Solar energy and pollinator conservation: A path for real impact?

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Credit: Rob Davis/Fresh Energy

Amid the steady growth of solar energy production in the United States, pollinator conservation at solar installations has become an appealing secondary pursuit, but the long-term success of such efforts remains to be seen. Can the land within a solar farm be made a true resource for pollinating insects? Will solar developers see value in the extra investment to plant and maintain flowering vegetation?

A group of entomologists tackles these questions in a new article published today in the journal *Environmental Entomology*. They say pairing solar energy with pollinator habitat offers great promise, but scientific evaluation and meaningful standards will be key to making it a true win-win combination.

Already, eight states have enacted legislation to promote pollinator-friendly solar development (Illinois, Maryland, Michigan, Minnesota, Missouri, New York, South Carolina, and Vermont), all of which include scorecards that outline criteria a solar installation must meet to earn a "pollinator-friendly" designation. The details vary, but the basic requirements are similar from state to state, following well-established principles for habitat that will attract and support bees, butterflies, and other pollinating insects.

"If you stick with the principles of native, perennial, flowering vegetation and think about a mixture of species that would flower through the growing season, that's more than half the battle," says Matthew O'Neal, Ph.D., professor of entomology at Iowa State University and co-author on the paper with Adam Dolezal, Ph.D., assistant professor of entomology at the University of Illinois at Urbana-Champaign, and Jacob Torres, a doctoral student in Dolezal's lab at UIUC.

O'Neal and colleagues endorse the scorecard approach, but they say the criteria should be both stringent enough to produce measurable, positive impacts on pollinators but flexible enough to be feasible within the unique conditions of a solar farm.

"You can say, 'How is this different than a hundred other conservation practices?'" Dolezal says. "And the answer is, well, it has some very weird and specific requirements to make it even on the table for solar developers to consider. And that's something we're still learning."

On a typical solar farm, the zones beneath solar panels, immediately adjacent to them, and around the perimeter of the farm each allow for different mixes of plants. Some solar panels, for instance, may stand just 18 inches off the ground, which would rule out tall grasses and non-shade-tolerant plants beneath them.

If the right mix of plants can be found, however, solar developers could stand to gain more than just positive, green public relations for their utilities. Some preliminary research suggests surrounding vegetation can boost efficiency of solar panels, but more in-depth analysis is needed. "We know that plants, through respiration, cool the air around them, and we know that, when solar panels are kept cooler, they are more efficient at producing electricity," says Dolezal. "What has not been demonstrated is, in these real-world, utility-scale facilities, does that actually provide a meaningful benefit that can then be quantified, put into an economic analysis that developers can look at and say, 'We will make X amount more megawatts of energy over what duration.'"

A scorecard for solar-farm pollinator habitat is also just a first step. Many plants recommended for pollinator conservation take time to establish and require attention to weed out unwanted, non-native plants. So, Dolezal, Torres, and O'Neal recommend standards also be paired with periodic evaluations by independent, certified third parties. "These environments are dynamic," O'Neal says. "You want to make sure those plants are established and you meet the goals that you set out at the start."

Other key elements for pollinator conservation at solar farms would include detailed maintenance and cultivation plans, clarity on whether to focus on wild pollinators or managed honey bees, and cooperation with local communities.

"What may be true or what may work well in Iowa and Illinois and Indiana may not work in the Southeast, or it may not work in the coastal mid-Atlantic," says Dolezal. "The realities are going to be different there."

Research has shown that even small patches of native habitat in otherwise cleared or developed areas can provide important resources for conserving plant and animal biodiversity. O'Neal and colleagues note examples of planned solar facilities in some states of several thousands of acres. "If even a fraction of the land allotted to future developments can be planted with effective pollinator habitat, these contributions could be substantial," they write.

As more and more solar energy developments come into shape, researchers will have the opportunity to start measuring just how effective accompanying pollinator habitat may be. Dolezal will be among them, as he works on a project selected for funding by the U.S. Department of Energy's Solar Technologies Office and managed by the University of Illinois Chicago. He'll be helping to evaluate ecological benefits, solar-production performance benefits, and economic impacts of pollinator plantings at six solar facilities.

It is a setting Dolezal says he never envisioned when he began studying entomology and one that speaks to the unique combination of solar energy and pollinator conservation.

"This would not have been a mechanism of habitat implementation I would have expected, for sure," he says. "And I never would have expected to have to go do pollinator sampling while wearing a hard hat."

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