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Planning & Zoning for Solar Energy Development in Michigan

September 2018

MICHIGAN STATE UNIVERSITY | Extension

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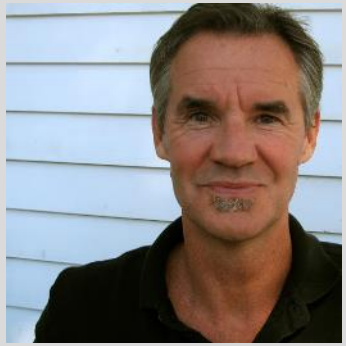

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Thank You to Our Sponsor!

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Handouts

- PowerPoint handout
- Planning and zoning for solar energy readiness: A hot proposition. MSUE News. February 11, 2015.
- Solar Energy. *Planning & Zoning News*. Vol. 36(4)
- Solar Planning Flowchart
- Community Energy Management Best Practices
- *Spartyville* Exercise handouts
- Evaluation; Civil Rights sheet (please return)

What We Will Cover

A. Introduction to Solar
B. The Public Policy Context
C. Types of Solar
D. Planning Approaches
E. Zoning Tools
F. Lead by Example
G. Next Steps
H. Additional Resources

A. Introduction to Solar

What is solar energy?

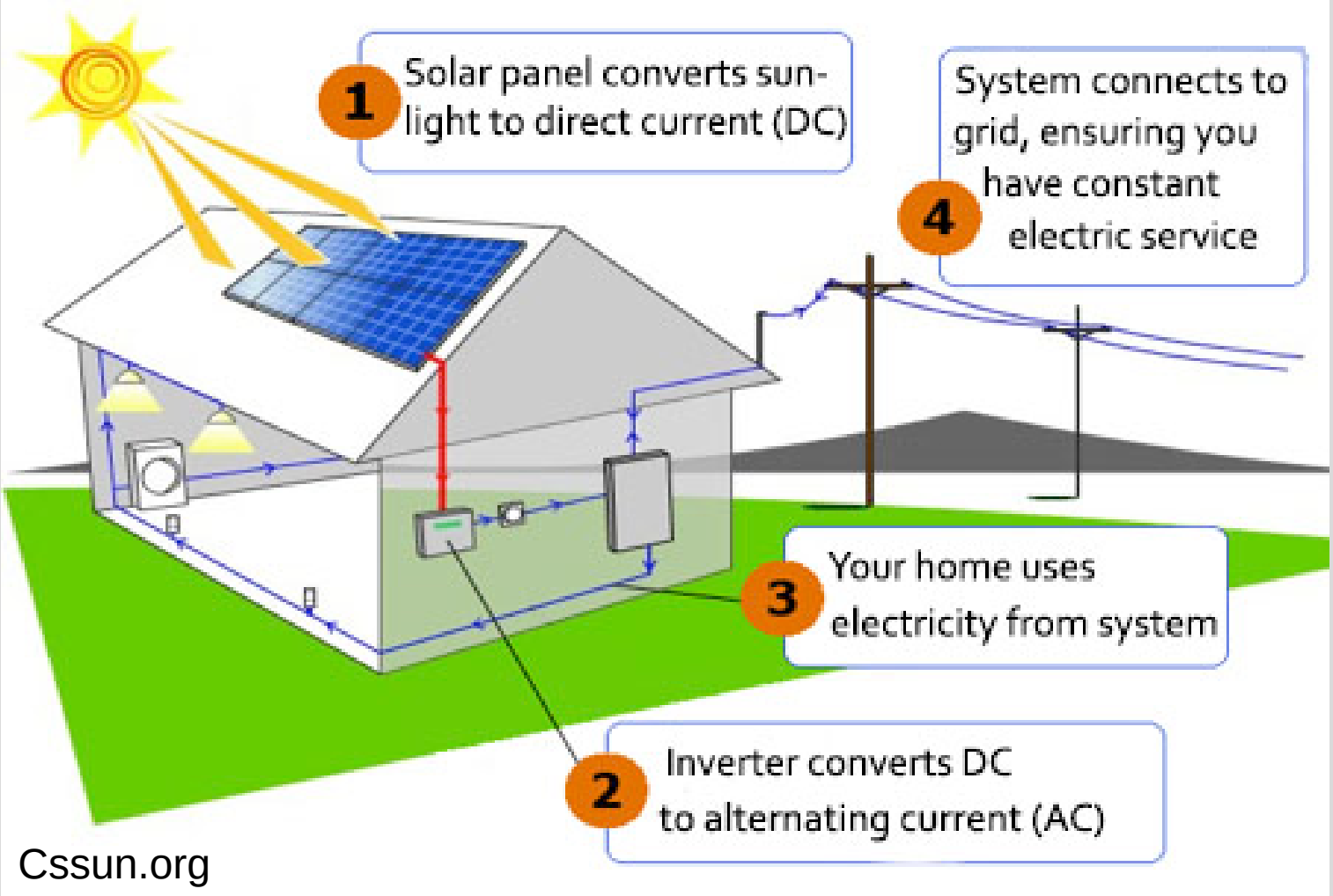
- Technologies that convert sunlight into a practical form of energy, most commonly for electricity or heat
  - Vary significantly in their costs, benefits, and access requirements
- Types of Solar Energy Systems:
  - Solar Photovoltaic (PV)
  - Solar Thermal
  - Concentrating Solar Power

Solar Photovoltaic

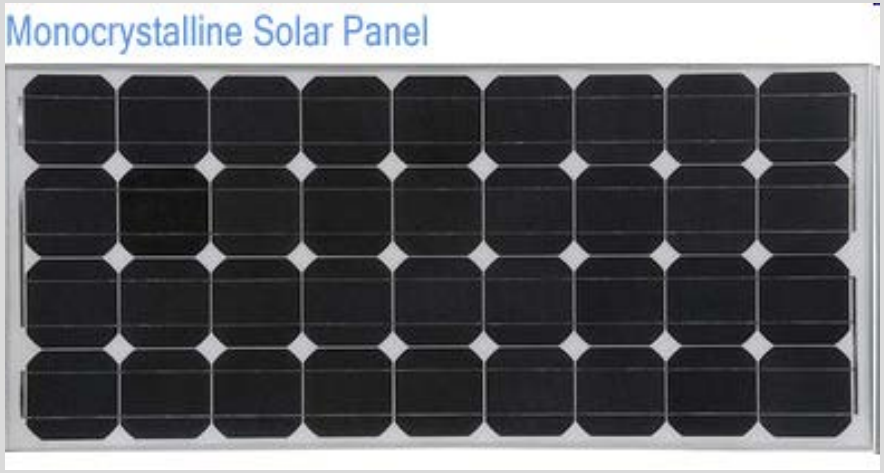
- Converts energy from the sun into a flow of electrons (direct current electricity) to power equipment or to recharge a battery.

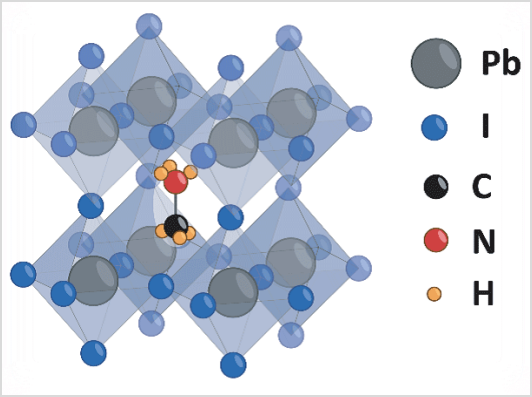
- Residential, commercial, and industrial applications.

PV - How does it work?



Types of Photovoltaic Materials





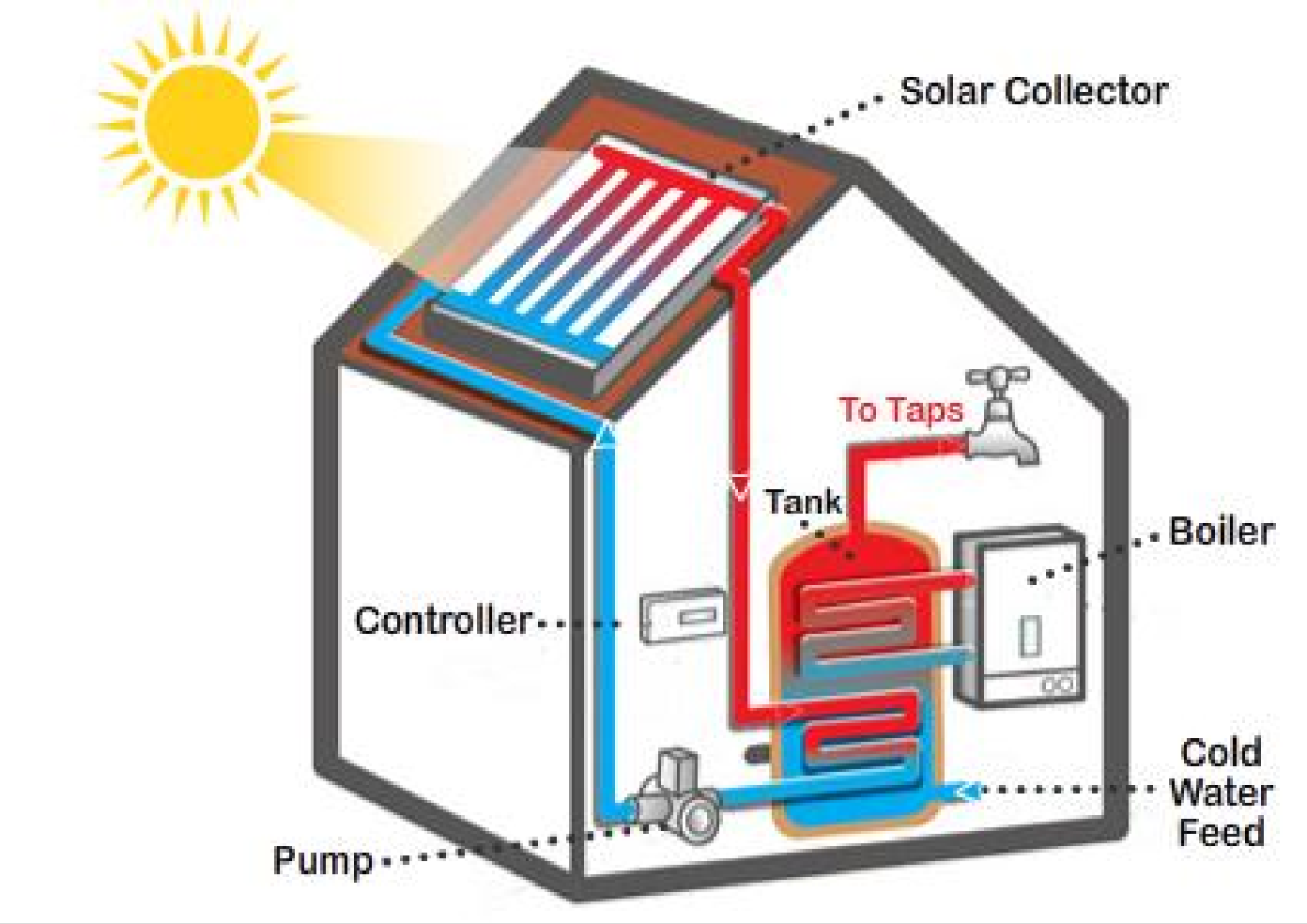
Methyl ammonium lead triiodide $(CH_3NH_3)PbI_3$ perovskite crystal

Solar Thermal

- Panels or tubes that capture sunlight and transfer the radiant heat in the form of energy.

- Solar thermal systems may feed a hot water tank, heat exchanger, or thermally driven chiller (for solar cooling).

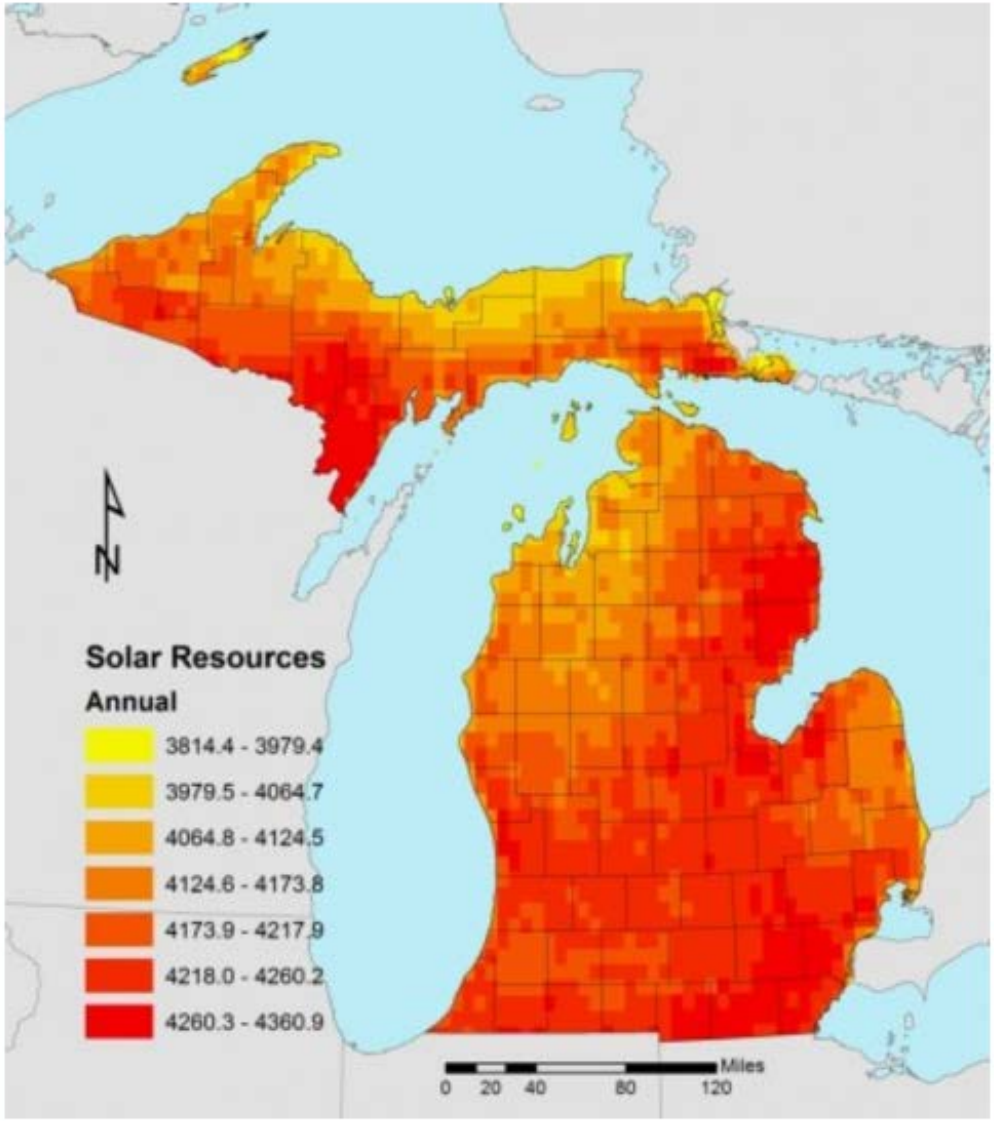
Solar Thermal - How does it work?



