US/SOLAR

SEE SOLAR IN A NEW LIGHT

PROPOSAL FOR COMMUNITY SOLAR ENERGY PILOT PROGRAM

NEW JERSEY BOARD OF PUBLIC UTILITIES

February 1, 2021

COVER LETTER

February 1, 2021

New Jersey Board of Public Utilities
44 South Clinton Avenue, 7th Floor
Post Office Box 350
Trenton, NJ 08625-0350
Attn: Office of Clean Energy
Community Solar Energy Pilot Program Application Package

Re: Community Solar Energy Pilot Program Application

Dear New Jersey Board of Public Utilities,

Thank you for the opportunity to apply to your Community Solar Energy Pilot Program. United States Solar Corporation ("US Solar") and its affiliates develop, finance, construct, own, and operate solar farms. We have been eagerly awaiting an opportunity to expand our community solar work into New Jersey and are excited about our proposed project.

US Solar has developed, financed, subscribed, and constructed over 70 large-scale solar projects in Minnesota, and we are confident in our ability to deliver high-quality projects focused on equity, economic, and environmental benefits in New Jersey.

US Solar brings a combination of experience and environmental commitment that uniquely positions us to meet the goals of this program. Highlights of US Solar's experience are as follows:

- 100+ MW of Minnesota community solar in operation
- 50+ MW of Minnesota community solar in construction or late-stage permitting currently
- An additional 225 MW [redacted] of community solar currently being developed and financed for construction in 2021-2022, in Minnesota and other select markets
- [redacted] in projects developed and financed by US Solar's management team

We are excited to provide this proposal for your review and look forward to implementing this project.

Sincerely,

Reed Richerson – COO
United States Solar Corporation
100 N 6th St, Suite 410B
Minneapolis, MN 55403
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reed.richerson@us-solar.com

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A. GENERAL COMPANY INFORMATION

United States Solar Corporation ("US Solar") is a turnkey developer, subscriber, financier, owner, and operator of solar farms, involved in both community solar and utility-scale solar markets. We seek to make solar energy accessible to everyone with simple, money-saving, short- and long-term solutions that are as good for our partners as they are for the environment. Founded in 2014 by a group of industry veterans, we are based in Minneapolis, MN and operate nationally with offices located in Connecticut, Illinois, and Virginia.

US Solar has been focused on Minnesota community solar since the beginning of its community solar program and is now a leading community solar developer in the state. Since then, we have expanded and have experience in developing many utility-scale solar gardens across the country, including over 150 MWs constructed or under development in Illinois, Maine, New Jersey, Connecticut, Colorado, and Virginia.

Solar development and finance require a wide range of skills that few solar companies possess. US Solar is uniquely positioned with deep experience in all facets of this market segment. Additionally, we draw on a set of partnerships of best-in-class providers within engineering, procurement, and construction; solar equipment manufacturing; energy management; legal services; development; and finance and investment.

WHY US SOLAR

- **Independently Owned and Operated** – We are a private, medium-scale business without third-party shareholders.
- **Long-term Ownership** – As a long-term owner and operator of solar projects, we take no shortcuts to ensure the highest standards.
- **Local Relationships** – We have developed a strong tie to the City of Salem and are committed to a long-term partnership with them.
- **We Deliver** – We have completed over 40 large-scale solar projects in Minnesota alone. We do what we say we're going to do.

FEATURED PROJECTS

MN POWER - WRENSHALL SOLAR
Wrenshall, MN
Operational · 1 MWac

USS DUBHE SOLAR
North Branch, MN
Operational · 1 MWac

SAUK RAPIDS SOLAR
Sauk Rapids, MN
Operational · 5 MWac

MINNESOTA SOLAR CSG 5
Monticello, MN
Operational · 5 MWac

WINSTED SOLAR
Winsted, MN
Operational · 3 MWac

USS GOOD SOLAR
Stacy, MN
Operational · 1 MWac

LEADERSHIP TEAM

The US Solar team is one of the most experienced teams in the Midwest and has deep experience nationally. In house, we perform project development, origination, finance, construction, operations and maintenance, and asset management. Our successful experiences span across utility-scale, commercial, and residential markets.

Martin Mobley – CEO: As CEO, Marty leads US Solar's strategy, culture, and growth. Marty brings fifteen years of energy and finance experience. Prior to forming US Solar, he created and led the Solar Desk within the Commodities group at Morgan Stanley. Marty was an energy transactions attorney with Morgan Stanley and McDermott, Will & Emery. He has an LL.M. from Georgetown University Law Center, a JD/MBA from Northern Illinois University, and a BSBA from The University of Arizona.

Reed Richerson - COO: As COO, Reed is responsible for the development, origination, and construction of US Solar's projects along with the daily management of US Solar's Minnesota office. Reed brings 12+ years of solar industry experience, previously serving as the VP of Sales and Business Development for BayWa r.e. and holding various roles for REC Solar. Reed has a BS in Applied Economics from the University of Minnesota.

Brian Lantz - CFO: Brian brings over a dozen years of solar industry financing experience to US Solar. As the CFO, Brian is responsible for all aspects of capital raising and structuring activities. After beginning his career at a renewable energy consulting firm, he held various finance positions at SunEdison focusing on the distributed generation market segment where he closed debt and equity financing on over $750 million of solar gardens. He was a member of the core team that successfully launched TerraForm Power's IPO and most recently served as the Director of Capital Markets and Structured Finance at TerraForm prior to joining US Solar. Brian holds a ME in Sustainable Energy Engineering from the University of Maryland, College Park, and a BS from James Madison University.

Robert Oden – EVP: As EVP, Rob oversees corporate reporting and manages contract administration for US Solar's development assets and fleet of operational projects. Rob brings twenty years of experience in energy and climate markets. He started his career in a principal energy investment group at Bear Stearns in New York and Houston and was later in the Commercialization group at EcoSecurities, a leading originator of emission reduction credits. Rob has an AB from Harvard College.

Bruce Bedwell – General Counsel: Bruce has over 18 years of legal experience in the energy sector. Bruce's legal practice has focused primarily on representing developers, owners, lenders, investors, manufacturers and contractors in the financing, development, acquisition and distribution of projects; with a focus on renewable energy generation. Bruce also has represented clients with respect to public-private partnership transactions, energy regulatory compliance matters, administrative litigation and regulatory proceedings before federal and state regulatory commissions and commercial litigation before federal courts. Prior to joining US Solar, Bruce was a partner at the law firm of Chapman and Cutler LLP. Bruce has a Juris Doctor from The Catholic University of America, Columbus School of Law, where he graduated magna cum laude, and a Bachelor of Science from Illinois State University.

POLLINATOR FRIENDLY SOLAR

US Solar has committed to and implements exceptional pollinator-friendly native habitats on all its solar farms, supporting monarch, bee, pheasant, and bird populations. The area underneath the modules and between rows will be transformed into a diverse mix of pollinator-friendly, low-lying, deep-rooted plants. US Solar will control for noxious weeds throughout the life of the Project.

Our design goals for this community solar garden seed mix are as follows:

- Improve soil, water, and air quality
- Withstand harsh climate conditions
- Minimize erosion and runoff
- Minimize maintenance costs
- Provide habitat and food sources for wildlife
- Increase crop yield on surrounding farms

US Solar also serves on the Agriculture and Solar Together: Research and Outreach (ASTRO) working group within the Department of Energy's National Renewable Energy Laboratory project "InSPIRE 2.0: Facilitating Low-Impact Solar Development through Data and Analysis for Environmental Resiliency and Compatibility". This group develops and studies best management practices for pollinator-friendly solar and is continuing to build on lessons learned through ongoing research, knowledge sharing, and the development of specific test sites around the country. ASTRO includes university researchers, nonprofits, national experts, private industry, and solar developers to share cross-functionally. US Solar will additionally be working with the [redacted] on this community solar garden, if selected, to continue the work of quantifying pollinator benefits.

In addition to maintaining pollinator-friendly habitat on this Project, US Solar also hopes to partner with local apiary groups to host commercial beehives and solitary bee houses at this site. Several US Solar projects in Minnesota host commercial beehives, contributing valuable Solar Grown™ honey. As the state insect of New Jersey, US Solar is excited to partner with local apiary groups to continue to support commercial and solitary bee populations, while also producing clean, renewable energy.

B. QUALITY AND EXPERIENCE OF THE DEVELOPMENT TEAM

The US Solar team has deep experience in the development and operation of both community solar gardens and utility-scale solar farms. In Minnesota, where we started, our solar gardens range far and wide across the state. A sampling of our Minnesota projects is below, as an example. Our experience in multiple markets shows our capability to identify and secure optimal land sites, acquire land use permits, interconnect with the utility, execute revenue contracts, and manage solar gardens through construction and beyond.

Further, the importance of choosing a developer that understands the complexities of engineering and constructing solar farms in this arctic climate cannot be overestimated. Our team understands the complexities of the region including frost heave mitigation, soil types, topography, and stormwater and erosion control. We partner with local groups where possible, to ensure that we can be as familiar with the site conditions and needs, as possible.

US SOLAR: TRACK RECORD AND PROJECT EXPERIENCE

US Solar has successfully completed more than [redacted] of projects in Minnesota, a sample of which are below:

US Solar - Operational Projects in MN		
Project	MWac	MWdc
[redacted]		

US SOLAR: PROJECTS UNDER CONSTRUCTION

US Solar is in advanced construction or breaking ground this fall on the following projects totaling [redacted]:

US Solar - Projects in Construction in MN		
Project	MWac	MWdc
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
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[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

US SOLAR'S TEAM EXPERIENCE: PRIOR TO US SOLAR

US Solar is a company founded in 2014 by industry veterans. US Solar staff held critical management roles in the following [redacted] of projects developed across 14 markets in the US and Canada:

MWdc	Portfolio Name	Projects	Location	Type	Offtaker	Completion Year
[redacted]						

US SOLAR'S COMPETITIVE ADVANTAGE

All of the solar farms above required the following development qualities and experience.

[redacted]

Project Engineering

For solar garden engineering, we partner with top national firms, including our local partner [redacted], to complete Environmental Site Assessments, Wetland Delineations, Stormwater Prevention Plans, and Electrical and Civil Site Plans. [redacted] and has been involved with the development of 7 GW of solar across the United States.

Interconnection

We have worked with a variety of utilities for our projects. With our diverse interconnection experience, we've developed an efficient process and are confident that we have the ability to successfully interconnect with Atlantic City Electric.

Permitting

US Solar has successfully permitted solar gardens throughout the country with many local government units. Through these permitting processes, we have run the gamut—from experienced cities and counties to those interacting with solar for the first time. Additionally, US Solar has worked with several permitting jurisdictions to write and enact solar ordinances.

Construction

Because our business model is to own, operate, and maintain our projects for their full lifespan, we take no shortcuts in the construction of our community solar gardens. Our construction and operation teams have experience deploying distributed and utility-scale solar farms nationally. We work with the highest quality construction groups and target local firms as much as possible to ensure that our projects are benefitting the community and to leverage local expertise.

Project Finance

Less experienced solar providers frequently underestimate the challenge of financing the construction and operation of a portfolio of solar gardens. US Solar is currently developing and financing approximately [redacted] of solar gardens in Minnesota, and the US Solar principals have raised project capital for solar gardens and programs with a notional value of over [redacted].

Asset Management

At the beginning of 2017, US Solar became a long-term owner and operator of our solar gardens and now manages the operation and revenue contracts for our solar gardens for the long-term. The Operations and Maintenance team at US Solar works with our field partners to remotely monitor and preform any needed maintenance for our portfolio of solar gardens. If US Solar is selected to move forward with this project, the BPU will benefit from having a long-term partner after the solar gardens are operational.

INDUSTRY REFERENCES

US Solar has successfully collaborated with many utilities, solar construction partners, engineering partners, and subscribers.

Industry Organization	Type	Contact Person	Title	Email
[redacted]				

C. PROPOSED PERSONNEL

The team's breadth of experience in community- and utility-scale solar projects equips US Solar to develop, own and manage assets and secure ongoing financing to construct high-quality solar gardens.

- Reed Richerson, Chief Operating Officer, has over 12 years of solar industry experience and is the project manager for this project. Reed has led development on many utility-scale solar projects across the country over the last ten years. Reed's expertise in solar garden development and business management prepares him well to manage a new market opportunity in New Jersey.

- Brian Lantz, Chief Financial Officer, leads financing of US Solar's pipeline of solar gardens. Brian's deep experience in solar finance and capital structuring prepares him to manage the financing for this Project. Brian has led the financing on hundreds of solar PV assets over the past decade. He was the finance lead on a team that financed/owned/managed over 1.5 GWs of solar assets including over a dozen utility-scale solar projects under his leadership.

- Jesse Royer, Director of Operations, has led construction and project management efforts through multiple successful portfolios of US Solar community solar gardens, and has led construction and project management in a number of utility-scale solar projects across the country. Jesse's 15 years of construction management expertise ensures that the BPU can expect the highest-quality construction and operation management of this Project.

- Peter Schmitt, Manager, New Markets, has led development work on over 100 MWs of solar gardens across several states. His community relationships, experience coordinating third parties, permitting projects, and navigating the interconnection process will facilitate the successful development of this Project.

- Jason Askins, Senior Project Manager, has over 21 years of utility-scale power systems experience. He is a Lean Management practitioner with a focus on process improvement in the Development and Preconstruction project stages. Jason has coordinated and executed over 1 Gigawatt of solar across 3,000 systems. Jason's experience will directly influence a successful and organized Project build.

D. FINANCIAL CAPABILITY OF THE RESPONDENT

US Solar is a private company and does not have any rated debt or corporate credit rating. As a private, stable, medium scale business, US Solar has grown in a financially prudent manner [redacted]. This, along with focusing on our strengths and target markets, allows us to be nimble and highly responsive to our customer needs. We do not focus solely on growth and do not expose ourselves to risk that our balance sheet cannot support.

[redacted]

APPENDIX I – COMMUNITY SOLAR ENERGY PILOT PROGRAM APPLICATION FORM

Agenda Date: 10/2/20
Agenda Item: 8C

STATE OF NEW JERSEY

Board of Public Utilities
44 South Clinton Avenue, 9th Floor
Post Office Box 350
Trenton, New Jersey 08625-0350
www.nj.gov/bpu/

CLEAN ENERGY

	)	ORDER
IN THE MATTER OF THE COMMUNITY SOLAR ENERGY PILOT PROGRAM	)	DOCKET NO. QO18060646
IN THE MATTER OF THE COMMUNITY SOLAR ENERGY PILOT PROGRAM YEAR 2 APPLICATION FORM AND PROCESS	)	DOCKET NO. QO20080556

Party of Record:

Stefanie A. Brand, Esq., Director, New Jersey Division of Rate Counsel

BY THE BOARD:

This Order reflects the Board's actions establishing the Application Form and process for Program Year 2 ("PY2") of the Community Solar Energy Pilot Program ("Pilot Program"), codified at N.J.A.C. 14:8-9 et seq.

BACKGROUND

On May 23, 2018, the Clean Energy Act, P.L. 2018, c. 17, was signed into law, directing the Board of Public Utilities ("Board" or "BPU") to adopt rules and regulations within 210 days establishing a Pilot Program. This Pilot Program enables New Jersey electric utility customers to participate in a solar energy project that may be remotely located from their properties and receive a credit on their utility bills. Community solar therefore enables access to clean energy generation for utility customers currently unable to place solar generation directly on their own properties. The BPU is particularly interested in ensuring that low- and moderate-income ("LMI") customers are able to access community solar, and that community solar development is pursued without materially compromising the preservation of open space or protected lands in New Jersey. The Pilot Program is designed to provide the necessary experience and to lay the groundwork for the development and implementation of a full-scale Community Solar Energy Program within 36 months of the signing of the Clean Energy Act.

The Board adopted the Pilot Program rules on January 17, 2019 following stakeholder engagement. The adopted rules were filed with the Office of Administrative Law and published in the New Jersey Register on February 19, 2019. The rules provide the framework necessary for the development and implementation of community solar in New Jersey during each of the Pilot Program's three Program Years. For instance, N.J.A.C. 14:8-9.3(c) directs Board Staff to initiate an annual application process, and lays out the requirements and conditions. Specifically, N.J.A.C. 14:8-9.3(c)1 directs Board staff to present to the Board for approval the application for participation in the Pilot Program and the criteria for evaluation of said application. N.J.A.C. 14:8-9.4(b) states that the annual capacity limit for PY2 shall be at least 75 MW per program year, and N.J.A.C. 14:8-9.4(d) provides that: "[t]he annual capacity will be divided among each EDC area based on their average respective percentages of in-State retail electric sales."

On March 29, 2019, the Board approved and released the Program Year 1 ("PY1") Application Form. The Application Period opened on April 9, 2019 at 9:00 a.m. and closed on September 9, 2019 at 5:00 p.m. The Board received 252 applications by the deadline, representing almost 652 MWdc. On December 20, 2019, the Board granted conditional approval to 45 community solar projects, representing almost 78 MWdc.

On July 9, 2020, the Board issued a request for comments regarding lessons learned from Program Year 1. A stakeholder meeting was held on July 27, 2020, and written comments were received by August 10, 2020. The request for comments was designed to supplement Staff's assessment of the PY1 Application process by eliciting stakeholder comments on a range of questions regarding PY1 and possible improvements to the Pilot Program. Questions were structured into four topics: 1) Equity and the Inclusion of Low- and Moderate-Income Households; 2) Program Year 1 Application Form and Application Process; 3) Program Year 2 Application Process; and 4) Other. Stakeholder comments are referenced when relevant throughout this Order; however, this Order does not provide an exhaustive summary of the comments received. Comments are available for review on the New Jersey Clean Energy Program website.

STAFF RECOMMENDATIONS

Program Year 2 Application Form and Process

Staff recommends that the PY2 Application Form and Process remain similar in structure to that used in PY1, as described in the Application Form included as an Appendix to this Order. The recommended Application Form includes amendments to clarify certain instructions, questions, and requirements in order to facilitate the review and selection of Applications.

In order to facilitate both the submission and the review of Applications, and based on strong stakeholder agreement, Staff further recommends that PY2 utilize an online application process. An online application process will eliminate the need for Applicants to meet in person to collate and submit hard copy applications, simplify the administrative completeness review process, and accelerate the application review process by reducing the need for data entry. As such, Staff recommends that the Application Form included as an Appendix to this Order be converted to an online application format (all questions and requirements would remain identical). Applicants would be able to begin developing applications on the basis of this Application Form; however, instructions on how to submit an Application online would be provided at a later date.

In order to account for sufficient time for project development, as well as the time needed to implement the online application process, Staff recommends that the PY2 window last approximately four months, closing on February 5, 2021 at 5:00 p.m.

Program Year 2 Capacity

N.J.A.C. 14:8-9.4(b) states that the annual capacity limit for PY2 shall be at least 75 MW per program year. Stakeholder feedback generally suggested substantially increasing the PY2 capacity beyond the 75 MW minimum. In PY1, the Board received 252 applications, representing almost 652 MWdc. Of these, 93 Applications, representing approximately 156 MWdc, received a score above 80 points.

In considering the appropriate capacity for PY2, Staff recommends that the Board balance increasing the capacity so as to continue to grow the community solar market and accessibility, while not increasing the capacity so much as to dilute the competitive nature of the Pilot Program. As such, Staff recommends that the Board double the PY2 capacity compared to PY1, to 150 MWdc. Pursuant to N.J.A.C. 14:8-9.4(e), at least 40% of the PY2 capacity (i.e. 60 MW) would be allocated to LMI projects. Additionally, Staff recommends that the Board give itself the flexibility to allocate up to 10% over or under this 150 MWdc capacity limit, based on the review of the PY2 Applications.

N.J.A.C. 14:8-9.4(d) provides that: "[t]he annual capacity will be divided among each EDC area based on their average respective percentages of in-State retail electric sales." Staff recommends that the Board utilize Energy Year 2019 data, which is the most recent year for which the Board has fully reconciled retail sales data from the annual RPS reconciliation process. The breakdown of allocated PY2 capacity would therefore be as follows:

Table 1: PY2 allocated capacity

EDC	% retail sales	MWdc allocated capacity
Atlantic City Electric ("ACE")	12.35%	18.525
Jersey Central Power & Light ("JCP&L)	28.86%	43.29
Public Service Electric & Gas ("PSE&G")	56.87%	85.305
Rockland Electric Company ("RECO")	1.92%	2.88
Total	100%	150

Staff also recommends that the Board consider, in the event that there have not been enough applications submitted in a given service territory to provide adequate competition, not awarding any capacity in said service territory, and possibly reallocating the unused capacity to other service territories.

PY2 Application Scoring

Staff recommends that the Board approve the following Evaluation Criteria for scoring the PY2 projects. These Evaluation Criteria will be used to score and rank complete Applications. Based on stakeholder feedback, Staff recommends utilizing similar criteria to those used in PY1, with some modifications. For example, the PY1 Evaluation Criteria included points for projects that committed to serving more than 51% residential subscribers. In reviewing the PY1 Applications, Staff found that the vast majority of projects answered "Yes" to this question, meaning that it did not serve as a meaningful criteria for differentiating between Applications. This likely at least in

part because the community solar bill credit is higher for residential customers than other customer types, so Applicants have an existing financial incentive to subscribe a majority of residential customers. Staff therefore recommends eliminating this criterion in PY2. Staff recommends that the siting criterion include a category for floating solar. Staff further recommends the inclusion of a "Project Maturity" requirement, which would award points to projects that are further along in the development process and are therefore expected to begin providing community solar benefits to subscribers sooner. Finally, in light of the high quality and number of applications received in PY1, Staff also recommends increasing the minimum score required to qualify for the Pilot Program, from 30 in PY1 to 50 in PY2. As in PY1, Staff recommends that the Board not limit the number of Applications that can be awarded to any one applicant, so as to maintain the competitive nature of the process and choose only the best scored projects.

Table 2: PY2 Evaluation Criteria	
Evaluation Criteria	**Max. Points (total possible points: 100)**
Low- and Moderate-Income and Environmental Justice Inclusion Higher preference: LMI project	25
Siting Higher preference, e.g.: landfills, brownfields, areas of historic fill, rooftops, parking lots, parking decks, canopies over impervious surfaces (e.g. walkway), former sand and gravel pits, former mines Medium preference, e.g.: floating solar on water bodies such as water treatment plants and sand and gravel pits, that have little to no established floral and faunal resources (*) No Points, e.g.: preserved lands, wetlands, forested areas, farmland Bonus points for site enhancements, e.g. landscaping, land enhancement, pollination support (**) Bonus points if project is located in a redevelopment area or an economic opportunity zone (**) *Note: Applicants with a floating solar project must meet with DEP prior to submitting an Application, and take special notice of DEP's siting guidelines. **Note: bonus points will only be available for projects in the "higher" or "medium" preference siting categories. Projects in the "No Points" siting categories are not eligible for bonus points.	20 Max. possible bonus points: 3 Max. possible bonus points: 2
Community and Environmental Justice Engagement Higher preference: formal agreement, ongoing collaboration or effective partnership with municipality and/or local community organizations and/or affordable housing provider (per Section X,	15

Questions 1, 2, and 3) Medium preference: consultation with municipality and/or local community organization(s) and/or or affordable housing provider (per Section X, Question 4) No Points: no collaboration or collaboration has not been proven	
Product Offering Higher preference: guaranteed savings >20%, flexible terms* Medium preference: guaranteed savings >10%, flexible terms* Low preference: guaranteed savings >5% No Points: no guaranteed savings, no flexible terms* *Flexible terms may include: no cancellation fee, short-term contract	15
Other Benefits Higher preference: Provides jobs and/or job training and/or demonstrates co-benefits (e.g. paired with storage, EV charging station, energy audits, energy efficiency)	10
Geographic Limit within EDC service territory Higher preference: municipality/adjacent municipality Medium preference: county/adjacent county No Points: any geographic location within the EDC service territory	5
Project Maturity Higher preference: project has received all non-ministerial permits; project has completed an interconnection study	5

Equity and Low- and Moderate-Income Inclusion

The July-August 2020 request for comments placed a strong emphasis on measures to improve and facilitate LMI inclusion. In particular, many stakeholders noted that the LMI verification rules at N.J.A.C. 14:8-9.8 allow for limited or onerous means for a potential subscriber to verify LMI status. This represents a barrier to access for LMI customers. Staff recommends that the Board consider alternatives to these LMI verification standards.

Another change that was suggested by some Applicants during the PY1 Application process was the implementation of an "opt-out" method of subscriber enrollment, by asking the Board to waive the rules that require the affirmative consent of a customer to sign them up for community solar (N.J.A.C. 14:8-9.10(b)(1)(i)). A simple waiver of the rules requiring affirmative subscriber consent presented a strong risk of customer slamming, among other concerns. Several stakeholder comments received in July-August 2020 indicated that an "opt-out" process would significantly reduce the costs of subscriber acquisition. Others, however, expressed caution, stressing the need to maintain consumer protection standards and questioning whether "opt-out" is necessary in the context of a Pilot Program. They further noted that the "opt-out" model would be better implemented with consolidated billing. Staff strongly agrees with those stakeholders that stated that consolidated billing is a pre-requisite to further discussion of an "opt-out" model. Staff therefore recommends that the Board direct the EDCs to work with Staff to implement consolidated billing for community solar, building upon the existing consolidated billing mechanisms employed for Third Party Suppliers when relevant. However, Staff also believes that the Pilot Program may be the appropriate context for testing new approaches and ideas on a

small scale. Staff therefore recommends that the Board explore amendments to the Pilot Program rules that would enable a limited scale testing of "opt-out" subscriber enrollment in the context of LMI municipal projects. The proposed PY2 Application Form includes a section dedicated to projects applying to use the "opt-out" subscriber enrollment method where owned and operated by a local government entity. This "opt-out" procedure for municipal projects will only be utilized if the Board approves the proposed rule amendments.

Community Solar Bill Credits

Staff recommends that the Board order the EDCs to update the community solar bill credit calculations, to ensure that they are kept up to date when consulted by community solar stakeholders.

Additionally, stakeholders identified an issue with the community solar bill credit for master-metered buildings, particularly affordable housing buildings. Master metered accounts are billed on a lower, commercial tariff. As a result, the community solar bill credit calculated for these master-metered accounts is lower than a bill credit calculated for a residential subscriber. Stakeholder feedback during the July stakeholder meeting suggested that the TREC value may generally be sufficient to compensate for the lower bill credit for master metered accounts; however, there remains a financial disincentive to subscribe master metered customers versus regular residential customers. Staff does not currently have sufficient data to provide a recommendation on measures to address this issue. Staff therefore recommends that the Board direct the EDCs to provide any existing data on the prevalence of master metered accounts, and then incorporate further discussion into the development of the permanent community solar program.

Eligibility for the Transition Incentive Program

The Board is currently implementing the New Jersey Solar Transition, i.e. the transition from the legacy SREC program to a new solar incentive program, the Successor Program. The current Transition Incentive Program was created to serve as a bridge between the SREC and Successor Programs. The development of the Successor Program is ongoing; however, the date of the Successor Program implementation and the specific details of the incentive program have not yet been established. Stakeholders emphasized that regulatory uncertainty can severely hamper the development of PY2 community solar Applications. Staff therefore recommends that Applications selected as part of PY2 be eligible for the current Transition Incentive program, even if Applications are selected after the establishment of the Successor Program.

Project Construction and Completion Timelines

The Pilot Program rules include deadlines for the construction and completion of projects that receive conditional approvals from the Board. Specifically, N.J.A.C. 14:8-9.3(c)7 requires that community solar projects begin construction within six months of their approval by the Board. N.J.A.C. 14:8-9.3(c)8 requires that community solar projects be fully operational within twelve months of their approval by the Board. In both cases, Board staff may approve one or more extensions if substantial progress is shown towards meeting the milestone within the deadline (two-month and six-month extensions, respectively). Both the experience from PY1 projects and stakeholder comments show these deadlines to be very ambitious. Many of the PY1 projects have experienced delays due to COVID-19 in both the permitting and interconnection processes. Some of the smaller and more straightforward PY1 projects (rooftop projects in particular) have been able to build quickly, and are expected to meet their deadlines. The larger and more

complex projects will require one or more extensions to both the start of construction and completion deadlines, and likely would have even in the absence of COVID-19. In addition, stakeholders informed staff that, although Staff are empowered to extend deadlines, project financers are concerned that those extensions may not be granted. Staff therefore recommends that the Board explore potential amendments to these project deadlines, specifically with respect to lengthening project completion deadlines but restricting the number of allowable extensions without a Board petition.

