Pollinator-Friendly Solar in Indiana

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Table of Contents

Authors & Acknowledgements

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Solar Energy & Pollinators

Indiana is approaching a major energy transition. Historically, electricity in the Hoosier State has been primarily generated by coal-fired power plants. But looking ahead into the 2020s and beyond, utilities across the State have made plans to retire many of these aging power plants to pursue cleaner and more cost-effective electricity generating resources like solar power.

The acreage required for the growing number of solar facilities that will be coming online in Indiana as part of a portfolio to replace coal plants offers an excellent opportunity to address a related, and increasingly pressing, environmental crisis: declining pollinator populations. Honeybees and butterflies are two prime examples of pollinators that face a host of imminent threats. A typical 1 megawatt (MW) solar facility sited in Indiana will occupy roughly 5-10 acres of land for a period of several decades. The anticipated growth in the development of new solar facilities in Indiana during the coming years could therefore impact a significant amount of land. With the proper planning and policies in place in advance, these solar sites could also easily become prime pollinator habitat – resulting in substantial economic, environmental, and social benefits to Hoosiers.

The time is therefore ripe for policymakers to consider adopting commonsense policies that encourage pollinator-friendly site management practices at Indiana solar facilities.

Solar Powering Indiana

Today, Indiana's electricity generation fleet remains dominated by fossil-fueled, primarily coal-fired, power plants. Indiana's solar industry, however, is poised for a boom. To date, Indiana has installed 377 MW of solar, with investments totaling more than $595 million, resulting in more than 3,100 jobs created.[1] Those numbers are expected to grow dramatically over the next decade based on utility resource plans.

A Note on Solar Terminology
This report uses "solar" to mean ground-mounted, large-scale solar photovoltaics (PV) facilities, except where otherwise specified. Solar PV is the dominant solar technology deployed today. Solar PV converts energy from the sun into electricity. Large- or "utility"-scale solar installations range from 1 megawatt (MW) to hundreds of MW in size.

Indiana Utilities Are Planning to Build Unprecedented Amounts of Solar

Every three years, each of Indiana's five investor-owned utilities (IOU), as well as its two generation and transmission electric cooperatives and the Indiana Municipal Power Agency, file an integrated resource plan (IRP) that identifies how it plans to meet the energy requirements of its customers in the future. Increasingly, these IRPs are also including competitive solicitations, the results of which consistently show solar as one of the most cost-effective resource options. For example, Northern Indiana Public Service Company (NIPSCO), an IOU serving Hoosiers in northern Indiana, filed its most recent IRP in 2018, in which it announced it would retire most of its coal generation by 2023 and all of it by 2028, replacing it with clean energy solutions – primarily solar – saving consumers approximately $4 billion.[2] Accordingly, in 2019 NIPSCO issued a request for proposals (RFP) for an unprecedented 2,300 MW of new solar – perhaps the single-largest competitive procurement for solar in U.S. history.

As shown in Table 1, NIPSCO is not alone in planning for substantial amounts of solar additions this decade as coal plants are slated for retirement. All recently filed IRPs by Indiana's IOUs show solar installations significantly expanding in the coming years in Indiana. In addition to NIPSCO, several other utilities like Indianapolis Power and Light (IPL) and Vectren have issued their own competitive solicitations for resources including solar. Collectively, Indiana's IOUs are planning the addition of more than 6,400 MW of solar – which would increase the state's total installed capacity by more than 1,600% – and that does not even include solar additions planned by other types of utilities (i.e., electric cooperatives and municipal utilities), businesses, organizations, or families.

Table 1. The Roaring 2020s: Solar Boom Anticipated as Indiana Utilities Retire Coal Plants

Utility	Anticipated IOU Solar Additions by 2030 (MW)	Anticipated IOU Coal Plant Retirements by 2030 (MW)
Duke Energy Indiana[3]	900	1,897
Indiana Michigan Power[4]	1,100	2,600
IPL[5]	825	644
NIPSCO[6]	2,900	2,094
Vectren*[,7]	*700**	580
Total	**6,425 MW**	**7,815 MW**

** Vectren solar additions are estimated, as IRP results had not been finalized at the time of publishing. See end note for additional details. Solar additions are in units of nameplate capacity. Coal retirements are in units of summer capacity.*

Indiana Businesses Are Demanding More Renewable Energy Options

Likewise, businesses in Indiana are taking a growing interest in procuring affordable clean energy solutions to reduce energy costs, provide greater cost certainty, and achieve sustainability goals. While smaller businesses can meet their energy needs with rooftop solar, larger entities with substantial power needs can leverage alternative arrangements that allow the renewable energy resource to be located offsite. For example, Cummins, an Indiana-based global power solutions business known for its diesel and natural gas engines, entered into a "virtual" power purchase agreement with developer EDP Renewables in 2017 for a 75 MW wind facility.[8] Utility green tariffs, which allow non-residential electric customers to buy renewable energy from their utility, could be another option that would allow businesses and other entities to access renewable energy located offsite, although this is contingent on utilities making such an offering available. These arrangements could provide attractive benefits to Indiana businesses in the near future. A recent report by trade association Advanced Energy Economy found demand for new renewables (solar and wind) in Indiana could be as much as 3,600 MW by 2030, which could result in $5.78 billion in investments and the creation of 25,000 jobs.[9]