Concentrating Solar Power (CSP)

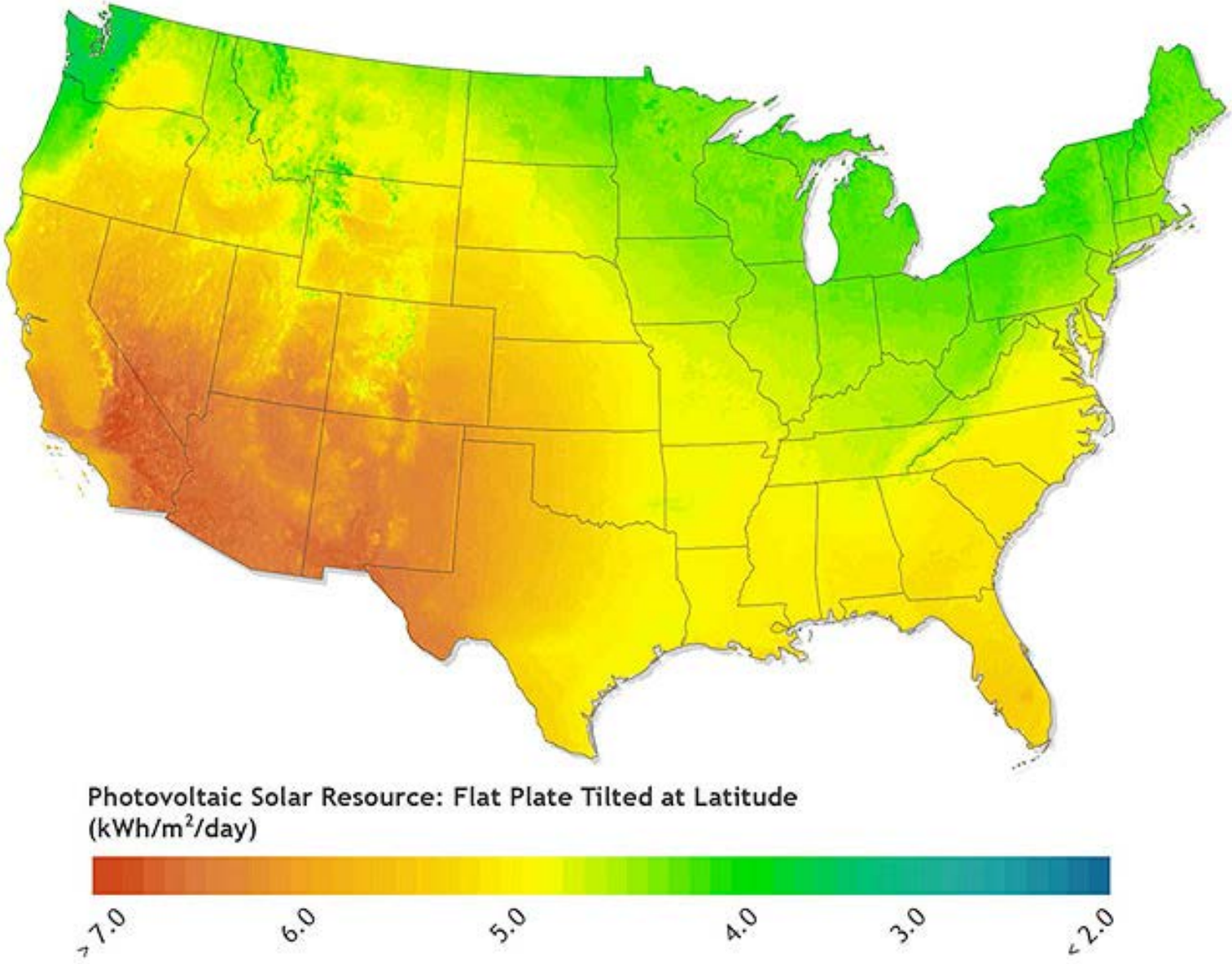
- Systems that use mirrors to focus light and heat a contained substance such as molten salts or water to create steam
- CSP unlikely in Michigan given levels of solar irradiance – a SW US technology for now.

NREL

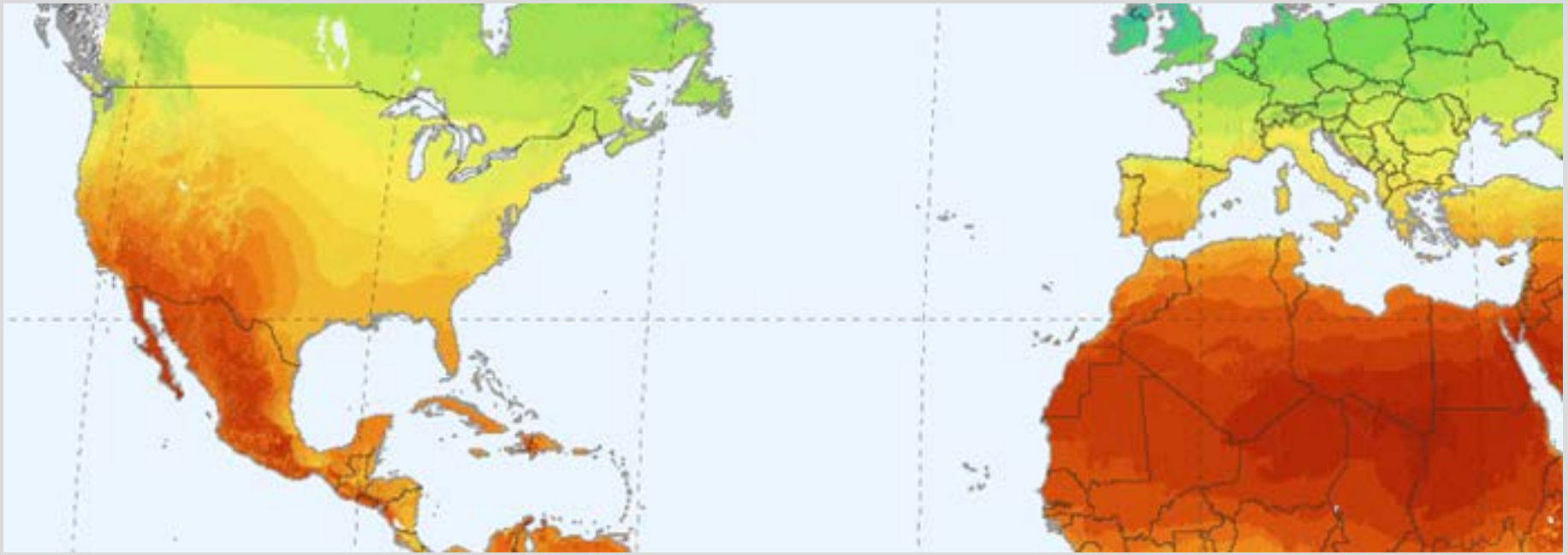


Annual average daily solar resource in watt-hours per square meter per day (Wh/m2/day). Photo credit: National Renewable Energy Laboratory and MSU Land Policy Institute

- **Radiation**: The electromagnetic energy that emanates from the Sun.
- Can be harnessed to create heat and electricity. Measured in megawatts.
- Siting is the key!

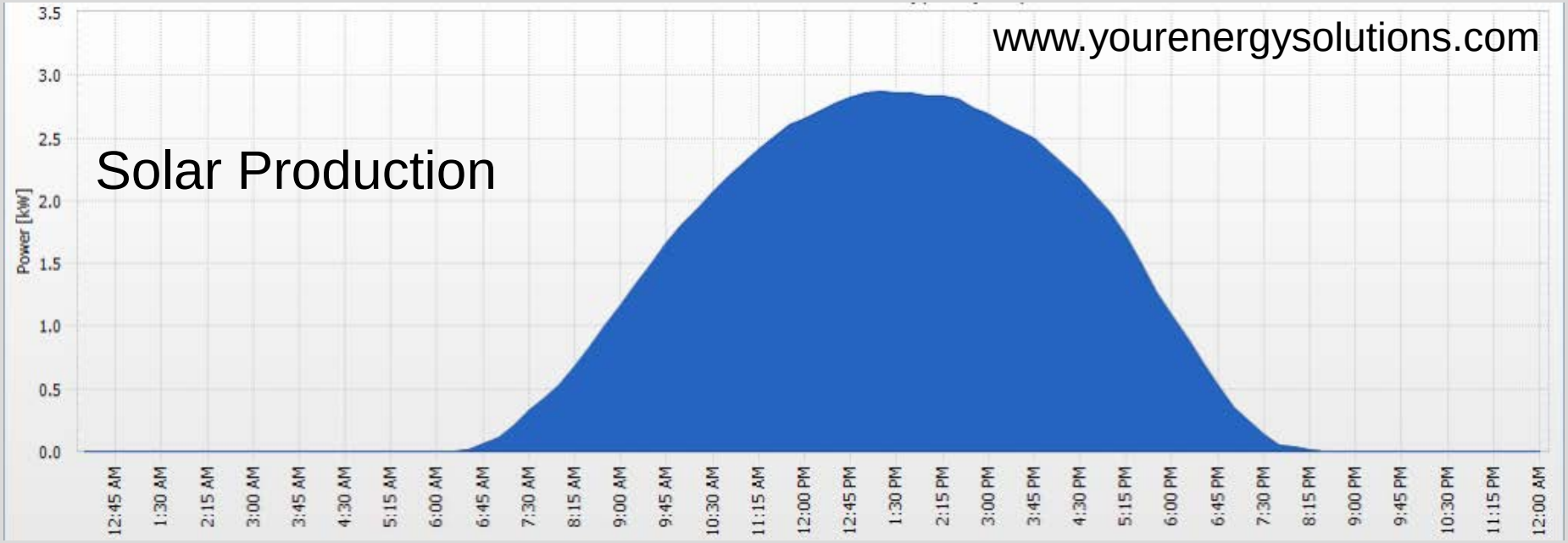

Photovoltaic Solar Resource: Flat Plate Tilted at Latitude
(kWh/m²/day)
> 7.0
6.0
5.0
4.0
3.0
< 2.0

The Solar Resource



Photovoltaic Map: Darker colors receive greater levels of solar radiation

Source: SolarGIS


www.yourenergysolutions.com
Solar Production
Power [kW]
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
12:45 AM
1:30 AM
2:15 AM
3:00 AM
3:45 AM
4:30 AM
5:15 AM
6:00 AM
6:45 AM
7:30 AM
8:15 AM
9:00 AM
9:45 AM
10:30 AM
11:15 AM
12:00 PM
12:45 PM
1:30 PM
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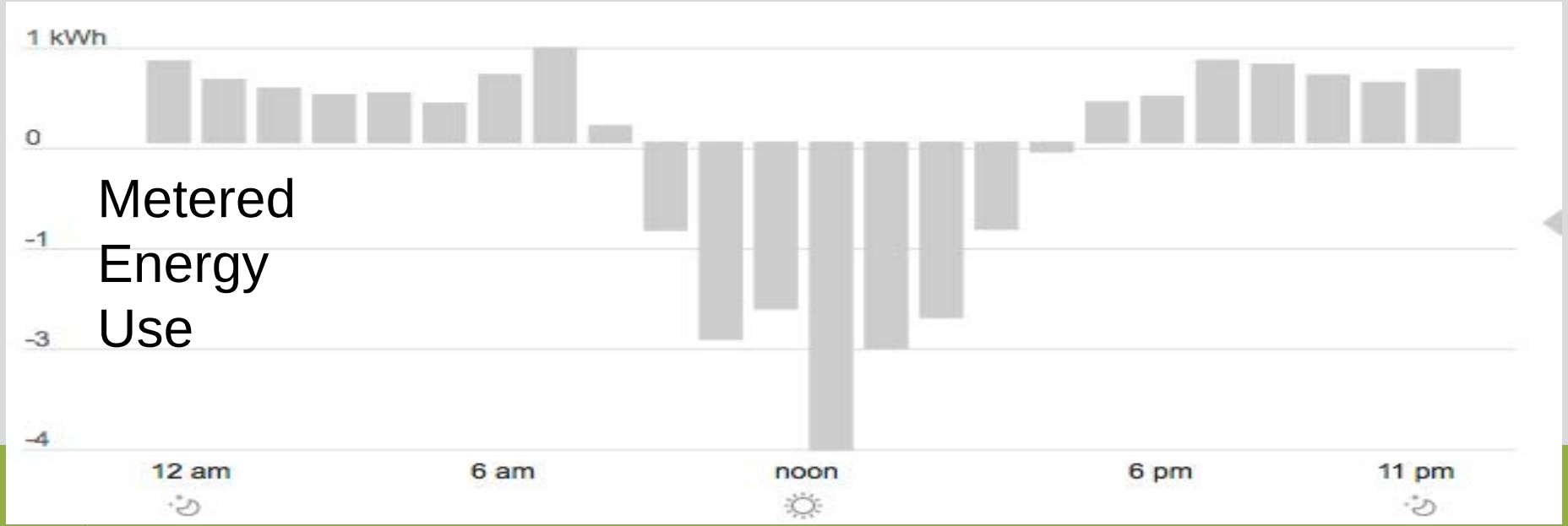
12:00 AM


1 kWh
0
-1
-3
-4
Metered
Energy
Use
12 am
6 am
noon
6 pm
11 pm

Testing a Prospective Solar Project

- Project Specific Calculator for homeowners

http://pvwatts.nrel.gov

Testing a Prospective Solar Project

- Calculator for professionals

https://sam.nrel.gov/

Solar Energy Issues and Challenges

- Many local building codes and zoning ordinances do not provide for or completely prohibit solar installations
- Many states do not offer many incentives for small- and large-scale solar energy production

midwestenergynews.com; harvestenergy.com

Solar Energy Issues and Challenges, cont.