Government Applicants

The PY1 Application Form included a special exemption process by which governmental applicants seeking to apply to the Pilot Program could do so prior to issuing a Request for Proposals or other public procurement process. This exemption process was developed in recognition of the fact that public procurement can be lengthy and complex. One of the projects granted conditional approval during PY1, developed by the Atlantic County Utilities Authority ("ACUA") exercised this exemption. Other municipal applicants applied for PY1, or were direct partners in the design and submission of PY1 Applications, without needing the provided exemption process. Finally, several municipalities submitted Applications that requested both the exemption provided for in PY1, as well as further exemptions, including from the requirement to identify a site. Subsequent conversations suggest that these Applicants may not have a site suitable for community solar belonging to the municipality; the intent may therefore have been for a project to be developed by a private developer, with the municipality managing the subscriber acquisition.

Staff strongly supports the development of community solar projects by and in partnership with government entities, particularly municipalities: one of the key priorities of community solar is for projects to serve the needs of local communities. However, given the very strong interest in the Pilot Program, Staff believes that key elements of project design, including siting, subscription design, and community partnerships, are necessary to demonstrate the viability of the proposed project. Staff believes that the Board should support efforts by governmental entities, particularly municipalities, to partner with developers in order to bring community solar benefits to their residents. Staff therefore recommends that the Board authorize Staff to explore the value of developing an online mechanism or platform to help governmental entities interested in bringing community solar to their communities to partner with interested developers.

FINDINGS AND DISCUSSION

The Pilot Program represents an important innovation in New Jersey solar, providing new means for ratepayers to access the benefits of solar energy, particularly in disadvantaged communities. The Board is therefore very pleased to see the Pilot Program grow in its second year, and looks forward to reviewing many high-quality applications.

Having reviewed comments received from stakeholders and Staff's recommendations based on the experience from PY1, the Board **HEREBY APPROVES** the release of the Community Solar Energy Pilot Program Year 2 Application Form included as an Appendix to this Order, including the PY2 Evaluation Criteria. The Board **ORDERS** Staff to develop an online application process based on this Application Form through which Applicants will be able to submit Applications. Applicants may begin to develop applications on the basis of this Application Form, but may not use this Form to submit an Application. Further information on how to submit an Application online will be provided by Staff at a later date. The Board **FURTHER ORDERS** that the PY2 application period will close on February 5, 2021 at 5:00 p.m.

The Board has the authority to waive its rules pursuant to N.J.A.C. 14:1-1.2(b), which provides that "[i]n special cases and for good cause shown," the Board may relax or permit deviations from these rules. Further, in accordance with the general purposes and intent of its rules, the Board shall waive sections of its rules if "full compliance with the rule would adversely affect the ratepayers of a utility or other regulated entity, the ability of said utility or other regulated entity to continue to render safe, adequate and proper service, or the interests of the general public."[1]

The Pilot Program rules at N.J.A.C. 14:8-9.4(b) require that the Board set the community solar PY2 and PY3 annual capacity limit no later than 30 days prior to the start of the respective program years. Compliance with this rule would have required the Board to set the PY2 capacity on December 1, 2019, which would have been prior to the selection of the PY1 projects. The Board would not have had the experience from the PY1 projects, or the benefit of Staff and stakeholders' evaluation of PY1 and recommendations for PY2. Blindly allocating capacity could adversely affect ratepayers, regulated entities and the community solar market. The Board, finding good cause therefore, **HEREBY WAIVES** the requirement at N.J.A.C. 14:8-9.4(b) that it set the PY2 annual capacity limit no later than 30 days prior to the start of the Program Year.

In order to balance the need to support the continued growth of the community solar market with the Board's desire to maintain the high quality and standards of Applications seen in PY1, the Board **HEREBY DETERMINES** that the PY2 capacity shall be set at 150 MWdc. Pursuant to N.J.A.C. 14:8-9.4(e), at least 40% of the PY2 capacity (i.e. 60 MW) will be allocated to LMI projects. The Board **FURTHER DETERMINES** that the Board may have the flexibility to allocate up to 10% over or under this 150 MWdc capacity limit, based on its review of the PY2 Applications. The breakdown of allocated PY2 capacity by EDC service territory is set as defined in Table 1 of the Staff Recommendations. In the event that there are not enough applications submitted in a given service territory to provide adequate competition, the Board may, at its discretion, elect to not award any capacity in said service territory, and may reallocate the unused capacity.

In order to limit regulatory uncertainty for projects applying to PY2 of the Pilot Program, the Board **FINDS** that Applications selected as part of PY2 will be eligible to register for the current Transition Incentive program, even if said Applications are selected after the establishment of the Successor Program. PY2 projects' Transition Incentive eligibility is subject to maintaining compliance with the rules and regulations of the TI Program and Community Solar regulatory deadlines.

With respect to the community solar bill credits, the Board **DIRECTS** the EDCs to provide updated bill credit calculations and sample bills to Staff no later than October 30, 2020, for posting to the community solar webpage on the NJCEP website. The Board **ORDERS** that, going forward, the EDCs should provide updated bill credit calculations and sample bills at least once annually, no later than October 15 of each year. The EDCs may provide more regular updates if required based on changes to the value of the community solar bill credit. When possible and relevant, the EDCs should also work with Staff to ensure reasonable consistency in the manner in which the bill credit calculations are presented.

In order to support the development of community solar projects by, and in partnership with, local communities, the Board **DIRECTS** Staff to explore and implement as warranted a mechanism by which interested governmental entities can be contacted by community solar developers.

[1] N.J.A.C. 14:1-1.2(b).

The Board also recognizes that some recommended changes to the Pilot Program will need to be addressed over the longer term. The Board **DIRECTS** the EDCs to work with Staff to develop options to implement consolidated billing for community solar, and include considerations of what is currently done by other state affiliates. The EDCs shall present actionable recommendations for consolidated billing implementation in a report to the Board, no later than February 26, 2021. The Board **FURTHER ORDERS** the EDCs to provide to Staff any existing data on the prevalence of master metered accounts in their respective service territories, including any demographic data regarding the types of buildings that are master metered.

The effective date of this order is October 13, 2020.

DATED: October 2, 2020

BOARD OF PUBLIC UTILITIES
BY:

JOSEPH L. FIORDALISO
PRESIDENT

MARY-ANNA HOLDEN
COMMISSIONER

DIANNE SOLOMON
COMMISSIONER

UPENDRA J. CHIVUKULA
COMMISSIONER

ROBERT M. GORDON
COMMISSIONER

ATTEST:

AIDA CAMACHO-WELCH
SECRETARY

IN THE MATTER OF A COMMUNITY SOLAR ENERGY PILOT PROGRAM
DOCKET NO. QO18060646

IN THE MATTER OF THE COMMUNITY SOLAR ENERGY PILOT PROGRAM YEAR 2 APPLICATION FORM AND PROCESS
DOCKET NO. QO20080556

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Publication on Clean Energy Program
Community Solar listserv

New Jersey Community Solar Energy Pilot Program
Program Year 2 Application Form

Section A: Application Form Requirements, Instructions, Terms and Conditions

The following Application Form is intended only for entities submitting a community solar project for consideration by the New Jersey Board of Public Utilities ("Board" or "BPU"). Projects selected by the Board will be approved for participation in the Community Solar Energy Pilot Program, pursuant to the rules at N.J.A.C. 14:8-9.

This Application Form is valid only for the following Program Year and Application Period:
Program Year 2, Application Period 1
Application Period Opens: Staff will inform stakeholders once the online application portal is open. The online application portal will open no later than December 31, 2020.
Application Period Closes: Friday, February 5, 2021 at 5:00 P.M. EST

I. Minimum Qualification Requirements

The Community Solar Energy Pilot Program is open to projects that meet the following minimum requirements, and the full requirements defined in N.J.A.C. 14:8-9 (available for reference at the following link: http://njcleanenergy.com/files/file/R_2019%20d_021%20(51%20N_J_R_%20232(a)).pdf).

1. The proposed community solar project must be located in the electric service territory of an Electric Distribution Company ("EDC") in the State of New Jersey.
2. Existing solar projects may not apply to requalify as a community solar project. An existing solar project, as defined in N.J.A.C. 14:8-9.2, means a solar project having begun operation and/or been approved by the Board for connection to the distribution system prior to February 19, 2019. Projects having received a subsection (t) conditional certification from the Board prior to February 19, 2019 should refer to section B. XIII. Special Authorizations and Exemptions for additional information.
3. The Board will not consider Applications for EDCs to develop, own, or operate community solar project(s).
4. The Board will not consider Applications for projects sited on preserved farmland, as defined in N.J.A.C. 14:8-9.2.
5. The Board will not consider Applications for projects exceeding the capacity limit for individual community solar projects, set at 5 MWdc as defined in N.J.A.C. 14:8-9.4(g).

II. Instructions for Completing the Community Solar Energy Pilot Program Application Form

1. Applications **must** be submitted via a dedicated online application process. Staff will provide further details on how to submit an Application online upon the opening of the online application process. The online application process will reflect the exact questions and requirements laid out

in this Application Form. This PDF Application Form is being provided to allow Applicants to develop their Applications; **do not** submit an Application using this PDF Application Form. Any Application submitted using this PDF Application Form rather than the dedicated online application process will not be considered.

2. Each solar project applying to participate in the Community Solar Energy Pilot Program requires the submission of an individual Application Form. **Do not apply for more than one (1) project per Application Form.** There is no limit to the number of Application Forms that can be submitted by any one Applicant (see the definition of an "Applicant" in section A. III. Terms and Conditions).
3. **Do not submit the same project (same Applicant name and project site) multiple times or with various sizes.**
4. All questions are required to be answered, unless explicitly marked as optional. All attachments are required, unless explicitly marked as optional. All attachments must be submitted with the Application Form via the online application process, therefore forming a complete application package.
5. Do not in any way amend, edit, or otherwise change the questions or format of this application form.
6. Original signatures on all forms and certifications of this Application Form are required. The certifications contained in section C must be notarized and may not be modified. More information on how to submit electronic certifications will be provided upon the release of the online application process.
7. Attachments must be submitted as part of the Application Form via the online application process. The Board will not accept documentation sent directly to the Board.

III. Terms and Conditions

General Terms and Conditions

1. The "Applicant" is defined as the entity that submits the Community Solar Energy Pilot Program Application Form (for example, an Applicant may be a project developer, project owner, project operator, property owner, contractor, installer, or agent thereof).
   Prior to completing the Application Form, the Applicant must carefully review the rules at N.J.A.C. 14:8-9, and any other rules, regulations, and codes applicable to the design, construction, and operation of a community solar project in New Jersey. All Applications must be in compliance with all local, state and federal rules, regulations and laws. Furthermore, submission of an Application Form does not obviate the need for compliance with all applicable local, state, and federal laws and regulations at any time during the design, construction, operation, and decommissioning of a community solar project including, but not limited to, regulations by commissions such as the New Jersey Highlands Council and the New Jersey Pinelands Commission.
2. By submitting an Application, the Applicant acknowledges notice on behalf of all project participants that the information included in the Application is subject to disclosure under the Open Public Records Act, N.J.S.A. 47:1A-1 et seq. Aggregated information may be used by the

Board and/or other state, federal, county, regional or local agencies in reports and evaluations, and the geographic location may be used to update Geographic Information System ("GIS") mapping. Applicants must identify sensitive and trade secret information that they wish to keep confidential by submitting them in accordance with the confidentiality procedures set forth in N.J.A.C. 14:1-12.3 (see "Submission of Confidential Information). Furthermore, the Applicant understands that the list of approved community solar projects will be published on the Board of Public Utilities website.

3. Amendments or supplements to the Community Solar Energy Pilot Program Application Form will be made available via the New Jersey Clean Energy Program ("NJCEP") website at www.njcleanenergy.com. This Application Form may be modified for future Application Periods at any time without prior notification.

Evaluation of Applications and Approval of Projects

4. Only Applications that are administratively complete by the close of the Application Period will be considered for participation in the Community Solar Energy Pilot Program during that Program Year. An application will be deemed administratively complete if: 1) All questions are completed, except those explicitly marked as optional, 2) All required attachments are included (see Appendix B for a checklist of required attachments), and 3) All required signatures are included. Applicants will be notified if an Application is deemed administratively incomplete. An incomplete Application may be amended and resubmitted during the next Pilot Program Application Period without advantage or disadvantage, so long as it conforms to the requirements of that Application Period. In the event that any required information or attachment is missing, the Application will be deemed incomplete and will not be scored.
5. Only Applications that are submitted via the online application process will be considered for participation in Program Year 2 ("PY2") of the Pilot Program.
6. Any Application that contains factually incorrect information will be eliminated from consideration.
7. The Applicant may be required to supplement the information provided in the Application Form upon request from the Board or Board Staff.
8. Following the close of the Application Period, each Application will be reviewed and evaluated by a dedicated Evaluation Committee.
9. In reviewing each application, Board Staff may consult with the New Jersey Department of Environmental Protection ("NJDEP"), the New Jersey Department of Agriculture, or other state agencies and consultants as are relevant to the Application. Any information marked and submitted as confidential will be treated as such by the receiving agency, and used for the sole purpose of evaluation.
10. **Board Staff may reject Applications that are incomplete at the close of the Application Period, that are not in compliance with the rules and regulations established in N.J.A.C. 14:8-9, or that do not meet a minimum standard for selection, as set forth in this Application Form.**
11. The criteria for evaluation of Applications are presented in Appendix C (Evaluation Criteria). Projects must score a minimum 50 points total in order to be considered for participation in the

Community Solar Energy Pilot Program. Projects that score above 50 points will be presented to the Board for approval for participation in the Community Solar Energy Pilot Program in order, starting with the highest-scoring project and proceeding to the lowest-scoring project, and until the allocated program capacity allocated for that Program Year to each EDC service territory. The last project to be selected by the Board will be granted conditional approval for its full capacity (i.e. no project capacity will be cut off).

The allocated program capacity for Program Year 2 is **150 MWdc**. At least 40% of program capacity (i.e. at least 60 MW) will be allocated to Low and Moderate Income ("LMI") projects. The Board may, at its discretion, award up to 10% over or under this 150 MWdc capacity limit.

The EDC service territory breakdown of capacity for PY2 is as follows:

EDC	% of retail sales	PY2 Allocated Capacity
Atlantic City Electric ("ACE")	12.35%	18.525
Jersey Central Power & Light ("JCP&L)	28.86%	43.29
Public Service Electric & Gas ("PSE&G")	56.87%	85.305
Rockland Electric Company ("RECO")	1.92%	2.88
Total	100%	150

12. The Board may elect not to select projects in an EDC service territory if the number of Applications submitted is insufficient to provide adequate competition. In that event, the Board may allow the unused capacity to be reallocated to another EDC territory.

Milestones and Follow-Up for Approved Projects

13. Should the proposed community solar project be approved by the Board for participation in the Community Solar Energy Pilot Program, such approval will be contingent on the project being constructed and operated as proposed in its Application. Applicants may not change the location or characteristics of selected projects.

    Furthermore, pursuant to the rules at N.J.A.C. 14:8-9.3(c), approved projects are expected to begin construction within 6 months of their approval by the Board, and are expected to become fully operational within 12 months of their approval by the Board. Extensions may be granted by Board Staff at its discretion, based on its assessment of the specific circumstances of each project approved.

    Please note: the Board proposed an amendment to the Pilot Program rules, which, if approved, would eliminate the deadline to begin construction, establish a requirement that approved projects provide quarterly progress updates, and extend the deadline to become fully operational from 12 to 18 months. Additionally, Staff would be able to grant one, six-month extension; further extensions would need to be requested from the Board via a petition. If approved, these rule amendments will apply to all community solar projects granted conditional approval to participate in the Pilot Program. This note is for informational purposes only. Applicants must be

prepared to construct their projects in accordance with the existing timelines in the current rules at N.J.A.C. 14:8-9.3(c).

In order to monitor compliance, approved projects will be required to submit updates to the Board:

a. Prior to the beginning of construction, the Applicant must provide evidence that commitments in the following categories have been met: project location, community and environmental justice engagement, other benefits.
b. Prior to applying for permission to operate ("PTO"), the Applicant must provide evidence that commitments in the following categories have been met: siting (other than location), all permits received.
c. Prior to applying to the EDC for allocation of bill credits, the Applicant must provide evidence that commitments in the following categories have been met: product offering, subscriber type, geographic limit within EDC service territory.

If the approved project fails to be completed as proposed in the Application, and the Applicant fails to remedy the failure or provide an equivalent modification within a reasonable timeframe, the project may be penalized up to and including a withdrawal of the permission to operate in the Community Solar Energy Pilot Program.

Incentive Eligibility

14. In order to limit regulatory uncertainty for projects applying to PY2 of the Pilot Program, the Board has determined that Applications selected as part of PY2 be eligible to register for the current Transition Incentive ("TI") program, even if said Applications are selected after the establishment of the Successor Program, subject to projects maintaining compliance with the rules and regulations of the TI Program.

Special Considerations for Project Siting

15. Unlike Program Year 1, Applicants with ground mounted projects are not required to meet with NJDEP's Office of Permitting and Project Navigation ("OPPN", formerly the Office of Permit Coordination and Environmental Review, or PCER) prior to submitting an Application to the Board. Applicants may request a meeting with the OPPN to identify permits and other potential issues, but doing so is not a prerequisite in the PY2 Application process.
    Exception: Applications for floating solar projects are required to meet with OPPN prior to submitting an Application. Applicants are responsible for requesting the meeting sufficiently in advance of the Application deadline to ensure that the meeting is able to occur.
16. Applicants are required to submit a complete OPPN Permit Readiness Checklist as an attachment to their Application. Applicants are not required to submit the OPPN Permit Readiness Checklist to OPPN prior to submitting an Application, except in the case of floating solar projects. The Evaluation Committee will submit the Checklists of shortlisted Applications directly to NJDEP prior

to presenting the list of project scores to the Board. The Permit Readiness Checklist is available at the following link: https://www.nj.gov/dep/pcer/introcklist.htm.

17. Special attention should be paid when siting a project on a landfill, a brownfield, or an area of historic fill. For reference, NJDEP's *Guidance for Installation of Solar Renewable Energy Systems on Landfills in New Jersey* can be found at the following link: https://www.nj.gov/dep/dshw/swp/solarguidance.pdf.
18. The Applicant should review the environmental compliance history at the proposed site and the various operations that were conducted there. Satisfaction of all outstanding NJDEP regulatory compliance obligations, if applicable, will be required prior to applying for permission to operate. The Applicant should identify any outstanding compliance and enforcement issues associated with the property on which the proposed project is to be sited and resolve them accordingly before submitting an Application, if applicable.
19. If the proposed project is sited on Green Acres preserved open space, as defined in N.J.A.C. 14:8-9.2, or on land owned by NJDEP, the Applicant must receive special approval for the project from NJDEP prior to submitting the Application to the Board, and attach proof of approval to their application package (see section B. VII. Community Solar Facility Siting).

Special Considerations for Government Entity Applicants

20. Specific exemptions are identified throughout the Application Form which apply only if: 1) the Applicant is a government entity (municipal, county, or state), AND 2) the community solar developer will be selected by the Applicant via a Request for Proposals ("RFP"), Request for Quotations ("RFQ"), or other bidding process. If this is the case, the Applicant must include a letter describing the proposed bidding process, and the Applicant should complete all sections of the Application Form based on the project as it will be designed in the bidding process. The Applicant must further commit to issuing said RFP, RFQ, or other bidding process within 90 days of the proposed project being approved by the Board for participation in the Community Solar Energy Pilot Program (see section B. XIII. Special Authorizations and Exemptions).
21. Alternatively, Government Entity Applicants may elect to submit an Application after issuing an RFP, RFQ, or other bidding process.
22. The Application Form has been designed to ensure that Government Entity Applicants provide the information necessary to equitably score the project against all other Applicants, and to provide contain reasonable assurances that the project will be developed. All Applicants are required to identify a project site.
23. Additionally, the Board proposed an amendment to the Pilot Program rules, which, if approved, would allow municipally-owned community solar projects to submit an application for a project that requests an exemption from the provisions at N.J.A.C. 14:8-9.10(b)(1) mandating subscriber enrollment via affirmative consent (i.e. an opt-out community solar project). Projects applying in PY2 may indicate in section B. XIII. Special Authorizations and Exemptions that they plan to utilize opt-out subscriber enrollment if the proposed rule amendment is approved by the Board. If the Application is selected but the proposed rule amendment is not approved by the Board, the

project will be required to proceed using affirmative consent (i.e. "opt-in") subscriber enrollment rules, as currently provided for in the Pilot Program rules at N.J.A.C. 14:8-9.10(b)(1).

Submitting an Application

24. Applications must adhere to all of the following instructions for submission. Applications must be received no later than 5:00 P.M. on the date of the close of the Application Period in order to be considered.
25. Applications **must** be submitted via the dedicated online application process. Staff will provide further details on how to submit an Application online upon the opening of the online application process. The online application process will reflect the exact questions and requirements laid out in this Application Form. This PDF Application Form is being provided to allow Applicants to develop their Applications; **do not** submit an Application using this PDF Application Form.

Submission of Confidential Information

26. All Applications received will be posted to the New Jersey Clean Energy Program website, and will be available through NJBPU's Public Document Search. The information contained in and submitted with the Application is subject to disclosure under the Open Public Records Act, N.J.S.A. 47-1A-1 et seq.
27. Claimed sensitive and trade secret information that Applicants wish to keep confidential must be submitted in accordance with the confidentiality procedures set forth in N.J.A.C. 14:1-12.3.

Questions and Further Information

28. Please address all questions pertaining to the Application Form to communitysolar@njcleanenergy.com.
29. Additional guidance and Frequently Asked Questions will be available on the NJCEP website at: http://njcleanenergy.com/renewable-energy/programs/community-solar.

Section B: Community Solar Energy Project Description

Project Name: USS Pollinator Solar LLC

*This name will be used to reference the project in correspondence with the Applicant.

I. Applicant Contact Information

Applicant Company/Entity Name: US Solar DG Development LLC ("US Solar")
First Name: Peter Last Name: Schmitt
Daytime Phone: 612-299-1434 Email: peter.schmitt@us-solar.com
Applicant Mailing Address: 100 N 6th Street, Suite 410B
Municipality: Minneapolis County: Hennepin Zip Code: 55403

Applicant is: ☑ Community Solar Project Owner ☑ Community Solar Developer/Facility Installer
☐ Property/Site Owner ☑ Subscriber Organization
☐ Agent (if agent, what role is represented) _____

II. Community Solar Project Owner

Project Owner Company/Entity Name *(complete if known)*: US Solar
First Name: Reed Last Name: Richerson
Daytime Phone: 612-260-2230 Email: reed.richerson@us-solar.com
Mailing Address: 100 N 6th Street, Suite 410B
Municipality: Minneapolis County: Hennepin Zip Code: 55403

III. Community Solar Developer

This section, "Community Solar Developer," is optional if: 1) the Applicant is a government entity (municipal, county, or state), AND 2) the community solar developer will be selected by the Applicant via a RFP, RFQ, or other bidding process. In all other cases, this section is required.

Developer Company Name *(optional, complete if applicable)*: US Solar
First Name: Peter Last Name: Schmitt
Daytime Phone: 612-299-1434 Email: peter.schmitt@us-solar.com
Mailing Address: 100 N 6th Street, Suite 410B
Municipality: Minneapolis County: Hennepin Zip Code: 55403

The proposed community solar project will be primarily built by:
☐ the Developer ☑ a contracted engineering, procurement and construction ("EPC") company

If the proposed community solar project will be primarily built by a contracted EPC company, complete the following *(optional, complete if known)*:
If the EPC company information is left blank and the proposed project is approved by the Board for participation in the Community Solar Energy Pilot Program, the Applicant must inform the Board of the information below once the EPC company becomes known.

EPC Company Name *(optional, complete if applicable)*: _____
First Name: _____ Last Name: _____
Daytime Phone: _____ Email: _____
Mailing Address: _____
Municipality: _____ County: _____ Zip Code: _____

IV. Property/Site Owner Information

Property Owner Company/Entity Name: [redacted]
First Name: [redacted] Last Name: [redacted]
Daytime Phone: [redacted] Email: [redacted]
Applicant Mailing Address: [redacted]
Municipality: [redacted] County: [redacted] Zip Code: [redacted]

V. Community Solar Subscriber Organization *(optional, complete if known)*

If this section, "Community Solar Subscriber Organization," is left blank and the proposed project is approved by the Board for participation in the Community Solar Energy Pilot Program, the Applicant must inform the Board of the information below once the Subscriber Organization becomes known.

Subscriber Organization Company/Entity Name *(optional, complete if applicable)*: US Solar
First Name: Erica Last Name: Forsman
Daytime Phone: 612-337-1959 Email: erica.forsman@us-solar.com
Mailing Address: 100 N 6th Street, Suite 410B
Municipality: Minneapolis County: Hennepin Zip Code: 55403

VI. Proposed Community Solar Facility Characteristics

Community Solar Facility Size (as denominated on the PV panels): 5 MWdc
*Any application for a system larger than 5 MWdc will be automatically eliminated. If awarded, projects will be held to the MWdc size indicated in this Application.

Community Solar Facility Location (Address): 125 Yorke Street
Municipality: Salem County: Salem Zip Code: 08079
Name of Property *(optional, complete if applicable)*: _____

Property Block and Lot Number(s): Block 94, Lots 4, 4Q

Community Solar Site Coordinates: 39°33'32.12"N Longitude 75°27'49.91"W Latitude

Total Acreage of Property Block and Lots: 110 acres

Total Acreage of Community Solar Facility: 25 acres

Attach a delineated map of the portion of the property on which the community solar facility will be located in PDF format. The map must be provided in color. Note: Applications may be required upon request to submit a copy of the delineated map as a design plan in drawing file format (.dwg) or as a shapefile (.shp), in order to facilitate integration with Geographic Information System (GIS) software.

EDC electric service territory in which the proposed community solar facility is located: *(select one)*

- ☑ Atlantic City Electric
- ☐ Jersey Central Power & Light
- ☐ Public Service Electric & Gas
- ☐ Rockland Electric Co.

Estimated time from Application selection to project completion* *(The Applicant should provide a good faith estimate of the date of project completion; however, this data is being collected for informational purposes only.)*: July (month) 2022 (year)

*Project completion is defined pursuant to the definition at N.J.A.C. 14:8-9.3 as being fully operational, up to and including having subscribers receive bill credits for their subscription to the project. Projects must be fully operational within 12 months of receiving conditional approval by the Board (subject to change according to the proposed rule amendment described in the Terms and Conditions).

The proposed community solar facility is an existing project* ..... ☐ Yes ☑ No

If "Yes," the Application will not be considered by the Board. See section B. XIII. for special provisions for projects having received a subsection (t) conditional certification from the Board prior to February 19, 2019.

*An existing project is defined in N.J.A.C. 14:8-9.2 as a solar project having begun operation and/or been approved by the Board for connection to the distribution system prior to February 19, 2019.

VII. Community Solar Facility Siting

1. The proposed community solar project has site control* ..... ☑ Yes ☐ No

   If "Yes," attach proof of site control.

   If "No," the Application will be deemed incomplete.

   *Site control is defined as property ownership or option to purchase, signed lease or option to lease, or signed contract for use as a community solar site or option to contract for use as a community solar site. The site control must be specific to the project in this Application, and may not be contingent on the approval of another Application submitted in PY2.

2. The proposed community solar facility is located, in part or in whole, on preserved farmland* …… ☐ Yes ☑ No

   If "Yes," the Application will not be considered by the Board.

   *Preserved farmland is defined in N.J.A.C. 14:8-9.2 as land from which a permanent development easement was conveyed and a deed of easement was recorded with the county clerk's office pursuant to N.J.S.A. 4:1C-11 et seq.; land subject to a farmland preservation program agreement recorded with the county clerk's office pursuant to N.J.S.A. 4:1C-24; land from which development potential has been transferred pursuant to N.J.S.A. 40:55D-113 et seq. or N.J.S.A. 40:55D-137 et seq.; or land conveyed or dedicated by agricultural restriction pursuant to N.J.S.A. 40:55D-39.1.