Before and After: An Indiana Solar Facility Using Pollinator-Friendly Site Practices

Photo Credit: Adam Thada, Ancilla College

Indiana Counties Consider Solar Moratoriums

Despite solar's popularity and central role in powering Indiana in the future, a number of Indiana counties have recently considered or started imposing moratoriums on large-scale solar development.[10,11] The primary drivers of the moratoriums in Indiana appear to be the lack of existing comprehensive rules on solar development at the state and local level, as well as a small, but sometimes vocal, contingent from the local community that

oppose the development for specific reasons (e.g., typically aesthetic preferences).* Local governments are sometimes caught unprepared when faced for the first time with the prospect of a large solar facility in their county. In some cases, local authorities have enacted moratoriums while updated siting rules are developed and put in place.

Pollinator-friendly solar site practices and standards could help mitigate potential opposition to new solar development. Planning and management practices used to at solar sites to benefit pollinators specifically offer numerous co-benefits, such as improved environmental quality and site aesthetics, which can work to help ameliorate common concerns that residents have previously expressed regarding solar development.

How Solar Can Benefit Pollinators (And Pollinators Can Benefit Solar)

Among the pollinators in Indiana are 430 species of bees, 144 species of butterflies, thousands of species of moths, and many species of flower-visiting flies, wasps, ants, and beetles.[12] Flowers, shrubs, trees, and more than 150 types of crops depend on pollinators like those found in Indiana to produce fruit and seeds to reproduce.[13]

However, pollinators in Indiana and across the country are facing rapidly declining populations that could have dire economic and environmental consequences. Populations of native bees, honey bees, and butterflies have been shrinking, and research points to chemical exposure, habitat loss and fragmentation, pathogens, invasive species, and climate change as the main threats.[14] Although Indiana is poised for a solar boom that promises to bring significant environmental benefits relative to its current coal-dominated portfolio, developing solar still involves some land use impacts, and these impacts can negatively impact pollinator populations that are already facing critical challenges.

Pollinator-Friendly Solar

Pollinator-friendly solar refers to solar sites that are planned and managed to promote pollinator conservation by creating and maintaining pollinator habitat.[15] These sites use diverse and native species as ground cover under and around solar panels rather than gravel, turfgrass, and/or non-native species. Solar panels are typically placed at least 36 inches above the ground to allow for plant growth without shading the panels, and cables between rows of solar panels are buried to allow for occasional mowing (i.e., not during flower bloom) between rows of solar panels. The sites are maintained to encourage the growth of pollinator habitat, while using appropriate vegetation management practices to control noxious weeds. This includes avoiding the use of insecticides that are harmful to pollinators and minimizing herbicide application. For example, sheep grazing has been successfully used in some circumstances as a means of vegetation control.

Table 2 highlights some of the benefits of adopting pollinator-friendly practices at solar sites. Several guides have also been developed to provide detailed information on planning and managing solar sites to encourage pollinator habitat and provide additional information on the benefits of pollinator-friendly solar.[16,17,18]

Table 2. How Hoosiers Can Benefit from Pollinator-Friendly Solar[19,20]

Category	Benefits	Description
Economic	Long-Term Cost Savings Through Reduced Maintenance	Although native seed mixes have higher upfront costs, long-term maintenance costs are lower (e.g., reduced mowing and pesticide application), resulting in lower project costs.
	Potential Increased Efficiency of Solar Panels	While more research is needed to validate these claims, the presence of diverse, water-rich plants compared to gravel or turfgrass is consistent with conditions (e.g., reduced ambient air temperatures) expected to result in higher solar panel efficiency, meaning more electricity could be generated by solar panels at pollinator-friendly sites.

* Long term planning guidance and example comprehensive zoning rules are being developed for Indiana counties in a collaborative effort between Indiana University and the Great Plains Institute for 2020 publication.

	Increased Crop Yield	Increasing local pollinators can result in higher fruit and nut yields nearby, as these types of crops depend on pollinators.
	Maintaining Future Agricultural Viability	Solar facilities are expected to generate power for at least 20-30 years. Upon decommissioning, the land can be returned to prior uses. Pollinator-friendly practices can increase organic matter and water-holding capabilities of soil.
	Honey Production	Since honeybees can produce honey for commercial sale, pollinator-friendly solar can result in additional economic gains.
Environmental	Improved Water Quality	Using deep-rooted native species can significantly increase infiltration and reduce fertilizer, herbicide, and pesticide application, resulting in less harmful runoff that contributes to water pollution.
	Reduced Erosion	Native plant cover reduces wind and water erosion, maintaining or improving soil health.
	Habitat for Native Species	Pollinator-friendly practices provide food, cover, and nesting habitat for insects, mammals, birds, reptiles, and amphibians.
Social	Improved Aesthetics	Using native species as ground cover and buffering at solar facilities, (e.g., flowering plants) improves the aesthetics of the facility and creates a more natural, as opposed to industrial, aesthetic.
	Greater Community Support	As a result of the numerous co-benefits described in this table, solar facilities designed to improve pollinator habitat may, and are arguably more likely to, experience more support from neighbors and surrounding communities.