- Visual impacts in districts with design and historic standards
- Concerns of changing the rural landscape and community character/identity

greenbuildingelements.com

Source: DTE Energy

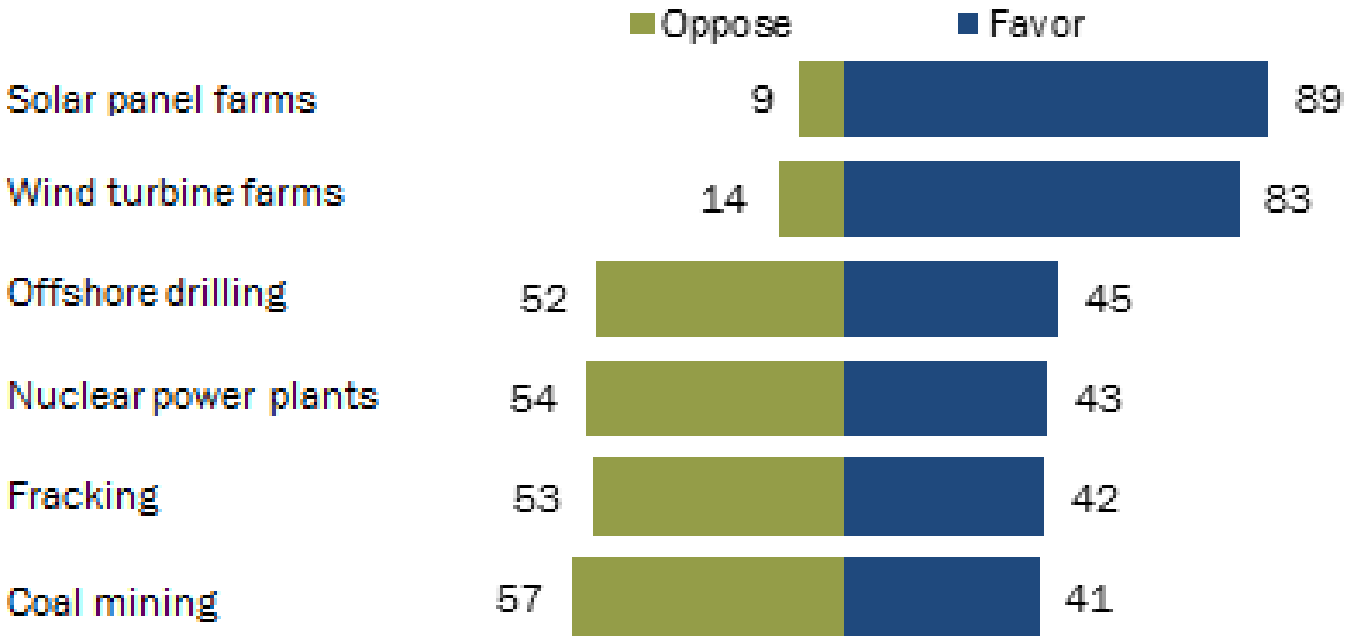
Solar Energy Issues and Challenges, cont.

University of Maryland Extension

- Ground mounted panels may affect stormwater management
- Renters and condominium owners do not have ownership of the space needed to install solar collectors

Strong public support for expanding wind, solar power

% of U.S. adults who say they favor or oppose expanding each energy source



Note: Respondents who did not answer are not shown.
Source: Survey conducted May 10-June 6, 2016.
"The Politics of Climate"

PEW RESEARCH CENTER

SPARTYVILLE

A Matter of Local Public Policy

Read the scenario in your handouts. Then discuss the questions with a neighbor:

- What are your own thoughts about private property rights?
- Can zoning go too far in restricting property owners' rights?

B. The Public Policy Context

MI Energy Legislation

2008: PA 295 - MI Clean Renewable and Efficient Energy Act

- Promotes development of clean energy, renewable energy, and energy optimization through implementation of a clean, renewable, and energy efficient standard.

2010: PA 270 - Property Assessed Clean Energy Act (PACE)

- Authorizes local governments to adopt property assessed clean energy programs to create districts that promote the use of renewable energy systems by property owners.

MI Energy Legislation

2016: PA 119-123 - Tax Exempt Lease Purchase

- Enables local governments to finance energy conservation projects without incurring new debt by paying for projects with energy savings resulting from projects.

2016: PA 342 - Amendment to PA 295 of 2008

- Prescribes Renewable Energy Standard which requires electric providers to achieve a retail supply portfolio that increases from 10% in 2015 to 15% in 2021

Renewable Portfolio Standard (RPS)

- A policy mechanism that mandates public and private electric utilities to supply a specified amount of power from renewable or alternative sources by a certain target date.

- Michigan RPS program prescribes Renewable Energy Standard which requires electric providers to achieve a retail supply portfolio that increases from 10% in 2015 to 15% in 2021.

State/Local Policy - Barriers

- The Michigan Public Service Commission identified two potential issues limiting the number of solar installations in the state:
  - Inconsistent permitting processes by jurisdiction; and
  - Varying interpretations of the tax code for solar systems.

White Paper: Market Barriers to Solar in Michigan. NREL. 1/23/12.
http://www.michigan.gov/documents/mpsc/marketbarrierssolarinmi_394662_7.pdf

State/Local Policy - Taxation

- Through 2012, residential solar was exempt from personal property tax.
- Local assessors must assess residential solar panels because the state law says all property must be assessed unless explicitly exempt.
- The ultimate responsibility for true cash value is with the local government's assessor.

C. Types of Solar

Onsite Solar - Defined

- *"Onsite Solar Energy Systems means an **accessory** use on a lot for the purpose of generating electricity by means of a solar collector or other solar energy device or a structural design feature mounted on a building or on the ground with the primary purpose of collecting, storage and distribution of the electricity…"*
  - Howell Township Zoning Ordinance, Article XVI, Section 16.19, Onsite Solar Energy Systems and Solar Energy Farms

‘Onsite’ Examples

Source: U.P Sustainable Solar

Onsite Example - Solar Carports at MSU

Community Solar - Defined

- Community Solar allows residents, organizations and businesses to invest in systems located at optimal sites, with the costs shared by multiple owners and the benefits divided among the participants.

SUN - Cherryland Electric Cooperative

- Cherryland gets over 18% of its energy from renewables
  - e.g., utility scale wind farm and community solar array
- Members can purchase up to 10 solar panel subscriptions from Spartan Solar community array
- Solar customers receive bill credits for share of the array's output

- Cherryland also allows members to install their own panels and sell solar generated energy at $0.10 per kWh

MI Community Solar

Lansing Board of Water & Light

Marquette Board of Light & Power

Marquette; Brad Neumann

Utility-Scale - Defined

- *"Solar Energy Farms means a principal use of a property as a system to produce electrical energy for sale back into an electrical energy grid system and not primarily consumed on site."*
  - Howell Township Zoning Ordinance, Article XVI, Section 16.19, Onsite Solar Energy Systems and Solar Energy Farms:

Utility-Scale Examples

The Lapeer Solar Parks

Source: DTE Energy

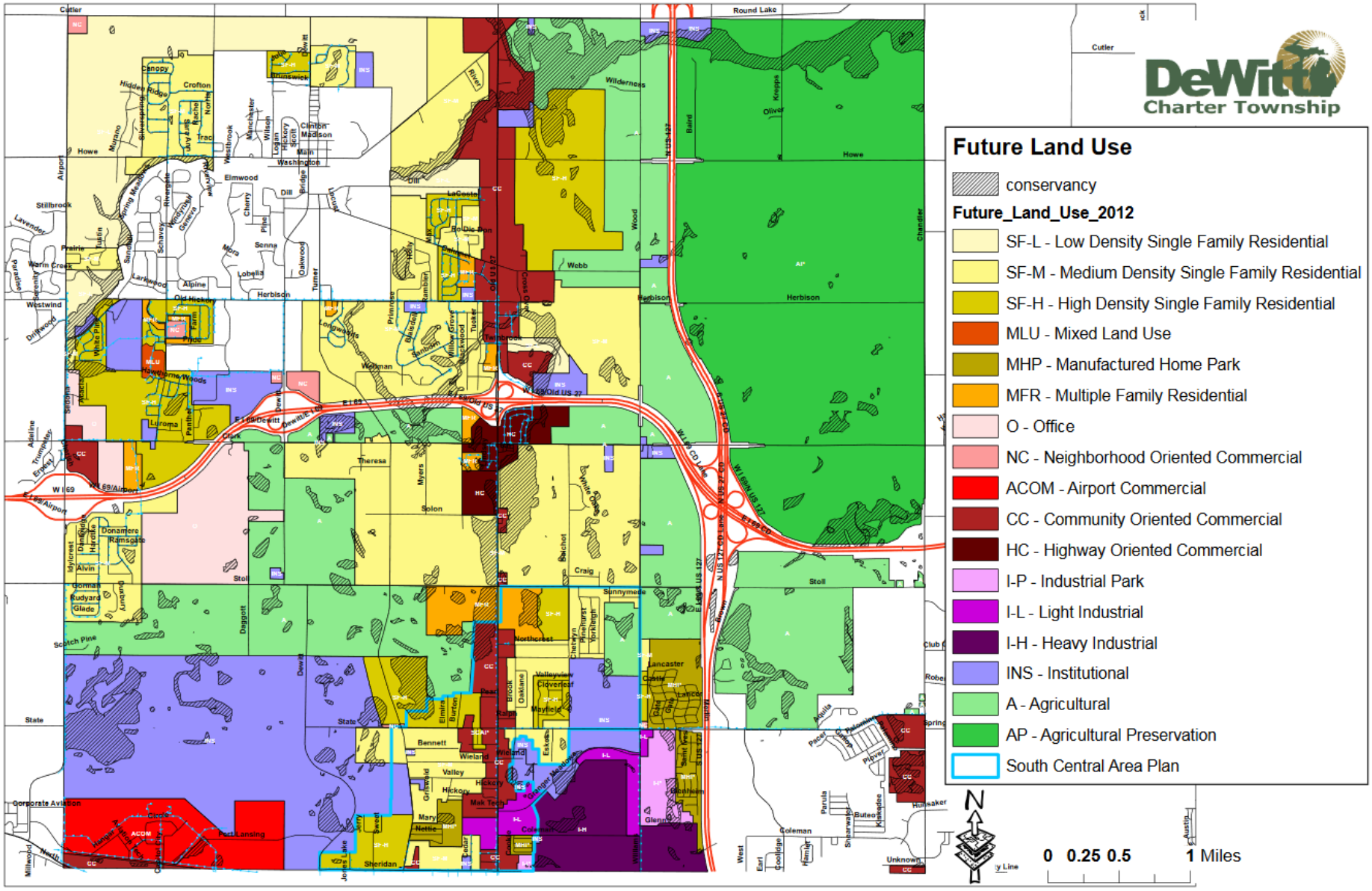
The Lapeer Solar Parks

Time Lapse Videos of the Demille Rd/Turrill Rd Solar Farms

https://inovateus.com/portfolio-items/lapeer-michigan-solar/

D. Planning Approaches

The Plan is the Future Community Vision



The Local Master Plan – PA 33 of 2008

- Communities set the direction of solar in their policy documents, such as the Master Plan.
- Master plans can promote the potential for solar energy use, set goals for solar energy development, and provide solar-specific implementation strategies.
- Master Plans may outline important decisions related to solar access, solar easements, and solar siting.
- Multi-jurisdictional solar advisory committees can facilitate the creation of a region-wide master plan to guide future solar panel installation and regulation

Proactive Planning vs. Reaction

- Like other community changes, solar has the potential to generate opposition if siting causes conflicts with surrounding land uses or interests.
- Planning ahead and engaging the public proactively to identify the best sites (utility-scale) will minimize conflict and opposition.

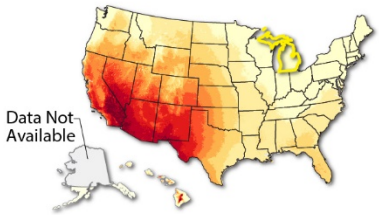
County planners endorse solar moratorium

Brenda Battel, Tribune Staff Writer Published 9:03 am, Friday, May 12, 2017

BAD AXE — Before allowing commercial solar development in county-zoned townships, there are a few things officials need to sort out.

There must be an ordinance, the **Huron County Master Plan** needs to progress, and the taxation of solar development must be investigated.

Direct Normal Solar Resource of Michigan



Fifty-state Resource Range (kWh/m^2/Day)

8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 0.5

4.4 4.2 4.0 3.8 3.6 3.4

Michigan Resource Range

This data provides annual average daily total solar resource averaged over surface cells of 0.038 degrees in both latitude and longitude, or, nominally, 4 km in size. The insolation values represent the resource available to concentrating systems, and were created using the PATMOS-X algorithms for cloud identification and properties, the MMAC radiative transfer model for clear sky calculations, and the SASRAB model for cloud sky calculations. The data are averaged from hourly model output over 8 years (2005-2012).