3. The proposed community solar facility is located, in part or in whole, on Green Acres preserved open space* or on land owned by the New Jersey Department of Environmental Protection (NJDEP) …… ☐ Yes ☑ No

   If "Yes," the Applicant must attach special authorization from NJDEP for the site to host a community solar facility. The Board will not consider Applications for projects located, in part or in whole, on Green Acres preserved open space or on land owned by NJDEP, unless the Applicant has received special authorization from NJDEP and includes proof of such special authorization in the Application package.

   *Green Acres preserved open space is defined in N.J.A.C. 14:8-9.2 as land classified as either "funded parkland" or "unfunded parkland" under N.J.A.C. 7:36, or land purchased by the State with "Green Acres funding" (as defined at N.J.A.C. 7:36).

4. The proposed community solar facility is located, in part or in whole, on (*check all that apply)*:

   ☐ a landfill (see question 7 below)
   ☐ a brownfield (see question 8 below)
   ☐ an area of historic fill (see question 9 below)
   ☐ a rooftop (see question 10 below)
   ☐ a canopy over a parking lot or parking deck
   ☐ a canopy over another type of impervious surface (e.g. walkway)
   ☐ a water reservoir or other water body ("floating solar") (see question 11 below)
   ☐ a former sand or gravel pit or former mine
   ☑ farmland* (see definition below)
   ☐ other (see question 5 below): _____

   *Farmland is defined as land that has been actively devoted to agricultural or horticultural use and that is/has been valued, assessed, and taxed pursuant to the "Farmland Assessment Act of 1964," P.L. 1964, c.48 (C. 54:4-23.1 et seq.) at any time within the ten year period prior to the date of submission of the Application.

5. If you answered "other" to question 4 above, describe the proposed site and explain why it is appropriate for siting a community solar facility:

6. The proposed community solar facility is located, in part or in whole, on land located in:
   - ☐ the New Jersey Highlands Planning Area or Preservation Area
   - ☐ the New Jersey Pinelands

   If the project is a ground mounted project (i.e. not rooftop or canopy), and answered "Yes" to either of the options above, include a letter or other determination from the New Jersey Highlands Council or the New Jersey Pinelands Commission, as relevant, stating that the proposed project is consistent with land use priorities in the area.

7. If the proposed community solar facility is located, in part or in whole, on a landfill, provide the name of the landfill, as identified in NJDEP's database of New Jersey landfills, available at www.nj.gov/dep/dshw/lrm/landfill.htm: _____

8. If the proposed community solar facility is located, in part or in whole, on a brownfield, has a final remediation document been issued for the property? ..... ☐ Yes ☐ No
   If "Yes," attach a copy of the Response Action Outcome ("RAO") issued by a Licensed Site Remediation Professional ("LSRP") or the No Further Action ("NFA") letter issued by NJDEP.

9. If the proposed community solar facility is located, in part or in whole, on an area of historic fill, have the remedial investigation requirements pursuant to the Technical Requirements for Site Remediation, N.J.A.C. 7:26E-4.7 been implemented? ..... ☐ Yes ☐ No
   Has the remediation of the historic fill been completed pursuant to the Technical Requirements for Site Remediation, N.J.A.C. 7:26E-5.4? ..... ☐ Yes ☐ No
   If the remediation of the historic fill has been completed, attach a copy of the Response Action Outcome ("RAO") issued by a Licensed Site Remediation Professional ("LSRP") or the No Further Action ("NFA") letter issued by NJDEP.

10. If the proposed community solar facility is located, in part or in whole, on a rooftop, has the Applicant verified that the roof is structurally able to support a solar system? ..... ☐ Yes ☐ No
    If "Yes," attach substantiating evidence.
    If "No," the application will not be considered by the Board.

11. If the proposed community solar facility is located, in part or in whole, on a water reservoir or other water body ("floating solar"), is the facility located at a water treatment plant or sand and gravel pit that has little to no established floral and faunal resources? ..... ☐ Yes ☐ No
    If "Yes," provide supporting details and attach substantiating evidence if needed.
    *All proposed floating solar projects are required to meet with NJDEP's OPPN prior to submitting an Application. Applicants are responsible for contacting NJDEP with sufficient advance notice to

ensure that a meeting will occur prior to the deadline to submit an Application. Please see section VIII Permits, Question 2 for more information.

12. The proposed community solar facility is located on the property of an affordable housing building or complex ..... ☐ Yes ☑ No

13. The proposed community solar facility is located on an area designated in need of redevelopment ..... ☐ Yes ☑ No
    If "Yes," attach proof of the designation of the area as being in need of redevelopment from a municipal, county, or state entity.

14. The proposed community solar facility is located in an Economic Opportunity Zone, as defined by the New Jersey Department of Community Affairs ("DCA") ..... ☐ Yes ☑ No
    If "Yes," attach proof that the facility is located in an Economic Opportunity Zone.
    *More information about Economic Opportunity Zones are available at the following link: https://www.state.nj.us/dca/divisions/lps/opp_zones.html.

15. The proposed community solar facility is located on land or a building that is preserved by a municipal, county, state, or federal entity ..... ☐ Yes ☑ No
    If "Yes," attach proof of the designation of the site as "preserved" from a municipal, county, or state entity, and evidence that such designation would not conflict with the proposed solar facility.

16. The proposed community solar facility is located, in part or in whole, on land that includes trees ..... ☑ Yes ☐ No
    Construction of the proposed community solar facility will require cutting down one or more trees ..... ☐ Yes ☑ No
    If "Yes," estimated number of trees required to be cut for construction: _____
    If "Yes," estimated number of acres of trees that required to be cut for construction: _____

17. Are there any use restrictions at the site? ..... ☑ Yes ☐ No
    If "Yes," explain the use restriction below and provide documentation that the proposed community solar project is not prohibited. No existing solar ordinance but the City of Salem is partnering on this project and approves.

    Will the use restriction(s) be required to be modified by variance or other means? ..... ☑ Yes ☐ No
    If "Yes," explain the modification below. Salem will pass a new solar ordinance for this project.

18. The proposed community solar facility has been specifically designed or planned to preserve or enhance the site (e.g. landscaping, site and enhancements, pollination support, etc.) This represents site improvements beyond required basic site improvements …… ☑ Yes ☐ No
If "Yes," explain below, and provide any substantiating documentation in an attachment. Explain how the proposed site enhancements will be made and maintained for the life of the project. If implementing pollination support, explain what type of pollination support, how this support is expected to help local ecosystems, and whether the proposed pollination support has received certifications or other verification.

[redacted]

19. This question is for informational purposes only, and will not impact the Application's score. The Board is interested in learning more about ways in which "dual use" projects may be implemented in the Pilot Program:
The proposed community solar facility is a "dual use" project: i.e. the project site will remain in active agricultural production throughout the life of the project (e.g. crop production under or between the panels, livestock grazing)…… ☑ Yes ☑ No
*Wildflower planting or other pollination support is not considered dual use for purposes of this question (pollination support is question 18).
If "Yes," explain what agricultural production will be maintained on the site and will be consistent with the presence of a solar system. Provide any substantiating documentation in an attachment.

[redacted]

VIII. Permits

1. The Applicant has completed the NJDEP Permit Readiness Checklist, and will submit it as an attachment to this Application…… ☑ Yes ☐ No
If "No," the Application will be deemed incomplete. This requirement only applies to ground mounted and floating solar projects. Community solar projects located on a rooftop, parking lot, or parking structure are exempt from this requirement.
*Applicants are not required to submit the Permit Readiness Checklist to NJDEP prior to submitting an Application to the Board, except in the case of floating solar projects.

2. The Applicant has met with NJDEP's OPPN …… ☑ Yes ☐ No
If "Yes," attach meeting notes or relevant correspondence with NJDEP's OPPN.
* If the Applicant met with OPPN or received comments from OPPN (formerly PCER) for this project as part of the Program Year 1 Application process, and if the details of the project and the site characteristics have remained the same, those comments remain valid. Please include those comments or meeting notes as an attachment to the Application.
*A meeting with NJDEP's OPPN is not required prior to submitting an Application. Exception: all floating solar projects are required to meet with NJDEP's OPPN prior to submitting an Application. Applicants with a floating solar project are responsible for contacting NJDEP with

sufficient advance notice to ensure that a meeting will occur prior to the deadline to submit an Application.

3. The Applicant has received all non-ministerial permits* for this project *(optional)* ..... ☐ Yes ☑ No
   *Receiving all non-ministerial permits is not required prior to submitting an Application.
   *A non-ministerial permit is one in which one or more officials consider various factors and exercise some discretion in deciding whether to issue or deny a permit. This is in contrast to a ministerial permit, for which approval is contingent upon the project meeting pre-determined and established standards. Examples of non-ministerial permits include: local planning board authorization, use variances, Pinelands or Highlands Commission approvals, etc. Examples of ministerial permits include building permits and electrical permits.

4. Please list all permits, approvals, or other authorizations that will be needed for the construction and operation of the proposed community solar facility pursuant to local, state and federal laws and regulations. Include permits that have already been received, have been applied for, and that will need to be applied for. These include:
   a. Permits, approvals, or other authorizations from NJDEP (i.e. Land Use, Air Quality, New Jersey Pollutant Discharge Elimination System "NJPDES", etc.) for the property.
   b. Permits, approvals, or other authorizations from NJDEP (i.e. Land Use, Air Quality, NJPDES, etc.) directly related to the installation and operation of a solar facility on this property.
   c. Permits, approvals, or other authorizations other than those from NJDEP for the development, construction, or operation of the community solar facility (including local zoning and other local and state permits)

   An Application that does not list all permits, approvals, or other authorizations that will be needed for the construction and operation of the proposed community solar facility will be deemed incomplete.
   If a permit has been received, attach a copy of the permit.

Permit Name & Description	Permitting Agency/Entity	Date Permit Applied for *(if applicable)* / Date Permit Received (*if applicable*)
Zoning Permit/Use Permit	City of Salem	Will apply upon receipt of award; City partner
Soil Erosion and Sediment Control Plan (251 Plan)	Cumberland Salem NRC	Will apply upon receipt of award
Stormwater Construction General Permit (5G3)	NJDEP	Will apply upon receipt of award and completion of Soil Erosion and Sediment Control Plan
Phase 1A Archaeological Reconnaissance	State Preservation Office	Will apply upon receipt of award
Freshwater Wetlands Letter of Interpretation	NJ Division of Land Use	Will apply upon receipt of award
Electrical Permit	Office of Local Code Enforcement	Will apply upon receipt of award
Building Permit	Office of Local Code Enforcement	Will apply upon receipt of award
Driveway Access Permit	Salem County	Will apply upon receipt of award

5. The Applicant has consulted the hosting capacity map of the relevant EDC via the EDC's website (links are available on the NJCEP website) and determined that, based on the capacity hosting map as published at the date of submission of the Application, there is sufficient capacity available at the proposed location to build the proposed community solar facility …… ☑ Yes ☐ No
   If "Yes," include a screenshot of the capacity hosting map at the proposed location, showing the available capacity.
   If the hosting capacity map shows insufficient capacity, the Application will not be considered by the Board, unless the Applicant provides: 1) a letter from the relevant EDC indicating that the hosting capacity map is incorrect in that location, or 2) an assessment from the relevant EDC of the cost of the interconnection upgrade that would be required to enable the interconnection of the proposed system, and a commitment from the Applicant to pay those upgrade costs if the project were to be selected by the Board.

6. The Applicant has conducted an interconnection study for the proposed system *(optional)* …… ☐ Yes ☑ No
   If "Yes," include the interconnection study received from the EDC.

IX. Community Solar Subscriptions and Subscribers

1. Estimated or Anticipated Number of Subscribers *(please provide a good faith estimate or range)*: [redacted]

2. Estimated or Anticipated Breakdown of Subscribers *(please provide a good faith estimate or range of the kWh of project allocated to each category)*:
   Residential: [redacted] Commercial: [redacted]
   Industrial: _____ Other: [redacted] (define "other": Municipality)

3. The proposed community solar project is an LMI project* …… ☑ Yes ☐ No
   *An LMI project is defined pursuant to N.J.A.C. 14:8-9 as a community solar project in which a minimum 51 percent of project capacity is subscribed by LMI subscribers.

4. The proposed community solar project has a clear plan for effective and respectful customer engagement process. …… ☑ Yes ☐ No
   If "Yes," attach evidence of experience on projects serving LMI communities or partnerships with organizations that have experience serving LMI communities.

5. The proposed community solar project will allocate at least 51% of project capacity to residential customers …… ☑ Yes ☐ No

6. An affordable housing provider is seeking to qualify as an LMI subscriber for the purposes of the community solar project ..... ☑ Yes ☐ No
   If "Yes," estimated or anticipated percentage of the project capacity for the affordable housing provider's subscription *(provide an estimate or range)*: 35-45%

   If "Yes," what specific, substantial, identifiable, and quantifiable long-term benefits from the community solar subscription are being passed through to their residents/tenants? Final terms and affidavit are still being worked out. Will provide to BPU prior to construction.

   Additionally, the affordable housing provider must attach a signed affidavit that the specific, substantial, identifiable, and quantifiable long-term benefits from the community solar subscription will be passed through to their residents/tenants.

   If "No," please be aware that, if, at any time during the operating life of the community solar project an affordable housing provider wishes to subscribe to the community solar project as an LMI subscriber, it must submit a signed affidavit that the specific, substantial, identifiable, and quantifiable benefits from the community solar subscription will be passed through to its residents/tenants.

7. This project uses an anchor subscriber *(optional)* ..... ☐ Yes ☐ No
   If "Yes," name of the anchor subscriber *(optional)*: _____
   Estimated or anticipated percentage or range of the project capacity for the anchor subscriber's subscription: _____

8. Is there any expectation that the account holder of a master meter will subscribe to the community solar project on behalf of its tenants? ..... ☑ Yes ☐ No
   If "Yes," what specific, identifiable, sufficient, and quantifiable benefits from the community solar subscription are being passed through to the tenants? Tied to affordable housing provider, referenced above.

   Additionally, the account holder of the master meter must attach a signed affidavit that the specific, identifiable, sufficient, and quantifiable benefits from the community solar subscription will be passed through to the tenants.

   If "No," please be aware that, if, at any time during the operating life of the community solar project the account holder of a master meter wishes to subscribe to the community solar project on behalf of its tenants, it must submit to the Board a signed affidavit that the specific, identifiable, sufficient, and quantifiable benefits from the community solar subscription will be passed through to its tenants.

9. The geographic restriction for distance between project site and subscribers is: *(select one)*
   ☐ No geographic restriction: whole EDC service territory

☑ Same county OR same county and adjacent counties

☐ Same municipality OR same municipality and adjacent municipalities

Note: The geographic restriction selected here will apply for the lifetime of the project, barring special dispensation from the Board, pursuant to N.J.A.C. 14:8-9.5(a).

10. Product Offering for LMI subscribers: *(The Applicant must also complete and attach one or more product offering form(s) found in Appendix A. See Appendix A for exemptions.)*

The subscription proposed offers guaranteed or fixed savings to subscribers …….. ☑ Yes ☐ No

If "Yes," the guaranteed or fixed savings are offered as:

☐ A percentage saving on the customer's annual electric utility bill

☐ A percentage saving on the customer's community solar bill credit

☑ Other: [redacted]

If "Yes," the proposed savings represent:

☐ 0% - 5% of the customer's annual electric utility bill or bill credit

☐ 5% - 10% of the customer's annual electric utility bill or bill credit

☑ 10% - 20% of the customer's annual electric utility bill or bill credit

☐ over 20% of the customer's annual electric utility bill or bill credit

The subscription proposed offers subscribers ownership or a pathway to ownership of a share of the community solar facility …….. ☐ Yes ☑ No

If "Yes," include proof of a pathway to ownership of a share of the community solar facility offered to the subscribers in Appendix A.

11. Product Offering for non-LMI subscribers: *(The Applicant must also complete and attach one or more product offering form(s) found in Appendix A. See Appendix A for exemptions.)*

The subscription proposed offers guaranteed or fixed savings to subscribers …….. ☑ Yes ☐ No

If "Yes," the guaranteed or fixed savings are offered as:

☐ A percentage saving on the customer's annual electric utility bill

☐ A percentage saving on the customer's community solar bill credit

☑ Other: Fixed savings on per kWh price, representing at least 10% at the start

If "Yes," the proposed savings represent:

☐ 0% - 5% of the customer's annual electric utility bill or bill credit

☐ 5% - 10% of the customer's annual electric utility bill or bill credit

☑ 10% - 20% of the customer's annual electric utility bill or bill credit

☐ over 20% of the customer's annual electric utility bill or bill credit

The subscription proposed offers subscribers ownership or a pathway to ownership of a share of the community solar facility ..... ☐ Yes ☑ No
If "Yes," include proof of a pathway to ownership of a share of the community solar facility offered to the subscribers in Appendix A.

12. The list of approved community solar projects will be published on the Board's website. Additionally, subscriber organizations have the option of indicating, on this list, that the project is currently seeking subscribers.
    If this project is approved, the Board should indicate on its website that the project is currently seeking subscribers ..... ☑ Yes ☐ No
    If "Yes," the contact information indicated on the Board's website should read:

Company/Entity Name: US Solar Contact Name: Erica Forsman
Daytime Phone: 612-337-1959 Email: erica.forsman@us-solar.com

*It is the responsibility of the project's subscriber organization to notify the Board if/when the project is no longer seeking subscribers, and request that the Board remove the above information on its website.

X. Community Engagement

1. The proposed community solar facility is located on land or a building owned or controlled by a government entity, including, but not limited to, a municipal, county, state, or federal entity ..... ☐ Yes ☑ No

2. The proposed community solar project is being developed by or in partnership or collaboration* with the municipality in which the project is located ..... ☑ Yes ☐ No
   If "Yes," explain how and attach evidence of the project being developed by or in partnership or collaboration with the municipality in which the project is located.
   *Partnership or collaboration with the municipality is defined as clear and ongoing municipal involvement in the approval of the design, development, or operation of the proposed community solar project (e.g. project is located on a municipal site, municipality facilitating subscriber acquisition, municipal involvement in defining the subscription terms, etc.). Examples of evidence may include a formal partnership, a municipal request for proposals or other public bidding process, letter describing the municipality's involvement in the project or meeting minutes. Documentation must be specific to the project described in this Application; "generic" documentation of support that applies to multiple projects submitted by the same Applicant will not be accepted.
   [redacted]

3. The proposed community solar project is being developed by or in partnership or collaboration* with one or more local community organization(s) and/or affordable housing providers in the area in which the project is located ..... ☐ Yes ☑ No

If "Yes," explain how and attach evidence of the project being developed by or in partnership or collaboration with the local community organization(s) and/or affordable housing providers.
*Partnership or collaboration is defined as clear and ongoing involvement by the local community organization(s) and/or affordable housing providers in the approval of the design, development, or operation of the proposed community solar project (e.g. community organization owns the proposed site, community organization is facilitating subscriber acquisition or was involved in the design of the community solar product offering, etc.). Documentation must be specific to the project described in this Application; "generic" documentation of support that applies to multiple projects submitted by the same Applicant will not be accepted.

_____

4. The proposed community solar project was developed, at least in part, with support and in consultation with the community in which the project is located* ..... ☑ Yes ☐ No
If "Yes," please describe the consultative process below.
*A community consultative process may include any of the following: letter of support from municipality and/or community organizations and/or local affordable housing provider demonstrating their awareness and support of the project; one or more opportunities for public intervention; and/or outreach to the municipality and/or local community organizations and/or affordable housing provider.
[redacted]

XI. Project Cost

This section, "Project Cost," is optional if: 1) the Applicant is a government entity (municipal, county, or state), AND 2) the community solar developer will be selected by the Applicant via a RFP, RFQ, or other bidding process. In all other cases, this section is required.

1. Provide the following cost estimates and attach substantiating evidence in the form of an unlocked Excel spreadsheet model:

Applicants are expected to provide a good faith estimate of costs associated with the proposed community solar project, as they are known at the time the Application is filed with the Board. This information will not be used in the evaluation of the proposed community solar project.

Net Installed Cost (in $)	[redacted]
Net Installed Cost (in $/Watt)	[redacted]
Initial Customer Acquisition Cost (in $/Watt)	[redacted]
Annual Customer Churn Rate (in %)	[redacted]
Annual Operating Expenses (in c/kWh)	[redacted]
Levelized Cost of Energy ("LCOE") (in c/kWh)	[redacted]

2. Pursuant to N.J.A.C. 14:8-9.7(q), "community solar projects shall be eligible to apply, via a one-time election prior to the delivery of any energy from the facility, for SRECs or Class I RECs, as applicable, or to any subsequent compensations as determined by the Board pursuant to the Clean Energy Act." Consistent with the Clean Energy Act of 2018, the Board is no longer accepting applications for the SREC Registration Program ("SRP"). Projects granted conditional approval to participate in PY2 will be eligible to apply for the TI Program.

For indicative purposes only, please indicate all local, state and federal tax incentives which will be applied to if the proposed community solar project is approved for participation in the Community Solar Energy Pilot Program: [redacted]

XII. Other Benefits

1. The proposed community solar facility will be paired with storage ..... ☐ Yes ☑ No
   If "Yes," please describe the proposed storage facility:
   a. Storage system size: _____ MW _____ MWh
   b. The storage offtaker is also a subscriber to the proposed community solar facility ..... ☐ Yes ☐ No

*Community solar credits will only be provided to community solar generation; credits will not be provided to energy discharged to the grid from a storage facility (i.e. no "double counting").

2. The proposed community solar facility will be paired with one or more EV charging stations ..... ☐ Yes ☑ No
   If "Yes," how many EV charging stations: _____
   Will these charging stations be public and/or private? _____
   Please provide additional details: _____

3. The proposed community solar facility will provide energy audits and/or energy efficiency improvements to subscribers..... ☐ Yes ☑ No
   If "Yes," please provide additional details: _____

4. The proposed community solar project will create temporary or permanent jobs in New Jersey ..... ☑ Yes ☐ No
   If "Yes," estimated number of temporary jobs created in New Jersey: 40-50
   If "Yes," estimated number of permanent jobs created in New Jersey: 0.5
   If "Yes," explain what these jobs are: Temporary construction jobs and permanent O&M and subscription.

5. The proposed community solar project will provide job training opportunities for local solar trainees ..... ☑ Yes ☐ No
   If "Yes," will the job training be provided through a registered apprenticeship? .... ☑ Yes ☐ No

If "Yes," identify the entity or entities through which job training is or will be organized (e.g. New Jersey GAINS program, partnership with local school):
NJ GAINS program, though we will also look at local schools in the area.

XIII. Special Authorizations and Exemptions

1. Is the proposed community solar project co-located with another community solar facility (as defined at N.J.A.C. 14:8-9.2)? ..... ☐ Yes ☑ No
   If "Yes," please explain why the co-location can be approved by the Board, consistent with the provisions at N.J.A.C. 14:8-9 _____

2. Does this project seek an exemption from the 10-subscriber minimum? ..... ☐ Yes ☑ No
   If "Yes," please demonstrate below (and attach supporting documents as relevant):
   a. That the project is sited on the property of a multi-family building.
   b. That the project will provide specific, identifiable, and quantifiable benefits to the households residing in said multi-family building.

3. Specific sections throughout the Application Form are identified as optional only if: 1) the Applicant is a government entity (municipal, county, or state), and 2) the community solar developer will be selected by the Applicant via a RFP, RFQ, or other bidding process. Is the Applicant a government entity that plans to select the developer via such bidding process? ..... ☐ Yes ☑ No
   If "Yes," attach a letter describing the proposed bidding process and a copy of the request for bids (RFP, RFQ, or other bidding document) that is ready to be issued if the project is granted conditional approval by the Board. The Applicant must further commit to issuing said RFP, RFQ, or other bidding process within 90 days of the proposed project being approved by the Board for participation in the Community Solar Energy Pilot Program. The Applicant will be required to provide the information contained in those optional sections to the Board once it becomes known.

4. Has the proposed community solar project received, in part or in whole, a subsection (t) conditional certification from the Board prior to February 19, 2019? ..... ☐ Yes ☑ No
   If "Yes," the project may apply to participate in the Community Solar Energy Pilot Program if it commits to withdrawing the applicable subsection (t) conditional certification immediately if it is approved by the Board for participation in the Community Solar Energy Pilot Program. Attach a signed affidavit that the Applicant will immediately withdraw the applicable subsection (t) conditional certification if the proposed project is approved by the Board for participation in the Community Solar Energy Pilot Program.

5. The Board has proposed an amendment to the Pilot Program rules, which, if approved, would allow municipally-owned community solar projects to submit an application for a project that requests an exemption from the provisions at N.J.A.C. 14:8-9.10(b)(1) mandating subscriber enrollment via affirmative consent (i.e. an opt-out community solar project). Projects that intend to utilize opt-out subscriber enrollment if the proposed rule amendment is approved by the Board must indicate such intent below. If the Application is selected but the proposed rule amendment is not approved by the Board, the project will be required to proceed using affirmative consent (i.e. "opt-in") subscriber enrollment rules, as currently provided for in the Pilot Program rules at N.J.A.C. 14:8-9.10(b)(1).

   A. This Application is for an opt-out community solar project..... ☐ Yes ☑ No

   B. The proposed opt-out project will be owned and operated by the municipality for the duration of the project life (excluding a possible period of temporary third-party, tax-credit investor ownership to maximize the financeability of the opt-out project, subject to appropriate contractual provisions that maintain the municipality's ultimate control of the proposed opt-out project)..... ☐ Yes ☐ No

   If "Yes," the municipality name is: _____

   If "No," the project will not be considered for eligibility as an opt-out community solar project.

   C. The proposed opt-out project has been authorized by municipal ordinance or resolution ..... ☐ Yes ☐ No

   If "Yes," attach a copy of the municipal ordinance or resolution allowing the development, ownership, and operation an opt-out community solar project, contingent on the proposed rules being approved by the Board.

   If "No," the project will not be considered for eligibility as an opt-out community solar project.

   D. The proposed opt-out project will allocate all project capacity to LMI subscribers ..... ☐ Yes ☐ No

   If "No," the project will not be considered for eligibility as an opt-out community solar project.

   E. Describe the process by which the municipality will identify the customers that will be automatically enrolled in the proposed opt-out project: _____

   F. The municipal applicant has reviewed the proposed rule amendment allowing for opt-out projects, and agrees to adhere to the proposed rules and any subsequent modification if they are approved by the Board. The applicant understands that any approval for the project to operate as an opt-out community solar project is contingent on the proposed rule amendment being approved by the Board. The applicant understands that, if the proposed rule amendment is not approved by the Board, the project, if approved, will be required to

adhere to the existing "opt-in" rules for subscriber enrollment (N.J.A.C. 14:8-9.10(b)(1)). …… ☐ Yes☐ No

Attach an affidavit that the municipal project owner will comply with all applicable rules and regulations, particularly those relating to consumer privacy and consumer protection.

Section C: Certifications

Instructions: Original signatures on all certifications are required. All certifications in this section must be notarized; instructions on how to submit certifications will be provided as part of the online application process. Certifications must be dated after October 3, 2020: PY1 certifications may not be reused in PY2.

Applicant Certification

The undersigned warrants, certifies, and represents that:

1) I, Reed Richerson (name) am the Vice President (title) of the Applicant US Solar DG Development LLC (name) and have been authorized to file this Applicant Certification on behalf of my organization; and
2) The information provided in this Application package has been personally examined, is true, accurate, complete, and correct to the best of the undersigned's knowledge, based on personal knowledge or on inquiry of individuals with such knowledge; and
3) The community solar facility proposed in the Application will be constructed, installed, and operated as described in the Application and in accordance with all Board rules and applicable laws; and
4) The system proposed in the Application will be constructed, installed, and operated in accordance with all Board policies and procedures for the Transition Incentive Program, if applicable; and
5) My organization understands that information in this Application is subject to disclosure under the Open Public Records Act, N.J.S.A. 47-1A-1 et seq., and that any claimed sensitive and trade secret information should be submitted in accordance with the confidentiality procedures set forth in N.J.A.C. 14:1-12.3; and
6) I acknowledge that **submission of false information may be grounds for denial of this Application, and if any of the foregoing statements are willfully false, I am subject to punishment to the full extent of the law, including the possibility of fine and imprisonment.**

Signature: _____ Date: 1/27/2021

Print Name: Reed Richerson

Title: Vice President Company: US Solar DG Development LLC

Signed and sworn to before me on this 27 day of Jan, 2021

_____
Signature

Keyla Montero
Name

KEYLA MONTERO
Notary Public - State of Florida
Commission # HH 015025
My Comm. Expires Jun 25, 2024
Bonded through National Notary Assn.

