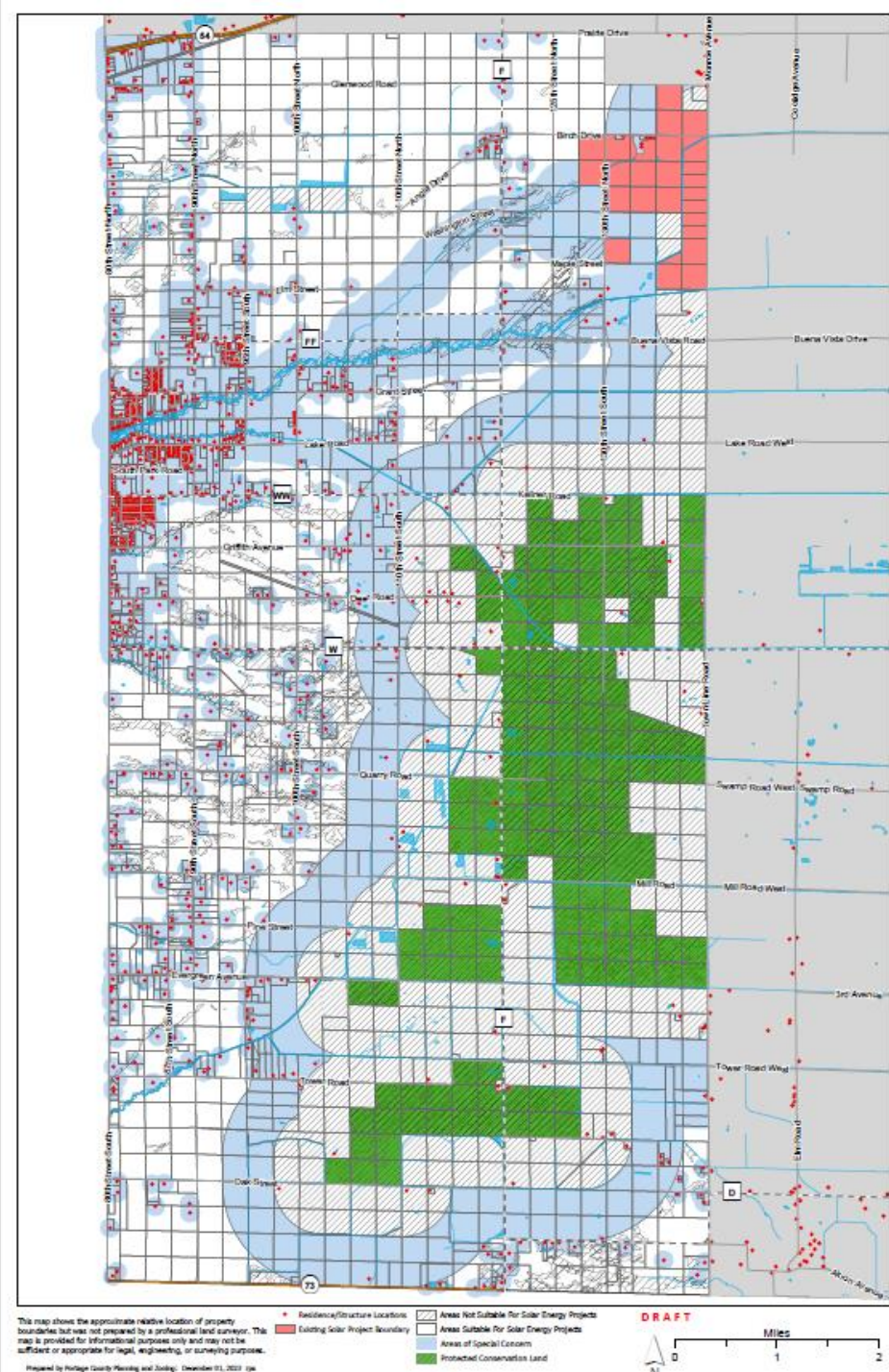
Why?