0 25 50 75 100 125 150 km

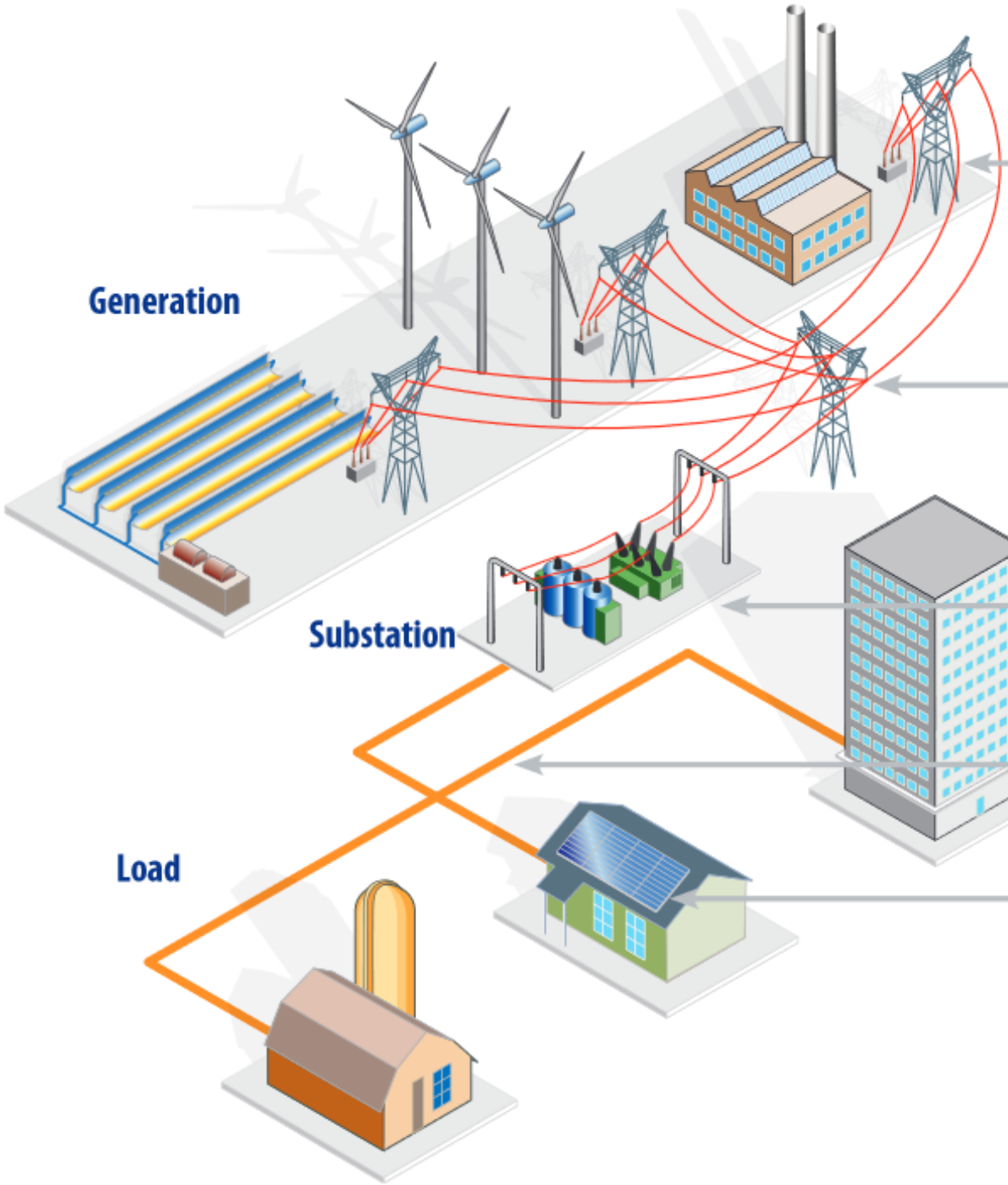
0 20 40 60 80 100 mi

This map was produced by the National Renewable Energy Laboratory for the U.S. Department of Energy.
Nicholas Gilroy, April 4, 2017

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Understanding The Grid –Utility Scale

- Developers consider locations near grid infrastructure and whether a project will be able to successfully interconnect with the grid.
- If many sources feeding into the grid, it may not be possible to add new generation at a location.
- In other areas, where there is capacity in transmission lines, it will be more feasible to add a new solar project.



The Electric Grid

Centralized generation can be located far from areas of high population and feeds large amounts of electricity into the transmission lines.

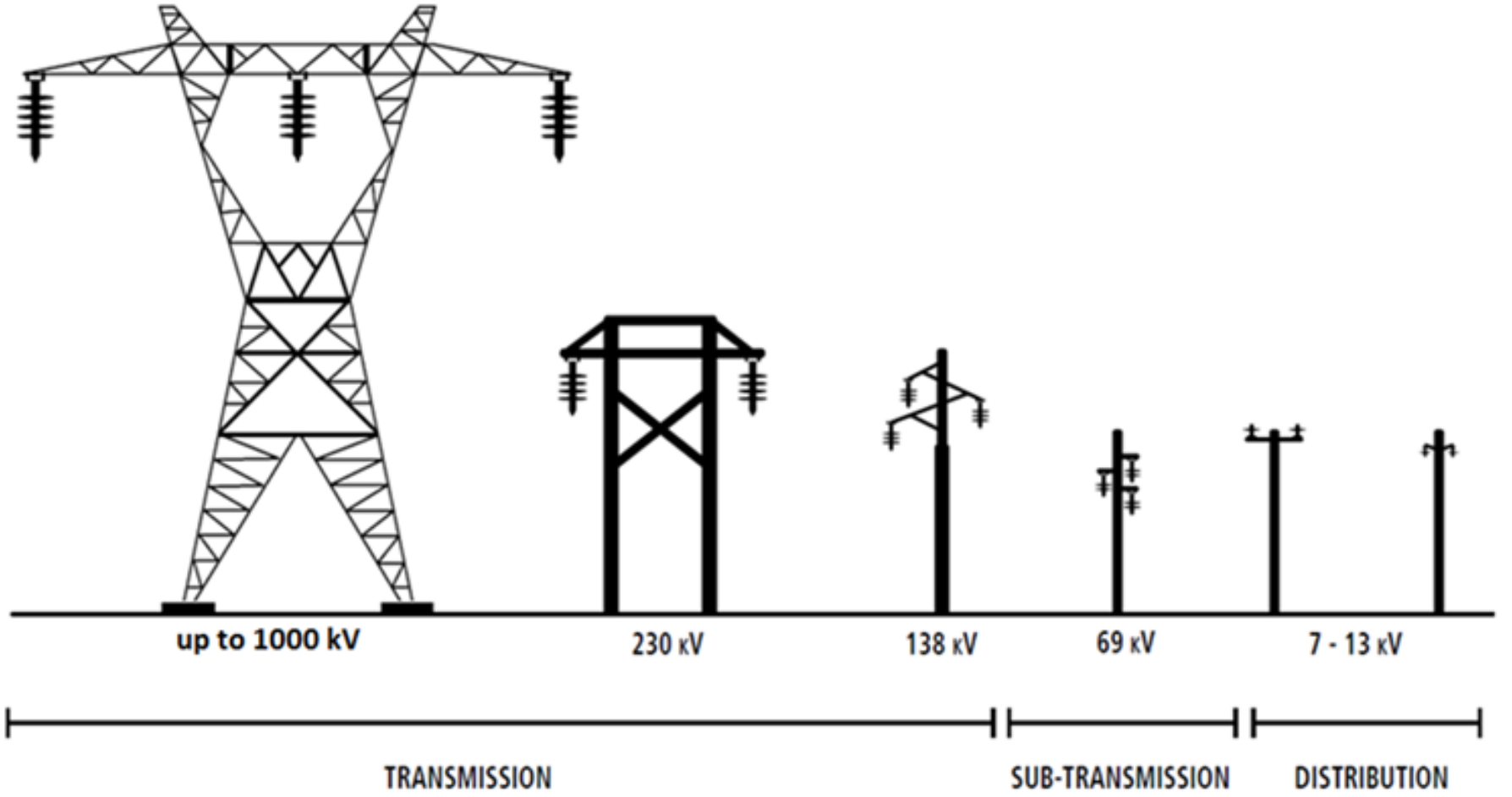
Transmission lines carry high voltage electricity from centralized power plants to a substation.

The electricity is converted to lower voltage at the substation.

Distribution lines carry lower voltage electricity to the load.

Distributed generation is any source of electricity that is at or near the point of load. It can be connected to the utility's distribution lines, or just provide power to a stand-alone load.

Transmission, Sub-transmission, Distribution



Source: www.samlexamerica.com

Transmission, Sub-transmission, Distribution

345 kV +

Schindler

69 kV

138 kV

Neumann

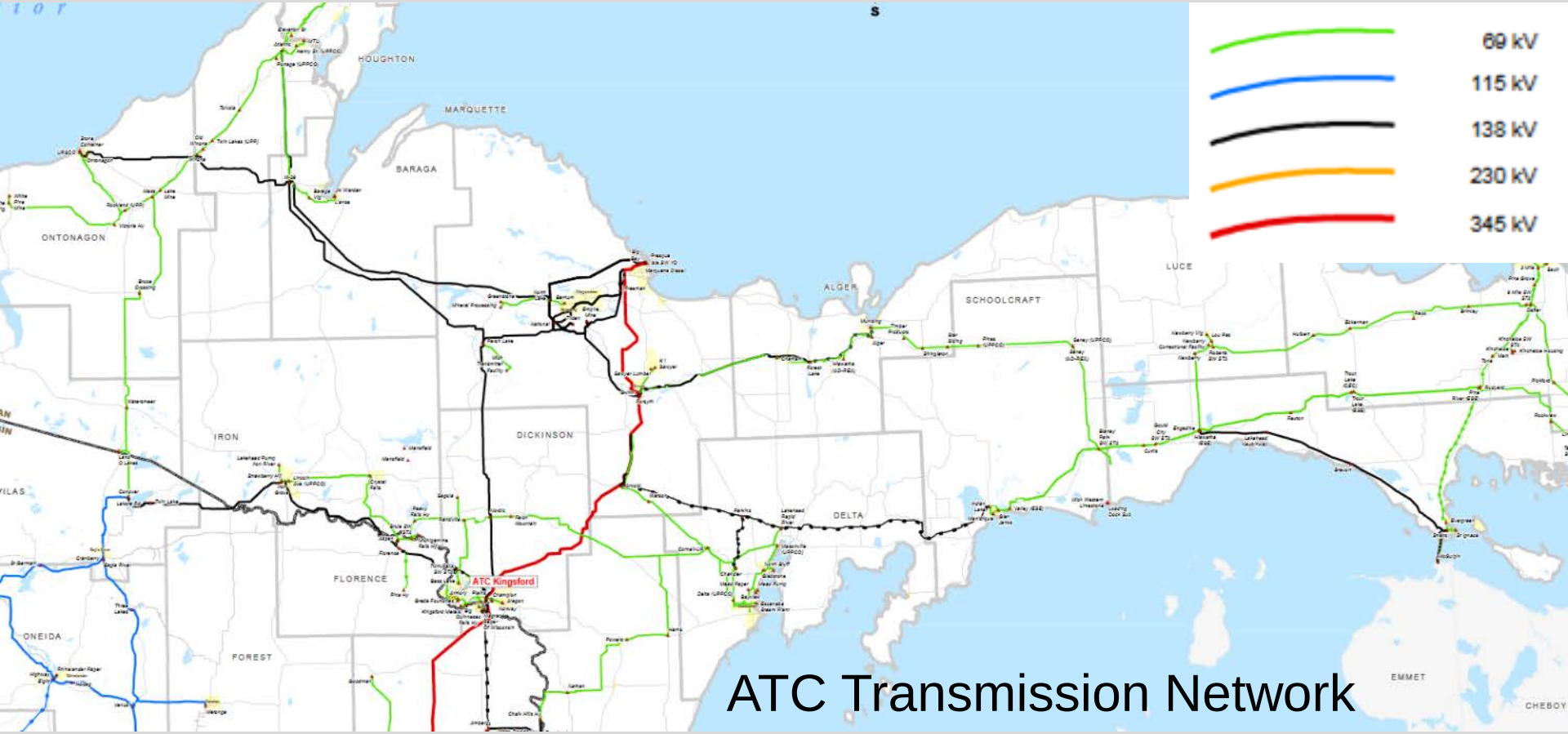
<34.5 kV

Neumann

Proximity to Transmission

- Utility-scale solar requires energy infrastructure within the area – ideally within 3 miles
  - Transmission lines, typically 69kV or greater, are needed for large solar projects of 20MW or more
  - Distribution lines as small as 8kV could support a small commercial solar project of 2MW
- Distributed, on-site solar is connected to distribution lines, typically 46kV lines and lower

Utility Infrastructure - Transmission



ATC Transmission Network

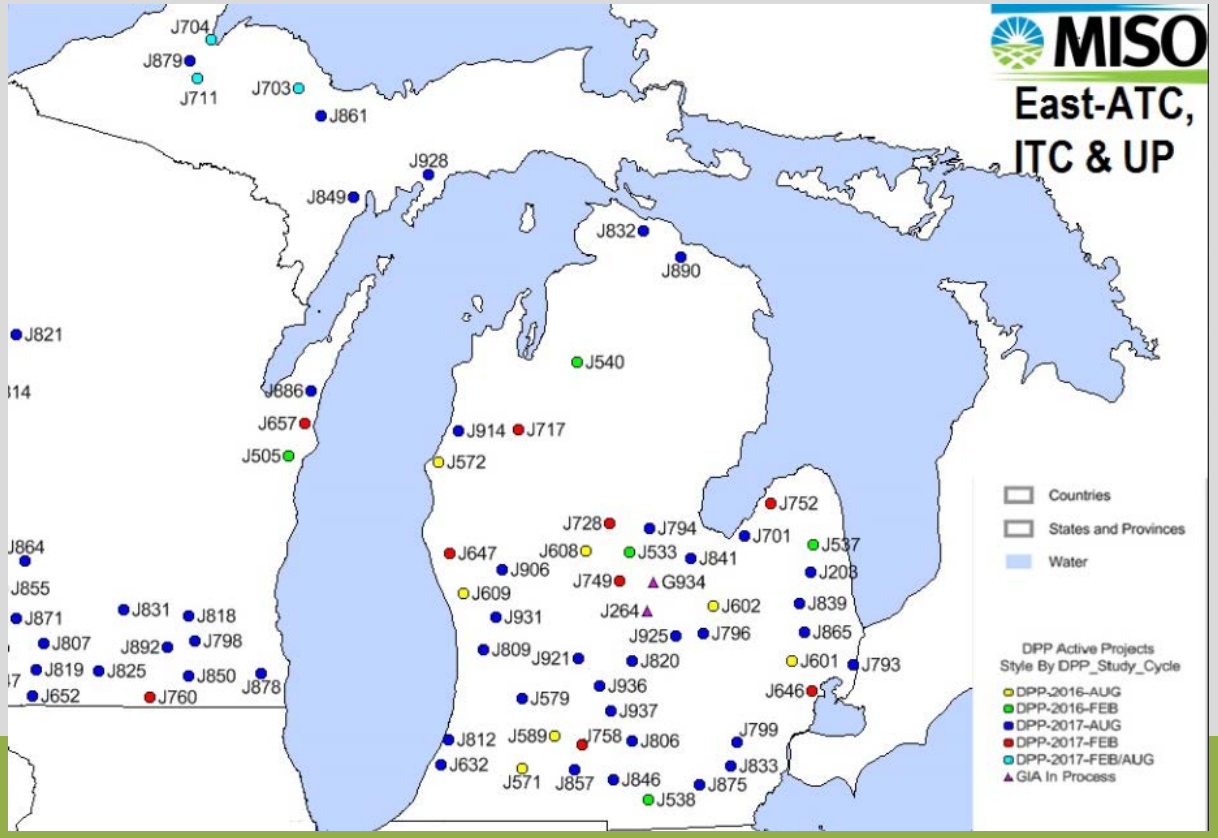
Transmission

Michigan Thumb Loop Project

- Approx. 140 miles of double-circuit 345,000 volt lines
- Four new substations
- Capable of supporting capacity of about 5,000 MW
- Targeted for completion by 2015

Transmission

- A project connected to transmission requires approval by the Midcontinent Independent System Operator (MISO)



Suitable Land

- Generally flat or slopes within 20-30 degrees of due south
- Gradual slopes of 2-3% are ideal for PV systems, especially when constructed to face south, thereby increasing sunlight exposure

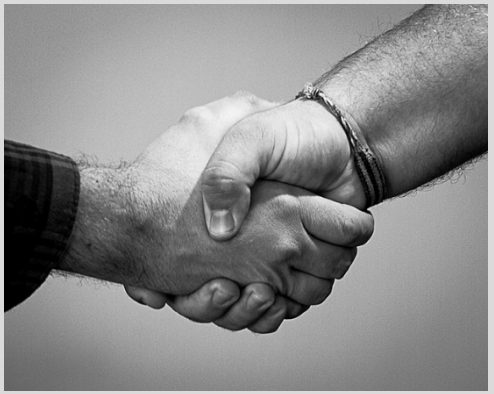
Suitable Land

- Land of sufficient size for project to minimize land assembly
- Utility-scale solar requires approximately 5 acres per 1 MW
  - More important to be sized to capacity of transmission or distribution lines.