Project Developer Certification

This Certification "Project Developer / Installer" is optional if: 1) the Applicant is a government entity (municipal, county, or state), AND 2) the community solar developer will be selected by the Applicant via a Request for Proposals (RFP), Request for Quotations (RFQ), or other bidding process. In all other cases, this Certification is required.

The undersigned warrants, certifies, and represents that:

1) I, Reed Richerson (name) am the Vice President (title) of the Project Developer US Solar DG Development LLC (name) and have been authorized to file this Applicant Certification on behalf of my organization; and
2) The information provided in this Application package has been personally examined, is true, accurate, complete, and correct to the best of the undersigned's knowledge, based on personal knowledge or on inquiry of individuals with such knowledge; and
3) The community solar facility proposed in the Application will be constructed, installed, and operated as described in the Application and in accordance with all Board rules and applicable laws; and
4) The system proposed in the Application will be constructed, installed, and operated in accordance with all Board policies and procedures for the Transition Incentive Program, if applicable; and
5) My organization understands that information in this Application is subject to disclosure under the Open Public Records Act, N.J.S.A. 47-1A-1 et seq., and that any claimed sensitive and trade secret information should be submitted in accordance with the confidentiality procedures set forth in N.J.A.C. 14:1-12.3; and
6) I acknowledge that **submission of false information may be grounds for denial of this Application, and if any of the foregoing statements are willfully false, I am subject to punishment to the full extent of the law, including the possibility of fine and imprisonment.**

Signature: _____ Date: 1/27/2021

Print Name: Reed Richerson

Title: Vice President Company: US Solar DG Development LLC

Signed and sworn to before me on this 27 day of January, 2021

Keyla Montero
Signature

Keyla Montero
Name

KEYLA MONTERO
Notary Public - State of Florida
Commission # HH 015025
My Comm. Expires Jun 25, 2024
Bonded through National Notary Assn.

Project Owner Certification

The undersigned warrants, certifies, and represents that:

1) I, Reed Richerson (name) am the Vice President (title) of the Project Owner US Solar DG Development LLC (name) and have been authorized to file this Applicant Certification on behalf of my organization; and
2) The information provided in this Application package has been personally examined, is true, accurate, complete, and correct to the best of the undersigned's knowledge, based on personal knowledge or on inquiry of individuals with such knowledge; and
3) The community solar facility proposed in the Application will be constructed, installed, and operated as described in the Application and in accordance with all Board rules and applicable laws; and
4) The system proposed in the Application will be constructed, installed, and operated in accordance with all Board policies and procedures for the Transition Incentive Program, if applicable; and
5) My organization understands that information in this Application is subject to disclosure under the Open Public Records Act, N.J.S.A. 47-1A-1 et seq., and that any claimed sensitive and trade secret information should be submitted in accordance with the confidentiality procedures set forth in N.J.A.C. 14:1-12.3; and
6) I acknowledge that **submission of false information may be grounds for denial of this Application, and if any of the foregoing statements are willfully false, I am subject to punishment to the full extent of the law, including the possibility of fine and imprisonment.**

Signature: _____ Date: 1/27/2021

Print Name: Reed Richerson

Title: Vice President Company: US Solar DG Development LLC

Signed and sworn to before me on this 27 day of January, 2021

Keyla Montero
Signature

Keyla Montero
Name

KEYLA MONTERO
Notary Public - State of Florida
Commission # HH 015025
My Comm. Expires Jun 25, 2024
Bonded through National Notary Assn.

Property Owner Certification

The undersigned warrants, certifies, and represents that:

1) I, [redacted] (name) am the [redacted] (title) of the Property [redacted] (name) and have been authorized to file this Applicant Certification on behalf of my organization; and
2) The information provided in this Application package pertaining to siting and location of the proposed community solar project has been personally examined, is true, accurate, complete, and correct to the best of the undersigned's knowledge, based on personal knowledge or on inquiry of individuals with such knowledge; and
3) My organization or I understand that information in this Application is subject to disclosure under the Open Public Records Act, N.J.S.A. 47-1A-1 et seq., and that any claimed sensitive and trade secret information should be submitted in accordance with the confidentiality procedures set forth in N.J.A.C. 14:1-12.3; and
4) I acknowledge that **submission of false information may be grounds for denial of this Application, and if any of the foregoing statements are willfully false, I am subject to punishment to the full extent of the law, including the possibility of fine and imprisonment.**

Signature: [redacted] Date: [redacted]

Print Name: [redacted]

Title: [redacted] Company: [redacted]

[redacted]

[redacted]

Subscriber Organization Certification *(optional, complete if known)*

The undersigned warrants, certifies, and represents that:

1) I, Reed Richerson (name) am the Vice President (title) of the Subscriber Organization US Solar DG Development LLC (name) and have been authorized to file this Applicant Certification on behalf of my organization; and
2) The information provided in this Application package has been personally examined, is true, accurate, complete, and correct to the best of the undersigned's knowledge, based on personal knowledge or on inquiry of individuals with such knowledge; and
3) The community solar facility proposed in the Application will be constructed, installed, and operated as described in the Application and in accordance with all Board rules and applicable laws; and
4) My organization understands that information in this Application is subject to disclosure under the Open Public Records Act, N.J.S.A. 47-1A-1 et seq., and that any claimed sensitive and trade secret information should be submitted in accordance with the confidentiality procedures set forth in N.J.A.C. 14:1-12.3; and
5) I acknowledge that **submission of false information may be grounds for denial of this Application, and if any of the foregoing statements are willfully false, I am subject to punishment to the full extent of the law, including the possibility of fine and imprisonment.**

Signature: _____ Date: 1/27/2021

Print Name: Reed Richerson

Title: Vice President Company: US Solar DG Development LLC

Signed and sworn to before me on this 27 day of January, 2021

Kayla Montero
Signature

Kayla Montero
Name

KEYLA MONTERO
Notary Public - State of Florida
Commission # HH 015025
My Comm. Expires Jun 25, 2024
Bonded through National Notary Assn.

Section D: Appendix

Appendix A: Product Offering Questionnaire

Complete the following Product Offering Questionnaire. If there are multiple different product offerings for the proposed community solar project, please complete and attach one Product Offering Questionnaire per product offering. Variations in any product offering require a separate Product Offering Questionnaire. Applicants are expected to provide a good faith description of the product offerings developed for the proposed community solar project, as they are known at the time the Application is filed with the Board. If the proposed project is approved by the Board, the Applicant must notify the Board and receive approval from the Board for any modification or addition to a Product Offering Questionnaire.

Exception: This "Product Offering Questionnaire" is optional if: 1) the Applicant is a government entity (municipal, county, or state), AND 2) the community solar developer will be selected by the Applicant via a Request for Proposals (RFP), Request for Quotations (RFQ), or other bidding process.

This Questionnaire is Product Offering number 1 of 3 (total number of product offerings).

This Product Offering applies to:

☐ LMI subscribers
☑ non-LMI subscribers
☐ both LMI and non-LMI subscribers

1. Community Solar Subscription Type *(examples: kilowatt hours per year, kilowatt size, percentage of community solar facility's nameplate capacity, percentage of subscriber's historical usage, percentage of subscriber's actual usage)*: [redacted]

2. Community Solar Subscription Price: *(check all that apply)*
   ☐ Fixed price per month
   [redacted]

3. [redacted]

4. Fees
   [redacted]

5. Does the subscription guarantee or offer fixed savings or specific, quantifiable economic benefits to the subscriber? ..... ☑ Yes ☐ No

If "Yes," the savings are guaranteed or fixed:

- ☐ As a percentage of monthly utility bill
- ☑ As a fixed guaranteed savings compared to average historic bill
- ☐ As a fixed percentage of bill credits
- ☐ Other: _____

6. Special conditions or considerations: [redacted]

Section D: Appendix

Appendix A: Product Offering Questionnaire

Complete the following Product Offering Questionnaire. If there are multiple different product offerings for the proposed community solar project, please complete and attach one Product Offering Questionnaire per product offering. Variations in any product offering require a separate Product Offering Questionnaire. Applicants are expected to provide a good faith description of the product offerings developed for the proposed community solar project, as they are known at the time the Application is filed with the Board. If the proposed project is approved by the Board, the Applicant must notify the Board and receive approval from the Board for any modification or addition to a Product Offering Questionnaire.

Exception: This "Product Offering Questionnaire" is optional if: 1) the Applicant is a government entity (municipal, county, or state), AND 2) the community solar developer will be selected by the Applicant via a Request for Proposals (RFP), Request for Quotations (RFQ), or other bidding process.

This Questionnaire is Product Offering number 2 of 3 (total number of product offerings).

This Product Offering applies to:

- ☑ LMI subscribers
- ☐ non-LMI subscribers
- ☐ both LMI and non-LMI subscribers

1. Community Solar Subscription Type *(examples: kilowatt hours per year, kilowatt size, percentage of community solar facility's nameplate capacity, percentage of subscriber's historical usage, percentage of subscriber's actual usage)*: _____

2. Community Solar Subscription Price: *(check all that apply)*
   [redacted]

3. [redacted]

4. Fees
   [redacted]

5. Does the subscription guarantee or offer fixed savings or specific, quantifiable economic benefits to the subscriber? ..... ☑ Yes ☐ No

If "Yes," the savings are guaranteed or fixed:

- ☐ As a percentage of monthly utility bill
- ☑ As a fixed guaranteed savings compared to average historic bill
- ☐ As a fixed percentage of bill credits
- ☐ Other: _____

6. Special conditions or considerations: [redacted]

Section D: Appendix

Appendix A: Product Offering Questionnaire

Complete the following Product Offering Questionnaire. If there are multiple different product offerings for the proposed community solar project, please complete and attach one Product Offering Questionnaire per product offering. Variations in any product offering require a separate Product Offering Questionnaire. Applicants are expected to provide a good faith description of the product offerings developed for the proposed community solar project, as they are known at the time the Application is filed with the Board. If the proposed project is approved by the Board, the Applicant must notify the Board and receive approval from the Board for any modification or addition to a Product Offering Questionnaire.

Exception: This "Product Offering Questionnaire" is optional if: 1) the Applicant is a government entity (municipal, county, or state), AND 2) the community solar developer will be selected by the Applicant via a Request for Proposals (RFP), Request for Quotations (RFQ), or other bidding process.

This Questionnaire is Product Offering number 3 of 3 (total number of product offerings).

This Product Offering applies to:

- ☐ LMI subscribers
- ☑ non-LMI subscribers
- ☐ both LMI and non-LMI subscribers

1. Community Solar Subscription Type *(examples: kilowatt hours per year, kilowatt size, percentage of community solar facility's nameplate capacity, percentage of subscriber's historical usage, percentage of subscriber's actual usage)*: _____

2. Community Solar Subscription Price: *(check all that apply)*
   [redacted]

3. [redacted]

4. Fees
   [redacted]

5. Does the subscription guarantee or offer fixed savings or specific, quantifiable economic benefits to the subscriber? ..... ☑ Yes ☐ No

If "Yes," the savings are guaranteed or fixed:

- ☐ As a percentage of monthly utility bill
- ☑ As a fixed guaranteed savings compared to average historic bill
- ☐ As a fixed percentage of bill credits
- ☐ Other: _____

6. Special conditions or considerations: [redacted]

Appendix B: Required Attachments Checklist

Note that this list is for indicative purposes only. Additional attachments may be required, and as identified throughout this Application Form. Please review the Application Form in its entirety, and attach attachments as required.

Required Attachments Attachments marked with an asterisk (*) are only required if the project meets the specified criteria. All others are required for all Applications.	**Reference Page Number**	**Attached?**
Delineated map of the portion of the property on which the community solar facility will be located (in color).	p. 10	☑Yes ☐ No
Proof of site control.	p. 10	☑Yes ☐ No
(*) If the proposed project is located, in part or in whole on a rooftop: substantiating evidence that the roof is structurally able to support a solar system.	p. 12	☐Yes ☐ No
(*) If the proposed project is located on an area designated in need of redevelopment: proof of the designation of the area as being in need of redevelopment from a municipal, county, or state entity.	p. 13	☐Yes ☐ No
(*) If the proposed project is located in an Economic Opportunity Zone ("EOZ"), as defined by DCA: proof that the facility is located in an EOZ.	p. 13	☐Yes ☐ No
(*) If the proposed project is located on land or a building that is preserved by a municipal, county, or federal entity: proof of the designation of the site as "preserved" and that the designation would not conflict with the proposed solar facility.	p. 13	☐Yes ☐ No
Copy of the completed Permit Readiness Checklist.	p. 14	☑Yes ☐ No
A screenshot of the EDC capacity hosting map at the proposed location, showing the available capacity (in color).	p. 16	☑Yes ☐ No
Substantiating evidence of project cost in the form of charts and/or spreadsheet models.	p. 20	☑Yes ☐ No
Product Offering Questionnaire(s) in Appendix A.	p. 30 – 31	☑Yes ☐ No
Certifications in Section C.	p. 25 – 29	☑Yes ☐ No

Optional Attachments Attachments marked with an asterisk (*) only apply if the project meets the specified criteria.	**Reference Page Number**	**Attached?**
(*) If the project is located, in part or in whole, on a brownfield: copy of the Response Action Outcome (issued by the LSRP) or the No Further Action letter (issued by DEP).	p. 12	☐Yes ☐ No
(*) If the project is located, in part or in whole, on an area of historic fill: copy of the Response Action Outcome (issued by the LSRP) or the No Further Action letter (issued by DEP).	p. 12	☐Yes ☐ No
Substantiating evidence that the proposed community solar facility has been specifically designed or planned to preserve or enhance the site (e.g. landscaping, site and enhancements, pollination support, etc.).	p. 14	☑Yes ☐ No

Proof of a meeting with NJDEP Office of Permitting and Project Navigation ("OPPN"), if applicable. (*) Proof of a meeting with OPPN is optional, except for projects that are in part or in whole a floating solar project. (*) If the Applicant met with OPPN (formerly PCER) during PY1, and there have been no changes to the project or site characteristics, include any comments received from OPPN on the PY1 Application.	p. 14	☑Yes ☐ No
Permits received for this site or project.	p. 15	☑Yes ☐ No
Evidence of experience on projects serving LMI communities or partnerships with organizations that have experience serving LMI communities	p.16	☑Yes ☐ No
(*) If an affordable housing provider is seeking to qualify as an LMI subscriber for purposes of the community solar project: signed affidavit from the affordable housing provider that the specific, substantial, identifiable, and quantifiable long-term benefits from the community solar subscription will be passed through to their residents/tenants.	p. 17	☐Yes ☐ No
(*) If the account holder of a master meter will subscribe on behalf of its tenants: signed affidavit from the account holder that the specific, identifiable, sufficient, and quantifiable benefits from the community solar subscription will be passed through to the tenants	p. 17	☐Yes ☐ No
Evidence that the proposed project is being developed by or in partnership and collaboration with the municipality in which the project is located.	p. 19	☑Yes ☐ No
Evidence that the proposed project is being developed in partnership or collaboration with one or more local community organization(s) and/or affordable housing providers in the area in which the project is located.	p. 19 – 20	☐Yes ☐ No
Evidence that the proposed project is being developed with support and in consultation with the community in which the project is located.	p. 20	☑Yes ☐ No
(*) If the project is seeking an exemption from the 10-subscriber minimum rule: supporting documents if needed.	p. 22	☐Yes ☐ No

Required Attachments for Exemptions	**Reference Page Number**	**Attached?**
If the Applicant is a government entity (municipal, county, or state), and the community solar developer will be selected by the Applicant via a Request for Proposals (RFP), Request for Quotations (RFQ), or other bidding process: ⇨ Attach a letter from the Applicant describing the bidding process and a copy of the request for bids (RFP, RFQ, or other bidding document) that is ready to be issued if project is granted conditional approval by the Board.	p. 22	☐Yes ☐ No
If the proposed community solar project is located, in part or in whole, on Green Acres preserved open space or on land owned by NJDEP. ⇨ Attach special authorization from NJDEP for the site to host a community solar facility.	p. 11	☐Yes ☐ No

If the proposed community solar project has received, in part or in whole, a subsection (t) conditional certification from the Board prior to February 19, 2019. ⇨ Attach a signed affidavit that the Applicant will immediately withdraw the applicable subsection (t) conditional certification if the proposed project is approved by the Board for participation in the Community Solar Energy Pilot Program.	p. 22	☐Yes ☐ No
If the proposed community solar project plans to operate as a municipal opt-out project, contingent on the Board's approval the relevant proposed rules. ⇨ Attach a copy of the municipal ordinance or resolution allowing the development, ownership, and operation an opt-out community solar project, contingent on the proposed rules being approved by the Board ⇨ Attach an affidavit that the municipal project owner will comply with all applicable rules and regulations, particularly those relating to consumer privacy and consumer protection.	p. 23 p. 24	☐Yes ☐ No ☐Yes ☐ No

Appendix C: Evaluation Criteria

The Evaluation Criteria chart below lists the various categories that the Board will consider in evaluating project Applications. Projects must score a minimum of 50 points total in order to be considered for participation in the Community Solar Energy Pilot Program. Projects that score above 50 points will be awarded program capacity in order, starting with the highest-scoring project and proceeding to the lowest-scoring project, until the capacity for each EDC territory is filled. The last project to be selected by the Board will be granted conditional approval for its full capacity.

Evaluation Criteria	Max. Points (total possible points: 100)
Low- and Moderate-Income and Environmental Justice Inclusion Higher preference: LMI project	25
Siting Higher preference, e.g.: landfills, brownfields, areas of historic fill, rooftops, parking lots, parking decks, canopies over impervious surfaces (e.g. walkway), former sand and gravel pits, former mines Medium preference, e.g.: floating solar on water bodies at water treatment plants and sand and gravel pits, that have little to no established floral and faunal resources (*) No Points, e.g.: preserved lands, wetlands, forested areas, farmland Bonus points for site enhancements, e.g. landscaping, land enhancement, pollination support (**) Bonus points if project is located in a redevelopment area or an economic opportunity zone (**) *Note: Applicants with a floating solar project must meet with DEP prior to submitting an Application, and take special notice of DEP's siting guidelines. **Note: bonus points will only be available for projects in the "higher" or "medium" preference siting categories. Projects in the "No Points" siting categories are not eligible for bonus points.	20 Max. possible bonus points: 3 Max. possible bonus points: 2
Community and Environmental Justice Engagement Higher preference: formal agreement, ongoing collaboration or effective partnership with municipality and/or local community organizations and/or affordable housing provider (per Section X, Questions 1, 2, and 3) Medium preference: consultation with municipality and/or local community organization(s) and/or or affordable housing provider (per Section X, Question 4) No Points: no collaboration or collaboration has not been proven	15

Product Offering Higher preference: guaranteed savings >20%, flexible terms* Medium preference: guaranteed savings >10%, flexible terms* Low preference: guaranteed savings >5% No Points: no guaranteed savings, no flexible terms* *Flexible terms may include: no cancellation fee, short-term contract	15
Other Benefits Higher preference: Provides jobs and/or job training and/or demonstrates co-benefits (e.g. paired with storage, EV charging station, energy audits, energy efficiency)	10
Geographic Limit within EDC service territory Higher preference: municipality/adjacent municipality Medium preference: county/adjacent county No Points: any geographic location within the EDC service territory	5
Project Maturity Higher preference: project has received all non-ministerial permits; project has completed an interconnection study	5

APPENDIX II – USS Pollinator Solar LLC Development Choices: Greenfield and County Restriction

US SOLAR
100 N 6th Street, Suite 410B
Minneapolis, MN 55403
612.260.2230
www.us-solar.com

USS Pollinator Solar LLC
Development Choices: Greenfield and County Restriction

Responsible Greenfield Development

Though the Community Solar Energy Pilot Program awards extra evaluation points for rooftop and brownfield sites, USS Pollinator Solar LLC chose to pursue this greenfield solar site for several reasons:

- Environmental benefits
- Speed of development and deployment
- Development risk, cost
- Community interaction
- Uniquely situated greenfield close to load

Rooftops that are compatible with solar installations should all have solar installations. [redacted] However, a ground-mount project like USS Pollinator Solar LLC offers a number of unique and substantial benefits not available with rooftop projects. For example, ground-mounted solar allows for designs that optimize production and capacity factors by optimizing row spacing, orientation, panel height, tilt angle, and the ability to utilize a single-axis tracking system providing for a longer period of daily peak generation.

In contrast, rooftop sites have lower capacity factors, in part because rooftops impose significant limitations on land tenure, system size, configuration, orientation, and weight. Rooftop sites also typically have higher installation costs, more restrictive access agreements, and often require a roof replacement or a system-removal provision for a future roof replacement. Additionally, rooftop systems present heightened concerns around effective plant maintenance and repairs, and may have higher incidents of fire due to wiring and grounding concerns[1]. These factors, combined with lower production per panel, make rooftop solar relatively more expensive and less productive than ground-mounted solar farms.

Our farm-sited solar project also pairs well with and enhances traditional farming. As described in Appendix IX ("Highly compatible: pollinator-friendly solar projects and farming"), ground mounted solar planted with pollinator-friendly habitat may even result in "a net gain in food production … when highly pollinator-dependent crops are grown near pollinator-friendly solar projects – even when accounting for the land taken out of production by the solar project." Here, our proposed project would use less than 25 percent the farm's existing acreage, allowing for traditional farming activity to continue around the array and benefit from the new on-site pollinator habitat. Pollinator-friendly solar farms also improve soil health and water quality, reduce soil erosion, runoff, and the use of pesticides and herbicides, and provide valuable diversification for farmers struggling with volatile commodity prices. As indicated by their

[1] "Walmart Sues Tesla Over Rooftop Fires It Blames on Faulty Solar Systems". Green Tech Media. 21 August 2019. https://www.greentechmedia.com/articles/read/walmart-sues-tesla-over-gross-negligence-in-solar-installs#gs.1jpdl1

letters of support, [redacted] want to work specifically with USS Pollinator Solar LLC to further their research specifically on these stacked environmental benefits.

Brownfields and landfill sites also have drawbacks relative to our greenfield proposal. They require extra layers of engineering, legal, and financial diligence and environmental review. While not insurmountable, these hurdles do make for higher costs, a longer development timeline, and the risk that the project may never actually be built due to development contingencies[2]. These same considerations may also persuade the BPU to approve a diversity of ground-mounted project types (not just brownfield projects) in the first Program Year, to allow for lower-risk sites that can be successfully built on a shorter timeline. USS Pollinator Solar LLC is confident in its ability to develop this site in a timely matter, particularly with the partnership of the City of Salem.

Finally, to the extent that a goal of this program is to allow residents and businesses to participate and interact with clean energy, rooftop and brownfield sites are often either not visible for residents or well out of the way. Greenfield development, particularly this site that is located in the City of Salem close to population and load, allows for opportunities to interact with renewable energy. For this reason, US Solar hosts public on-site events throughout the year such as our recent Pollinator Celebration, which allows residents and partners to celebrate community solar for the environmental and economic benefits being provided. We plan on having this same type of engagement with our USS Pollinator Solar LLC project, particularly because it is located directly next to the local high school and down the road from the Energy & Environmental Resource Center.

Contrary to the current evaluation regime, we feel that responsibly developed greenfield solar sites, like USS Pollinator Solar LLC, deserve better consideration. Projects of this quality deserve 10-15 points for utilizing poor commodity cropland, installing substantial pollinator-friendly habitat that will benefit surrounding crop yields, and creating a tangible, accessible venue for community engagement with renewable energy and the fight against the climate crisis. USS Pollinator Solar LLC is designed to be more than a solar project and should be scored accordingly. We hope the BPU considers these broader benefits in its scoring.

[2] Note: US Solar does develop brownfield sites and is evaluating potential brownfield sites in New Jersey, but we were unable to pre-qualify (*i.e.*, sufficiently evaluate and de-risk) and fully negotiate site control in time for these sites to be submitted for Program Year 1.

US SOLAR
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County Restriction

One other item of note on our application is USS Pollinator Solar LLC's choice to restrict its subscriptions to the same or adjacent county, instead of choosing the more restrictive municipality or adjacent municipality restriction. Though we are committed to finding as many direct community members as possible to subscribe, as can be seen by our commitment to residential and LMI subscribers, our extensive subscription experience has swayed us to allow for a bit more geographic freedom.

The City of Salem and the surrounding municipalities only represents roughly 11,000 housing units. If we had committed to limiting our project subscribers to that geography, it would require us to successfully subscribe roughly 5% of all households. But our extensive experience in subscribing community solar tells us that this level of market penetration is unrealistic in a timely fashion. We do not want to commit to a residential subscription target and not be able to meet that commitment in a timely manner. Some residents are faster adopters of new options than others. With community solar being new in New Jersey, it is likely that there will be some stratification of early adopters to those waiting to see more projects operational first. Our goal continues to be to subscribe as locally as we can, and we will be working with the City of Salem in our partnership to reach out to residents. Choosing to allow residents from a slightly larger area to subscribe simply allows our project to move forward faster.

One final note on the county level restriction specifically relates to Atlantic City Electric (ACE). Given the relatively limited amount of allocated community solar capacity for ACE in the first pilot year, allowing subscribers from anywhere in the county or an adjacent county allows a broader geographic area to benefit from this community solar garden. Though we hope to have more projects all over the territory in the future, this looser subscription restriction provides benefits to a wider range of ACE users. As discussed above, early adopters may not be close enough to a community solar garden if they are all following a municipal subscription restriction. Our choice to follow a county level restriction follows a middle ground of still having an intense community component while allowing the flexibility to serve a broader range of customer geographies.

APPENDIX III – DEPARTMENT OF ENVIRONMENTAL PROTECTION'S OFFICE OF PERMIT COORDINATION AND ENVIRONMENTAL REVIEW APPLICATION AND CORRESPONDENCE

Peter Schmitt <peter.schmitt@us-solar.com>

USS Pollinator Solar DEP Comments

Nolan, Katherine <Katherine.Nolan@dep.nj.gov> Tue, May 21, 2019 at 2:35 PM
To: Peter Schmitt <peter.schmitt@us-solar.com>
Cc: "Foster, Ruth" <Ruth.Foster@dep.nj.gov>, "Brunatti, Megan" <Megan.Brunatti@dep.nj.gov>

Good Afternoon Peter,

The Office or Permit Coordination and Environmental Review (PCER) distributed project information to various programs within the Department for the proposed USS Pollinator Solar project located in Salem City, Salem County. Below are preliminary comments of possible permits and action items this project may require (but not limited to) based on the information that was submitted on April 30, 2019: ** *this is neither a comprehensive nor a technical summary* **

Land Use : Chris Jones: Chris.Jones@dep.nj.gov or (609) 633-6757

- According to the information provided, there are no streams, wetlands or tidal waters within the project limits. Based on that information, Land Use Permits are not required. However, the Division of Land Use Regulation recommends that the project sponsor/developer obtain a Freshwater Wetlands Letter of Interpretation to confirm that there is no Freshwater Wetlands Protection Act jurisdiction over the project.

Fish and Wildlife: Kelly Davis: Kelly.Davis@dep.nj.gov or (908) 236-2118

- The NJ Division of Fish and Wildlife (DFW) requests more details for the proposed final cover seed mixture. By incorporating different layers of flowering plants and grasses in the landscape, pollinators can find the food and shelter they need for survival. Grasses help balance the ecosystem, but incorporating herbaceous plants, wildflower mixes and mosaics of cool/warm seasons grasses would benefit wildlife and pollinators to a greater extent.
- What is being described in the text of the project summary is fairly marginal habitat. Such as, under the Vegetative Seeding Plan, "*The area underneath the modules and between rows will be transformed into a diverse mix of pollinator friendly, low-lying, deep-rooted grasses*." or under the section titled - Preliminary Drainage Plan, "*Aside from the gravel access road and meter pad, the entire area within the fence boundary will be restored to a low-maintenance grass, including the area below the solar panels*." While DFW appreciates the intent to provide excellent habitat and food sources for native wildlife, it's not sure that grasses alone will accomplish this.