- Protect their rural area and way of life
- Protect grassland species including Greater Prairie Chicken
- Protect wildlife corridors along trout streams/ditches
- Protect homeowners adjacent to proposed solar projects

# T of Grant solar overlay

## Rationale

- Areas **suitable** for solar energy system projects (white)
- Areas **not suitable** for solar energy system projects (cross hatch)
  - Buena Vista Wildlife Area (green) and  $\frac{1}{2}$  mile buffer around perimeter: Greater Prairie Chickens known to nest up to 1 mile from wildlife area
- Setbacks from trout streams for wildlife corridors
- 150-foot-wide natural vegetative adjacent to non-participating landowners with structures

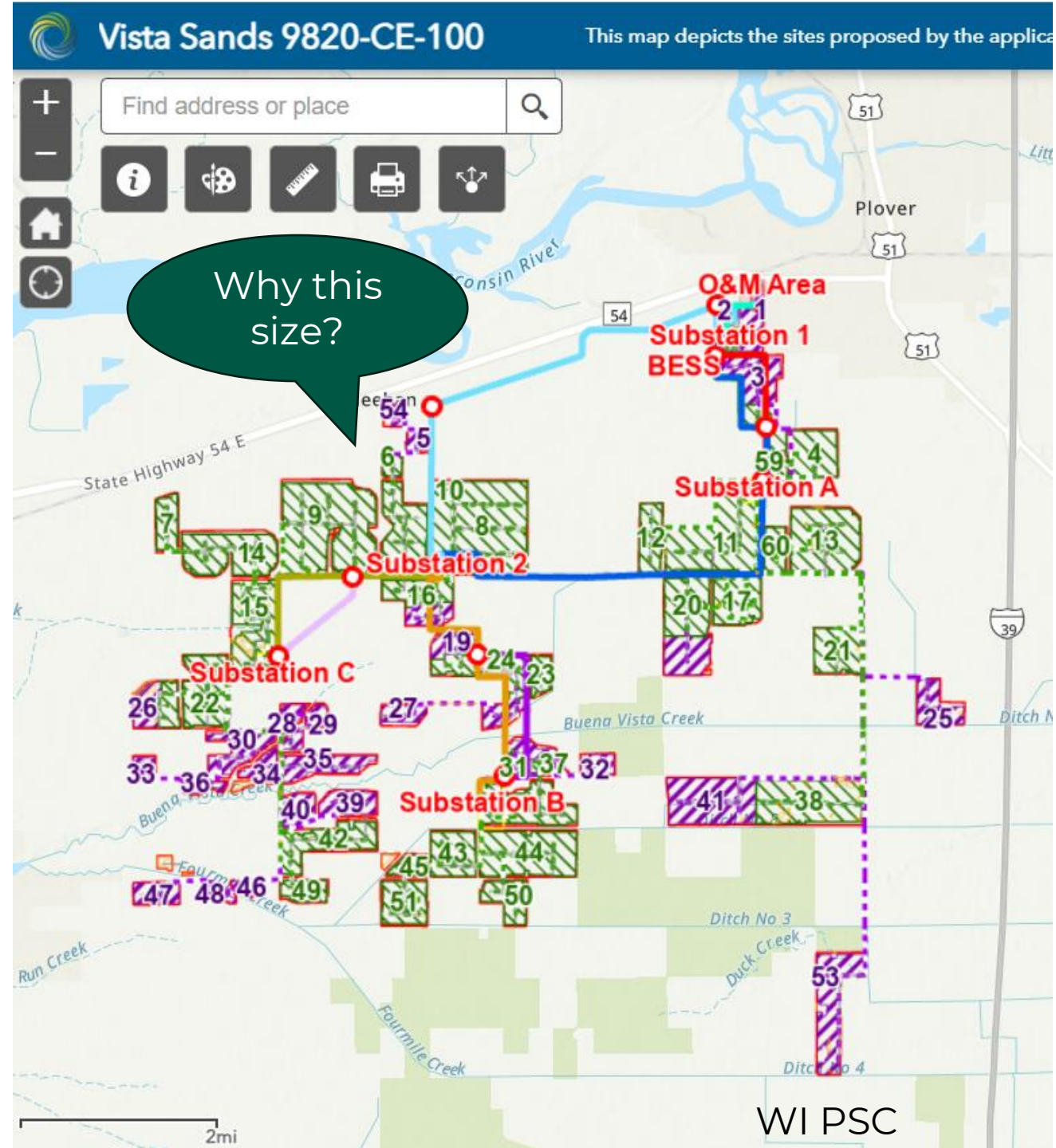


# Vista Sands Solar, LLC

- Applied to the PSC in Jan 2024