Land Use and Agriculture

Agriculture comprises an important part of Indiana's economy, land use, and overall aesthetic. Indiana is one of the nation's leading agricultural producers, with corn and soybean the leading products and the sector as a whole contributing more than $31.2 billion to the state's economy.[21] The more than 56,000 farming operations in the state have an average farm size of 264 acres.[22] More than half of the state's 23 million acres are designated as prime farmland, which refers to land that has best physical and characteristics for growing crops.[23]

Pollinator-friendly practices are a natural fit for agricultural land that is slated for solar development. The planning and management practices used to foster pollinator habitat under and around solar panels can improve soil health and reduce erosion, increase pollinator populations that provide pollinating services to certain types of crops, and avoid the need for alternative cover options like gravel that could otherwise make it difficult to restore a site back to agricultural use after decommissioning. Landowners benefit from the stable revenue stream associated with leasing a portion of their land for temporary use as a solar facility. With Indiana farmers recently impacted by the combination of flooding and tariffs on commodities, solar offers a way to diversify their "crops" and provide economic security in a time of unprecedented uncertainty. Incorporating pollinator-focused practices at the solar site enhances those benefits.

While the overall land impacts of Indiana's forecasted solar boom are expected to be small relative to the overall size of the state, pollinator-friendly solar could still have a significant impact in creating pollinator habitat. Ground-mounted utility-scale solar facilities typically require 5-10 acres of land per MW.[24] Nationwide, solar facilities are expected to need three million acres of land by 2030.[25] If these facilities used pollinator-friendly practices, they could play an important role in rehabilitating pollinator populations across the country.

In Indiana specifically, the five IOUs are anticipated to build roughly 6,425 MW of large-scale solar by 2030, which would impact up to 64,000 acres of land total, or only about 0.28% of Indiana's total size, assuming all of

the facilities were sited in-state.† It is worth noting that even if *all* of these anticipated IOU-driven solar additions in the 2020s were sited on prime farmland (an unlikely scenario, as some projects would likely be sited elsewhere), they would only compose of about 0.5% of the state's prime farmland. Even after accounting for the likelihood of additional solar facilities beyond those planned by IOUs, more than 99% of the state's prime farmland today would still be expected to be unaffected by solar development and available for continued agricultural use in 2030.[26]

Water Quality and Permitting

Using pollinator-friendly practices at solar sites, such as planting deep-rooted native species as groundcover, can protect and improve water quality. Native vegetation buffers adjacent to agricultural land has been found to reduce runoff, with the resulting water quality benefits increasing over time as the plants become established.[27] Reducing water runoff can diminish the loss of on-site and nearby agricultural soil and critical nutrients such as phosphorus and nitrogen.[28] A major water quality issue in Midwestern states like Indiana is runoff of agricultural fertilizer into waterways, as excessive phosphorus and nitrogen can result in eutrophication in waterways that produce "dead zones." Finally, native species can boost the organic matter in soil and increase the soil's water-holding capacity, improving both soil quality and water absorption.

Solar projects typically must get a National Pollutant Discharge Elimination System (NPDES) construction stormwater permit, due to the area of land disturbed when constructing a solar facility (i.e., >1 acres) and the resulting stormwater runoff that can occur from this development. The construction NPDES permits in Indiana require a Construction Plan to describe how erosion and sedimentation discharge will be minimized, the impacts of impervious surfaces being constructed, and post-construction stormwater quality measures.[29] While solar panels themselves are impervious surfaces, pollinator-friendly solar practices can help reduce or eliminate the need for onsite stormwater treatment and achieve compliance with stormwater requirements, since groundcover under the panels are a pervious surface.

Policies to Encourage Pollinator-Friendly Solar

Key Tools for Encouraging Pollinator-Friendly Solar

State and local policymakers can promote pollinator-friendly solar practices by passing laws or ordinances that promote, incentivize, or require practices that create beneficial pollinator habitat. Utilities and other entities that issue competitive solicitations to procure renewable energy can incorporate provisions within their RFPs that encourage or give preferential treatment to solar projects that commit to adopting pollinator-friendly practices at their site (e.g., via bid scoring protocols).

Policymakers

The most popular policy tool states and local governments have relied on is the use of pollinator habitat assessment "scorecards" that allow solar developers to earn the voluntary designation that the solar site is pollinator friendly.[30] The scorecards typically contain a list of practices that can be implemented at a solar site to establish and maintain pollinator habitat (e.g., see Appendix D for Illinois's scorecard). A point value is earned for each pollinator-friendly practice adopted. A site that meets the best management practices by attaining a specified score attains the designation as "pollinator friendly." A solar developer can therefore use the scorecard to evaluate the extent to which a site uses best management practices that support native pollinators.