Source: DTE Energy

Willing Landowner

- Regardless of anything else, solar development requires a willing landowner
  - Non-municipal utilities and developers do not have the power of eminent domain
- Development requires a land sale or signed lease.
  - Typically starts with an option, then assessment of the land, then a contract with a utility (up to 5 years), then a lease



Flickr user dhendrix73

Site Conditions

- **Wind loading**
  - Wind-induced loads are often inadequately addressed in local codes and must be considered in solar array design
- **Geotechnical issues**
  - Soil composition, bearing capacity, groundwater level and surface water runoff
  - Site conditions will determine the appropriate foundation type, e.g., ballasts, ground-mounted, hybrid, etc.

Planning for Solar - Prioritize Marginal Lands First!!

- First consider prioritizing solar on marginal lands:
  - Brownfields, landfills, RoWs, airports, etc.
  - Non-prime farmland - Edges, transitional areas, steeper slopes, highly-erodible land, droughty soils, paved areas, etc.

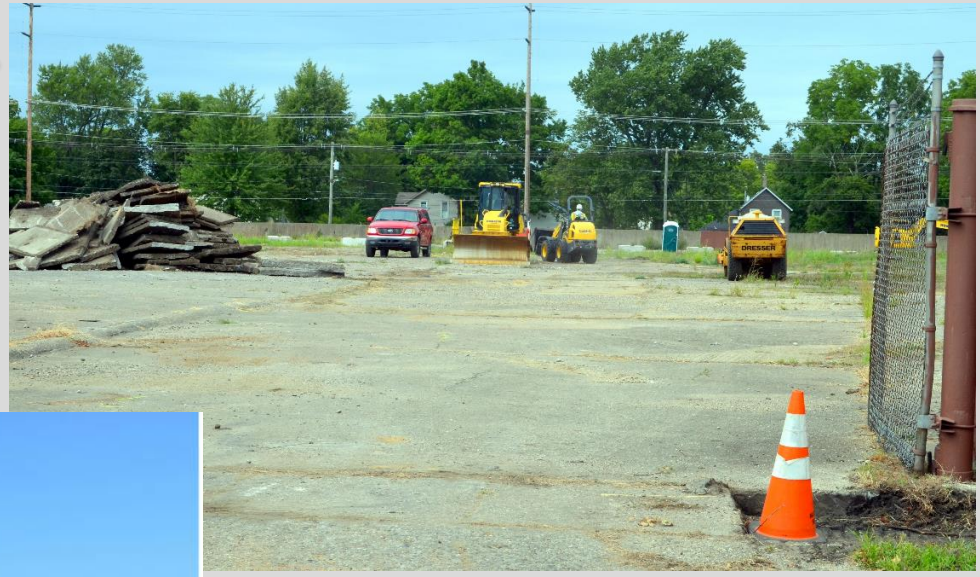
- Marginal lands - a catch-all term for property that would make good sites for solar because of limitations on use, current condition, ownership, etc.

Planning for Solar - Prioritize Marginal Lands First!!

- Special standards may be needed
- Incentivize, expedite site plan review etc.
- May need an active BRAuthority in place
- Need to understand the local community values for different landscapes

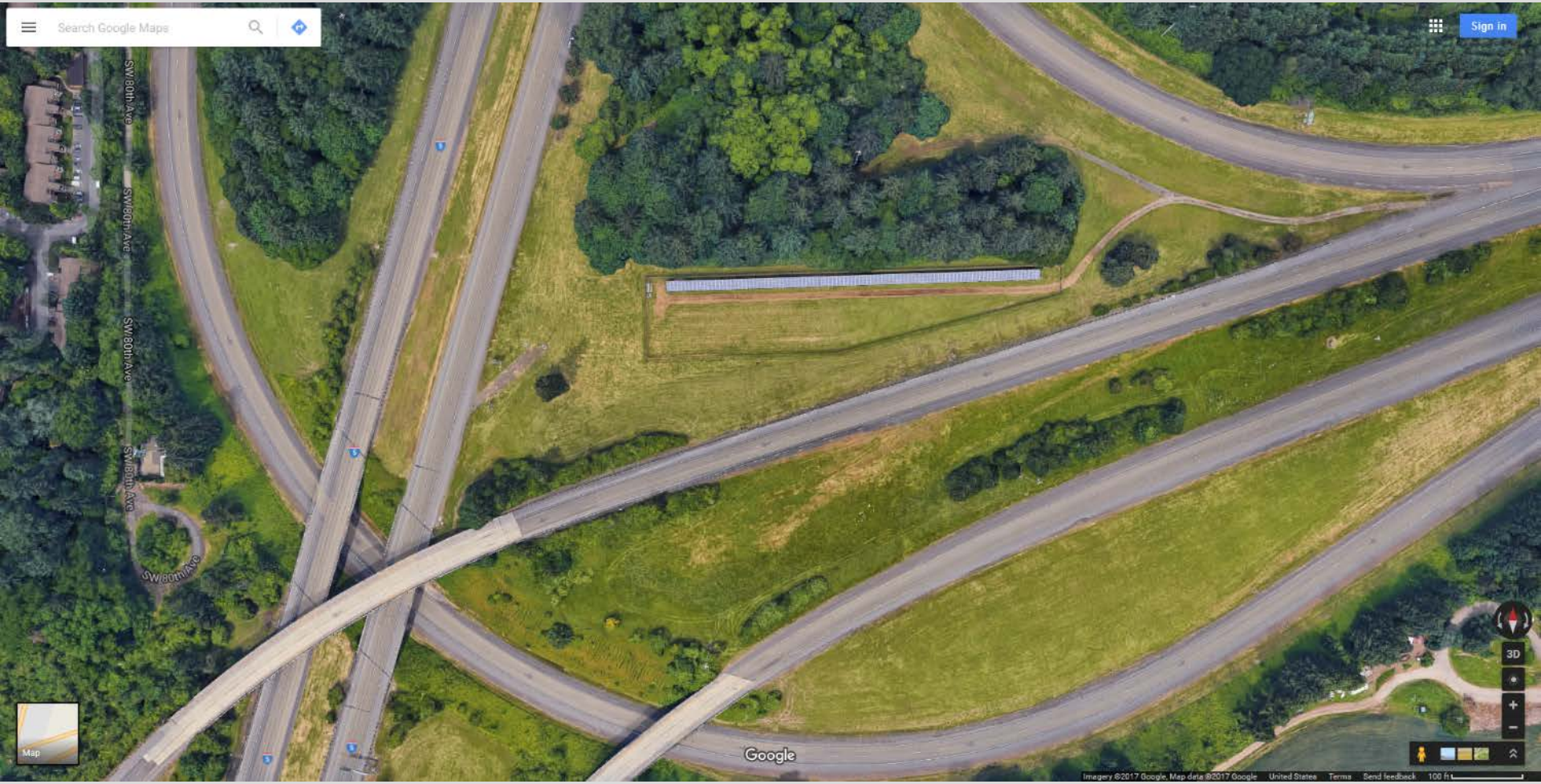
Source: Google Images

City of Coldwater Solar Park – Former Brownfield



Source: The Daily Reporter

Solar in the Right-Of-Way



Solar Highway Program: From Concept to Reality. Nov. 2016. *Oregon DOT*.

Farm and Forestland Considerations

- Prime farm and forest land is already in a productive use
  - Not in transition to ‘highest and best use’
- Other practical limitations:
  - PA 116 - Farmland and Open Space Preservation Program
  - Other state, federal programs providing tax benefits to retain land in undeveloped state

Farm and Forestland Considerations

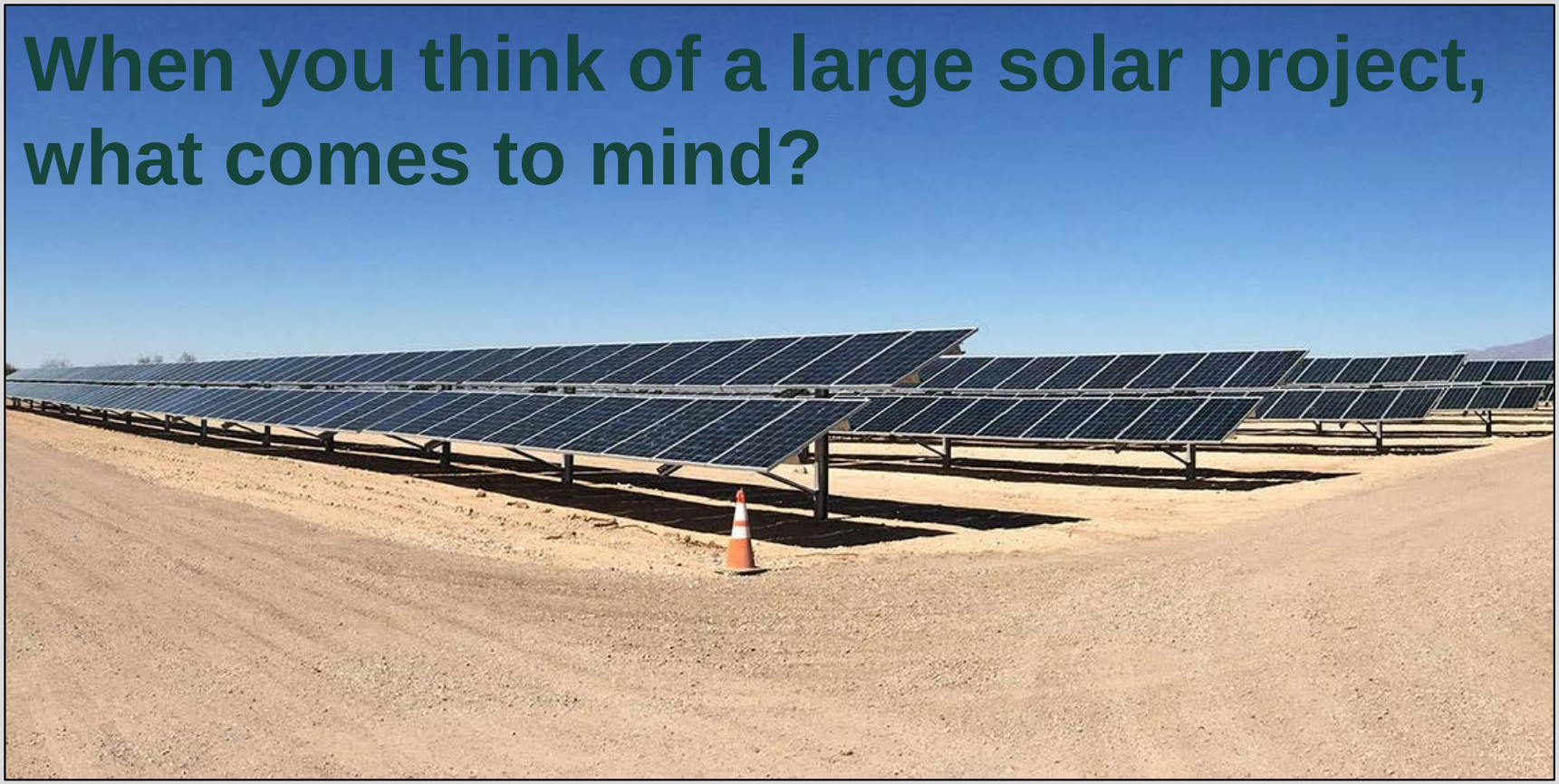


Photo credit: E.ON Climate and Renewables

When you think of a large solar project, what comes to mind?

Photo credit: Rob Davis

Categories of low impact solar development

- Solar centric
  - Minimal changes to solar configuration.
  - Low-lying vegetation for ground cover and habitat.
- Vegetation centric
  - Minimal changes to vegetation design.
  - Slightly larger spacing in solar layouts.
- Co-location and Co-optimization
  - Solar and vegetation configurations are designed jointly for maximum dual output.

Source: Jordan Macknick, National Renewable Energy Laboratory.

Solar centric (scrub or no vegetation)

Source: Macknick, Jordan, Brenda Beatty, and Graham Hill. 2013. *Overview of Opportunities for Co-Location of Solar Energy Technologies and Vegetation.* NREL/TO-6A20-60240, National Renewable Energy Laboratory.

Vegetation centric (useful species)

Sunflower oil production in Wisconsin.