- 1300 MW = 4 times larger than largest solar project in WI
- Primary solar array areas proposed as 6,737 acres (10.5 square miles, hatched green)
- Alternate areas are 3,012 acres (4.7 square miles, hatched purple)
- **Abutting and intermingled with the state Buena Vista Wildlife Area** (solid light green)

The project includes:

- Solar panels with 7-foot fences around each solar array
- 300 MW battery energy storage system
- approximately 120 miles of underground collector circuits
- five substations
- four to five miles of 345 kV transmission line





# Vista Sands Proposal/Application

Vista Sands Solar Project  
PSC Docket #9820-CE-100

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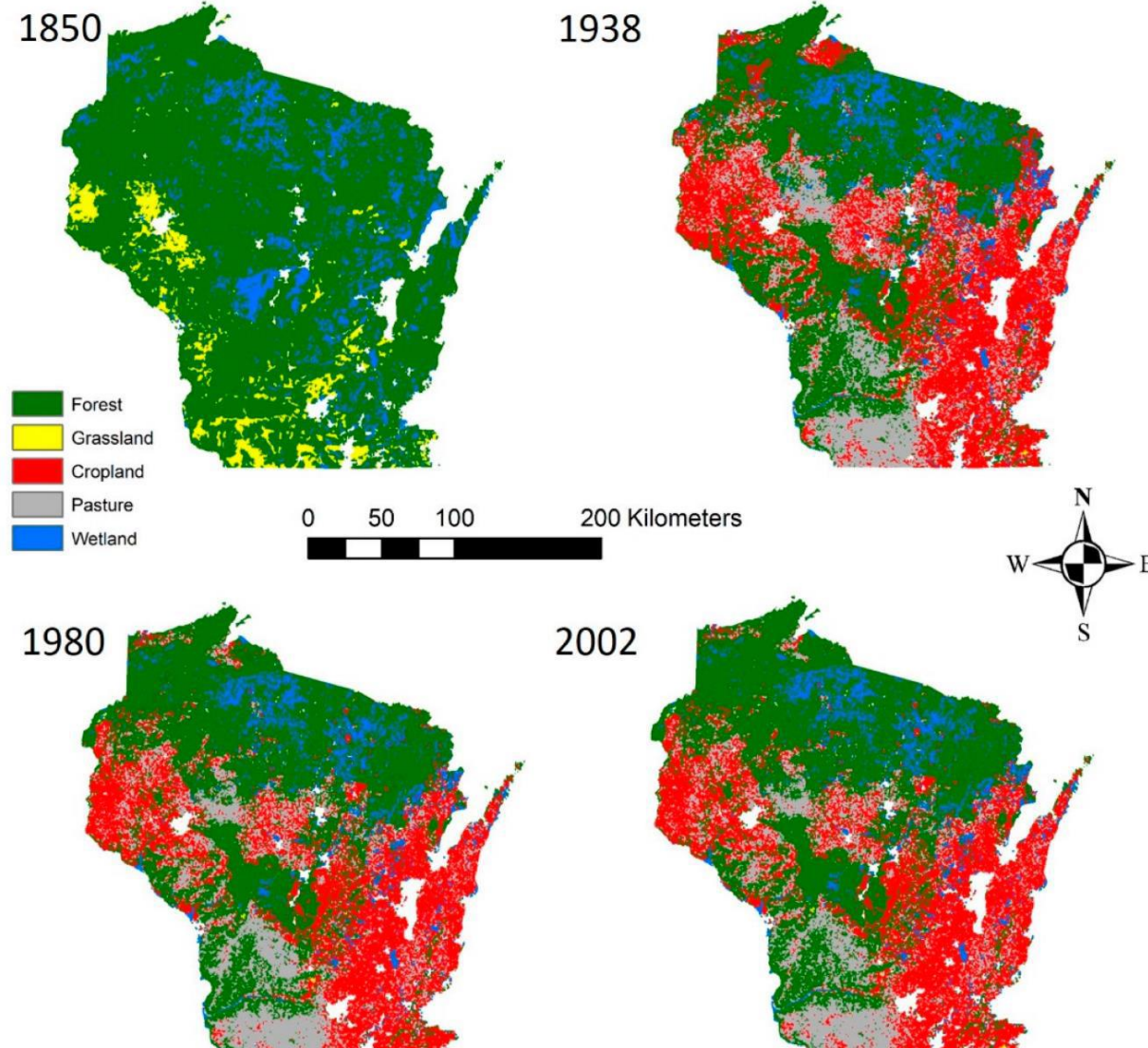
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Vista Sands Solar Project  
PSC Docket #9820-CE-100