As shown in Figure 1, Midwestern states are leading the way in adopting pollinator-friendly solar scorecards through state legislation. In total, seven states have enacted laws encouraging the use of pollinator-friendly solar scorecards: Minnesota, Illinois, Michigan, New York, Maryland, Vermont, South Carolina.[31] Pollinator-friendly solar scorecards have also been voluntarily published by state agencies in Virginia, North Carolina,

† Some solar facilities could be sited outside of Indiana. For instance, solar facilities could be sited in nearby states and be used to provide electricity to Indiana customers via transmission lines. In addition, I&M's planned solar additions would also serve its customers in Michigan, so a portion of its solar target may be sited there.

and Ohio, and state universities have created scorecards in Pennsylvania, Florida, and Georgia. Generally, these scorecards follow the example set by Minnesota's scorecard, which was the first adopted in the nation. In Indiana, the Purdue Extension is creating an Indiana-specific scorecard to be published in 2020.

Another option for policymakers is to create financial incentives to encourage best management practices at solar sites. For example, Massachusetts is considering creating an extra financial incentive under its Solar Massachusetts Renewable Target (SMART) program for solar projects that are awarded pollinator certification by UMass Amherst Clean Energy Extension.[32]

Figure 1. States with Laws Encouraging Use of Pollinator Friendly Scorecards[33]

Siting Requirements

At the local level, balanced planning and zoning ordinances are particularly important for ensuring solar facilities are designed and sited in desirable ways and locations, which can help prevent siting opposition that some communities have experienced when faced with proposed solar development.[34] Indeed, some of the solar siting challenges in Indiana are in part due to a lack of planning for the potential of new solar facilities until after such a facility is proposed.

In Indiana, local planning commissions oversee land planning and make zoning ordinance recommendations to the applicable legislative body (city or town council, or county commissioners), who adopts, amends, or rejects the ordinance after notice is provided to the public and a public hearing is held.[35] There are three types of planning commissions in Indiana: area, advisory, and metro. A plan must be adopted before a planning commission adopts a zoning ordinance.[36] The local Board of Zoning Appeals (BZA) then has the authority under state law to grant relief from specific zoning requirements that have been adopted, such as by issuing special exceptions, conditional uses, and variances of use.[37] Solar developers often need to secure a special use permit and variances from the county's BZA to move forward with large, ground-mounted solar projects.[38]

In Indiana, existing zoning ordinances can be updated to encourage pollinator-friendly practices at solar sites. Recently, both St. Joseph County and Porter County have enacted changes through ordinances to encourage pollinator-friendly practices at solar sites.

Electric Utilities and Businesses

Electric utilities issue competitive solicitations, engage in bilateral negotiations, or build their own electric generating facilities to meet the forecasted energy needs of their customers. For instance, NIPSCO[39] and IPL[40] both issued RFPs in 2019 specifically for solar facilities, and Vectren[41] issued an RFP for all types of generation, including solar.

Although Indiana commercial and industrial (C&I) customers cannot typically choose their electricity provider or directly purchase power from a solar facility owner, they still have some options for procuring solar energy, such as on-site facilities, utility green tariffs (if available), and virtual power purchase agreements.[42] C&I customers can adopt policies of encouraging or requiring pollinator-friendly practices as part of their procurement regime.

Best Practices for Solar Farm Apiaries

Winnie the Pooh misled us all into thinking that flower-foraging honey bees are the same as aggressive stinging hornet wasps—there's no honey in spherical hornet nests. Honey bees are managed livestock like cows and sheep, and areas to tend honey bees can easily and safely be created outside the fence of a PV solar site.

The practice of "Solar Farm Apiaries" got its start in the United Kingdom and then was first implemented in the US by Bee the Change of Vermont before coming to the Midwest (Bare Honey) and the Northwest (Old Sol Apiaries). These beekeepers are delighting energy customers and partners with customized jars of honey that are "Solar Grown." They are also collaborating with breweries, cideries and restauranteurs to use the honey as a hero ingredient. Beekeepers can adhere to the following best practices.

1. Ensure the site includes abundant pollinator-friendly vegetation.
    - The developer should provide to the beekeeper a completed copy of the state's pollinator-friendly solar scorecard, or a scorecard from a state with similar climates and soils. When in doubt, contact the Center for Pollinators in Energy.[43]
2. Have more than a handshake.
    - A simple written agreement should be created with the project owner or landowner that includes the apiary location and the beekeper's right to access, any planned movement of the hives, as well as price and pre-payment arrangements for a portion or all of the honey.
3. Consider professional packaging options for the honey.
    - Many solar companies and/or landowners will love to have their name or the project name on a jar or other packaging option that they can share.
4. Location, location, location.
    - The hives should be placed and oriented to ensure bee droppings do not accumulate on the panels and bees do not interfere with regular operations and management.
    - The beekeeper should request to closely inspect nearby panels for droppings at least once per year.
5. Connect the beekeeper and landscaper/ecologist.
    - Beekeeper and vegetation manager should have one another's contact information.
    - Agree who will be managing the vegetation near the hives to be free of any invasive or noxious weeds.
6. Beekeepers should keep it separate.
    - The beekeeper should extract and keep the honey from the pollinator-friendly solar farm separately from other honey.
    - Consumers strongly support solar energy and creating habitat to help save the bees. Honey from solar sites encourages the adoption of pollinator-friendly solar as a best practice.
7. Engage with local media and the community.
    - Partner with clean energy non-profits and the solar company to educate more people about the importance of solar sites that provide healthy forage.
    - Take and share photographs and video of the site. Tell a story with each shot by including key the flowering vegetation, the bees or hives, and the solar array.
    - Tag your social media posts with #BeesLoveSolar.