State Historic Preservation Office: Vincent Maresca: Vincent.Maresca@dep.nj.gov or (609) 633-2395

- The proposed development is in close proximity to the Salem Working Class Historic District and the Alloway Creek Rural Historic District which are both eligible for inclusion on the New Jersey and National Registers of Historic Places. The project is adjacent to buildings and structures over 50 years old based on a review of historic aerial photography. Finally, the project setting on moderately well-drained uplands bordering tributaries for Salem Creek is an area of high archaeological sensitivity for Pre-Contact period archaeological resources based on existing models for archaeological sensitivity in New Jersey.

- If this project is subject to any formal regulatory review, the HPO would request the following initial surveys to identify any historic and archaeological resources that may be affected by the proposed solar project:
  - Assessment of visual effects of the proposed development on the known historic districts;
  - Architectural reconnaissance of buildings, structures, or landscapes over 50 years old within the viewshed of the project, assessment of affects, and any recommendations for additional studies;
  - Phase IA archaeological reconnaissance of the project site and recommendations for additional studies.
- Please reference HPO project No. 19-2272 in any future communications to help expedite our review.

Bureau of Energy and Sustainability (Solar): Erin Hill: Erin.Hill@dep.nj.gov or (609) 633-1120

- Agriculture lands per the NJDEP Solar Siting Analysis are a Not Preferred siting location for solar https://www.state.nj.us/dep/aqes/solar-siting.html
- The screen shot (attached) is from the NJ Community Solar Siting Tool https://www.state.nj.us/dep/aqes/solar-siting.html#cstool
- In the Community Solar Application and Evaluation Criteria, projects on Ag lands will receive zero points under the siting category. Application, page 28.

Stormwater: Eleanor Krukowski (Eleanor.Krukowski@dep.nj.gov)

- Construction projects that disturb 1 acre or more of land, or less than 1 acre but are part of a larger common plan of development that is greater than 1 acre, are required to obtain coverage under the Stormwater construction general permit (5G3). Applicants must first obtain certification of their soil erosion and sediment control plan (251 plan) form their local soil conservation district office. Upon certification, the district office will provide the applicant with two codes process (SCD certification code and 251 identification code) for use in the DEPonline portal system application. Applicants must then become a registered user for the DEPonline system and complete the application for the Stormwater Construction General Authorization. Upon completion of the application the applicant will receive a temporary authorization which can be used to start construction immediately, if necessary. Within 3-5 business days the permittee contact identified in the application will receive an email including the application summary and final authorization.

Should circumstances or conditions be or become other than as set forth in the information that was recently provided to the NJDEP, the comments and regulatory requirements provided above are subject to change and may no longer hold true. Statements made within this email are not indicative that the NJDEP has made any decisions on whether the proposed project will be permitted.

Please review the comments that were provided. If you would like to work with the programs directly, we just ask that you keep Permit Coordination copied on any correspondence so we may update our records. This email shall serve to satisfy the Community Solar application requirement that the Applicant has met with PCER.

Sincerely,

Katie Nolan

New Jersey Department of Environmental Protection

Office of Permit Coordination & Environmental Review

401 East State Street

Trenton, NJ 08625-0420

Mailcode: 401-07J

Office #: (609) 272-3600

Direct #: (609) 984-6506

Fax #: (609) 633-1196

Email: Katherine.Nolan@dep.nj.gov

New Jersey DEPARTMENT of ENVIRONMENTAL PROTECTION

Connect with us:

Solar Siting Tool.jpg
173K

Peter Schmitt <peter.schmitt@us-solar.com>

USS Pollinator Solar LLC - Proposed Seed Mix

Peter Schmitt <peter.schmitt@us-solar.com> Fri, Jun 28, 2019 at 12:02 PM
To: Kelly.Davis@dep.nj.gov
Cc: "Nolan, Katherine" <Katherine.Nolan@dep.nj.gov>

Hi Kelly,

My name is Peter Schmitt and I am the developer in charge of the USS Pollinator Solar LLC project in Salem County that you provided comments on last month.

In your comments, you had requested to see a proposed seed mix, which I have attached below. We are planning to work with [redacted] to provide the seed and perform maintenance on this site. We also have consulted with [redacted] for similar seed mixes. Any feedback on this mix is welcome - we are excited to bring pollinator friendly solar to New Jersey!

Best,
Peter

--

Peter Schmitt – Manager, New Markets

United States Solar Corporation
100 N 6th St, Suite 218C, Minneapolis, MN 55403
O: 612.299.1434 M: 612.850.7134
peter.schmitt@us-solar.com
us-solar.com

EPS - New Jersey Seed Mix Example.pdf
159K

PERMIT READINESS CHECKLIST

APRIL 30, 2019

COVER LETTER

April 30, 2019
New Jersey Department of Environmental Protection
Office of Permit Coordination and Environemental Review
PO Box 420, Mail Code 07J
Trenton, NJ 08625

RE: Permit Readiness Checklist Application by USS Pollinator Solar LLC

Dear New Jersey DEP,

Attached, please find a permit readiness checklist application to construct and operate a community solar garden within the City of Salem. The request is being made by USS Pollinator Solar LLC on behalf of United States Solar Corporation ("US Solar"). US Solar, a small business headquartered in Minnesota, is a turnkey community solar developer, coordinating all project details—development, permits, finance, construction, management, insurance, maintenance, monitoring, and customer service.

USS Pollinator Solar LLC plans to develop and construct a 5-megawatt (MW) Community Solar Garden on approximately 40 acres of a 110-acre parcel in LaSalle County at 125 Yorke Street, Salem, NJ 08079, ("the Property). It is the intent of USS Pollinator Solar LLC to market subscriptions to schools, cities, and nearby residential customers in Atlantic City Electric territory in Salem County and neighboring counties.

USS Pollinator Solar LLC chose this Property because it is well-suited for the proposed use. We appreciate the coordination and insights provided by the New Jersey DEP staff and look forward to working with both New Jersey DEP and Salem City.

Please contact us with any questions, comments, or points for clarification. We look forward to working with the Board on this project.

Sincerely,

Peter Schmitt – Manager, New Markets

USS Pollinator Solar LLC
100 N 6th St., Suite 218C
Minneapolis, MN 55403
W: (612) 299.1434
E: peter.schmitt@us-solar.com

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APPENDIX I – SITE PLANS AND PROJECT MAPS

PROJECT SUMMARY

Property Address	125 Yorke Street, Salem, NJ 08079
Landowner	[redacted]
Township	Salem City
Current Use of Property	Agriculture

The project will generate enough electricity to power approximately 800 homes annually and interconnect directly to Atlantic City Electric ("ACE")'s existing distribution system. Residents and businesses in and around Salem County who are ACE customers may subscribe to a portion of the electricity generated and receive bill credits on their ACE bills. In this way, local residents and businesses receive a direct economic benefit from the project. USS Pollinator Solar LLC is contracted to deliver electricity for a period of 20 years, commencing on the date of commercial operation, which is expected to occur in the first half of 2020.

Surrounding land use is a mixture of agricultural and residential, with several other farmsteads within a mile of the project. We plan to contact all neighbors in the immediate vicinity of the Project to share our plans and ensure their concerns have been discussed.

LOCAL ECONOMIC IMPACT

In addition to discounted electric bills, this Project will have a positive economic impact, detailed below.

Already Spent

- ~[redacted] on travel, meals, legal fees, and county recordings
- [redacted] on local engineering, legal, and environmental consulting services

During Construction

- [redacted] on capital infrastructure investment
- [redacted] on local spending
- 30+ temporary construction and related service jobs, equivalent to ~4 full-time job years

During Operation

- [redacted] on increased property tax payments during operation
- ~0.5 permanent full-time employees ($22,500/yr, totaling $562,000 over 25 years)

SELECTING THIS PROPERTY

The Property was selected because of its solar resource, physical characteristics, proximity and access to high-value 3-phase distribution facilities, applicable zoning and permit requirements, and willingness of the landowner.

- Solar Resource
  - Unobstructed access to natural sunlight
- Physical Characteristics

    - Limited grading, if any, maintaining natural topsoil and existing drainage patterns
    - Not in Agricultural Preserve
    - No impact to wetlands or neighboring properties
    - Soils capable of supporting facility and equipment
    - No water or other infrastructure improvements needed
- Proximity to Distribution Facilities
    - Existing distribution line on the Project-side of Yorke Street
    - Adequate capacity for the Project on existing distribution line and other infrastructure
    - Supplies electricity throughout the local community

LOGISTICS

DESCRIPTION OF OPERATIONS

The major equipment components of a community solar garden are solar panels, inverters, and racking. Single-axis tracker racks provided by a vetted manufacturer hold up the solar panels, reaching a maximum average height of 10 feet. Racking is installed with noise-mitigating, vibrated piles that are anchored into the ground to the appropriate depth to guarantee long-term stability and structural soundness, based on detailed structural and geotechnical analysis. Vibrated piles also facilitate decommissioning at the end of the life of the solar garden, as they do not require cement foundations and are easily removed. Most importantly, we will provide ongoing maintenance of all of our solar gardens, both equipment and site conditions. On a regular schedule, we will analyze solar array performance, detecting and diagnosing any production anomalies, identifying and addressing underperformance issues, managing service teams and technicians, and contacting landowners and the utility if necessary.

SITE VISITS DURING OPERATION

Approximately once per quarter, one vehicle with approximately two (authorized and insured) employees will be sent out to perform routine maintenance on the site, in addition to any unplanned maintenance. During the first few years, one vehicle and two landscape maintenance employees will visit the site monthly during the growing season, to ensure the health efficacy of landscaping. The facility will be fenced, locked, and remotely monitored. The proposed solar garden, once operational, requires no daily traffic.

In addition, ACE personnel will have an easement to support maintenance activities of their interconnection point.

VEHICLES

Trucks for maintenance activities will be standard, with minimal tooling and parts for activities as described above.

PARKING

During the operational phase of the solar garden, there will be approximately two parking sports within the boundaries of the perimeter fence. During construction, a temporary parking area will be created for installation crews, delivery trucks (as needed), and construction and supervision personnel.

STRUCTURES

All monitoring is done remotely. No permanent structures will be built onsite.

STORAGE DURING OPERATION

As referenced above, there will be no equipment or materials storage onsite.

SIGNAGE

There will be no external signage of the facility. To provide safety and support good practices, labeling of electrical equipment requires internal signage. All signage will be in compliance with local and state regulations.

WATER, SEWAGE, WASTE, AND FLAMMABLE/EXPLOSIVE MATERIALS

No water, sewage, waste management services, or flammable/explosive materials are required onsite. Portable waste facilities will be provided during the construction period.

CONSTRUCTION TRIPS

Construction is expected to last 4-6 months, with most deliveries in the first month and most electrical testing in the later stages of construction. Delivery expectations are listed below.

- Modules will come on 40-foot flatbed trucks or in 40-foot containers.
    - We expect no more than 20 deliveries for all solar modules.
- We expect no more than 15 container trucks to deliver racking material.
- We expect no more than 8 deliveries for inverters, switchgears, and transformer.
- We expect some additional trips for Balance of Plant equipment, in containers that are 40 feet or smaller.

Note: We expect no more than 4 deliveries per day.

Delivery routes will be designed to pose the smallest traffic impact in the local community. We will coordinate with local authorities as to preferred times and routes prior to construction mobilization.

Construction employees will park within the Project premises. There will be no permanent storage on-site. Employees will be provided with mobile waste management options sourced from the local area. USS Pollinator Solar LLC takes responsibility for maintenance or replacement or new installation of any drain tile servicing this site, if USS Pollinator Solar LLC and landowner determine it necessary.

SITE PLAN

The proposed site plan is enclosed as Appendix I to describe our design of the community solar garden, showing the parcel, solar garden dimensions and specifications, setbacks, and more.

EXAMPLE OF A SOLAR PROJECT IN CONSTRUCTION

EXAMPLE OF A SOLAR PROJECT IN OPERATION

SITE ACCESS

An unpaved access road will be built from the public road to the solar array. This provides necessary access for construction, regular mowing and maintenance activities, and decommissioning of the garden, while minimizing impact to ongoing farming operations. The road also provides access in the unlikely event that emergency crews are needed onsite. There is a simple process for construction of the access road:

(1) Remove topsoil from a 15-foot wide area and store this onsite as a berm,

(2) Lay down a geotech fabric barrier, if necessary, to prevent vegetative growth, and

(3) Install approximately four to eight inches of aggregate material.

This Project will be accessed from a 15-foot-wide access road directly off Yorke Street via the existing field access. USS Pollinator Solar LLC will work with the road authority for approval. See Appendix I for a depiction of the access road.

VEGETATIVE SEEDING PLAN

The area underneath the modules and between rows will be transformed into a diverse mix of pollinator-friendly, low-lying, deep-rooted grasses. USS Pollinator Solar LLC will control for noxious weeds throughout the life of the project. US Solar has experience working with local experts to develop ideal native grass mixes for pollinators unique to each site location. We will be contracting a similar, local expert on this project as well. These mixes will provide excellent habitat and food sources for native wildlife, preserve and improve the soils, and reduce erosion and water runoff.

The design goals for this solar garden seed mix will be:

- Withstand harsh climate conditions
- Minimize erosion
- Improve water quality
- Reduce storm water runoff
- Minimize maintenance costs

FENCING

In addition, our solar garden will include a security fence around the entire perimeter. The security fencing will be located entirely on the Property on the inside of any landscape screening. The fence will not exceed 8 feet in height, and it will be a farm-field style fence without barbwire. The fence will meet National Electric Code.

PRELIMINARY DRAINAGE PLAN

A full drainage report is forthcoming and will be completed as part of the Stormwater and Pollution Prevention Plan (SWPPP) permit. Volume control (infiltration) will be provided through the disconnection of impervious surfaces as well as on-site infiltration basins. Aside from the gravel access road and meter pad, the entire area within the fence boundary will be restored to a low-maintenance grass, including the area below the solar panels. Runoff from the panels and gravel access roads will be allowed to sheet flow across the newly established perennial vegetation. The proposed project discharges in a manner like the existing flow pattern in all modeled storm events and does not alter drainage patterns.

The SWPPP will include:

- Summary of general construction activity
- Storm water mitigation and management resources
- Wetland impacts
- Project plans and specifications
- Temporary erosion prevention measures
- Temporary sediment control measures
- Permanent erosion and sediment control measures, if needed
- Best management practices (BMPs) regarding erosion control
- Inspection and maintenance
- Pollution prevention measures
- Final stabilization plan for long-term soil stability

As a company with a record of successfully developing community solar gardens, US Solar has met the requirements for all previously attained Stormwater and Pollution Prevention Plan (SWPPP) permits. US Solar will continue to develop and construct projects to the design standards necessary for all relevant permits.

GRADING AND FILLING

We propose no substantial grading, filling, removal of soils, or addition of soils. Our solar racking can accommodate the current terrain, a primary reason we selected this location. This will maintain the original grading on the site and sustain the existing drainage and runoff patterns, minimizing impact to surrounding lands.

MANUFACTURER'S SPECIFICATIONS

USS Pollinator Solar LLC uses only Tier 1 solar modules. Tier 1 solar modules are manufactured to the highest quality, performance, and lifespan, produced by companies that have at least a five-year history in manufacturing them. Countless banks and financial partners have vetted these modules. These modules are designed to absorb light and reflect less than 2% of the incoming sunlight, which is less than many natural features, including water, snow, crops, and grass. There will be no effect of glare.

The foundation of the racking system will utilize galvanized steel. The foundations should utilize vibrated galvanized steel, I-Beam piers. Depending on final soil analysis and foundation design prior to construction, they may be helical piles. The Project will utilize single-axis trackers, which rotate from east to west with the rising and setting of the sun. Single-axis trackers typically have a shorter solar panel height (10 feet at the highest point) and produce less glare. The trackers will have a maximum rotational axis of 60 degrees each direction.

An underground, medium-voltage cable will run along the access road, connecting directly to the proposed utility poles. All onsite power and communication lines running between solar modules will be underground.

Project Component	Tracker
Project Size	5 MWDC
Acres Required	40
Type of PV Panels	Silicone Polycrystalline
Panel Manufacturer	[redacted], or similar
Panel Model	[redacted] or similar
Panel Warranty	6 year limited warranty on materials and workmanship from production date, 90% power guarantee after 10 years, 80% power output after 25 years
Mounting Manufacturer	[redacted]
Mounting Warranty	10 years on structural components; 5 years on drive and control systems
Tilt Angle	0 degrees
Inverter Manufacturer	[redacted]
Inverter Model	[redacted]
Inverter Warranty	Up to 25 years; 10 years standard with additional options of up to 15 years
Performance Monitoring System	[redacted]

INTERCONNECTION WITH ATLANTIC CITY ELECTRIC

This project working with ACE on its Interconnection Agreement process and will be applying as soon as available.

DECOMMISSIONING PLAN

Our lease contains a decommissioning plan, described below:

Lessee shall (a) remove from the Premises all above surface grade equipment relating to the Facility and other personal property owned, located, installed, or constructed by or on behalf of Lessee thereon, (b) remove concrete footings, foundations and other fixtures of Lessee to a depth of two (2) feet below the surface grade, (c) cover up all pit holes, trenches and other borings and excavations made by or on behalf of Lessee on the Premises, and (d) leave the surface of the Premises (or applicable portion thereof) free from debris arising from the foregoing or from the operations or activities of Lessee. Reclamation shall include, as reasonably required, repair or replacement of damaged drainage tile, leveling, terracing, mulching and other reasonably necessary measures to prevent soil erosion. Lessor shall provide Lessee with reasonable access to the Premises during the performance of such removal and other work by Lessee for a period of twelve (12) months following the termination or expiration of this Lease.

The community solar garden consists of many recyclable materials, including glass, semiconductor material, steel, aluminum, copper, and plastics. When the project reaches the end of its operational life, the component parts will be dismantled and recycled as described below. The decommissioning plan would commence in the event of twelve (12) months of non-operation. At the time of decommissioning, the project components will be dismantled and removed using minimal impact construction equipment, and materials will be safely recycled or disposed. USS Grandpa Solar LLC will be responsible for all the decommissioning costs.

REMOVAL PROCESS

The decommissioning of the project proceeds in reverse order of the installation:

1. The solar system will be disconnected from the utility power grid.
2. PV modules will be disconnected, unattached, collected, and removed.
3. Aboveground and underground electrical interconnection and distribution cables will be removed and recycled off-site by an approved recycler.
4. PV modules support racking will be removed and recycled off-site by an approved recycler.
5. PV modules support steel and support posts will be removed and recycled off-site by an approved recycler.
6. Electrical devices, including transformers and inverters, will be removed and recycled off-site by an approved recycler.
7. Concrete pads will be removed and recycled off-site by an approved recycler.
8. Fencing will be removed and recycled by an approved recycler.
9. Reclaim soils in the access driveway and equipment pad areas by removing imported aggregate material and concrete foundations. Replace with soils as needed.

The project site may be converted to other uses in accordance with applicable land use regulations at the time of decommissioning. There are no permanent changes to the site, and it will be returned in terrific condition. This is one of the many great things about solar gardens; If desired, the site can return to productive farmland after the system is removed.

MAINTENANCE & OPERATIONS PLAN

Maintenance and Operations questions can be directed to the USS Pollinator Solar LLC Operations Team at 612-260-2230. The Operations Team will be able to address any issues related to drainage, weed control, screening, stray voltage questions, general maintenance, and operation.

PROJECT OWNERSHIP

The applicant of this Project, USS Pollinator Solar LLC, is a subsidiary of United States Solar Corporation ("US Solar"), the owner of the Project. Please find more information about US Solar at www.us-solar.com.

APPENDIX I – SITE PLANS AND PROJECT MAPS

Updated 10/11/16

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

OFFICE OF PERMIT COORDINATION AND ENVIRONMENTAL REVIEW

PERMIT READINESS CHECKLIST

FOR PCER OFFICE USE ONLY

DATE RECEIVED ___ PRC ID NUMBER ___

Completion of this form will assist the Department in determining what permits might be needed to authorize a project and to insure that all appropriate programs attend a pre-application meeting. Please fill out the below form as completely as possible, noting any areas you are not sure of and including any information about the project and the site that might help the Department determine the permitting needs of the project.[1]

1. Please complete the following questions if applicable and return to the Department with a **1 to 2 page narrative description of project, its function, and its benefits; as well as a site plan, maps, aerial photos, GIS shape files, etc.**

A. GENERAL INFORMATION

1. Name of Proposed Project USS Polllinator Solar LLC

2. Consultant/Contact Information (if any) ___

3. Name/Address of Prospective Applicant Peter Schmitt
   Address/tel./fax 100 N 6th Street, Suite 218C, Minneapolis, MN 55403
   Company Name United States Solar Corporation ("US Solar")
   Address/tel./fax 612-299-1434

4. Does the project have any existing NJDEP ID#s assigned? i.e., Case number, Program Interest (PI)#, Program ID#?

B. PROPOSED PROJECT LOCATION

Street Address/munic. 125 Yorke Street
County Salem Zip Code 08079
Block No. 94 Lot _No. 4
X Coordinate in State Plane (project centroid) 39°33'32.12"N

[1] Please be advised that this form is not a permit application. To receive authorization, approval, or a permit to conduct regulated activities, a formal application must be filed and a formal permit or authorization issued by the appropriate Bureau within the Department prior to the conduct of regulated activity. This form is used solely for the Department's preliminary review and discussion of this project to determine what permits or authorizations may be needed to conduct the proposed activity. Any guidance offered to the applicant during this process is not binding on the Department or the applicant and a final response can only be rendered through the actual issuance of permits, approvals, or authorizations.

Y Coordinate in State Plane (project centroid) 75°27'49.91"W

C. PROPOSED ACTIVITY DESCRIPTION AND SCHEDULE

1. Project Type: ___ New Construction ___ Brownfield Redevelop. ___
   Alternative Energy x Other (Please describe) ___

   a) Estimated Schedule: Date permits needed or desired by, beginning construction date; construction completion, and operation of facility date: Hoping to start construction in Q1/Q2 2020

   b) Funding Source: Is any Federal Funding being used for this project? Not at the moment. We are considering applying to be an Economic Opportunity Fund. We will likely also take advantage of some of the remaining federal tax credit.
   State Funding over 1 million dollars? ___
   Is funding secured at this time? ___ Is funding conditional? ___ If so, on what?___

   c) Is the project contingent on receiving the identified funding? No
   If yes, explain ___

   d) What DEP permits do you think you need for this project? (The Department will confirm this through the PRC process). I do not believe that this project is in a wetland or environmental protection, but we may need a letter stating so. The land has been in agriculture for quite some time, so there may be some historic permit required.

2. For additional guidance on Department permits, please refer to the Permit Identification Form (PIF) which will be forwarded upon request. The PIF does not need to be filled out or submitted to the Department.

   a) Which Department(s), Bureau(s), and staff have you contacted regarding your proposed project? I have been in contact with the City of Salem, as we would like to partner with them on this project to make it a bigger boon for the community.

   b) Are there any Department permits that will need to be modified as a result of this project. Please explain and identify the project reviewer of the permit to be modified. Salem does not currently have a solar ordinance, so we hope to work with them to create one, as necessary.

   c) Please identify any pre-permit actions or modifications you have applied for or obtained from the Department or other state agencies for this project:
      1) Water Quality Management Plan consistency _____
      2) Highlands Consistency _____
      3) Wetland Delineation (LOI) _____
      4) Tidelands Conveyance _____
      5) Flood Hazard Jurisdiction or determinations _____
      6) Water Allocation _____
      7) Site Remediation RAW, Remedial Action Permit – Soil and or Groundwater, NJPDES Discharge to Ground Water, NJPDES Discharge to Surface Water, No Further Action Response Action Outcome _____
      8) Landfill Disruption Approval _____
      9) Landfill Closure Plan _____
      10) Other _____

3. Please submit this Permit Readiness Checklist form, completed to the extent possible, electronically to Ruth.Foster@dep.nj.gov and Megan.Brunatti@dep.nj.gov and one (1) copy via mail[2] with the following items if available:
   (a) The completed Permit Readiness Checklist;
   (b) A description of the proposed project;
   (c) Any overarching regulatory or policy call(s) or guidance that the Department must make or make known prior to the receipt of the application to determine the project's feasibility, regulatory, or review process.
   (d) USGS map(s) with the site of the proposed project site boundaries clearly delineated (including the title of the USGS quadrangle sheet from which it was taken)[3];
   (e) Aerial photos/GIS information regarding the site;
   (f) A site map including any known environmental features (wetlands, streams, buffers, etc[4]);
   (g) Site plans to the extent available;
   (h) Street map indicating the location of the proposed project;
   (i) Any other information that you think may be helpful to the Department in reviewing this project.
   (j) List of any local or regional governments or entities, their historical involvement in this project or site, identification of conflicts with DEP rules; with contact names and information whose attendance/input would be helpful in facilitating this project, ie Soil Conservation Districts, health departments, local zoning officials, etc.

D. The following are questions by Program to guide the Department in its determination of what permits may be needed to authorize this project. If the questions do not apply to the proposed project please indicate N/A. Please include any other information you think may be helpful for the Department to determine which permits are needed.

WATER AND WASTE WATER INFORMATION

DEP Safe Drinking Water Program (609) 292-5550
http://www.nj.gov/dep/watersupply/

Is the project located within an existing water purveyor service area? If yes, which one? I don't think so.

Will the project affect any land or water controlled by a Water Supply Authority or water purveyor in New Jersey? If so, please identify and explain. If anything, the pollinator plantings that we will be installing on this site should improve water drainage and quality.

Does the purveyor have adequate firm capacity and allocation to support project demand?

---

[2] Submit to: New Jersey Department of Environmental Protection
Office of Permit Coordination and Environmental Review
P.O. Box 420, Mail Code 07J
Trenton, New Jersey 08625
Street Location: 401 East State Street, 7th Floor East Wing
Telephone Number:(609) 292-3600
Fax Number: (609) 292-1921

[3] USGS maps may be purchased from NJDEP, Maps and Publications, P.O. Box 420, Trenton 08625-0420; (609) 777-1038

[4] NJGIS information

Do water pipes currently extend to the project location? No.

If not, is it located within a franchise area? This project does not require water services.

Does the project have an approved Safe Drinking Water main extension permit? Not necessary.

Will the project affect any land or water controlled by a Water Supply Authority or water purveyor in New Jersey? If so, please identify and explain. Again, our pollinator plantings should improve overall water conditions, if anything.

DEP Water Allocation Program (609) 292-2957
http://www.nj.gov/dep/watersupply

Is the project seeking a new ground water allocation or modification? If yes, does the project have all necessary well location and safe drinking water permits? No

Is the project located within an area of critical water supply concern? Unsure

Will this project have the capability to divert more than 100,000 gallons per day from a single source or a combination of surface or groundwater sources? No.

Will this project draw more than 100,000 gallons per day of ground or surface water for construction or operation? No.

WATER POLLUTION MANAGEMENT ELEMENT

DIVISION OF WATER QUALITY

Non-Point Pollution Control (609) 292-0407
http://www.nj.gov/dep/dwq/bnpc_home.htm

The **Bureau of Non-Point Pollution Control** (BNPC) is responsible for protecting and preserving the state's groundwater resources through the issuance of NJPDES Discharge to Groundwater Permits and is responsible for permitting industrial facilities and municipalities under NJPDES for discharges of stormwater to waters of the State.

Groundwater Section (609) 292-0407

This Program does not issue NJPDES-DGW permits for remediation operations.