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- Plus appendices A-Z, AA, BB

# Most of WI's grasslands have been lost



# Buena Vista Wildlife Area



Buena Vista Wildlife Area is a 12,700-acre property located in southwestern Portage County.

In the mid-1950s, a successful partnership among the DNR, Dane County Conservation League and the Prairie Chicken Society was created to purchase land specifically for the management of grassland habitat for the greater prairie chicken, a state threatened species in Wisconsin, and other grassland-dependent species. It is home to the largest concentration of greater prairie chickens in Wisconsin and represents one of the most extensive grasslands east of the Mississippi River. The property harbors a healthy population of other important grassland bird species including: Henslow sparrows (state threatened species), short-eared owls, upland sandpipers, northern harriers, bobolinks and eastern and western meadowlarks, to name a few.

# Prairie chickens are celebrated: Festival started in 2006

## 2024 Wisconsin Prairie Chicken Festival, April 8 - April 14

2024 Wisconsin Prairie Chicken Fest...

[Home](#) [Vendors](#) [Silent Auction](#)

### Monday, April 8

- Movie • [Carbon Cowboys](#) • [McMillan Library](#) • 1:30 pm & 6:00 pm

### Saturday, April 13

- Birding Tour by Bus 6:00 am • [Eron Event Barn](#) • Guided by Susan Vos and Stan Skutek (**tour is full**)
- Prairie Chicken Viewing: before 4:00 - 8:00 • [Paul J. Olson and Buena Vista](#) (**blinds are full**)
- Breakfast 7:30 am - 10:00 • [Eron Event Barn](#)
- Morning Speakers - 8:30 to 10:30
  1. Farmers of Mill Creek: Members of the group will discuss their role in managing the PJO Wildlife area.
  2. Live kestrel presentation - Amber Eschenbach
  3. Audubon Society: New Programs available – Ashley Steinke
  4. GPC population update – Lesa Kardash
  5. Natural Resource Education – Dan O’Connell and Tracy Arnold
- Vendors: Nature Artists and Conservation Organizations
- Kids Activities – fun for all ages!
- Silent Auction
- Keynote Speaker: Dr. George Archibald, Co-Founder of The International Crane Foundation • [McMillan Library](#) • 3:00 to 4:30 pm

### Sunday, April 14

- Prairie Chicken Viewing before 4:00 - 8:00 • [Paul J. Olson and Buena Vista](#) (**blinds are full**)



OUTDOORS

# A massive proposed Wisconsin solar farm could wreak havoc on threatened prairie chickens

*The 8,500-acre facility in Portage County would encroach on the Buena Vista State Wildlife Areas, home to most of the threatened birds in the state.*



**Paul A. Smith**

Milwaukee Journal Sentinel

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WI Wildlife Federation: "You know well the fragility of the prairie chicken population in the state. Buena Vista is the key property with 60 to 70% of the state's population but the species has trended downward and is heading towards its survival tipping point."