Midwestern Policies Encouraging Pollinator-Friendly Solar

Midwestern states have taken a national leadership role in establishing best practices and enacting flexible policies that encourage pollinator-friendly practices at solar sites. The following Midwestern examples highlight state legislation (Minnesota), Governor-led action (Michigan), utility practices (Xcel Energy), and a local ordinance (Linn County, Iowa) that encourage pollinator-friendly solar development.

Minnesota

Minnesota enacted the first pollinator-friendly solar law in the nation in 2016.[44] Under H.F. 3353, solar developers can claim that their solar site provides benefits to gamebirds, songbirds, and pollinators only if the site follows specific guidance established by the Minnesota Board of Water and Soil Resources. The owner of a solar facility that markets their site as containing beneficial habitat for pollinators is also required to make their vegetation management plan available to the public.[45]

The Board of Water and Soil Resources (BWSR) established its guidance by creating a scorecard that a solar developer uses to assess a site's pollinator habitat based on identified criteria, with sites achieving more than 70 points qualifying as beneficial to pollinators.[46] The scorecard assesses the site based on the following criteria:

- The percentage of proposed site vegetation cover dominated by wildflowers or native species cover.
- The number of native species in seed mixes used for cover.
- The number of seasons with at least three blooming species present.
- Available habitat components (e.g., created nesting features like bee blocks).
- Site planning and management.
- Seed mix characteristics (e.g., genetic origin within 175 miles of the site).
- Insecticide risk (including a 40-point penalty for planned on-site insecticide use).

BWSR has identified a number of Minnesota local governments that have incorporated the state's beneficial habitat standard, or a proxy as a requirement for solar farm development, including Stearns, Mower, Clay, Carlton, Chisago, Sherburne, Winona, and the City of Scandia.

Michigan

Under the Farmland Open Space Preservation Program, a Michigan landowner may enter into a developmental rights agreement with the State, under which they can receive certain tax benefits and not be subject to special assessments in exchange for committing to keep the land in agricultural use for at least 10 years and not developing it for non-agricultural use.

In 2019, Governor Gretchen Whitmer approved changes to this program to allow pollinator-friendly commercial solar sites on property enrolled in the Michigan Farmland Development Rights Program.[47] Previously, commercial solar development was barred on farmland enrolled in the program, meaning solar was effectively barred on roughly one-third of the state's agricultural land unless the landowner paid back years of tax benefits they had already received (e.g., reduced property taxes) due to their participation in the program. The policy change opened up 3.4 million acres of farmland currently enrolled in the program to pollinator-friendly solar development. A landowner participating in the program and building a solar facility is required to plan and design the site to achieve a score of 76 or higher on the State's pollinator habitat scorecard.[48] Participating landowners are not allowed to claim the tax credit during the time the land is used for solar production, but they are not subject to payback for the time already in the program prior to installing solar. The landowner is also required to remove the solar panels and restore the land to agricultural use upon the project's decommissioning and must provide a surety (either a bond or irrevocable letter of credit) as an upfront assurance.[49]

Xcel Energy

In 2018, Xcel Energy in Minnesota became the first utility in the U.S. to require developers that submit bids to build new solar facilities under competitive solicitations to disclose the proposed solar facilities' pollinator

plan.[50] Specifically, Xcel is requiring all developers provide a completed copy of the state-developed pollinator habitat scorecard as part of a bid. Although attaining the pollinator-friendly designation under the scorecard is not required, the utility's decision to adopt the new requirement that the information be included when responding to future RFPs ensures pollinator habitat is factored into decision-making about future solar development and sends a clear signal to developers that the pollinator-friendly practices are an important component of the site design and management. Furthermore, as part of its vegetation management practices, Xcel and its contractors do not use neonicotinoids or other chemicals that are harmful to beneficial insects.[51]

Xcel Energy has also committed to becoming a solar leader, generally. In December 2018, Xcel Energy became the first large IOU in the nation to pledge to achieving 100% clean energy by 2050. In its Upper Midwest service territories (predominantly Minnesota, with parts of Wisconsin, North Dakota, South Dakota, and Michigan), Xcel Energy's most recent iteration of its IRP showed the utility planning to install at least 3,000 MW of solar by 2030.[52]

Linn County, Iowa

Linn County's solar development standards under its zoning ordinances specify site requirements related to ground cover and buffer areas of solar projects that benefit pollinators.[53] The standards require the ground under and around solar facilities to be planted and maintained with perennial vegetation using seeds that have a mix of grasses and wildflowers that are "ideally native to the region" and will result in a diversity of forbs or flowering plants blooming throughout the growing season. Seed mixes and maintenance practices are to be consistent with expert recommendations (e.g., as provided by Department of Natural Resources professionals). Finally, the use of neonicotinoids and other systemic insecticide treatment is banned.

