Evaluation of Economic, Ecological, and Performance Impacts of Co-Located Pollinator Plantings at Large-Scale Solar Installations

Project Overview

The co-location of pollinator plantings at large-scale solar facilities (10 MW or larger) has recently gained increased interest from energy companies, state and local governments, and others, but faces barriers to adoption due to uncertainties around the scale and configuration of pollinator plantings and effects on photovoltaic (PV) performance, installation and operational costs, and ecological benefits. This three-year project, funded by the U.S. Department of Energy Solar Energy Technology Office, brings together leading researchers and large-scale solar developers to investigate the ecological and economic benefits as well as performance impacts of co-located pollinator plantings at large, utility-scale photovoltaic (PV) facilities. The team will leverage existing and new research, collaborative partnerships, and industry and other stakeholder involvement to achieve the following objectives:

(1) Research co-location and scalability of pollinator plantings at six solar facilities with capacities greater than 10 MW, namely PV performance impacts, economic considerations, and ecological benefits;
(2) Create comprehensive implementation guidance and decision tools to assist solar developers and other stakeholders when considering pollinator plantings at large-scale solar facilities; and
(3) Engage solar industry partners and share findings with broader industry stakeholders.

Tangible products from the project will include a pollinator planting implementation manual, cost-benefit calculator, a native plant selection tool, and a pollinator assessment tool for large-scale facilities. The findings and products will be distributed to the solar industry, conservation partners, state and local governments, and other stakeholders through presentations at industry conferences and meetings, webinars, academic publications, and the creation of a dedicated online information hub on the Rights-of-Way as Habitat Working Group's (ROWHWG) website.

Technical Scope Summary

The project will study the PV performance impacts, economic considerations, and ecological benefits of co-locating pollinator plantings at large-scale solar facilities through field research at six operating large-scale solar facilities (see Table 1). A variety of pollinator-supportive seed mixes will be introduced at least at four of the solar facility test sites during the first year of the study and the remaining site(s) in the second year. It will likely take two to five years for the pollinator plantings to become fully established. Trends in performance and ecological impacts may start to be seen about one year after planting (i.e., during the second field season), and will become more evident in the second year after planting (i.e., third field season).

Table 1. Solar facility test sites

Site Name	Location	Size	Estimated Pollinator Planting Date	Approximate Pollinator Planting Configuration
Logansport	Logansport, IN	16 MW	Fall 2021	63 acres of 80-acre site
Solar Farm 2.0	Urbana, IL	12 MW	Spring 2021	Full 54-acre site
Point Beach	Two Creeks, WI	100 MW	Fall 2021	TBD acres of 465-acre site
Bellflower Solar Farm	Rush County, IN	170 MW	Spring 2021	950 acres of 1400-acre site
Electric City	Sturgis, MI	19 MW	Spring 2021	90 acres of 130-acre site
Riverstart Solar Park	Randolph County, IN	200 MW	Fall 2021	1,200 acres of 2,000-acre site

For the **PV performance** field research, the project team will test the theory that evapotranspiration of the plantings results in a cooler microclimate underneath the panels, thereby improving the PV panel efficiency and power production. The team will collect data on environmental conditions under and around the panels as well as PV performance data provided by the site operators. The **ecological performance** field research will evaluate the diversity and abundance of native pollinator insects, birds, and bats in and around the pollinator plantings using a variety of different sampling methods (e.g., netting, observational transects, acoustic and ultrasonic monitors). Plant diversity and abundance (particularly flowering species) within the pollinator plantings will also be assessed. The **economic analysis** will consist of the collection of cost data on the installation and maintenance of pollinator plantings compared to other ground cover types (e.g., turf, gravel). Data will be gathered from solar facility test sites, other solar facilities, and past work from the National Renewable Energy Laboratory's Innovative Site Preparation and Impact Reductions on the Environment (InSPIRE) project. The project team will conduct a life-cycle cost analysis to compare the different configurations and options.

Utilizing the field research and review of existing literature, the project will also develop an **implementation manual** for pollinator plantings at large-scale solar facilities that includes key considerations for planning, design, installation, and maintenance. In addition, the project will provide three online tools: (1) a **cost-benefit calculator** for site owners and developers to evaluate the economic costs and benefits of including pollinator plantings at large-scale solar facilities; (2) a **solar site seed selection tool** for users to select plants based on specific site conditions, including EPA ecoregions, soil moisture, deer resistance, sun exposure, soil pH, and salt tolerance; and (3) a solar-specific update to the existing **pollinator scorecard** developed by the ROWHWG to assist owners and operators in evaluating pollinator vegetation at large-scale solar facilities once it is established.

Project Milestones

Task Description	Anticipated Month of Completion
Form Industry Advisory Group (IAG) and Technical Advisory Group (TAG) and hold kick-off meetings (via web).	May 2021
Prepare research plans for each solar facility test site and conduct reviews with IAG and TAG.	May 2021
Install monitoring equipment at three or more of the solar facility test sites and begin collecting field data.	July 2021
Prepare outline of implementation manual and conduct review with IAG and TAG.	September 2021
Test the current ROWHWG pollinator scorecard at five or more large-scale solar facilities.	September 2021
Define inputs and outputs for the cost-benefit calculator and the solar site seed selection tool.	November 2021
Collect cost data from at least 10 solar companies and conduct review with IAG and TAG.	February 2022
Summarize Year 1 findings and present to IAG and TAG.	February 2022
Update research plans for each solar facility test site as needed.	May 2022
Prepare first draft of implementation manual and conduct review with IAG and TAG.	August 2022
Release beta version of the solar site seed selection tool for testing.	October 2022
Release beta version of the cost-benefit calculator for testing.	February 2023
Release updated version of the pollinator scorecard.	February 2023
Summarize Year 2 findings and present to IAG and TAG.	February 2023
Update research plans for each solar facility test site as needed.	May 2023
Publish final implementation manual, cost-benefit calculator, pollinator scorecard, and solar site seed selection tool to online information hub.	December 2023
Summarize Year 3 findings and present to IAG and TAG.	February 2024
Conduct final outreach activities and submit research papers for peer-reviewed publication.	February 2024

About the Solar Energy Technologies Office:

The U.S. Department of Energy Solar Energy Technologies Office supports early-stage research and development to improve the affordability, reliability, and domestic benefit of solar technologies on the grid. Learn more at energy.gov/solar-office.