The following definitions should be used to assist in identifying discharge activities:
Subsurface disposal system is any contrivance that introduces wastewater directly to the subsurface environment, such as, but not limited to: septic systems, recharge beds, trench systems, seepage pits, and dry wells.
Injection/recharge wells are constructed such that they are deeper than they are wide, receive effluent via gravity flow or pumping, and include dry wells and seepage pits.
Overland flow is the introduction of wastewater to the ground surface, over which the wastewater travels and eventually percolates or evaporates.
Industrial wastewater is any wastewater or discharge which is not sanitary or domestic in nature, including non-contact or contact cooling water, process wastewater, discharges from floor drains, air conditioner condensate, etc.

1. Will the project/facility have a sanitary wastewater design flow which discharges to groundwater in excess of 2,000 gallons per day? No.
2. Will the project/facility generate a discharge to groundwater of industrial wastewater in any quantity? No.
3. Will the project/facility involve the discharge to groundwater by any of the following activities or structures, or include as part of the design any of these activities or structures? No.

Please indicate which:
Upland CDF (Dredge Spoils) Spray Irrigation No.
Overland Flow Subsurface Disposal System (UIC) No.
Landfill Infiltration/Percolation Lagoon No.
Surface Impoundment No.

Please specify the source of wastewater for every structure identified above (e.g., sanitary wastewater to a subsurface disposal system or non-contact cooling water to a dry well): None.

Please specify lining materials for each lined structure identified as being used by the proposed project and give its permeability in cm/sec (e.g., 8-inch thick concrete lined evaporation pond at 10-7 cm/sec): None.

Does your project/facility include an individual subsurface sewage disposal system design for a facility with a design flow less than 2,000 gallons per day which does not strictly conform to the State's standards? No.

Does your project involve 50 or more realty improvements? No.

DEP Pretreatment and Residuals program (609) 633-3823

Will the project involve the discharge of industrial/commercial wastewater to a publicly owned treatment works (POTW)? No.
If yes, name of POTW: _____
Volume of wastewater (gpd): _____

Will/does this project involve the generation, processing, storage, transfer and/or distribution of industrial or domestic residuals (including sewage sludge, potable water treatment residuals and food processing by-products) generated as a result of wastewater treatment. If so, please explain.
No.

Stormwater Program (609) 633-7021
http://www.njstormwater.org/
http://www.state.nj.us/dep/dwq/ispp_home.html

Will your site activity disturb more than one acre? Temporarily yes. Once the facility is installed, we will be establishing and maintaining native pollinator habitat to benefit the site itself and the surrounding community.

Will any industrial activity be conducted at the site where material is exposed to the rain or other elements? Our entire site is open air except for a small cabinet for our transformers.

Does your facility have an existing NJPDES permit for discharge of stormwater to surface groundwater? No.

Is your facility assigned one of the following Standard Industrial Classification (SIC) Codes? No.
(To determine your SIC Code see the box "Industry Code" on your New Jersey Department of Labor Quarterly Contribution Report.

Surface Water Permitting (609) 292-4860
http://www.nj.gov/dep/dwq/swp.htm

Will this wastewater facility discharge to Surface Water? _____Yes/No No.

If yes, state the name of the proposed receiving stream _____

Describe the proposed discharge of wastewater to Surface Water _____

If no, how is the wastewater proposed to be discharged (e.g., to be conveyed to another STP, Publicly Owned Treatment Works, etc. No wastewater impact.

MUNICIPAL FINANCE AND CONSTRUCTION ELEMENT

Treatment Works Approvals (609) 984-4429
http://www.nj.gov/dep/dwq/twa.htm

Will this project include the construction, expansion or upgrade of a domestic or industrial wastewater treatment facility or an off-site subsurface disposal system that generates more then 2,000 gallons per day? No. If yes, explain _____

Will the project result in a construction design of more than 8000 gallons of water discharge per day? No.

Office of Water Resources Management Coordination (609)777-4359

http://www.state.nj.us/dep/wrm

Sewer Service

Is the project in an approved sewer service area for the type of waste water service needed? No sewer needed.
If yes, what is the name of the sewer service area? _____

Has this project received endorsement from the appropriate sewer authority with adequate conveyance and capacity? None needed.

Do waste water pipes currently extend to the project location? There are existing sewage pipes on each side of the project site, but this project will not be using them.

Is the project consistent with and in an area covered by an up to date Wastewater Management Plan? Unsure. I would assume that the City of Salem has one.

Will an amendment to the existing WQMP be required to accommodate this project? We don't have any wastewater.

If tying into an offsite treatment plant, is the capacity and conveyance system currently available? _____

What is the volume of wastewater that will be generated by the project? 0

DEP Land Use Regulation (609) 777-0454
http://www.nj.gov/dep/landuse

Does the project involve development at or near, or impacts to the following; describe the type and extent of development in regards to location and impacts to regulated features:

Water courses (streams) The river is quite a ways to the west of this site.

State Open Waters? No.

Freshwater Wetlands and/or freshwater wetland transition areas? No.

Flood Hazard areas and/or riparian buffers No.

Waterfront development areas No.

Tidally Flowed Areas No.

Bureau of Tidelands Management: http://www.nj.gov/dep/landuse/tl_main.html

The CAFRA Planning Area? http://www.state.nj.us/dep/gis/cafralayers.htm

`DEP NATURAL AND HISTORIC RESOURCES

Green Acres Program (609) 984-0631
http://www.nj.gov/dep/greenacres

Does the project require a diversion of State property or parkland, lease of same, lifting of a Green Acres of Land Use deed restriction, or work within an existing easement? No. Will any activity occur on State owned lands? No. If so please describe. _____

Does the project require a diversion of property funded with federal Land and Water Conservation Funding? No. If so, please describe _____.

Does the project include activities that are under the jurisdiction of the Watershed Property Review Board? If so, please describe. I don't think so. Has the Watershed Property Review Board made a jurisdictional determination? _____

Division of Parks and Forestry: State Park Service 609-292-2772

Is the temporary use of State lands administered by the New Jersey State Park Service required for pre-construction, construction and/or post construction activities? If so, please describe.

Division of Parks and Forestry: State Forestry Services (609) 292-2530
http://www.nj.gov/dep/parksandforests/forest

Forest clearing activities/No Net Loss Reforestation Act
Will construction of the project result in the clearing of ½ acres or more of forested lands owned or maintained by a State entity**?** No.
If so, how many acres? _____

Division of Parks and Forestry: Office of Natural Lands Management (609) 984-1339
http://www.nj.gov/dep/parksandforests/natural/index.html

Is the project within a State designated natural area as classified in the Natural Areas System Rules at N.J.A.C. 7:5A? I don't think so.
If so, please describe. _____

State Historic Preservation Office – SHPO (609) 292-0061
http://www.state.nj.us/dep/hpo/index.htm

Is the site a Historic Site or district on or eligible for the State or National registry? No
Will there be impacts to buildings over 50 years old? No
Are there known or mapped archeological resources on the site? Unknown.

Dam Safety Program (609) 984-0859
http://www.nj.gov/dep/damsafety

Will the project involve construction, repair, or removal of a dam? No
If so, please describe _____

Fish and Wildlife (609) 292-2965
http://www.nj.gov/dep/fgw

Will there be any shut off or drawdown of a pond or a stream? No

Threatened and Endangered Species Program

Are there records of any Threatened and Endangered species, plant, or animal in this project area? Unknown

Will the proposed development affect any areas identified as habitat for Threatened or Endangered Species? Unknown. Our pollinator habitat will be supporting habitat for endangered pollinator species.

SITE REMEDIATION PROGRAM (609) 292-1250
http://www.nj.gov/dep/srp/

Office of Brownfield Reuse (609) 292-1251

Is the project located on or adjacent to a known or suspected contaminated site? No.
http://www.nj.gov/dep/srp/kcsnj/

Is the project within a designated Brownfield Development Area? No.
http://www.nj.gov/dep/srp/brownfields/bda/index.html

Has a No Further Action, Response Action Outcome, or Remedial Action Permit been issued for the entire project area? N/A

If not, what is the current status of remediation activities? _____ Please include remedial phase, media affected and contaminant(s) of concern.

Name of current SRP Case Manager or Licensed Site Remediation Professional and Preferred Identification (PI) Number _____

Is the applicant a responsible party for contamination at the property? No.

Is the project located on a landfill that will be redeveloped for human occupancy? No. If yes, is there an approved Landfill Closure Plan? _____

Dredging and Sediment Technology (609) 292-1250

Does the project involve dredging or disposing of dredge materials? No.

SOLID AND HAZARDOUS WASTE MANAGEMENT PROGRAM (609) 633-1418
http://www.nj.gov/dep/dshw/

Does the project receive, utilize, or transport solid or hazardous wastes? No.

Will the project involve the disposing of hazardous Substances per 40 CFR part 261 and NJAC 7:26? No.

Will the project include operation of a solid waste facility according to N.J.A.C. 7:26-1-et seq.? No.

Is the project a solid waste facility or recycling center? No.

Is the project included in the appropriate county Solid Waste Management Plan? No. Explain _____

AIR QUALITY PERMITTING PROGRAM
http://www.nj.gov/dep/aqpp

Will activity at the site release substances into the air? If it is dry, some dust could be disturbed during post installation. We plan to seed the site in a cover crop before installation, though, in an effort to limit any dust disturbance.

Does the project require Air Preconstruction permits per N.J.A.C. 7.27-8.2©1? Unknown.

Will your project require Air Operating permits (N.J.A.C. 7:27--22.1)? I don't think so.

Will the project result in a significant increase in emissions of any air contaminant for which the area is nonattainment with the national ambient air quality standards (all of NJ for VOC and NOx; 13 counties for fine particulates), thereby triggering the Emission Offset Rule at NJAC7:27-18? No.

Will the project emit group 1 or 2 TXS toxic substances listed in NJAC 7:27-17? No.

Will the project emit hazardous air pollutants above reporting thresholds in NJAC7:27 8, Appendix 1?
No.
Will the project result in stationary diesel engines (such as generators or pumps) or mobile diesel engines (such as bulldozers and forklifts) operating on the site? If so, which?
There will be forklifts and a backhoe on site during construction, but not once construction is complete.

RADIATION PROTECTION AND RELEASE PREVENTION (609) 984-5636
www.state.nj.us./dep/rpp

Will the operation receive, store or dispose of radioactive materials? No.

Will the operation employ any type of x-ray equipment? No.

DISCHARGE PREVENTION PROGRAM (DPCC) (609) 633-0610
www.nj.gov/dep/rpp

Is this a facility as defined in N.J.A.C. 7:1E in which more than 20,000 gallons of Hazardous substances other then petroleum or greater than 200,000 gallons of petroleum are stored? No.

TOXIC CATASTROPHE PREVENTION ACT (TCPA) (609) 633-0610

HTTP://WWW.STATE.NJ.US/DEP/RPP/BRP/TCPA/INDEX.HTM

Is this a facility that handles or stores greater than a threshold amount of extraordinarily hazardous substances as defined in N.J.A.C. 7:31? No.

Bureau of Energy and Sustainability (609)633-0538
http://www.nj.gov/dep/aqes/energy.html
http://www.nj.gov/dep/aqes/sustainability.html

GREEN DESIGN (609) 777-4211

Have you incorporated green design features into this project? Examples of green design features may include: renewable energy, water conservation and use of low impact design for stormwater.

Yes__x_____ No_____

Will this project be certified by any of the following green building rating systems?

New Jersey Green Building Manual? No.
http://greenmanual.rutgers.edu/

US Green Building Council's LEED (Leadership in Energy and Environmental Design)? No
http://www.usgbc.org/

ASHRAE Standard 189.1? No.
http://www.ashare.org/publications/page/927

National Green Building Standard ICC 700-2008? No.
http://www.nahbgreen.org

USEPA's ENERGY STAR? No.
http://www.energystar.gov/index.cfm?c=business.bus_index

INNOVATIVE TECHNOLOGY (609) 292-0125

Is an environmental and energy innovative technology included in this project? x Y ☐ N

Is this technology used for manufacturing alternative fuels? ☐ Y x N
- If yes, what is the non-fossil feedstock(s) used for manufacturing the fuels?
☐ Biomass ☐ Municipal Solid Waste ☐ Other Non-Fossil Feedstocks

-What will be the primary use of the manufactured alternative fuels?
☐ CHP System ☐ Micro Turbine ☐ Fuel Cells

For other innovative technology type, what is the proposed application?
x Energy ☐ Site Remediation ☐ Drinking Water ☐ Wastewater

For other innovative energy systems, what is the source of energy?
x Solar ☐ Wind ☐ Tidal/Wave ☐ Hydroelectric ☐ Geothermal

Is there independent third-party performance data for the technology? x Y ☐ N

Has the technology been verified by an independent third-party entity? x Y ☐ N

Is this technology in use at any other location at this time? x Y ☐ N
- If yes, please provide location Solar PV technology is used widely around the state._

DEP COMPLIANCE AND ENFORCEMENT

Does the applicant have outstanding DEP enforcement violations, and if so, what is the status? No.

If yes, please identify the case, case manager, program, and phone number. _____

Does the proposed project facilitate compliance where there is a current violation or ACO? _____

COMMUNITY ENGAGEMENT (609)292-2908

The Department is committed to the principles of meaningful and early community engagement in the project's approval process. The Department has representatives available who could discuss community engagement issues with you and we encourage this communication to take place at the earliest possible time.

(a) What community groups and stakeholders have you identified that may be interested in or impacted by this project?

We are working directly with the City of Salem to see how this can best benefit the community, whether that is by subscribing the City directly to save money on its electric bills or to work with community members and business directly.

(b) How have you or will you engage community and stakeholders in this project? Please supply individuals or stakeholder groups contacted or who have been identified for community engagement.
I will be meeting with the City Council for the second time on May 20th and will continue to actively be involved in the community throughout this project. I am also hoping to meet with the high school, which is directly to the west of this site.

(c) What are the potential impacts of this project on the community?
This project will increase the tax base, help people, businesses, and the City save money on electric bills, and we will be working to create a community fund to support local nonprofits and/or sports teams.

(d) How do you intend to mitigate these potential impacts?
Our potential impacts are positive.

(e) What are the community concerns or potential concerns about this project?
Some people do not like the appearance of solar panels. If we hear that from the community, we will work to create a landscaping plan to screen it from view.

(f) How do you intend to address these concerns?
As discussed, we will create a landscaping plan, as necessary, to screen this site if requested.

(g) As part of this project, do you plan to perform any environmental improvements in this community? If yes, describe.
Yes, we plan on planting pollinator friendly habitat underneath this array to support pollinator habitat, better fix the soil, improve drainage, and create a beautiful landscape for this site.

Please provide the Department with an additional 1 to 2 page narrative description of the project, focusing on its function and its local/regional environmental, social, and economic benefits and impacts. Also, what sensitive receptors are present and how might they be affected by this project?

GENERAL

Is the project subject to:

Highlands Regional Master Plan – Planning or Preservation Area? No.
http://www.nj.gov/dep/highlands/highlands_map.pdf

Pinelands Comprehensive Management Plan? No.
http://www.state.nj.us/pinelands/cmp/

D&R Canal Commission Standards No.
http://www.dandrcanal.com/drcc/maps.html

Delaware River Basin Commission
(609) 883-9500
http://www.state.nj.us/drbc/

US Army Corp of Engineers review? No.

APPENDIX IV – LETTERS OF PARTNERSHIP AND SUPPORT

[redacted]

CITY OF SALEM

Charles Washington, Jr
Mayor

17 New Market Street, Salem, New Jersey 08079
Tel. (856) 935-0372 Fax (856) 935-4095

Anita Garcia
Acting City Clerk

August 8, 2019

State of New Jersey Board of Public Utilities
44 South Clinton Avenue, 7th Floor
PO Box 350
Trenton, NJ 08625-0350
Attn: Office of Clean Energy

Dear New Jersey Board of Public Utilities Commissioners and Staff:

The City of Salem is excited to partner with US Solar on the two projects being proposed in our City. Salem was originally laid out in 1675 and formally incorporated in 1798. We have a long history of community investment, agriculture, and manufacturing. US Solar is an established and growing developer and owner/operator of community solar projects based in Minneapolis, Minnesota.

The City understands that the New Jersey state legislature recently authorized community solar to allow for development of distributed-scale solar farms up to 5 MWdc, or approximately 40 acres, in size. We also understand that the statute places a strict cap on the number of community solar arrays that will be allowed in 2019, which could result in the Board of Public Utilities (BPU) selecting as few as 15 projects in this first year. Most importantly, we understand that community solar is designed to benefit a wide array of community stakeholders and project subscribers, including but not limited to low- and moderate-income subscribers.

Over the past few months, the City has had the opportunity to develop a relationship with US Solar and fully supports US Solar's application to the BPU for permission to install a community solar project on a portion of the Fowler/Millstone farm on the southern edge of the City.

We are supporting this application because it will be sited within the City and will benefit the City from a tax-base perspective, support our constituents desiring to use their land for this purpose, and also as a potential subscribing partner. The dedication that US Solar is showing to develop both quality solar projects, including perennial native vegetation to support honeybees, native pollinators, and songbirds, as well as mechanisms (such as a Community Investment Fund to benefit the City and its residents over the long-term) is laudable.

On the equity side of community solar benefits, Salem is also home to many lower income residents. US Solar's commitment to help all of our citizen's benefit from these sites also demonstrates why we are excited for this partnership.

We urge the NJBPU to select these projects for its Pilot Community Solar Program as soon as possible so we can bring these economic, environmental, and equity benefits to our community. These are exciting developments that will help us show off that Salem is open for business while also being an environmental champion.

Sincerely,

Charles Washington, Jr.
Mayor
17 New Market Street
Salem, NJ 08079

APPENDIX V – PROJECT FINANCIALS

APPENDIX VI – PROJECT MAPS AND CAPACITY MAPS

APPENDIX VII – PROOF OF SITE CONTROL

APPENDIX VIII – GRID BENEFITS

100 N 6th Street, Suite 410B
Minneapolis, MN 55403
612.260.2230
www.us-solar.com

Grid Benefits Provided By USS Pollinator Solar LLC

Our proposed 5-MW_{dc} solar farm, USS Pollinator Solar LLC, will provide multiple levels of grid benefits. [redacted]

Additional resources on these topics are below:

- "RMI: New Insights Into the Real Value of Distributed Solar", Green Tech Media, 2013. https://www.greentechmedia.com/articles/read/RMI-New-Insights-into-the-Real-Value-of-Distributed-Solar#gs.z7w3cd
- "Solar & Renewables Benefit the Grid & the US Economy", Solar Energy Industries Association, 2016. https://www.seia.org/sites/default/files/resources/Grid-Econ-Benefits-Briefing-Paper_5-16-17.pdf
- "How solar helps the grid", Energy Sage, 2016. https://news.energysage.com/how-solar-helps-the-grid/
- "Fixed-Tilt vs. Axis Tracker Solar Panels", Kiewit. https://www.kiewit.com/plant-insider/current-issue/fixed-tilt-vs-axis-tracker-solar-panels/

APPENDIX IX – POLLINATOR RESOURCES AND REFERENCES

[redacted]

[redacted]

ABF Quarterly, Rob Davis – Bees find solar sanctuary

PV Magazine – Solar and pollinators: a photo essay (selection shows US Solar site)

Argonne National Laboratory – Can solar energy save the bees?

Environmental Science & Technology – Examining the Potential for Agricultural Benefits from Pollinator Habitat at Solar Facilities in the United States

New Jersey Herald – Pollination and farming: It's all about bees

MinnPost – Highly compatible: pollinator-friendly solar projects and farming

Commercial apiary on US Solar site

[redacted]

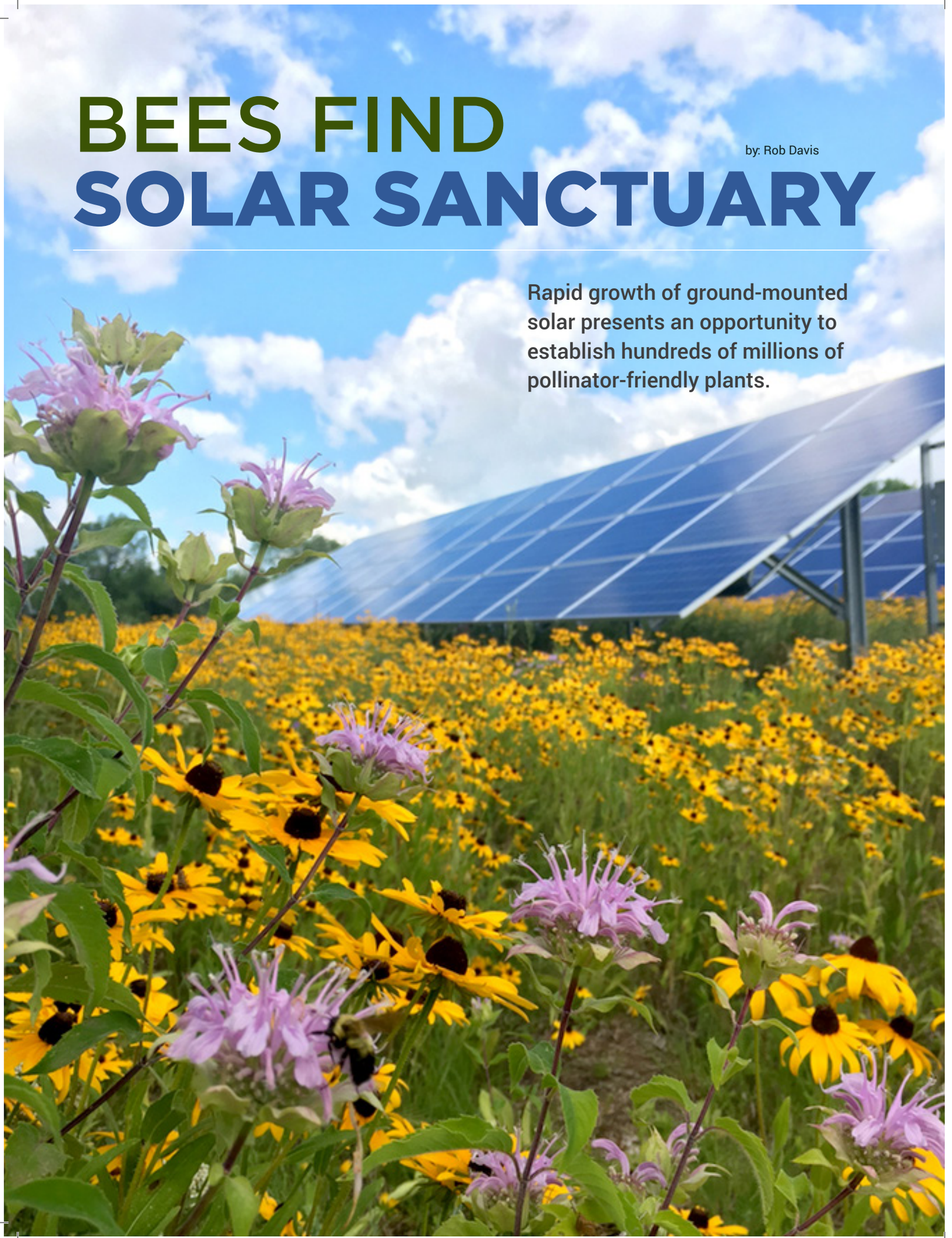
[redacted]

CW Crew – US Solar – Bare Honey

BEES FIND SOLAR SANCTUARY

by: Rob Davis

Rapid growth of ground-mounted solar presents an opportunity to establish hundreds of millions of pollinator-friendly plants.



John Jacob of Old Sol Apiaries in Oregon's Rogue Valley arranged his newest bee yard among millions of emerging flowers and native grasses. Glancing over his shoulder, he knew the site wouldn't be sprayed with insecticides—his yard is adjacent to millions of dollars' worth of space-age technology suspended a few feet off the ground.

While John worked, ground-mounted solar panels were silently converting light from Earth's "old Sol" directly into electricity for nearby schools, businesses and residents, as well as generating revenue that pays ecologists to manage the flowering Yarrow, Blue-eyed Mary, Oregon Sunshine, Rose Checkermallow and other ground cover throughout the site.

Across the country, University of Maryland biologist Dr. Kirsten Traynor established a similar apiary last year after *National Geographic* decided to power its headquarters and museum with 50 percent solar energy. Dr. Traynor was contacted by one of the solar engineers who is also a beekeeper and was familiar with her research. Jacob and Dr. Traynor are joined by beekeepers in Vermont, Wisconsin, Illinois, Minnesota, Texas, New York and Iowa pioneering an American path inspired by British beekeepers who started placing apiaries on solar farms years ago. "Solar farm honey might be our favorite thing ever," read the headline of a UK-based article from 2014.

Recipient of the MacArthur Foundation's "Genius Award," Dr. Marla Spivak of the University of Minnesota Bee Lab, sees a promising opportunity. "It would be great to have pollinator habitat under and around solar panels and arrays."

Solar Bloom

Indeed, driven by plummeting costs and growing demand, tens of thousands of acres of solar sites are blooming across the country. Churches, school districts, manufacturers and data center operators are saving hundreds to thousands of dollars every year by getting a percentage of their energy from the sun. And much like personal computers, the cost of solar panels—an American invention to power space-race satellites—have fallen by more than 99 percent since 1960. Solar is so cheap now that in many places it's cheaper to build a new large-scale solar array, than to continue to pay for fuel and maintenance costs on aging smokestack power plants.

And farmers are actively pursuing this new cash crop as well. When farmers lease their land for a large-scale solar array, they can lock in revenue of $500-1500 per acre for the duration of the lease, giving them a buffer against fluctuating commodity prices and the opportunity to grow pollination-dependent crops nearby. The catch? The land has to be fairly flat and within a mile or two of a substation.

Fig. 1: Solar Site Management for Soil, Storm Water and Pollinator Benefits

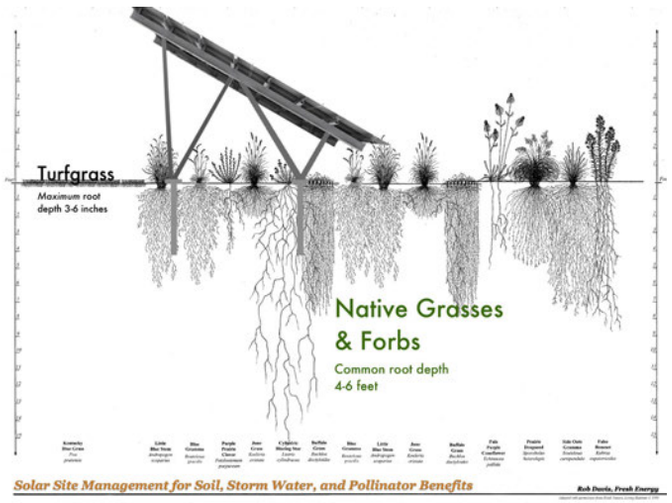


Figure 1. Not to be mistaken with concentrated solar, which uses heat, photovoltaic (PV) solar panels get only as hot as a car parked in the sun. Original illustration by Heidi Natura, adapted with permission.

From Solar-Centric to Solar-Pollinator

Because the U.S. solar industry first took off in the desert Southwest, standard practices for the land on solar sites have included bare ground, gravel and shallow-rooted lawn grass. These "solar-centric" designs prioritize the solar configuration and give comparatively little consideration to land stewardship and other agricultural factors.

Fig. 2: Site Study with Pollinator Habitat

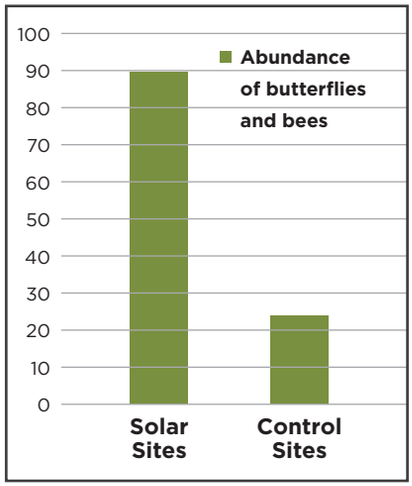


Figure 2. An 11-site observational study found that solar sites with pollinator habitat have a statistically significant increase in abundance of bees and butterflies (The Effects of Solar Farms on Local Biodiversity, Montag et. al., 2016).