Linn County highlights how local governments can include pollinator habitat considerations as part of siting requirements for solar facilities even if no formal action has been taken yet at the state level. Linn County's ordinance uses language developed as part of a model ordinance developed for the state of Iowa in 2016 under the Iowa Solar Ready Pilot Communities project originally funded by the Iowa Economic Development Authority.[54] Similar toolkits have also been developed for Minnesota, Illinois, and Wisconsin.

Recommendations

The coming solar boom in Indiana suggests that solar siting issues that have recently emerged in several counties in the state are likely to continue to become more pressing in the future, spurring additional action on policy. These discussions offer an ideal forum for considering policy changes aimed at protecting and enhancing pollinator habitat through site planning and management practices. Policymakers at the state and local level can take action now that will help to unlock the benefits of pollinator-friendly solar going forward.

Indiana Can Develop a Pollinator Habitat Assessment Scorecard

Indiana should follow the lead of other Midwestern states and create a pollinator habitat assessment scorecard. Developing a state-specific scorecard is an important first step for establishing best management practices at solar sites. Local governments and procuring entities can then leverage this tool to encourage pollinator-friendly practices as Indiana's solar development accelerates.

The Purdue Extension is currently developing such a scorecard for publication in 2020. Until then, scorecards that have been developed in neighboring states like Illinois,[55] Ohio,[56] and Michigan[57] can serve as useful guides to Indiana-sited solar.

Local Governments Can Adopt Solar Siting Guidelines that Encourage Pollinator-Friendly Practices

Local governments can adopt solar siting guidelines or requirements that encourage solar developers to use pollinator-friendly site planning and management practices. An open and transparent process that pro-actively

solicits industry and other stakeholder input is often the most effective way to find the right balance and avoid the adoption of restrictions that might later prove to be overly onerous and result in the cancellation of what could otherwise be a large economic development opportunity.

Given the unique nature of each solar facility and site, providing some flexibility in the guidelines or requirements may be warranted to avoid overly prescriptive requirements that could prevent solar development.

Appendix A provides an example ordinance and permit standards adopted by Stearns County, Minnesota, which has been a leader in including solar development in its plans and ordinances,[58] that would require site owners to use pollinator friendly practices. The County is adopting changes where site plans must be approved by the Soil and Water Conservation District Board, in addition to regular site inspections to ensure compliance. Appendix B provides a model ordinance that local governments can adopt as part of their siting requirements for solar facilities.

Utilities and Procuring Entities Can Require Information from Prospective Solar Developers on Pollinator Practices

Utilities and other procuring entities seeking to buy or purchase power from new large-scale solar facilities should expressly require solar developers to include pollinator habitat information about prospective solar sites. Specifically, RFPs can include language requiring a solar developer to provide a completed pollinator habitat scorecard as part of any proposal submitted in response to a competitive solicitation. As part of negotiations with shortlisted bidders, procuring entities can also seek additional details about site planning and management practices impacting pollinators and request modifications if necessary.

Appendix C provides a model provision that procuring entities can consider for inclusion as part of a request for proposals for solar that would require developers to complete a pollinator habitat assessment scorecard, presuming one has been developed by the state.

Solar Developers Can Design and Manage Solar Sites to Be Pollinator Friendly

In addition to adopting pollinator-friendly management practices (e.g., using diverse native species for ground cover, avoiding the application of insecticides, etc.), solar developers should implement several project design elements to ensure that new solar facilities can easily accommodate pollinator-friendly practices. First, ground-mounted solar panels should be installed at least 36 inches above the ground at their lowest point to allow for native plant growth around and under the panels while minimizing the risk of shading. Second, cabling and wiring between solar panel arrays should be buried to allow for easy mowing of vegetation several times a year. Panels should also be appropriately spaced to allow for maintenance. Developers should also follow best management practices regarding the construction and maintenance of a site (e.g., avoiding developing in existing critical pollinator habitat when possible; not overly grading the site and compacting soil; timing mowing to avoid harming ground nesting pollinators; and avoiding the use of herbicides and insecticides).[59]

Appendix A. Stearns County, MN Proposed Ordinance

The following are excerpts from Stearns County's standard conditions incorporated into the Conditional Use Permit (CUP) and the Construction Permit. The County's CUP conditions require solar site owners to adhere to pollinator friendly practices for the life of the project and contribute to the costs of county site plan review and performance site visits. Specifically, the pollinator-friendly solar requirements would be enforced by having the site's proposed planting plan be reviewed and approved by the Soil and Water Conservation District (SWCD), who would then annually inspect the site during the first four years and once every three years thereafter. Solar permitting fees would be used by the county to reimburse SWCD for the costs of its services.

Since solar permitting fees create additional project costs that could make a project less attractive or financially viable, any increase in permitting fees should be carefully considered, reasonable, and cost-based to avoid creating disincentives to desirable solar development. Alternative approaches, such as creating incentives for pollinator-friendly solar practices, could also be considered.