Milwaukee Journal Sentinel, 2011

Co-location and Co-optimization

Source: Rob Davis, Center for Pollinators in Energy, Fresh Energy

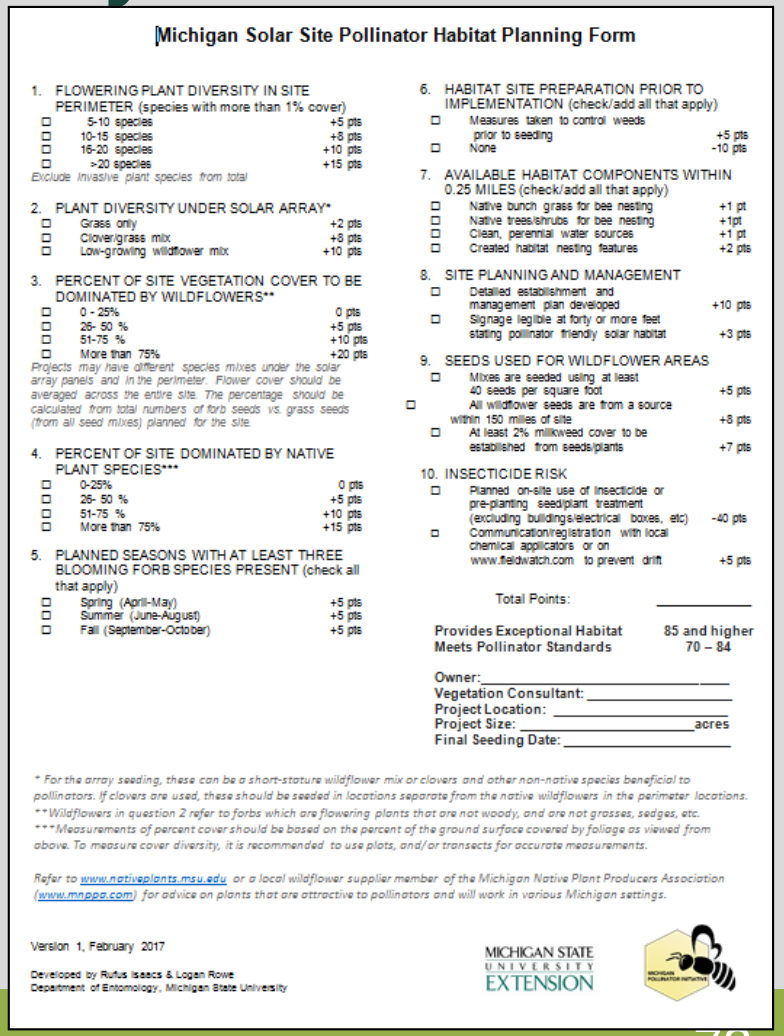
Making the Case for Solar-Pollinator Habitat

- Business case
  - Potential reductions in O&M costs with pollinator habitat (e.g., less mowing, risks)
- Ecosystem benefits
  - Increased biodiversity
  - Storm water and erosion control
  - Carbon storage
  - **Agricultural benefits (e.g., pollination services)**

Source: Argonne National Laboratories, NREL, and USDOE.

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

- Percent wildflowers
- Percent native species
- Diversity of species
- # seasons flowering
- Nearby assets
- Management plan
- Insecticide use
- >100 points possible
- 70+ for "pollinator friendly"



Michigan Solar Site Pollinator Habitat Planning Form

1. FLOWERING PLANT DIVERSITY IN SITE PERIMETER (species with more than 1% cover)
   - ☐ 5-10 species +5 pts
   - ☐ 10-15 species +8 pts
   - ☐ 16-20 species +10 pts
   - ☐ >20 species +15 pts

   Exclude invasive plant species from total

2. PLANT DIVERSITY UNDER SOLAR ARRAY*
   - ☐ Grass only +2 pts
   - ☐ Clover/grass mix +8 pts
   - ☐ Low-growing wildflower mix +10 pts

3. PERCENT OF SITE VEGETATION COVER TO BE DOMINATED BY WILDFLOWERS**
   - ☐ 0 - 25% 0 pts
   - ☐ 26- 50 % +5 pts
   - ☐ 51-75 % +10 pts
   - ☐ More than 75% +20 pts

   Projects may have different species mixes under the solar array panels and in the perimeter. Flower cover should be averaged across the entire site. The percentage should be calculated from total numbers of forb seeds vs. grass seeds (from all seed mixes) planned for the site.

4. PERCENT OF SITE DOMINATED BY NATIVE PLANT SPECIES***
   - ☐ 0-25% 0 pts
   - ☐ 26- 50 % +5 pts
   - ☐ 51-75 % +10 pts
   - ☐ More than 75% +15 pts

5. PLANNED SEASONS WITH AT LEAST THREE BLOOMING FORB SPECIES PRESENT (check all that apply)
   - ☐ Spring (April-May) +5 pts
   - ☐ Summer (June-August) +5 pts
   - ☐ Fall (September-October) +5 pts

6. HABITAT SITE PREPARATION PRIOR TO IMPLEMENTATION (check/add all that apply)
   - ☐ Measures taken to control weeds prior to seeding +5 pts
   - ☐ None -10 pts

7. AVAILABLE HABITAT COMPONENTS WITHIN 0.25 MILES (check/add all that apply)
   - ☐ Native bunch grass for bee nesting +1 pt
   - ☐ Native trees/shrubs for bee nesting +1pt
   - ☐ Clean, perennial water sources +1 pt
   - ☐ Created habitat nesting features +2 pts

8. SITE PLANNING AND MANAGEMENT
   - ☐ Detailed establishment and management plan developed +10 pts
   - ☐ Signage legible at forty or more feet stating pollinator friendly solar habitat +3 pts

9. SEEDS USED FOR WILDFLOWER AREAS
   - ☐ Mixes are seeded using at least 40 seeds per square foot +5 pts
   - ☐ All wildflower seeds are from a source within 150 miles of site +8 pts
   - ☐ At least 2% milkweed cover to be established from seeds/plants +7 pts

10. INSECTICIDE RISK
    - ☐ Planned on-site use of insecticide or pre-planting seed/plant treatment (excluding buildings/electrical boxes, etc) -40 pts
    - ☐ Communication/registration with local chemical applicators or on www.fieldwatch.com to prevent drift +5 pts

Total Points: _____

Provides Exceptional Habitat 85 and higher
Meets Pollinator Standards 70 – 84

Owner: _____
Vegetation Consultant: _____
Project Location: _____
Project Size: _____ acres
Final Seeding Date: _____

** For the array seeding, these can be a short-stature wildflower mix or clovers and other non-native species beneficial to pollinators. If clovers are used, these should be seeded in locations separate from the native wildflowers in the perimeter locations.*
*** Wildflowers in question 2 refer to forbs which are flowering plants that are not woody, and are not grasses, sedges, etc.*
**** Measurements of percent cover should be based on the percent of the ground surface covered by foliage as viewed from above. To measure cover diversity, it is recommended to use plots, and/or transects for accurate measurements.*

Refer to www.nativeplants.msu.edu or a local wildflower supplier member of the Michigan Native Plant Producers Association (www.mnppa.com) for advice on plants that are attractive to pollinators and will work in various Michigan settings.

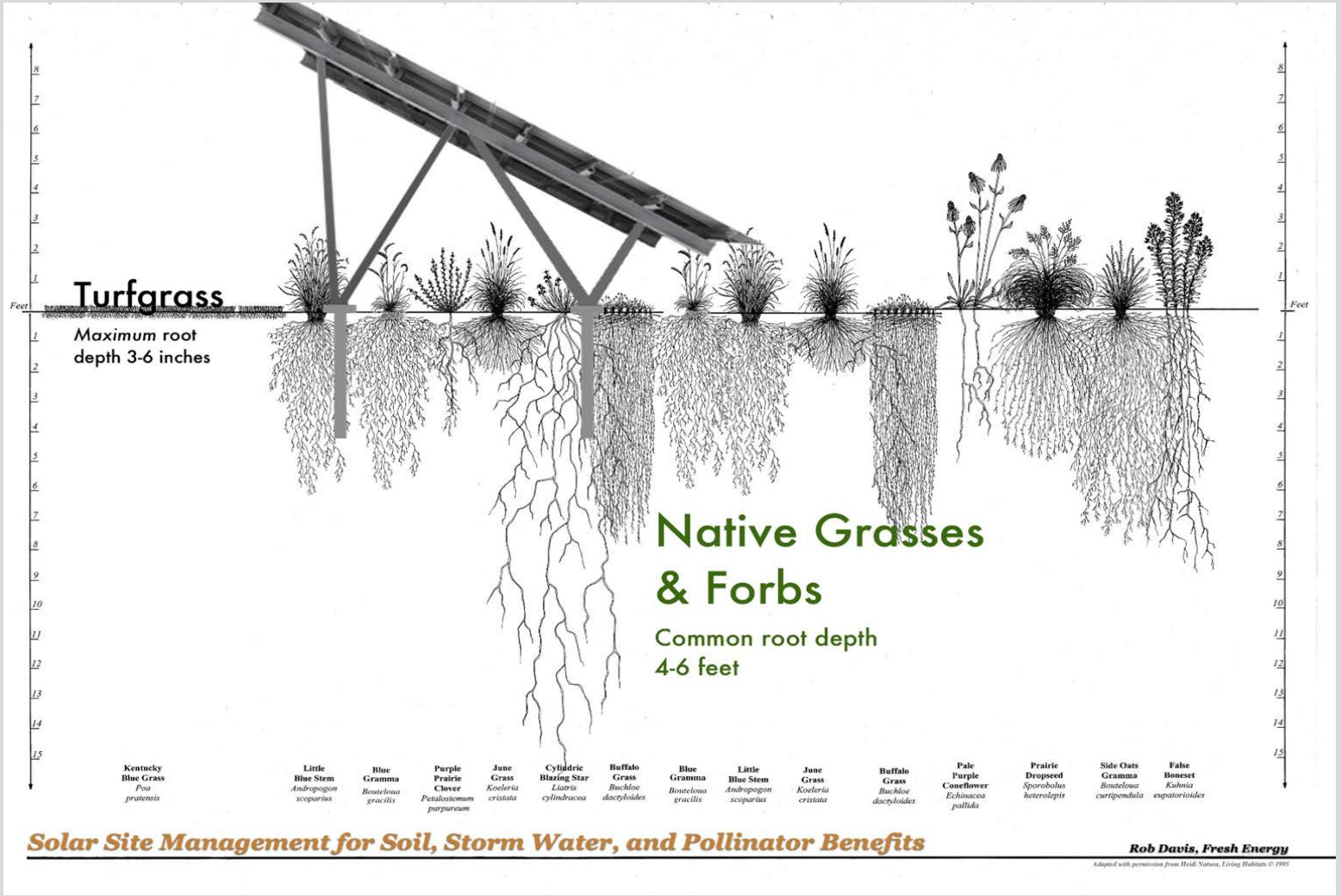
Version 1, February 2017

Developed by Rufus Isaacs & Logan Rowe
Department of Entomology, Michigan State University

MICHIGAN STATE UNIVERSITY EXTENSION

Source: Rob Davis, Center for Pollinators in Energy, Fresh Energy

Soil Regeneration & Surface Water Retention



Source: Rob Davis, Center for Pollinators in Energy, Fresh Energy

Potential Benefits of Co-location of Solar and Agriculture/Vegetation

Benefits to Land Owners

- Self-generation of electricity and reduced energy bills.
- Additional income stream and increased revenue security.
- Compatible with grazing activities, provides shade and cover for livestock.
- New market opportunities for shade tolerant crops.
- Control of wind and erosion.
- Protection of natural habitat.
- Safeguarding soil health.
- Improved habitat for pollinator species.

Benefits to Solar Developers

- Reductions in site preparation.
- Reductions in O&M costs.
- Reduced need for dust suppression.
- Reduction in litigation vulnerability.
- Decreased permitting time.
- Increased solar energy production from cooler air zone created under modules.
- Reduction in environmental mitigation investments.

Research is being conducted to quantify these benefits.

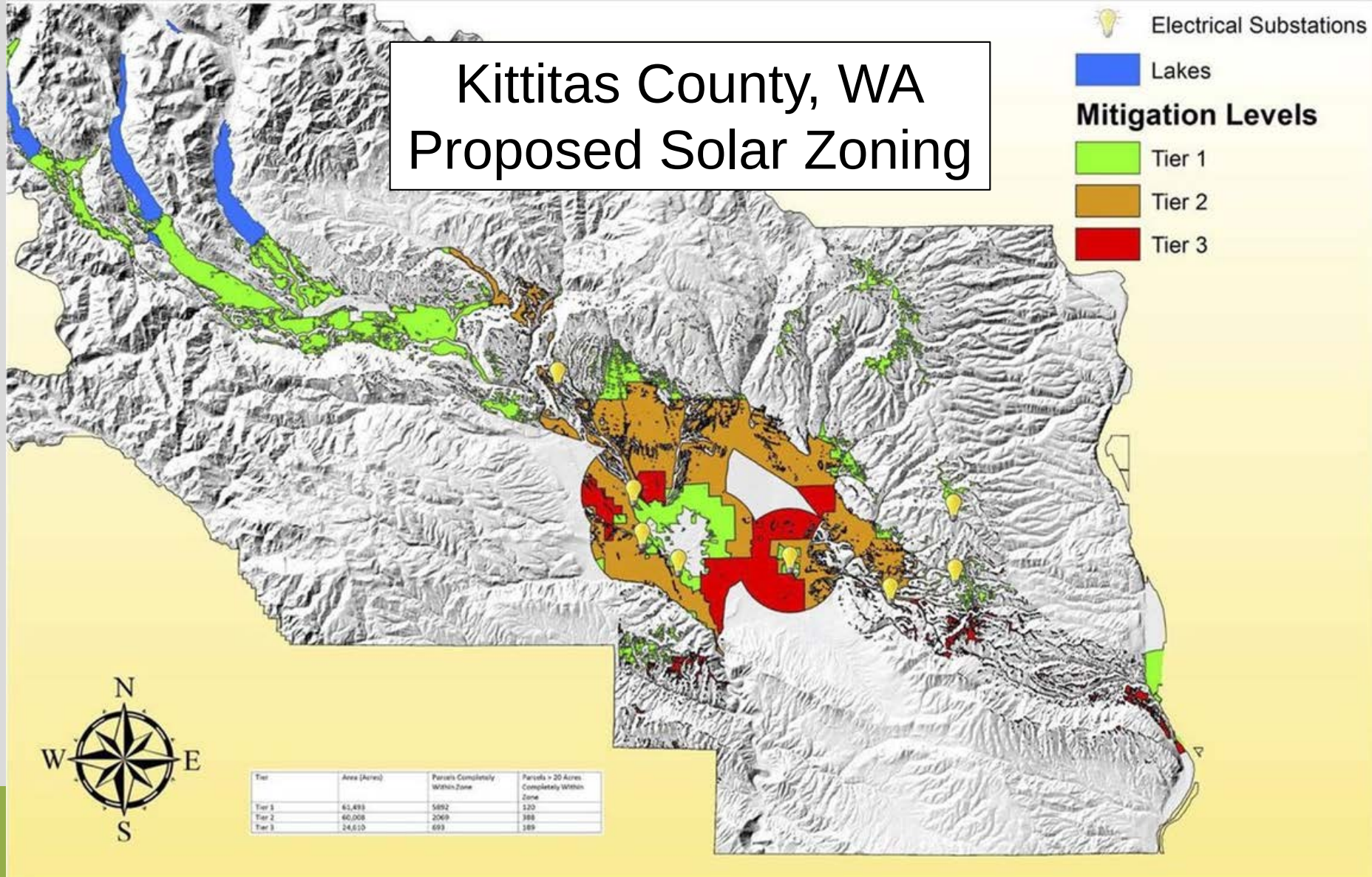
Source: National Renewable Energy Laboratory.