At the same time solar was taking off in the Southwest, solar was also growing rapidly in England and Germany, though with radically different engineering, design and management principles. With equal priority given to agricultural functions and enhancing biodiversity, solar sites with low-growing meadows under and around the panels became a common practice. In these situations, the solar company leases the land, then the solar hardware and flowering habitat is established and managed at their cost for the life of the project. Data shows that pollinator-friendly solar arrays don't just reduce operations and management costs (frequent mowing and mowers damaging solar panels is expensive), but also result in increased abundance of bees and other insects.

The nonprofit organization I work for, Fresh Energy, has been in regular contact since 2015 with leading practitioners of pollinator-friendly solar in the United Kingdom, actively importing, adapting and sharing best practices and lessons learned. Moving into 2018 we expanded this work and created the Center for Pollinators in Energy (www.Fresh-Energy.org/BeesLoveSolar), a national clearinghouse and catalyzer of pollinator-friendly solar information, standards, best practices and state-based initiatives.

Pollinator-friendly solar and the work of the Center for Pollinators in Energy have been highlighted by the U.S. Department of Energy and the U.S. Department of Interior's National Conservation Training Center and featured in *Scientific American*, *National Geographic*, *Modern Farmer* and other media. We are actively working to make pollinator-friendly a standard development practice for ground-mounted solar arrays.

Maximizing Benefits

Our research and deep expertise in this area have revealed two key (while light-hearted) insights: 1.) people aren't well suited to pollinate crops, and 2.) bees aren't very good at public policy.

Photographers visiting the pear and apple orchards of southwest China have documented the staggering effect of over-use of insecticides. Farmers in the area lash chicken feathers to bamboo rods and use these makeshift tools to pollinate each individual flower—a practice that would be impossibly costly for large-scale agricultural production in the United States. To produce a single market-ready blueberry requires a pollinator to visit a flower 2-4 times. Each raspberry, 5-6 visits. Each strawberry 20-60 visits. These crops, and others, produce hundreds of billions of individual flowers, each opening at around the same time, and require trillions and trillions of visits by pollinators. Honey bees, bumblebees and other native bees are well suited for this work.

And, while it really is hard to tell some days, on the whole, people are well suited to public policy. For example, in slightly more than three hours this spring, several hundred beekeepers visiting the headquarters of Mann Lake signed a petition saying, "We should all support farmers who seek to enable private-sector investments in high-quality habitat and forage for bees. When designed to benefit bees, ground-mounted solar arrays can provide the funding to establish and manage flowering landscapes while also improving agricultural soils and improving water quality."

Another example is from 2016 when Fresh Energy, Audubon Minnesota, Minnesota Corn Growers and Minnesota Farmers Union worked with agricultural and business leaders to establish the nation's first statewide standard for the vegetation that grows under and around large ground-mounted solar sites. With bipartisan lead authors, the "Pollinator-Friendly Solar Act" passed unanimously as part of the 2016 Agriculture Omnibus bill. In the two years since, Fresh Energy has worked across the aisle to pass similar legislation in New York, Maryland, Vermont and Illinois.

Integrity Is Key

From the beginning, it was important to ensure the standards for the managed landscape in a solar array, would result in meaningful benefits to pollinators. "We're not talking about just a narrow row of native vegetation by the front gate that makes it look like a project is pollinator-friendly," said Laura Caspari, a director with Chicago-based SoCore Energy that has adopted pollinator-friendly development principles across its portfolio. "Just putting a row of pretty plants along the front fence doesn't achieve that. That's why the standard is so important—it provides a benchmark."

Dr. Marla Spivak at the University of Minnesota and Dr. Adam Dolezal, now working with Dr. May Berembaum at the University of Illinois, see solar sites as perfect healthy refuge sites for honey bees. Dr. Spivak notes that honey bees will benefit from the nutritional floral pollen—particularly their immune systems and detoxification systems—and this is backed by Dr. Dolezal's research. Unless there's an alfalfa or clover field adjacent to the solar array, these may not be top-producing honey hives, but the habitat will contribute to healthy bees.

Not All Roses

Of course, any new land use ultimately needs a building permit from local authorities. Some people prefer things just the way they are, and a large number of solar arrays still feature a "solar-centric" design. Though repeated home valuation and sales data shows that there are just as many people who want to live near a solar array (i.e., a quiet neighbor) as who don't, it is good that people are attending these county-level planning meetings to learn more and get involved.

Brewer and beekeeper Emily Watson of New York's Plan Bee Brew Farm told the *Poughkeepsie Journal*, "I understand, some people might say solar panels aren't pleasing to look at, but I disagree. Solar panels remind me of innovation and clean energy harnessed from the sun. They are a symbol of hope for the future, for my daughter's future, and they're a change we'll embrace and celebrate with our bees and with our beer."

Because images of solar-centric sites are so common in the media, people are sometimes mistaken in thinking that using some farmland for solar threatens our food supply. But beekeepers and other conservation advocates have consistently highlighted the grave food system risk from lack of available healthy forage for pollinators. Acres enrolled in the Conservation Reserve Program have been slashed from 36.8 million in 2007 to just 24 million acres for 2017/18. And a recent report by America's Farmland Trust specifically highlighted how low-density residential development (houses on one- to 20-acre parcels) replaced 12.7 million acres of farmland from 1992 to 2012. "The pattern of low-density residential development expanding well beyond the suburbs represents an additional, insidious threat to the nation's agricultural land," read the report.

Clare Lindahl, CEO of the Soil and Water Conservation Society, sees the significant opportunity to benefit farmland soils and pollinators. "Each year we lose tons of topsoil to our streams, lakes and rivers," she said. "Acknowledging that state and federal funding alone can't meet our conservation demand for healthy soil and pollinator preservation, there is a push in the conservation community to engage the private sector so that we can scale this work up to where it needs to be. The practice of pollinator-friendly solar will hold soils on site and enrich them over time—making an incredibly productive use of the space today and into the future."

Altogether, solar projects could provide a world of good for pollinators—and seed and landscape business including Minnesota-based Prairie Restorations, Pennsylvania-based Ernst Conservation Seeds and Oregon-based Lomakatsi

have noticed as well. The United States has more than 280 million acres of row crops and just a tiny fraction will be used for solar sites, but these sites can provide a badly needed and long-lasting service in providing healthy food to the hardworking commercial and native bees that pollinate our crops.

"Within every habitat in North America, there is a large variety of pollinator-friendly plant species that can be used under solar panels," said Ron Bowen, founder and CEO of Prairie Restorations, Inc. "The seasonal spectrum that can be planted beneath a solar array, and the fact that once it's installed, herbicides and pesticides aren't typically used, makes acreage near solar fields excellent locations for raising healthy bee colonies."

Could Pollinator-Friendly Become the Norm?

Back in 2014, Connexus Energy, a member-owned electric cooperative, built the largest co-op solar array in Minnesota—a 245-kilowatt system on 1.2 acres adjacent to its headquarters. The site was designed with gravel, but an experienced staff person made the case that a meadow of grasses and flowers was more in line with the organization's values. Now, Connexus is annually celebrating National Pollinator Week and providing customized jars of honey from the solar array to its members and community partners while also planning for several much larger pollinator-friendly solar projects.

Steve Freese, President and CEO of the Wisconsin Electric Cooperative Association, talked about the unexpected consequences of many of its member co-ops having pollinator-friendly solar arrays. "People are coming out and paying the bill at the co-op headquarters instead of mailing it in," said Freese. "They're member-owners and take pride in what their utility is doing for them."

OneEnergy Renewables, a socially conscious B-Corporation and developer of solar projects nationwide, is using pollinator-friendly seed mixes for a number of its projects currently under development. "It's a great opportunity for the solar industry as a whole, and we're excited that our projects will provide so many benefits to the communities in which they're located," said project manager Gia Clark.

Another national solar developer, Cypress Creek Renewables, hired one of the nation's first graduate students to write her master's thesis on pollinator-friendly solar and recently pledged that all its New York state projects will meet a pollinator-friendly solar standard. Other solar developers, including US Solar and IPS Solar, have pollinator-friendly solar arrays in Minnesota and Illinois. One of the most experienced firms in this approach, Eden Renewables, recently crossed the pond from England to New York, where it is developing several projects.

Something is abundantly clear—interest in solar from farmers and demand from hospitals, cities and towns is all increasing. More solar is coming, and from what I've seen firsthand, when beekeepers show up to strongly support a proposed pollinator-friendly solar array, it's going to be built and planted. The fastest way to change many industries, and solar is no exception, is to highlight and reward the companies that are doing it right. Competition is a powerful motivator.

Back in the Rogue Valley, PineGate Renewables' environmental manager Julianne Wooten is talking with John Jacob about the higher up-front cost for seed and investment in additional soil evaluations and ecological planning. Ending the day at a local brewery, Wooten shares the rationale for what started the company's pollinator-friendly initiative. "We all knew it, but our CEO said it. She said it's just the right thing to do."

BEST PRACTICES FOR SOLAR FARM APIARIES

1. ENSURE IT IS A POLLINATOR-FRIENDLY SOLAR SITE

- Ask the developer to provide a completed copy of your state's pollinator-friendly solar scorecard or a scorecard from a state with similar climates and soils. When in doubt, contact us at the Center for Pollinators in Energy, davis@fresh-energy.org.

2. HAVE MORE THAN A HANDSHAKE

- Draw up an agreement with the solar company that includes the apiary location and your right to access, any planned movement of the hives as well as price and pre-payment arrangements for a portion or all the honey.

3. OFFER PROFESSIONAL PACKAGING OPTIONS

- Many solar companies 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

- Place and orient the hives to ensure bee droppings do not accumulate on the panels and bees do not interfere with regular operations and management.
- Request to closely inspect nearby panels for droppings at least once per year.

5. KNOW THE LANDSCAPER OR ECOLOGIST

- Exchange phone numbers with the vegetation management contacts.
- Agree who will be managing the vegetation near the hives to be free of any invasive or noxious weeds.

6. KEEP IT SEPARATE

- 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 the flowering vegetation, the bees or hives and the solar array.
- Tag your social media posts with #BeesLoveSolar.

Natural Resource Services seeded and manages this 1 MW installation built by US Solar in Big Lake, Minnesota. US Solar says that all of its solar projects are now using pollinator-friendly ground cover that significantly exceeds the standards. *Image: Fresh Energy*

Argonne NATIONAL LABORATORY

FEATURE STORY | ARGONNE NATIONAL LABORATORY

Can solar energy save the bees?

SHARE

BY GREER RUSSELL | AUGUST 3, 2018

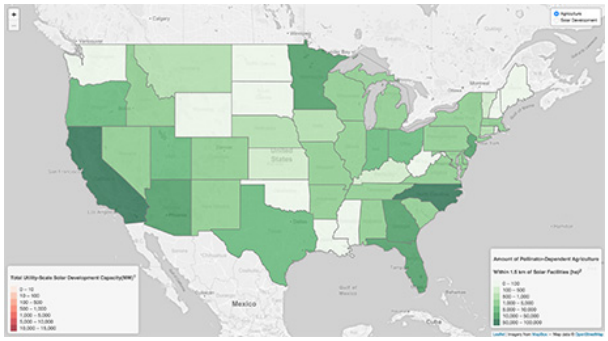
In response to the population decline of pollinating insects, such as wild bees and monarch butterflies, researchers at the U.S. Department of Energy's (DOE) Argonne National Laboratory are investigating ways to use "pollinator-friendly solar power."

Argonne researchers hope that we can rehabilitate bee and butterfly populations by allowing them to live at solar energy facilities. (Image by Prairie Restorations Inc., Princeton MN.)

By studying solar energy facilities with pollinator habitats on site, researchers hope to rehabilitate pollinator populations that play a crucial role in the national and global agricultural industries. Loss of such species could devastate crop production, costs and nutrition on a global scale.

Though small, insects are at least partially responsible for pollinating nearly 75 percent of all crops world-wide consumed by humans in their daily diet. As man-made environmental stressors – including pesticides and land development – have increased, insect pollinators have lost habitats and species have declined significantly.

However, a team of Argonne researchers has been examining the potential benefits of establishing pollinator habitat at utility-scale solar energy (USSE) facilities to conserve pollinators and restore the ecosystem they provide. Looking at over 2,800 existing and planned USSE facilities in the contiguous United States, researchers in Argonne's Environmental Science (EVS) division have found that the area around solar panels could provide an ideal location for the plants that attract pollinators.



This interactive map shows the amount of existing and planned utility-scale solar energy facilities by state. It also shows the amount of agriculture that depends on pollinators near those sites. Click to explore. (Map by Argonne National Laboratory.)

Often filled with gravel or turf grass, this land otherwise goes unused. Research has shown that in some locations these grounds offer a perfect place to establish native plant species, such as prairie grass or wildflowers, which are prevalent pollinator habitats, in hopes of encouraging steady population growth.

Helping to conserve declining pollinator populations, EVS researchers Lee Walston, Heidi Hartmann, Shruti Khadka Mishra and Ihor Hlohowskyj, along with National Renewable Energy Laboratory researchers James McCall and Jordan Macknick believe that growing pollinator habitat around solar sites will also help improve the sustainability of solar energy development in agricultural regions. By increasing the ability of pollinators to pollinate adjacent agricultural fields, solar-sited pollinator habitat may boost farmer's crop yields and make solar farms a more welcome neighbor to agricultural farms.

The researchers examined whether solar-sited pollinator habitat could benefit agriculture in a recent study published in *Environmental Science & Technology*. The study found over 3,500 square kilometers of agricultural land near existing and planned USSE facilities that could benefit. Walston believes this method of rehabilitation could help reinstate the declining pollinator population with few subsequent side effects.

"Solar-sited pollinator habitat can help optimize the land-use efficiency of solar energy developments, while not compromising solar panel efficiency," he said.

"We're also looking into whether the high upfront costs for seed mixes and establishing the pollinator habitats will be offset by lower facility maintenance costs," added Hartmann.

This – along with widening appreciation among community members and local governments for the pollinators' role in agricultural production – may persuade solar developers to make the switch.

Walston and Hartmann looked at three example crop types to measure the agricultural benefits of increased pollinator habitat. These crops – soybeans, almonds and cranberries – depend on insect pollinators for their annual crop yields. If all existing and planned solar facilities near these crop types included pollinator habitat and increased yield by just one percent, crop values could rise $1.75 million, $4 million and $233,000 for soybeans, almonds and cranberries, respectively.

Walston and Hartmann's research is the first to quantitatively support agricultural benefits of adding pollinator habitat at solar facilities. Next, said Hartmann, the team will begin fieldwork that measures the

type and numbers of native pollinators in areas surrounding USSE facilities.

This study provides even more opportunities for investigating the environmental benefits of pollinator habitat, such as water conservation, land management and carbon dioxide reduction.

With more states recognizing the need to address pollinator population declines through legislation, more solar facilities are making the switch to pollinator-friendly areas. Argonne's very own state of Illinois recently passed a "Pollinator-Friendly Solar Energy Bill" at the end of May, joining states like Maryland and Minnesota, which have made similar legislative progress toward a more "landscape compatible" future.

The publication is titled "Examining the Potential for Agricultural Benefits of Pollinator Habitat at Utility-Scale Solar Facilities in the United States."

The research was funded by the U.S. Department of Energy Solar Energy Technologies Office within the Office of Energy Efficiency and Renewable Energy.

The Office of Energy Efficiency and Renewable Energy supports early-stage research and development of energy efficiency and renewable energy technologies to strengthen U.S. economic growth, energy security, and environmental quality.

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IMAGE GALLERY

Pollinator-friendly native flowers and grasses establish a low-growing perennial meadow at a solar facility in Minnesota. Ground cover that is beneficial to pollinators can be established in many regions across the United States, including the Midwest. (Image by Rob Davis, Fresh Energy.)

Pollinator habitat creates a low-maintenance ground cover at a utility-sc solar facility in Wisconsin. (Image by Prairie Restorations, Inc.)

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Examining the Potential for Agricultural Benefits from Pollinator Habitat at Solar Facilities in the United States

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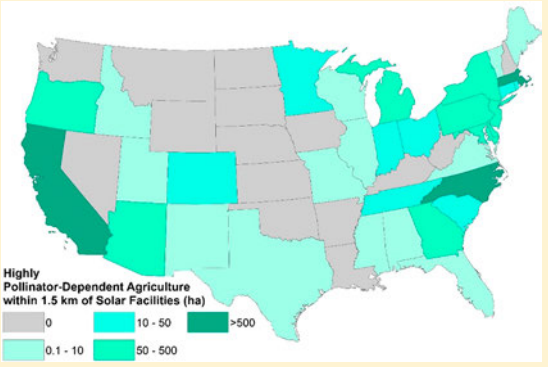
Supporting Information

ABSTRACT: Of the many roles insects serve for ecosystem function, pollination is possibly the most important service directly linked to human well-being. However, land use changes have contributed to the decline of pollinators and their habitats. In agricultural landscapes that also support renewable energy developments such as utility-scale solar energy [USSE] facilities, opportunities may exist to conserve insect pollinators and locally restore their ecosystem services through the implementation of vegetation management approaches that aim to provide and maintain pollinator habitat at USSE facilities. As a first step toward understanding the potential agricultural benefits of solar-pollinator habitat, we identified areas of overlap between USSE facilities and surrounding pollinator-dependent crop types in the United States (U.S.). Using spatial data on solar energy developments and crop types across the U.S., and assuming a pollinator foraging distance of 1.5 km, we identified over 3,500 km^2 of agricultural land near existing and planned USSE facilities that may benefit from increased pollination services through the creation of pollinator habitat at the USSE facilities. The following five pollinator-dependent crop types accounted for over 90% of the agriculture near USSE facilities, and these could benefit most from the creation of pollinator habitat at existing and planned USSE facilities: soybeans, alfalfa, cotton, almonds, and citrus. We discuss how our results may be used to understand potential agro-economic implications of solar-pollinator habitat. Our results show that ecosystem service restoration through the creation of pollinator habitat could improve the sustainability of large-scale renewable energy developments in agricultural landscapes.



INTRODUCTION

Insects are among the most diverse groups of organisms on Earth, with approximately 1 million described species.[1] Of the many roles insects serve for ecosystem function, plant pollination is possibly the most important service directly linked to human well-being.[2,3] Among the services pollinators provide to humans are pollination for food and seed production, and assistance in maintaining biodiversity and ecosystem function.[3] It has been estimated that as much as 8% of global crop production could be lost without insect pollination services,[4] and such a decline could have significant wide-ranging impacts on global agricultural markets, affecting consumer welfare and jeopardizing human health.[3] Recent trends in pollinator abundance, agriculture land uses, and human socio-political activities have highlighted the need to maintain pollinator populations to sustain human food production. Declines in wild and managed insect pollinator populations due to anthropogenic stressors such as habitat loss have raised concerns about a lost pollination service benefit to agricultural production.[2,3] For example, approximately 75% of globally important crop types are at least partially reliant upon animal pollination,[5] and in the U.S., about 23% of agricultural production comes from insect pollinator-dependent crops.[6]

Concerns regarding the conservation of pollinators have risen to the global scale as countries have recognized the severity of pollinator declines and begun developing strategies to sustain pollinator services in the face of a growing human population.[7,8] In many areas, land conversion associated with agricultural intensification has paradoxically contributed to the decline of pollinator populations and their habitats.[9,10] One mechanism to improve pollinator populations and increase agricultural service benefits is through the provision and maintenance of insect pollinator habitat in close proximity to pollinator-dependent agricultural fields. Previous studies have shown how the provision of pollinator habitat around agricultural fields could enhance local pollinator communities.[11] In agricultural landscapes, therefore, land management approaches that focus on providing diverse high-quality

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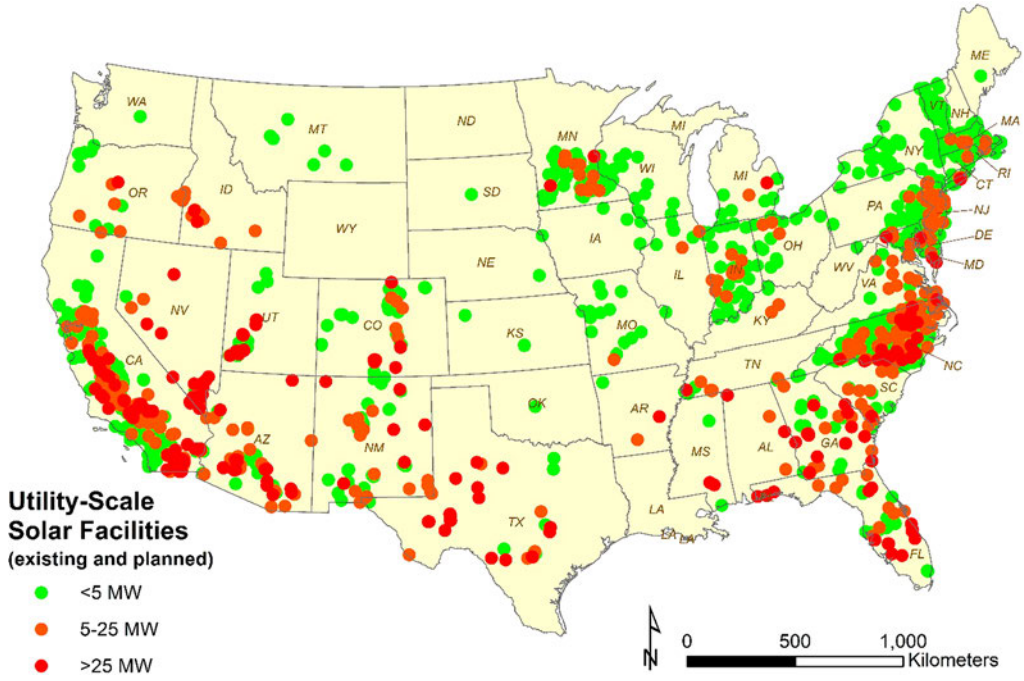

Figure 1. Locations of utility-scale solar energy (USSE) developments in the United States (>1 MW). Data were obtained from the U.S. Energy Information Administration.[17] As of 2016, there were 2,888 existing or proposed solar energy facilities in the U.S., totaling nearly 35 GW of electrical generation capacity.

pollinator habitat may have an important role in safeguarding pollinator populations and the agricultural services they provide.

In addition to agricultural intensification, renewable energy development represents another form of land cover change in rural landscapes across the United States (U.S.).[12,13] Utility-scale solar energy (USSE, ≥1 megawatt [MW]) developments are increasing in agricultural landscapes, due in part to the siting of USSE developments on former agricultural fields.[14,15] The rapid increase in USSE developments is driven in part by economic considerations as well as by concerns about the use and depletion of fossil fuels, global climate change, air and water pollution, and energy security. For example, utility-scale solar development grew at an average rate of 72% per year between 2010 and 2016,[16] and as of the end of 2016, USSE facilities accounted for approximately 22 GW of installed U.S. electricity generation capacity, with an additional 13 GW of planned USSE construction (USEIA 2016) (Figure 1).[17]

Besides the benefits of USSE development as an alternative to fossil fuels, recent work has also indicated several potential adverse consequences associated with solar developments. USSE developments have substantial spatial footprints, with an average total facility area of approximately 3.0−3.6 ha per MW of electric production.[15,18] USSE development in agricultural landscapes has the potential to reduce local agricultural production if farmland or nearby habitat for insect pollinators is converted to USSE development.[19] For example, Hernandez et al.[15] discussed the electricity generation potential of solar development in agricultural areas and brownfield sites in California. Indeed, over 70% of the USSE developments in California are sited in rural areas including shrublands, areas of former agricultural production, and barren lands[12] and some of these areas may contain high quality pollinator habitat.[20] A number of potential adverse impacts have also been indicated with these large-scale developments, including altered hydrologic patterns, habitat loss and fragmentation, impacts to cultural and visual resources, and direct mortality of wildlife.[21−24] Although the total land area projected to be required for solar development through 2030 is less than 0.1% of the contiguous U.S. surface area,[22] there is nonetheless a need to improve the landscape sustainability of large-scale solar developments to avoid or minimize potential impacts to local agriculture and cultural, ecological, and other natural resources.

Recent attention has been placed on USSE developments that integrate measures to conserve habitat, maintain ecosystem function, and support multiple ongoing human land uses in the landscape (hereafter "landscape compatibility"). Opportunities to improve the landscape compatibility of individual USSE facilities in agricultural regions exist through approaches that can reduce impacts of site preparation (i.e., from removal of vegetation, soil compaction, and/or grading), optimize multiple land uses, and restore ecosystem services. For example, the colocation of USSE development and agricultural production (i.e., planting crops among solar infrastructure) could maximize the land-use potential of USSE developments as sites of energy and food production.[13,25−27] In addition, on-site vegetation management approaches could restore ecosystem services such as crop pollination and pest control that may maintain or enhance production on nearby agricultural lands.[11,28] Recent emphasis has been placed on the creation and maintenance of pollinator habitat at USSE facilities (hereafter "solar-pollinator habitat"),[24] which is the concept of planting of seed mixes of regional native plants such as milkweed (*Asclepias* spp.) and other wildflowers, either within the solar infrastructure footprint after construction, such as among solar panels or other reflective surfaces, or in offsite areas adjacent to the solar facility, that attract and support native insect pollinators by providing food sources, refugia, and nesting habitat.

The ecological parameters that constitute pollinator habitat are often species- and region-specific. For example, the creation

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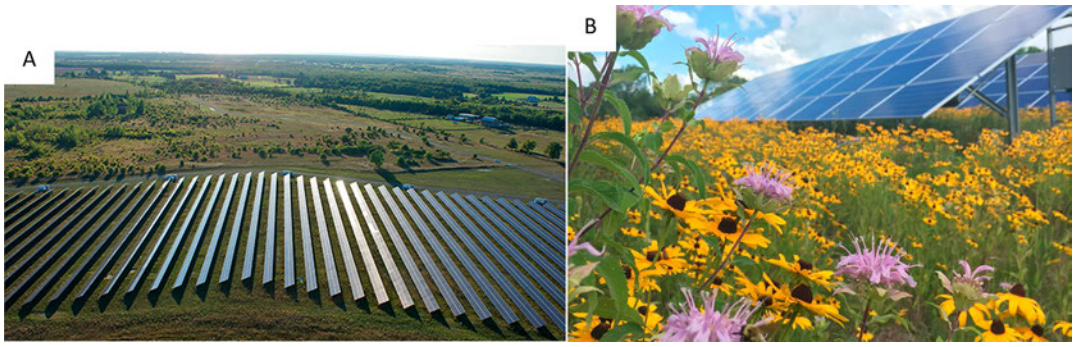

Figure 2. Example opportunities for ecosystem service benefits from solar-pollinator habitat at USSE facilities in agricultural landscapes. (A) A photovoltaic facility in an agricultural landscape (Sandringham Solar Project, Ontario, Canada) (credit: Invenergy, LLC). (B) Solar-pollinator habitat at a solar photovoltaic facility (credit: Rob Davis, Center for Pollinators in Energy/Fresh Energy). By establishing pollinator habitat at solar facilities, local insect pollinator communities may benefit, which in turn could result in increased pollination services to nearby agricultural fields.

of pollinator habitat to support specific native insect species may include the planting of different seed mixes as compared to seed mixes used to establish pollinator habitat to support nonnative Eurasian honey bees (*Apis mellifera*). Despite their ecological differences, all types of solar-pollinator habitat have the potential to improve biodiversity and ecosystem function as compared to conventional USSE vegetation management practices. In general, conventional vegetation management practices, such as placement of gravel, establishment and maintenance of turf grass, mowing, and herbicide application, are intended to minimize or prohibit the growth of vegetation within the facility footprint. Such practices provide little or no habitat suitable for pollinator species, especially if these vegetation management practices occur frequently during operation of the solar facility. In contrast, the provision and maintenance of solar-pollinator habitat and related activities, such as limited mowing and no herbicide or pesticide application, have the potential to provide a variety of ecological benefits for pollinators and nonpollinators alike.[24] Solar energy development policies in Europe have supported pollinator-friendly habitat, and currently two states in the U.S. have incentivized the incorporation of pollinator habitat at solar facilities through voluntary solar-pollinator habitat certification programs (Maryland bill SB1158; Minnesota bill HF 3353).[29,30] It is also possible for many different types of vegetation, including solar-pollinator habitat, to be established with minimal effect on solar energy generation and USSE land use intensity.[25,26]

Depending on the types of vegetation established, the ecological benefits of solar-pollinator habitat may include improved habitat diversity and connectivity for rare or at risk species such as the Karner Blue (*Plebejus samuelis*), Carson Wandering Skipper (*Pseudocopaeodes eudus obscurus*), and monarch butterfly (*Danaus plexippus*); the control of storm-water and carbon storage; and increased pollination and beneficial insect services (Figure 2). More than half of the primary crop types in the U.S. rely, in part, on animal pollination, equal to approximately $14.6 billion USD in agricultural production per year.[31] Therefore, the agro-economic implications for the enhanced pollinator service benefits provided by solar-pollinator habitat could be significant. Solar-pollinator habitat could also provide economic benefits to the solar project through improvements in microclimate conditions underneath the solar arrays, reductions in operations and maintenance costs (e.g., mowing, herbicide use), and the potential for hosting beekeeping operations.[32−34] In addition to ecological benefits, solar-pollinator habitat may increase the social acceptance of USSE facilities by improving the aesthetic value of the managed area.[35]

Despite the potential ecosystem service benefits of solar-pollinator habitat and state-level actions promoting solar-pollinator habitat development, little has been done to quantify the potential for these benefits. Because of the geographic variability in USSE development (Figure 1) and agriculture, the first step toward quantifying the potential agricultural pollinator service benefits of solar-pollinator habitat is to identify the intersection of USSE development and pollinator-dependent agriculture. In this paper, we frame the potential for solar-pollinator habitat service benefits to agricultural production by identifying and quantifying pollinator-dependent crop types in the vicinity of existing and planned USSE facilities in the U.S. We also discuss the crop types (and their locations) that have the greatest potential to receive agricultural pollination service benefits from solar-pollinator habitat.