# Smith: Final Environmental Impact Statement cites risks to prairie chickens future

*A final Environmental Impact Statement on a proposed solar farm fails to provide adequate protection for prairie chickens in Portage County.*



**Paul A. Smith**

Milwaukee Journal Sentinel

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Male prairie chickens dance at Buena Vista Wildlife Area in central Wisconsin. *Paul A. Smith*

The prairie chicken generally stays away from trees, fences, towers and other human-built structures. The behavior is partly a survival instinct since hawks and other avian predators roost on such high points.

As a result the Wisconsin Wildlife Federation said in its testimony the "best available scientific research would indicate that there should be a minimum of a one-half mile setback of the solar arrays from the grassland habitat on the Buena Vista Wildlife Area and a minimum of a one-mile distance between the solar arrays and (prairie chicken) leks."

# Vista Sands Proposal

- Filed with the PSC in Jan 2024
- Many public questions and comments submitted about environmental impacts led the PSC and DNR to draft Environmental Impact Statement (EIS), released in April 2024
- Final EIS (170 pp.) at <https://apps.psc.wi.gov/ERF/ERFview/view/doc.aspx?docid=508693>

In May 2024, groups represented by attorneys (intervenor) started to present testimony and rebuttal before an administrative law judge:



Testimony covers many topics, including multiple PhD wildlife biologists summarizing over 200 research studies about prairie chickens. Will likely continue into Sept 2024.

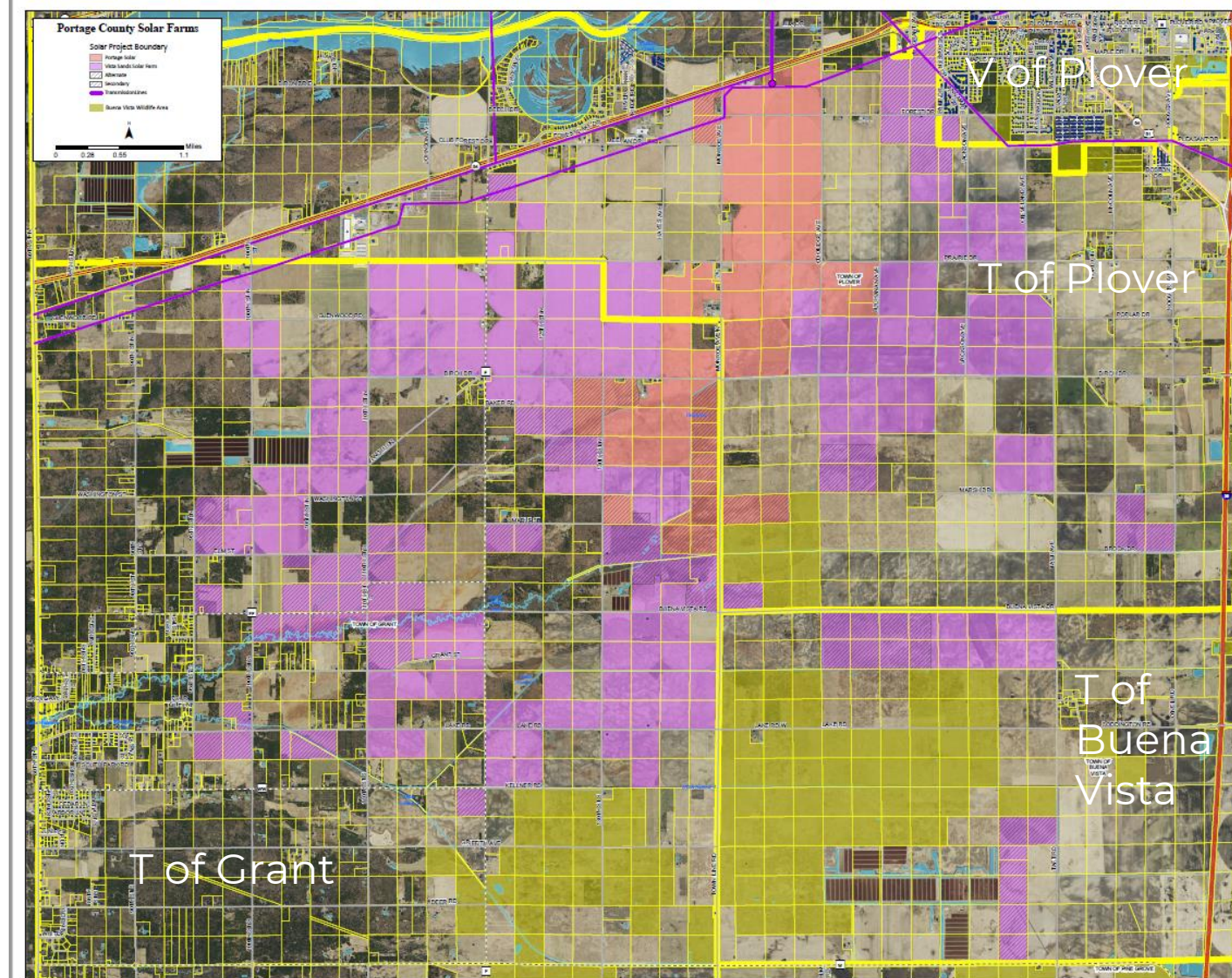
The PSC will receive:

- the legal record from the administrative law judge, and
- the final EIS with staff recommendations.

PSC decision by January 2025

# Southwest Portage County

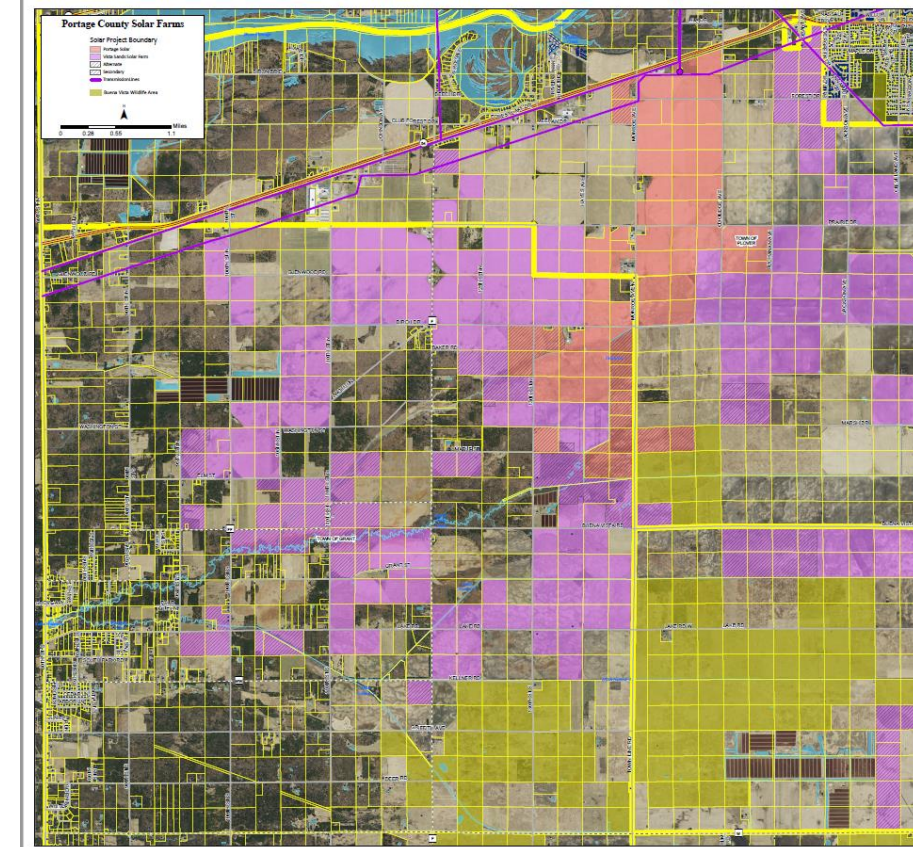
- State Buena Vista Wildlife Area shown in yellow
- Portage Solar – 250 MW
  - 2,167 acres
  - Approved by PSC in April 2023
- Vista Sands Solar – 1,300 MW panels + 300 MW batteries
  - 6800 acres
  - Submitted to PSC January 2024. Decision by Jan 2025.