Example – Planning for Solar

- Kittitas County, WA set criteria for solar facility placement, including:
  - Sites within three-mile radius of infrastructure,
  - Less than a 5 percent slope, and
  - Not in prime agriculture zoning.

- Analysis splits land into three levels:
  - Tier 1 (green): Meet all criteria
  - Tier 2 (orange): Meets some criteria
  - Tier 3 (red): Meets few or no criteria

Example – Planning for Solar



SPARTYVILLE Goes Solar

A farmland solar development proposal

- Use the provided handout and graphics for background information.
- As a small group, talk through questions 1-3.
- Time: 15 mins.

E. Zoning Tools

Principal Use vs. Accessory Use

- Adopt different standards for:
  - On-site use systems (accessory use of land)
  - Utility or community-based systems (principal use of land)

Marquette; Brad Neumann

Principal Use vs. Accessory Use

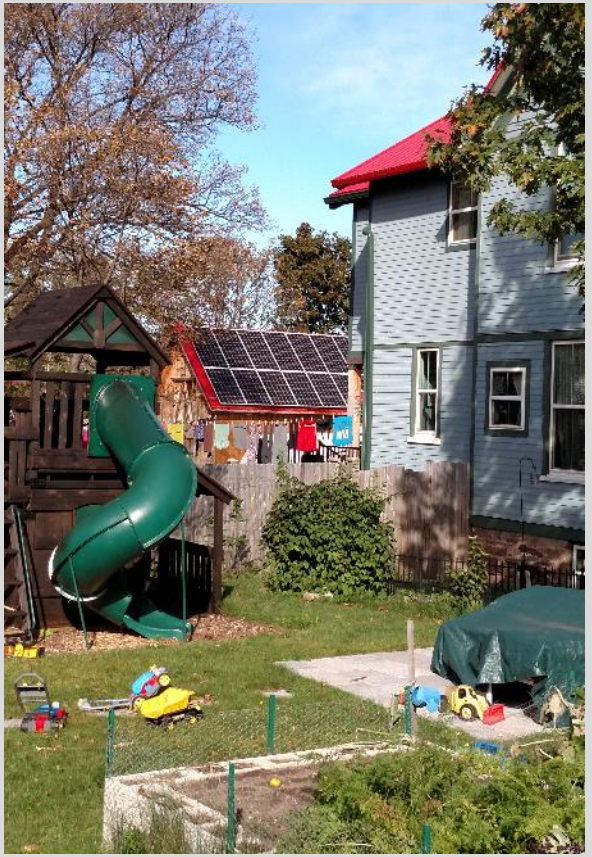
- A principal use is the primary use or structure permitted on a property.

- Solar as a principal use on a property is generally a utility-scale array that occupies most of the property.

energy.utah.gov

Principal Use vs. Accessory Use

- Accessory uses are uses or structures that offer an additional benefit to an accompanying principal use
- Many communities permit small-scale, ground- or roof-mounted solar systems as accessory uses in all districts



Marquette; Brad Neumann

Permitted Land Use (use by right)

- Within each zoning district, there will be a list of permitted uses.
  - Aka **'Use by Right'**

- Owner can use the property in that way without special review and approval by the local government

Source: Google Images

Special Land Use

- Generally compatible with other uses within a zoning district, but may not be appropriate in every location.
- Special land uses:
  - Typically require a public hearing and planning commission review.
  - Approved only when ordinance standards are met.

Source: Google Images

On-Site Use vs. Utility-Scale

Zoning Approach:

- Accessory, Permitted Use in all districts as appropriate
- Minimal review = expediency

Source: Google Images

Zoning Approach:

- Principal, Special Land Use in certain districts as appropriate
- More review = siting based on standards

Source: Google Images

Zoning for Solar Energy

- Local units of government typically provide for solar energy on private and public property through:
  - Amending their Zoning Ordinances;
  - Updating their Site Plan Review processes;
  - Amending subdivision regulations;
  - Revising their building codes (if applicable);
  - Expediting their permitting processes; and
  - Changing their inspection procedures.

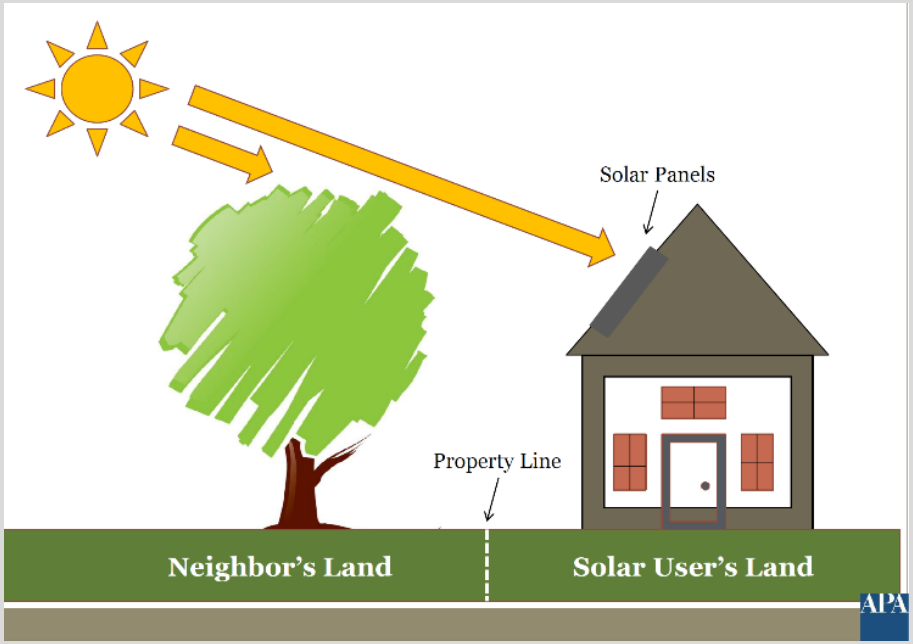
Sample Zoning Provisions

Definitions - Include storage in the definition to accommodate anticipated growth in battery storage devices linked to solar energy systems.

- *Solar Energy System: solar energy devices or design features of a building used for the collection, **storage**, and distribution of solar energy for space heating, space cooling, lighting, electric generation, or water heating.*

Solar Access

- Solar Access Rights - to access and harness sunlight so property owners can:
  - Grow crops, illuminate space, dry clothes, etc…. and operate solar collectors



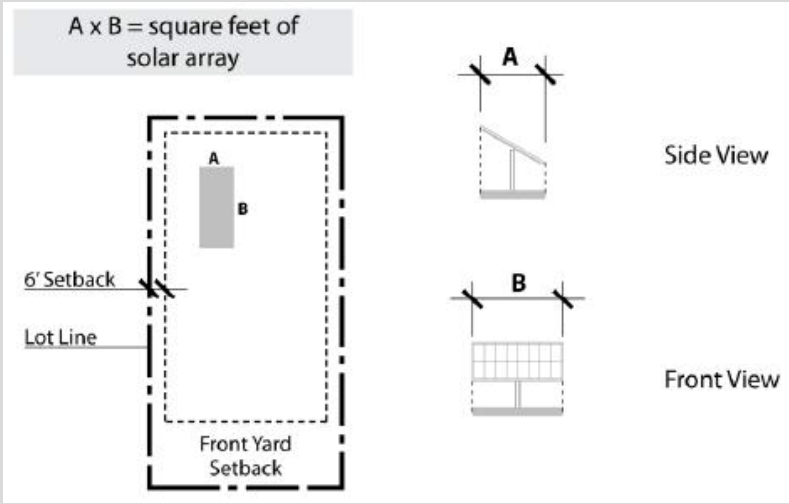
Source: "Solar Planning 101: Opportunities and Obstacles" (webinar), *American Planning Association*, 9/11/17

Solar Access Zoning Provisions

- Solar access provisions define and protect property owners' rights to sunlight
- Some municipalities require:
  - **Solar Access Permits** to protect from prohibited interferences, i.e., vegetation and neighboring properties. Example: Tecumseh, MI
  - **Solar Access Easements** are effectuated to protect solar skyscape or a designated solar structure by forbidding activities, land uses, and structures that may interfere. Example: Milan, MI

Solar Setbacks

- To minimize interactions with shadows cast by principal or adjacent structures; Prevent visual nuisances
- Required setback sometimes determined using formula (takes into account slope, angle of sun, size of property, etc.)
- Example: Grosse Ile, Township
  - Free-standing solar panels shall be placed no less than 6 ft from any lot line
  - Surface area coved by solar panel shall not exceed 2% of the lot or 360 sq. ft., whichever is smaller



Sample Zoning Provisions

Setbacks

- Canton, MI zoning ordinance applies orientation and special solar setback standards to building placement requirements to protect solar access in mid- and high-rise developments
  - Required Setback = (Building height (in feet) Å~ 2.2) minus (Required yard setback of adjacent residential zone). The 2.2 factor is based on the solar azimuth on December 21, and the latitude of Canton Township, 42° 20′.

Considerations for Historic Structures

- Regulations and strict interpretations of historic standards can prevent the installation of solar on historic structures
- **Goal:** Allow historic property owners to install solar energy systems without negatively impacting the structure's or site's integrity.

Sample Zoning Provisions

Historic Structures

- Ypsilanti's HP Ordinance explains how the Secretary of the Interior's standards for rehabilitation provide specifically for solar energy systems:
  - Solar panels cannot obscure character-defining features
  - If a solar panel causes a finish (i.e., stucco) to deteriorate, the HDC will deny the application
  - The HDC must consider the installation and de-installation of the system

Sample Zoning Provisions

Historic Structures

- The Grand Rapids HDC will evaluate solar installation applications on the following:
  - The visibility of the skylights and/or solar system from adjacent public streets and adjoining properties; and,
  - The design and replacement of the skylight and/or solar system and their compatibility with the structure's roof line, color, texture, and shape.

Sample Zoning Provisions

Glare - Due to the crystalline material on most solar arrays, sunlight may be reflected towards neighbors and/or drivers on adjacent roads

- **Example Regulation:** Dundee, MI Zoning Ordinance
  - *Solar panels shall be placed and arranged such that reflected solar radiation or glare shall not be directed onto adjacent buildings, properties or roadways.*

Sample Zoning Provisions

Visual - Solar panels can face strong opposition due to their tendency to negatively alter the visual character of buildings

- **Example Regulation:** Manchester, MI Zoning Ordinance
  - *The solar energy system shall not have a significant adverse visual impact on the natural features or neighborhood character of the surrounding area… must be either composed of building-integrated components (such as solar shingles) that are not readily evident, or be designed and mounted to match the shape, proportions, and slope of the roof.*

Other Sample Zoning Standards – Utility-Scale

- All applicable local, state, federal permits
- Comply with electrical and building codes
- Decommissioning plan
- Performance guarantee
- Height restrictions – the maximum height allowed in the district

- Update Site Plan Review requirements
- Amend subdivision regulations to maximize sun exposure of lots in new developments
- Lot coverage – waive for solar arrays
- Access – fencing?

Sample Zoning Standards – Onsite

- On-site use systems permitted by right subject to administrative site plan review
- Removal if inoperable for 12 months
- Rooftop:
  - Not extend more than 4 feet above the surface
- Array:
  - Height less than 10 feet in rear or side yards
  - Height less than 42 inches in front yard
  - Lot coverage less than 20%

Basic Regulatory Changes

1. Differentiate between on-site, accessory-use systems vs. utility-scale systems, which are new principal uses of land.
2. Allow on-site use systems that are accessory to the principal use by-right with minimal review by the zoning administrator.
3. Allow utility-scale solar systems by-right in certain zoning districts, such as industrial, and list them as special land uses subject to siting review by the PC in those zoning districts where there might be land use conflicts

Basic Regulatory Changes

3. By special land use in those zoning districts where there might be land use conflicts:
   a) Develop special land use standards (discretionary and non-discretionary), e.g.:
      i. Not on prime farmland
      ii. Sited to minimize visual impact on an otherwise natural or agrarian landscape
      iii. Others?
   b) Amend site plan review requirements

F. Lead by Example

TC Commits To Going 100 Percent Renewable By 2040

By Beth Milligan | Aug. 15, 2018

Traverse City became the first city in the state of Michigan Tuesday to commit to using 100 percent renewable energy community-wide by 2040.

Traverse City Light & Power (TCL&P) board members approved a commitment to obtain 100 percent of the utility's power generation from renewable sources – such as solar, wind, and landfill gas – within the next two decades. Traverse City had previously committed to powering all city buildings with renewable energy by 2020; other Michigan cities, including Grand Rapids and Ann Arbor, have made similar commitments to powering their municipal operations with clean energy.