Solar Conditional Use Permit Conditions

1. A qualified engineer shall certify that the foundation and design of the solar panels is within accepted professional standards prior to issuing a construction site permit.
2. A financial guarantee in the form of a cash escrow or letter of credit meeting the County letter of credit requirements in the amount $25,000 shall be submitted prior to issuing a construction site permit to ensure proper decommissioning of the solar garden.
3. The applicant shall install and establish ground cover meeting the beneficial habitat standards consistent with Minnesota Statutes, section 216B.1642 and guidance as set by the Minnesota Board of Water and Soil Resources. The Solar Site Pollinator Habitat Assessment Form shall be completed to show that the beneficial habitat standard is met and submitted, along with the planting plan, with the construction site permit application.
    a. A cash escrow or letter of credit meeting the County letter of credit requirements in the amount of 125% of the cost to vegetate the project area is required. A work and material list shall be submitted to determine the guarantee amount. The guarantee shall be kept for a minimum of three years or may be held longer if vegetation is not sufficiently established after three years. The Solar Site Pollinator Habitat Assessment Form for Established Plantings shall be completed prior to release.
    b. The ground cover shall be maintained for the life of the project and continue meeting Habitat Friendly Solar Standards, which includes filling out the established project assessment form every 3 years.
    c. A seeding plan review and inspection fee will be required to be paid prior to issuing the construction site permit. This fee will cover review of the seeding plan, inspections for the first 3 years after planting and every third year after that to ensure the ground cover is being maintained.
4. Vegetative screening shall be added along County Road 18 and on the west side of the solar garden. A planting plan shall be approved by Environmental Services. A financial guarantee in the form of a cash escrow or letter of credit meeting the County letter of credit requirements in the amount of 125% of the cost to implement the screening plan shall be submitted.
5. Environmental Services shall be notified of any changes to project ownership, including new contact information. 6
6. An approach permit is required from the MN Department of Transportation prior to issuing a construction site permit.
7. An approved wetland delineation is required prior to issuing a construction site permit.

Construction Permit Conditions

1. Issued per the plans with last revision date of _____.
2. Vegetation plan meets the State of MN beneficial habitat standard, as approved by the Board of Water and Soil Resources and must be implement as proposed.
3. Seed tags shall be submitted to Environmental Services after planting has been completed.

4. The ground cover shall be maintained for the life of the project and continue meeting Habitat Friendly Solar Standards, which includes filling out the established project assessment form and submitting to the County every 3 years.
5. Screening shall be implemented per the approved screening plan.
6. Environmental Services shall be notified of any changes to project ownership, including new contact information.
7. Project must be built in compliance with Township conditional use permit. OR Must meet all conditions of Stearns County CUP _____.
8. Use construction site best management practices to prevent impacts to wetlands and adjacent properties. Install silt fence down grade of ground disturbing activities.

Appendix B. Model Ordinance for Local Governments

The following is a Model Ordinance that local governments can use as a starting point when considering a text amendment to existing zoning ordinances that encourage or require the use of pollinator-friendly practices at large-scale solar sites.

The first part of the Model Ordinance creates a voluntary designation for non-residential ground-mounted solar facilities of any size that meet voluntary best management practices for creating pollinator habitat at the site. The standards could also be made mandatory, as has been done in a number of counties across the Midwest. The second part of the Model Ordinance applies exclusively to large-scale (1 MW or greater) solar facilities sited on prime farmland. These provisions encourage or require pollinator-friendly practices as a mitigation measure for taking farmland out of production and to build soil health while the site in used for solar energy production.

Standards for Ground-Mounted Solar Facilities

1. Pollinator-Friendly Site Management Practices (General).
   Ground-mounted solar energy systems may claim that the site provides benefits to pollinators only if the site adheres to guidance set forth by the Purdue University Extension or an Indiana state government agency. If no such standard exists, the applicant can use following best management practices:

   a. Ground around and under solar panels and in project site buffer areas shall be planted, established, and maintained for the life of the solar project in perennial native vegetated ground cover to the maximum extent feasible and economical.

   a. To the maximum extent feasible and economical, perennial vegetation ground cover shall be based on a diverse seed mix of native species, or in the alternative, based on guidance specific to the local area provided by the National Resources Conservation Service, Soil and Water Conservation District, or Conservation District.

   b. The site shall be planted and maintained to be free of all invasive species, as listed by the Indiana Invasive Species Council.

   c. No insecticide use is permitted on the site. This provision does not apply to insecticide use in on-site buildings, in and around electrical boxes, or as otherwise may be deemed necessary to protect public health and safety.