# Wrap up

- **A lot of change** and potential change to this rural community since 2022 when Portage Solar was proposed
- Some local residents say these large solar proposals came very quickly (over 15 square miles leased for Vista Sands) and they were blindsided
- For most development projects, developers plan for years, and then community/local governments are surprised when proposal is announced
- Due to this, as land use professionals, we encourage communities to develop comprehensive plans to state and guide the future they want – agree ahead of time. Use strong language so it's meaningful.
- Towns of Grant and Plover updated their plans in 2018 and 2021, respectively, but didn't include solar. Little utility-scale solar in WI at that time. Other issues and priorities.
- **But, what weight, if any, will PSC give to local land use plans when deciding on locations for large solar projects?**



# Wrap up

- To address climate change we need renewable energy and energy conservation to reduce GHG emissions.
  - ~260,000 acres needed; 3% of harvested cropland
- WI policies do not allow or favor rooftop or smaller solar projects. To increase smaller solar:
  - Set high statewide standardized net metering limits (5 MW like Minnesota)
  - Clearly allow third party ownership of solar
- Local government has no jurisdiction for solar projects over 100 MW; very limited conditions for smaller projects
- No limit on amount of land in a town or county that can be approved for solar
- Joint Development Agreements between solar developer and local governments are sometimes signed which address road costs, decommissioning, etc.
  - JDA does not address location of solar project
  - JDA not required for PSC approval



# What say should local government have in large solar projects?

## What we know

- Local government gives people where a large solar project is proposed an opportunity to meet in open meetings, reach agreement/majority vote to develop solar overlay map & rationale as part of their comprehensive plan
- What weight, if any, will the PSC give to local plans?
  - Little to no weight given to local plans for 14 solar projects permitted by previous PSC
  - PSC does not have land use planner to review local plans; summary of plans sometimes inaccurate. No staff recommendations.
- Should solar developers be allowed to ignore locals and just look at a map and site a solar farm based on available capacity on the electric grid?

## Ideas for moving forward

- PSC or DOA could have a land use planner compare solar project footprints and local land use plans for conflicts early in the process (before obtaining landowner leases)
- Solar projects and landfills are essential needs
- For landfills, WI law describes a negotiation process between local governments and landfill developers, 289.33 Stats.
  - Local govts cannot say “no” if state feasibility study says landfill is needed
  - Most topics can be negotiated
  - Funding for local govts to hire technical experts
- Similar to Wind Energy System rule (PSC 128), consider adopting specifics related to solar energy systems

# Webinar resource page

- Slides
- **Webinar recording** will be posted in a few days
- **Regulation of solar generation facilities**, WI Legislative Council, 2024. Includes flow chart for PSC solar approvals.  
[https://docs.legis.wisconsin.gov/misc/lc/information\\_memos/2024/im\\_2024\\_01](https://docs.legis.wisconsin.gov/misc/lc/information_memos/2024/im_2024_01)
- **WI Public Service Commission Docket Search**, including by keyword.  
<https://apps.psc.wi.gov/APPS/dockets/>
- **WI Public Service Commission Highlighted Construction Cases.**  
<https://psc.wi.gov/Pages/CommissionActions/HighlightedCases.aspx>
- **Perceptions of Large-Scale Solar Project Neighbors: Results From a National Survey** <https://emp.lbl.gov/publications/perceptions-large-scale-solar-project>

*Thank You!*

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Poll 3



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