City of Ann Arbor's Solar Plan

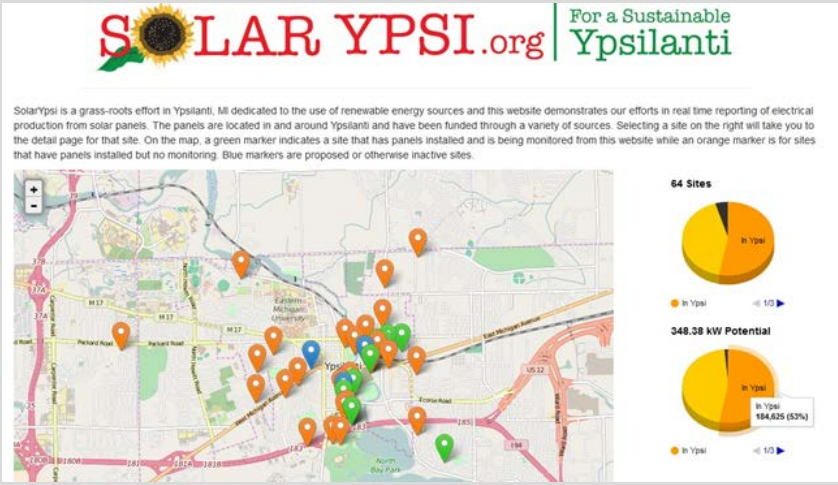
The plan recommends

- solar public works projects;
- fiscal incentives;
- expedited permitting process for solar panels;
- Incorporating solar into city infrastructure (i.e. parking meters);
- Creating a solar campaign to advocate for statewide policy; and
- amending the zoning ordinance

City of Ypsilanti's Climate Action Plan

- In 2013 the City adopted a goal of 1,000 solar roofs or 5 MW by 2020
- In 2016, the City worked with SolarYpsi, DTE, and Highland Cemetery to install a 800 KW solar field
- SolarYpsi worked with a private donor to install a 50KW rooftop installation on the Fire Dept.
- In 2017, the City established the Sustainability Commission to help move the City forward on economic, social, and environmental health goals

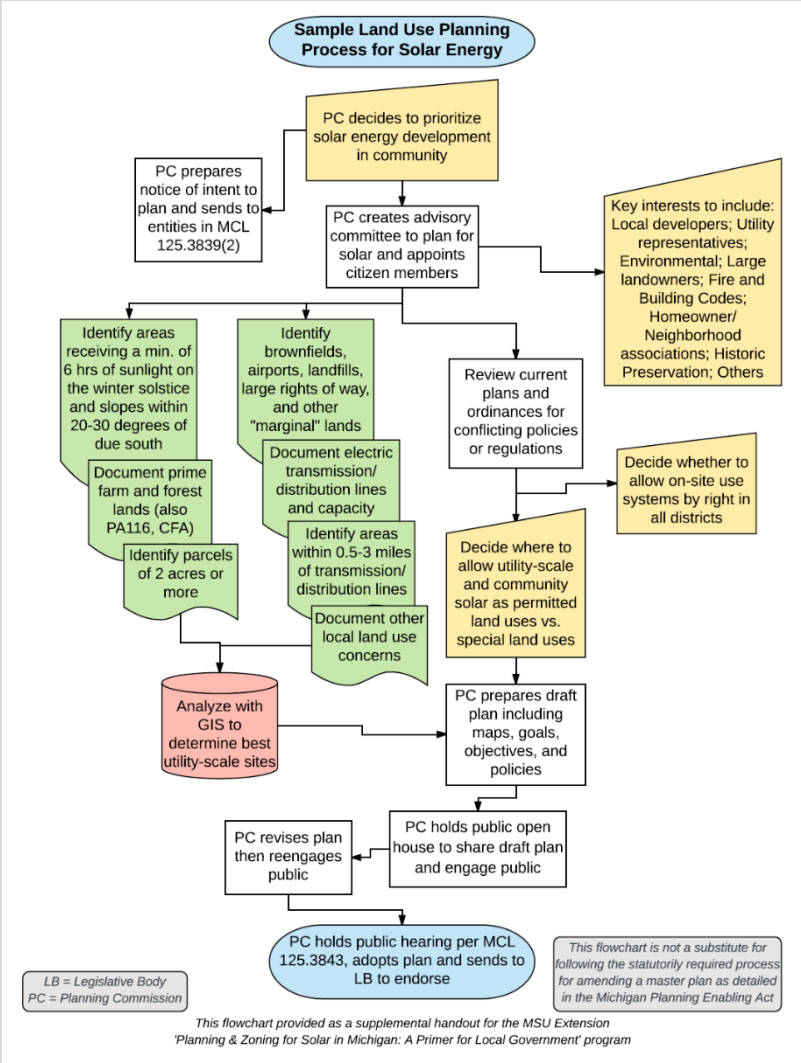
Source: Google Images



G. Next Steps

So, what to do?

- ***Start the conversation in your community!***
  - Better to be proactive and have the policies and regulations in place before controversial applications arrive.
- See the Planning for Solar Flowchart



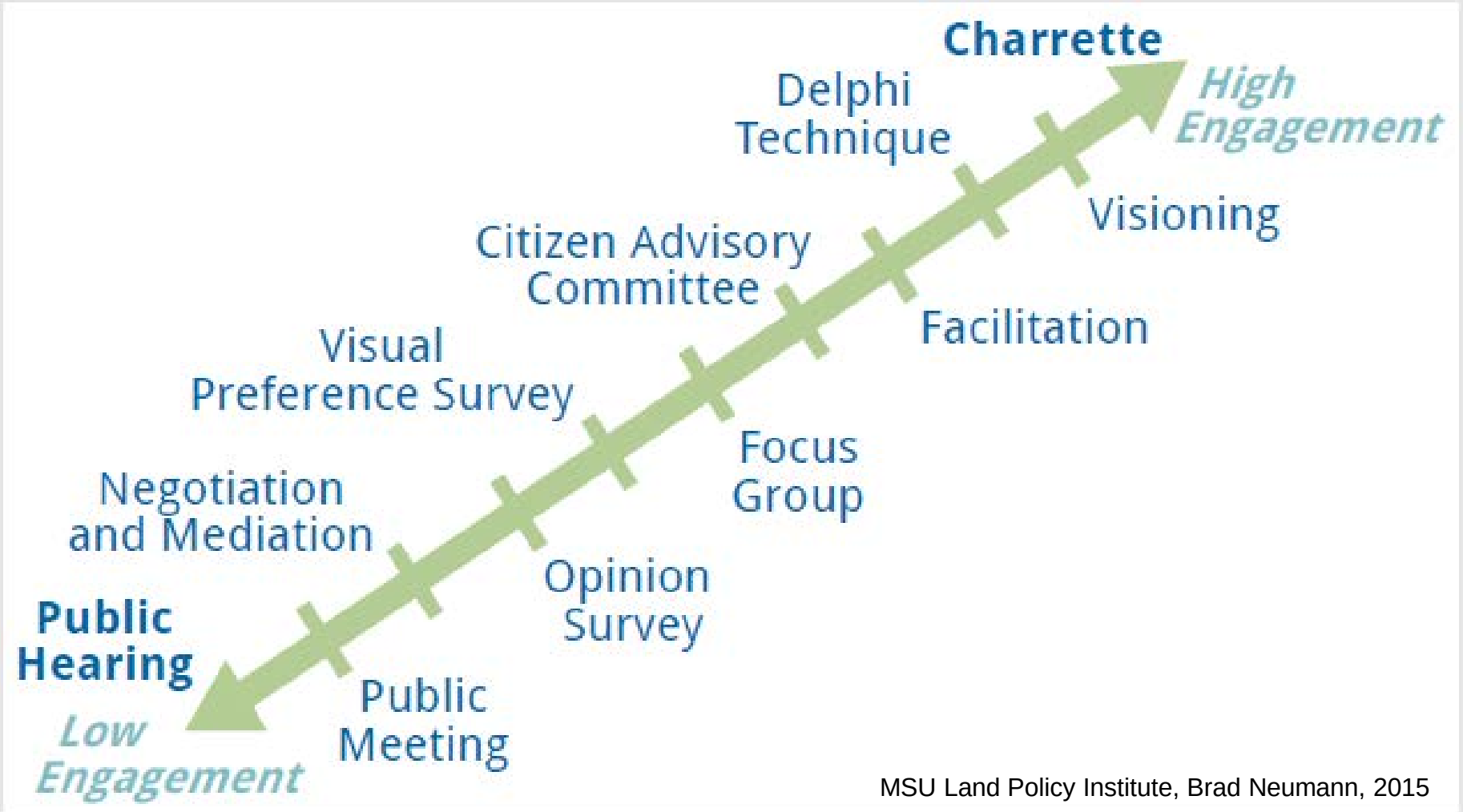
Engage the Public

- ***It is important to hear from many perspectives***:
  - Local energy developers
  - Utility representatives
  - Environmental interests
  - Large landowners
  - Fire and Building Codes
  - Homeowner/ Neighborhood associations
  - Historic Preservation
  - Who else?

Public Engagement

- Planning Commissions are empowered to create advisory committees (MCL 125.3817)
  - Members can include those not serving on the PC
- Consider involving:
  - Local developers; Utility representatives; Environmental; Large landowners and resource managers; Fire and Building Codes; Homeowner/ Neighborhood associations; Historic Preservation; Others

Engage the Public



MSU Land Policy Institute, Brad Neumann, 2015

An Engagement Tool

https://www.planning.org/research/solar/sunnyside.htm

Vision, Goals, Objectives, Policies

- It starts with a well-crafted vision and supporting documents…
  - Goals
    - Objectives
      - Policies
- See ‘Community Energy Management Best Practices’ checklist; and ‘Becoming a Solar Ready Community’ sample planning language

Source: Google Images

Multi-jurisdictional approaches

- Consider developing a joint master plan with another municipality under the Joint Municipal Planning Act, PA 226 of 2003, as amended

NORWAY AREA | MASTER PLAN

Solar energy systems hold great promise for the future energy needs of the Norway Area because they use a renewable energy resource; they require less capital, land, water and other resources needed for central-station generation of electricity; and because they do not pollute the community's water and air; and the successful use of solar energy systems for such purposes as supplying space heating, water heating or the production of electricity is dependent upon sufficient access to direct sunlight. Regulations could be adopted promoting the use of solar

H. Additional Resources

Additional Resources

- **Becoming a Solar-Ready Community: A Guide for Michigan Local Governments**. Sept. 2013. *Clean Energy Coalition*. http://cec-mi.org/wp-content/uploads/2013/09/Guide-Book_Solar_FINAL_web.pdf
- **A Guidebook for Community Solar Programs in Michigan Communities**. Feb. 2014. *Great Lakes Renewable Energy Association.* https://www.michigan.gov/documents/mdcd/Michigan_Community_Solar_Guidebook_437888_7.pdf
- **White Paper: Market Barriers to Solar in Michigan**. Jan. 2012. *National Renewable Energy Laboratory*. http://www.michigan.gov/documents/mpsc/marketbarrierssolarinmi_394662_7.pdf

Additional Resources

- MSU Extension **Shining a Light on Agricultural Solar Energy Development Webinar** - March 28 and 29, 2018

- Recording at: http://www.canr.msu.edu/bioeconomy/solar-photovoltaic/leasing-land-for-solar-projects
  - Part 1 - 3.28.18 and Part 2 - 3.29.18

  - Handouts for the program are also available online at: https://sites.google.com/msu.edu/shineagsolar

Additional Resources

- **Advancing Solar: Great Lakes Bay Region**. Oct. 2012. *Clean Energy Coalition*. http://cec-mi.org/wp-content/uploads/2014/02/GLBR-Final-Report-FINAL-2-2014-edit.pdf
- **Best Practices for Siting Solar Photovoltaics on Municipal Solid Waste Landfills**. *Environmental Protection Agency; National Renewable Energy Laboratory*. Feb. 2013. https://www.epa.gov/sites/production/files/2015-03/documents/best_practices_siting_solar_photovoltaic_final.pdf
- **Implementing Solar PV Projects on Historic Buildings and in Historic Districts**. Sept. 2011. *NREL*. https://www.nrel.gov/docs/fy11osti/51297.pdf

Additional Resources

- **Planning for Solar Energy**. 2014. *American Planning Association* Planning Advisory Service Report 575. https://www.planning.org/publications/report/9117592/
- **Planning and Zoning for Solar Energy**. 2014. *American Planning Association* Essential Info Packet 30. https://planning-org-uploaded-media.s3.amazonaws.com/document/product_EIP_E_IP30.pdf

Sources for Updating Site Plan Review and Permitting Processes

- **Emerging Approaches to Efficient Rooftop Solar Permitting**. May 2012. *Interstate Renewable Energy Council*.
  - Summarizes general steps in the permitting process and gives examples of cities/counties/states widely cited as having the best model in each step.
- **Solar Electric Permit Fees in Northern California: A Comparative Study**. July 2011. Loma Prieta Chapter, Sierra Club.
  - Makes permitting reform recommendations including: flat permit fees, not valuation based, standardizing permitting requirements across jurisdictions, and fast-track application for solar installers

Sources for Updating Site Plan Review and Permitting Processes

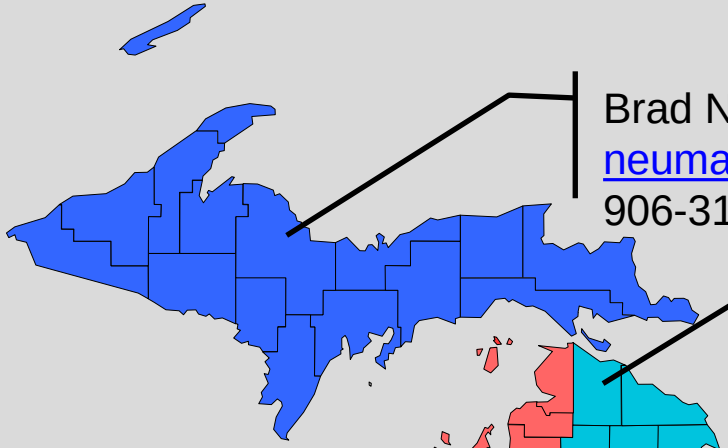
- **Taking the Red Tape Out of Green Power** (Sept. 2008); **Freeing the Grid: Best and Worst Practices in Interconnection Standards** (2011 ed.). *Network for New Energy Choices (NNEC).*
  - Makes specific recommendations to improve the process including removing PV zoning/building barriers and streamlining approval/permitting processes

Sources for Updating Site Plan Review and Permitting Processes

- **Expedited Permit Process for PV Systems: A Standardized Process for Review of Small-Scale PV Systems**. Oct. 2011. *Solar ABCs* (Solar America Board for Codes & Standards).
  - Detailed technical report outlines an expedited permitting process, including sample electronic permitting forms that can be used and/or customized by a jurisdiction. It is widely cited in best-practices reports (SunRun, IREC) as starting place for standardizing the solar permitting across the U.S.

Land Use Educators

Contact the MSU Extension land use educator closest to you with your planning and zoning questions.



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Wayne Beyea (campus)
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Webinar Option Available

- Know someone who couldn't be here, or someone else that needs to hear this information?
- **Friday, October 12th 11:30 am-1:30pm**
- Register at: https://events.anr.msu.edu/PlanningandZoningforSolar

Thank you!

Questions?