2. Pollinator-Friendly Site Management Practices on Prime Farmland.
   Ground-mounted solar energy systems sized 1 (one) megawatt or larger and located on prime farmland are required to adhere to guidance set forth by the Purdue University Extension, or an Indiana state government agency, on pollinator-friendly management practices. If no such guidance is established, such sites shall meet the following best management practices for creating pollinator habitat:

   a. Ground around and under solar panels and in project site buffer areas shall be planted, established, and maintained for the life of the solar project in perennial vegetated ground cover to the maximum extent feasible and economical.

   d. To the maximum extent feasible and economical, perennial vegetation ground cover shall be based on a diverse seed mix of native species, or in the alternative, based on guidance specific to the local area provided by the National Resources Conservation Service, Soil and Water Conservation District, or Conservation District.

b. The site shall be planted and maintained to be free of all invasive species, as listed by the Indiana Invasive Species Council.

e. No insecticide use is permitted on the site. This provision does not apply to insecticide use in on-site buildings, in and around electrical boxes, or as otherwise may be deemed necessary to protect public health and safety.

Appendix C. Model RFP Provision on Pollinator-Friendly Solar

The following Model RFP Provision can be adapted and included as part of an RFP issued by a procuring entity for solar.

RFP General Requirements

Pollinator Habitat Assessment

Respondents shall submit a completed [Indiana Solar Pollinator Habitat Assessment] (Appendix [X]) for each solar site contained in its Proposal. While solar sites are not required to achieve a minimum score to be considered under this solicitation, [Procuring Entity] may give preferential consideration to projects that are determined to meet established pollinator-friendly standards. Respondents may, but are not required, to provide an additional narrative describing the actions the Respondent will take to establish and maintain pollinator habitat at the site using recognized best management practices.

Appendix D. Pollinator Habitat Scorecard Example: Illinois[60]

Illinois Solar Site Pollinator Habitat Planning Form

In Between and Under Solar Panels

1. PLANNED PLANT DIVERSITY IN ROWS & UNDER SOLAR ARRAY (choose up to 2)
   - ☐ 4-6 species +5 pts
   - ☐ 7 or More species +8 pts
   - ☐ All Native Species (minimum 4 species) +10 pts

Perimeter and Buffer Area

2. VEGETATIVE BUFFER PLANNED ADJACENT TO THE SOLAR SITE (choose all that apply)
   - ☐ Buffer planned outside of array fencing +5 pts
   - ☐ Buffer is 30-49ft wide measured from array fencing +5 pts
   - ☐ Buffer is at least 50ft wide measured from array fencing +10 pts
   - ☐ Buffer has Native shrubs/trees that provide food for wildlife +5 pts

3. SEEDS USED FOR NATIVE PERIMETER & BUFFER AREAS (choose all that apply)
   - ☐ Mixes are seeded using at least 20 seeds per square foot of Pure Live Seed or 40 Seeds per square foot on slopes > 5% +10 pts
   - ☐ All seeds are from a source within 150 miles of site +5 pts
   - ☐ At least 2% milkweed cover is planned to be established from seeds/plants +5 pts

4. PLANNED # OF NATIVE SPECIES IN SITE PERIMETER & BUFFER AREA (species with more than 1% cover)(choose 1)
   - ☐ 5-10 species +2 pts
   - ☐ 10-15 species +5 pts
   - ☐ 16-20 species +10 pts
   - ☐ >20 species +15 pts

Exclude invasive and non-native plant species from total

5. PLANNED PERCENT OF PERIMETER & BUFFER AREA DOMINATED BY NATIVE PLANT SPECIES (choose 1)
   - ☐ 26- 50 % +2 pts
   - ☐ 51-75 % +10 pts
   - ☐ More than 75% +15 pts

Whole Site

6. PLANNED PERCENT OF SITE VEGETATION COVER TO BE DOMINATED BY DESIRABLE WILDFLOWERS (choose 1)
   - ☐ 26- 50 % +2 pts
   - ☐ 51-75 % +10 pts
   - ☐ More than 75% +15 pts

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

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

8. HABITAT SITE PREPARATION PRIOR TO IMPLEMENTATION (choose all that apply)
   - ☐ Soil preparation done to promote germination and reduce erosion as appropriate for the site. +10 pts
   - ☐ Measures taken to control weeds prior to seeding +10 pts
   - ☐ None -10 pts

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

10. SITE PLANNING AND MANAGEMENT(choose all that apply)
    - ☐ Detailed establishment and management plan developed +10 pts
    - ☐ Signage legible at forty or more feet stating "pollinator friendly solar habitat" +3 pts

11. INSECTICIDE RISK (choose all that apply)
    - ☐ 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: _____

Meets Preliminary Pollinator Standards - 85
Provides Exceptional Habitat - 110 and higher

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

This form is designed (with the help of the Solar Site Pollinator Guidelines found on IDNR's website) to guide owners or managers of solar sites to meet the requirements to be able to claim a site is pollinator friendly according to the "Pollinator Friendly Solar Site Act (525 ILCS 55)". This form is for company records only and does not grant the title of a Pollinator Friendly Solar Site until the "Illinois Planned Pollinator Habitat on Solar Sites Scorecard" is completed with a score of 85 or higher on IDNR's website. This preliminary recognition is good for 3yrs, after which the "Established Pollinator Habitat on Solar Sites Scorecard" will need to be completed every 5 years to maintain recognition as a Pollinator Friendly Solar Site.

12/3/2019

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