METHODS

The geographic scope of this study is the conterminous 48 states in the U.S. (Figure 1). We obtained data on existing and planned USSE facilities in the U.S. from the U.S. Energy Information Administration Form EIA-860.[17] Form EIA-860 reported data on the status of existing electric generating plants in the U.S. (existing), and those scheduled for initial commercial operation within 5 years (planned). These data included electric capacity (MW), the solar generation technology type, and latitude and longitude information for each of 2,244 operational USSE facilities and 644 planned USEE facilities in the study area. We combined operational and planned USSE facilities (N = 2,888 solar facilities) to estimate total foreseeable USSE buildout and associated pollinator service potential to nearby agricultural fields. On the basis of previously reported land-MW relationships,[15,18] we used a relationship of 3.2 ha of land per MW of electric capacity to estimate the footprint size of each USSE facility. This is a conservative land-use intensity estimate for most solar facilities in the United States, although the land-use intensity for solar electricity generation may be greater in northern latitudes or due to some site-specific designs.[36] We then mapped each facility footprint, sized to represent the total size of the facility, as a circular polygon centered on each USSE location (Figure 3). We included USSE facilities of all technology types in our analysis, including solar photovoltaic (PV) and concentrating solar power technologies.

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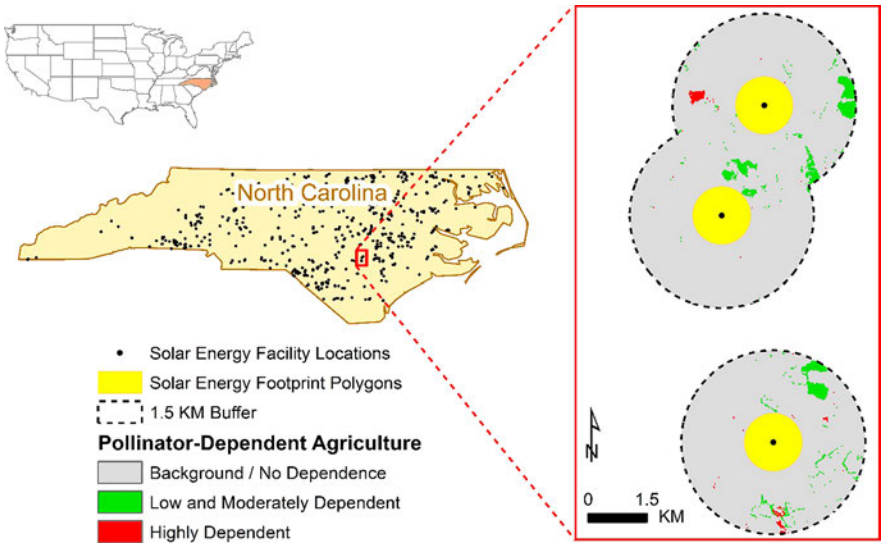

Figure 3. Example 2016 crop data layer (CDL) within 1.5 km of three existing and planned solar energy facilities in North Carolina, USA. The inset shows the areas of different pollinator-dependent crop cover types present in the foraging buffer zone, based on the pollinator-dependence status categories of Aizen et al.,[4] Calderone,[38] and Klein et al.[5] In this example, low and moderately pollinator-dependent crop types include cotton and peanuts (1−40% dependent upon pollinators), whereas the highly pollinator-dependent crops include squash and watermelons (>40% dependent upon pollinators).

We obtained spatial information on the pollinator-dependent crop types in the U.S. from the cropland data layer (CDL) produced by the U.S. Department of Agriculture, National Agricultural Statistic Service (NASS).[37] The CDL is a spatially explicit raster data layer, updated annually, and represents the total agricultural land cover at 30-m resolution across the conterminous U.S. based on classification of satellite imagery by the NASS. The CDL data layer classified 129 land cover types, from which we identified 107 cultivated crop types (SI Table 1). The pollinator dependency of a crop type was defined as the level of total pollination and subsequent total seed production that resulted solely from insect activity rather than from wind or passive (self-driven) pollination. Highly pollinator-dependent plants were those for which a high reduction in seed production would occur if insect pollinators were excluded; in such plants, insect pollination was determined to be essential.[5] For example, if a plant was considered to be 50% pollinator dependent, 50% of its seed production was due to insect pollinators and 50% to other pollination mechanisms. In the complete absence of insect pollinators, successful pollination and subsequent seed production in this plant would be reduced by 50%. For this study, we ranked pollinator dependence of each crop type into one of 5 classifications, based on the classification schemes of Aizen et al.[4] and Calderone:[38] 0 = no benefit from insect pollinators; 1 = >0 but <10% dependence on insect pollinators; 2 = 10−40% dependence on insect pollinators; 3 = 40−90% dependence on insect pollinators; and 4 = >90% dependence on insect pollinators. In a few cases where a CDL crop type was not ranked by Aizen et al.[4] or Calderone,[38] crop dependency values from Klein et al.[5] were used to assign ranks. We ranked crop types based on overall dependence on insect pollinators, including both wild and managed insects such as honey bees. We considered crop types ranked 3 and 4 (i.e., >40% dependence on insect pollinators) as being highly dependent on insect pollinators. To characterize the overlap of pollinator-dependent agriculture with solar electricity resource potential, we summarized the distribution of highly pollinator-dependent agriculture within 10 km regular grids across the 48 states, and displayed these locations with the solar resource potential developed for the 48 states by the National Renewable Energy Laboratory,[39] which modeled solar PV electrical generation potential in terms of kilowatt hours (kWh)/m^2/day.

To identify pollinator-dependent crop types that could benefit from increased insect pollination services provided by solar-pollinator habitat at existing and currently planned USSE facilities, we delineated 1.5 km wide buffers around each USSE facility footprint, based on an approximate maximum foraging distance for native insect pollinators and honeybees originating from the USSE facilities.[11,40,41] We assumed that solar-pollinator habitat established within the USSE footprint or adjacent areas could benefit local insect pollinator communities and thus increase insect visitation and subsequent pollination success in agricultural fields within this 1.5 km foraging zone. We used a geographic information system to calculate, by state and pollinator-dependency ranking, the amount of land area of pollinator-dependent crop cover types within the 1.5 km foraging zones of each of the 2,888 USSEs included in this study (Figure 3). To account for annual crop rotation and errors in classification, we used the CDL raster data to calculate the average area of each crop type within the foraging zone over the most recent three-year period (2014−2016). To avoid overlap of 1.5 km buffers of nearby solar facilities, where applicable, we merged the buffer areas and analysis was conducted on aggregated buffer area and not on an individual USSE basis.

Finally, we estimated the pollinator service value for three crops types to exemplify the potential economic implications of solar-pollinator habitat for agricultural production. We developed simple scenarios to illustrate the potential agro-economic benefit, assuming a hypothetical increase of only 1% in crop production associated with solar-pollinator habitat. The three crop types exemplified were soybeans, almonds, and cranberries because these were among the most abundant pollinator-dependent crop types identified within the 1.5 km pollinator foraging zones around USSE facilities.

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RESULTS

The 2,888 existing and planned USSEs across the U.S. represent a combined electrical generation capacity of 35,457 MW, with an average capacity of 12.2 MW (±0.60 SE) per facility. The estimated total USSE footprint size for all installations is approximately 11,346 km^2, based on a relationship of 3.2 ha per MW of electrical generation capacity. Based on the 2016 CDL,[37] approximately 1,300,000 km^2 of the conterminous U.S. is cultivated for crop production, of which approximately 500,000 km^2 are crop types that are at least partly dependent on insect pollination (pollinator dependence ranks 1−4) (SI Table 1). The total aggregated area within the 1.5 km pollinator foraging buffer zones of all USSEs (including all existing and planned projects) was 39,148 km^2, of which approximately 3,528 km^2 (9.0%) include agricultural crop types that could benefit from insect pollination (pollinator dependence ranks 1−4) (SI Table 2). Of this latter area, approximately 363 km^2 (10%) are used for crops that are highly dependent on insect pollinators (>40% dependence; pollinator ranks 3 and 4).

The ten states with the greatest amount of land within 1.5 km of existing and planned USSE facilities account for 78% (2,743 km^2) of all pollinator-dependent agriculture near USSE facilities, and for nearly 98% (355 km^2) of all highly pollinator-dependent agriculture near the facilities (Table 1). California has the greatest amount of existing and planned solar energy capacity (14,562 MW), and also has the greatest amount of land within 1.5 km of solar facilities (8,565 km^2). Other states with at least 2,000 km^2 within 1.5 km of solar facilities include North Carolina, Massachusetts, and New Jersey. See SI Table 3 for a complete summary of the intersection of solar development and pollinator-dependent agriculture in each state.

Overall, there was no detectable geographic relationship between solar PV resource potential and locations of highly pollinator dependent agriculture (Figures 4 and 5). Many areas where solar PV resource potential is high do not currently support large amounts of highly pollinator dependent agriculture, such as the Southwestern U.S. However, there are several areas throughout the U.S., such as the Central Valley of California and along the East Coast, where USSE developments and highly pollinator dependent agriculture occur (Figures 1 and 4).

Over 3,500 km^2 of land within the 1.5 km pollinator foraging zones of existing and planned USSE facilities contain crops that benefit from insect pollinators (>0% pollinator dependent; SI Table 2) and nearly 80% of this cropland (2,742 km^2) occurs within the ten states with the most land area within the USSE foraging zones (Table 1). Within these foraging zones, approximately 363 km^2 of land contain crops that are highly dependent on insect pollinators (>40% pollinator dependent). There are 12 states with at least 5 km^2 of pollinator-dependent cropland within USSE foraging zones (Figure 6A). The three states with the greatest amount of highly pollinator-dependent agriculture near solar facilities are California, North Carolina, and Massachusetts (Table 1; Figure 6B). These three states also have the greatest amount of USSE foraging zone area (Table 1). For the states in which existing or planned USSE facilities are present (n = 43), there was a strong positive correlation between total aggregated foraging area and total area of pollinator-dependent crops within the foraging zones (Pearson Correlation; r = 0.872; p < 0.001).

Overall, the most abundant crops near USSE facilities that have some level of pollinator-dependence are soybeans, alfalfa, and cotton (Table 2A). These crops have a low to moderate dependence on insect pollinators (1−40% dependence). The following five pollinator-dependent crop types accounted for over 90% of the pollinator-dependent agriculture near USSE facilities: soybeans, alfalfa, cotton, almonds, and citrus (Table 2A,B). The most abundant crops near USSE facilities that are highly dependent on insect pollinators are almonds, cranberries, and melons (Table 2B). Highly pollinator-dependent crops account for nearly 360 km^2 of all crops near USSE facilities that could benefit from insect pollinators.

To exemplify the potential economic implications of solar-pollinator habitat for agricultural production, we estimated the pollinator service value for three crops types known to occur within the 1.5 km foraging zone around USSE facilities. Assuming a hypothetical increase of only 1% in crop production associated with solar-pollinator habitat, agro-economic benefits for soybeans, almonds, and cranberries were estimated as follows:

Soybeans. Although soybeans are considered to be autogamous (self-fertilizing), insect pollinators have been reported to increase yields by up to 18%.[42] Soybeans are the most dominant crop type that we identified near USSE facilities, with nearly 1,500 km^2 of soybean production occurring within 1.5 km of existing and planned solar facilities (Table 2A), which is about 0.45% of the total acreage of U.S. farmland in soybean production in 2016 (335,000 km^2).[43] The total estimated value of U.S. soybean crop was $40 billion USD.[44] On the basis of these figures, we estimate that the 2016 soybean production value in areas within 1.5 km of USSE facilities to be $175 million USD. A 1% increase in soybean yield in these areas from increased pollination services facilitated by solar-pollinator habitat, therefore, could result in an additional $1.75 million USD in soybean crop value.

Almonds. California's almond industry is valued at over $5 billion USD.[44] Almond orchards are largely dependent upon managed honey bees to complete pollination. However, improved pollinator habitat near almond plantations may increase pollination by wild insects and improve the pollination efficiency of both managed and wild pollinators.[45] We identified nearly 300 km^2 of almond orchards within 1.5 km of California USSE facilities (Table 2B), which represents approximately 8% of the total farmland in almond production in California (approximately 3,800 km^2 in 2016).[46] Based on these figures, a 1% increase in almond production in these areas due to increased pollination services from solar-pollinator habitat could result in an approximately $4 million USD increase in almond crop production. Additional economic trade-offs for the almond industry related to solar-pollinator habitat could result from decreased reliance on managed honey bees and associated reductions in honey bee rental fees, which averaged $750 USD per ha to pollinate almond orchards in 2016.[47]

Cranberries. Nearly all cranberry production areas we identified within 1.5 km of USSE facilities were in the state of Massachusetts (Table 2B). The 19 km^2 of cranberry bogs near USSE facilities represent approximately one-third of the total area of cranberry production in the state, which is valued at nearly $70 million USD.[48] Based on these figures, a 1% increase in cranberry production in these areas due to increased pollination services from solar-pollinator habitat could result in an approximate $233,000 USD increase in cranberry production. As with almonds, additional economic benefits

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Table 1. Ten States with the Greatest Total Land Area within 1.5 km of Existing and Planned USSE Facilities[a]

State Name	Total Number of USSE Projects[b]	Total USSE Electric Capacity (MW)	Total Area within 1.5 km of Solar Facilities (km^2)[c]	Total Area of Pollinator-Dependent Crops within 1.5 km of Solar Facilities (km^2)	Total Area of Highly Pollinator Dependent Crops within 1.5 km of Solar Facilities (km^2)[d]
California	776 (680 existing, 96 planned)	14,562 (9,861 existing, 4,701 planned)	8,059 (6,301 existing, 2,772 planned)	879.0	322.2
North Carolina	591 (433 existing, 158 planned)	4,027 (2,427 existing, 1,600 planned)	7,572 (5,384 existing, 2,817 planned)	991.7	6.0
Massachusetts	220 (182 existing, 38 planned)	569 (474 existing, 95 planned)	2,238 (1,956 existing, 392 planned)	29.3	20.8
New Jersey	218 (213 existing, 5 planned)	666 (614 exiting, 52 planned)	2,031 (1,964 existing, 83 planned)	109.3	4.0
Arizona	111 (96 existing, 15 planned)	2,528 (1,889 existing, 639 planned)	1,647 (1,331 existing, 506 planned)	172.8	0.7
Texas	42 (19 existing, 23 planned)	2,701 (580 existing, 2,121 planned)	1,456 (529 existing, 927 planned)	58.2	0
Nevada	61 (52 existing, 9 planned)	2,458 (1,598 existing, 860 planned)	1,301 (758 existing, 569 planned)	11.0	0
Florida	40 (24 existing, 16 planned)	1,105 (331 existing, 774 planned)	1,070 (442 existing, 680 planned)	136.6	0.1
Minnesota	168 (53 existing, 115 planned)	489 (255 existing, 234 planned)	1,059 (464 existing, 650 planned)	254.6	0.2
Georgia	39 (37 existing, 2 planned)	1,030 (978 existing, 52 planned)	965 (901 existing, 64 planned)	100.2	1.1
Total	2,266 (1,789 existing, 477 planned)	30,135 MW (19,007 existing, 11,128 planned)	27,298 km^2 (20,030 existing, 9,460 planned)	2,742.7 km^2	355.1 km^2

[a]See Supporting Information (SI Table 3) for a complete summary of the amount solar development and pollinator-dependent agriculture in each state. [b]USSE projects are defined as those >1 MW. Data Source: U.S. Energy Information Administration.[17] [c]The sum of values in parentheses exceeds the total area because there is overlap of 1.5 km buffers for existing and planned USSE facilities. [d]Highly pollinator dependent crop types are considered to be those that are >40% dependent on insect pollinators (pollinator dependence ranks 3 and 4).

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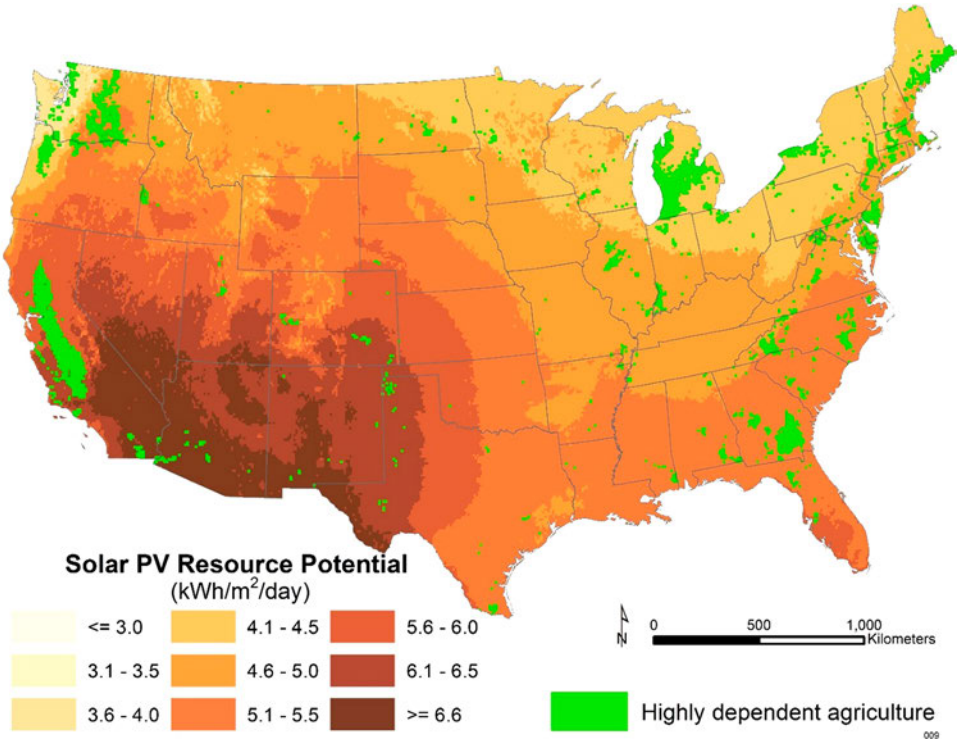

Figure 4. Overlap of solar resource potential (kWh/m^2/day) and highly pollinator dependent agriculture (>40% dependence on insect pollinators).

for the Massachusetts cranberry industry related to solar-pollinator habitat could also result from decreased reliance on managed honey bees and associated reductions in honey bee rental fees, which averaged $417 USD per ha to pollinate cranberry bogs in 2016.[47]

DISCUSSION

A growing body of literature has demonstrated the potential effectiveness of pollinator habitat established in agricultural landscapes in conserving insect pollinators and restoring important ecosystem services they provide.[11,28,35] Our results highlight one such opportunity, namely the development of solar-pollinator habitat to improve the compatibility of USSE facilities in agricultural landscapes. The development of such pollinator habitat at USSE facilities has the potential to increase the biodiversity and abundance of both wild and managed insect pollinators, which in turn can increase pollination services.[49] We identified nearly 7,000 km^2 of cultivated cropland near existing and planned USSE facilities in the U.S. (SI Table 2), with over half of this cropland planted in crops that are at least partially reliant on insect pollination. Though the amount of cropland that could benefit from solar-pollinator habitat represents less than 1% of the total U.S. cropland in production with pollinator-dependent agriculture (approximately 500,000 km^2 in 2016),[37] there may be significant economic benefits at local scales where there is overlap between USSE development and high-value insect pollinator-dependent crops, especially in those areas where insect pollination is essential for production (e.g., for crops with >40% dependence on insect pollinators).

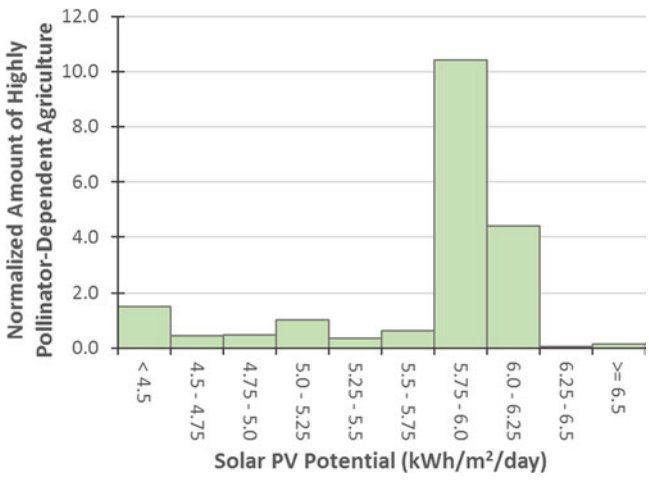

Figure 5. Amount of highly pollinator-dependent agriculture (>40% dependence on insect pollinators) by solar resource potential (kWh/m^2/day). Figures were normalized by dividing the total amount of highly pollinator-dependent agriculture (km^2) by the total land area (km^2) within each solar PV potential category. There was no statistically significant correlation between solar resource potential and amount of highly pollinator-dependent agriculture (Pearson's r = 0.188; p = 0.602).

Our study focused on understanding the potential for agricultural benefits of solar-pollinator habitat by identifying the intersection of USSE development and surrounding agriculture that could benefit from insect pollinators. Our 1.5 km pollinator foraging zones were sized to represent the average foraging activity of native pollinators and honey bees. The planting and maintenance of native pollinator-friendly vegetation at USSE developments in agricultural landscapes could offset local impacts to agricultural production not only through benefits provided by increased pollination services but also through services such as insect pest management and stormwater and erosion control.[24] However, quantifying the actual benefits of solar-pollinator habitat to agricultural production depends on a number of additional factors, such as the specific methods to

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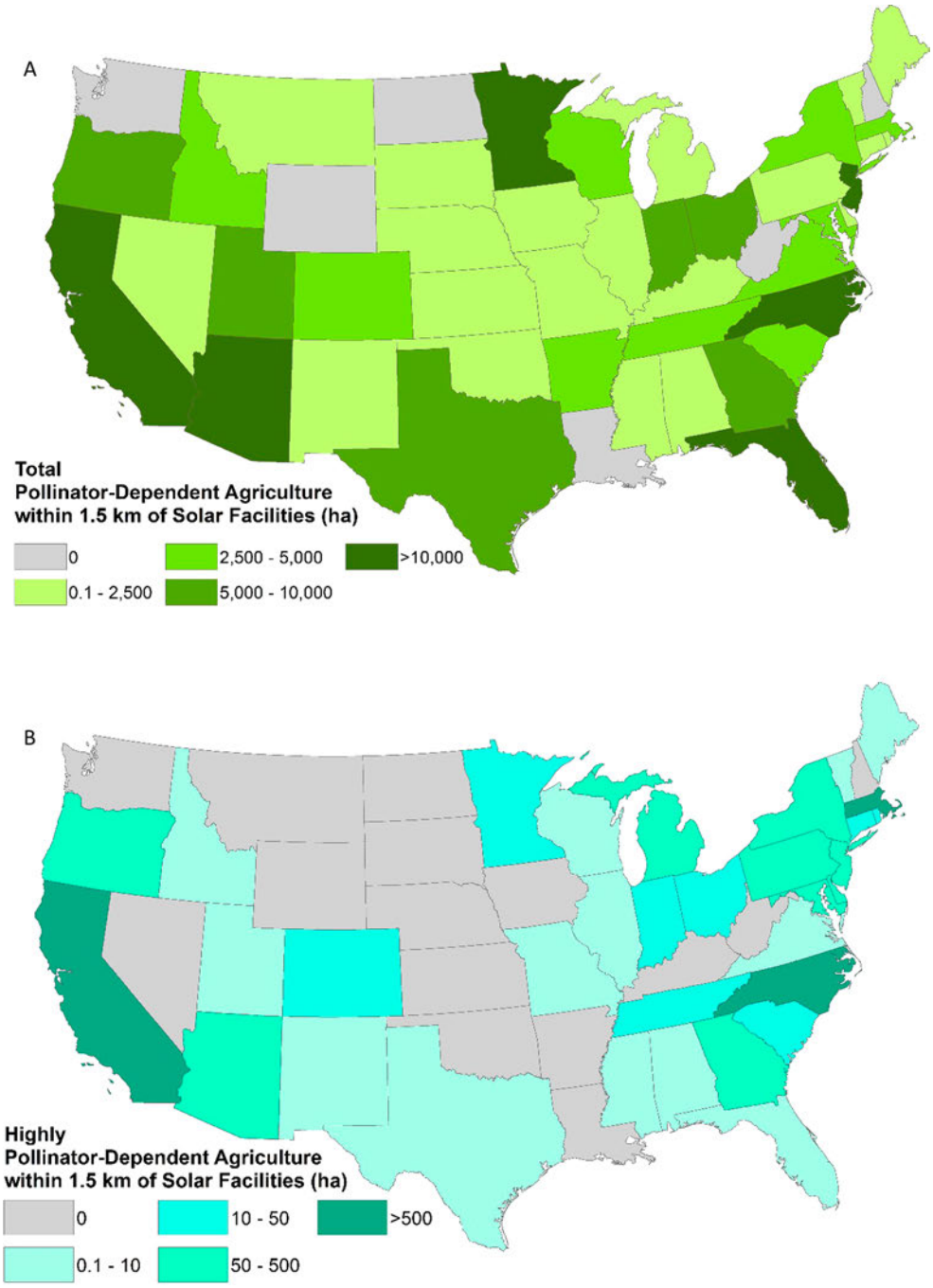

Figure 6. Amount of pollinator-dependent agriculture near existing and planned utility-scale solar energy facilities in the United States. (A) Amount of total pollinator-dependent agriculture (>0% pollinator dependence) within 1.5 km of solar facilities. (B) Amount of highly dependent agriculture (>40% pollinator dependence) within 1.5 km of solar facilities.

establish and maintain solar-pollinator habitat (e.g., seed mixes, soil preparation methods, and habitat management practices), the amount of solar-pollinator habitat provided, and characteristics of the regional pollinator community (e.g., insect diversity, flight distances, pollination efficiency, etc.). For example, some insect species are highly specialized and require uncommon genera of plants for pollen sources that may be difficult to establish within solar facilities. Additional research is needed to understand how these factors could influence the potential agricultural benefits of solar-pollinator habitat. However, our simple extrapolation of the potential economic implications of providing solar-pollinator habitat for three crop types underscores the potential pollination service benefit that solar-pollinator habitat may provide for agricultural production. Almonds, cranberries, and soybeans represent over half of the total pollinator-dependent agriculture currently within the foraging zones at USSE facilities across the U.S. (Table 2). Our hypothetical case studies for these three crop types illustrate the broad geographic potential for solar-pollinator habitat benefits to agricultural production and the economic benefits of solar-pollinator habitat for agricultural production, which could represent millions of dollars (USD).

This study represents the first step toward understanding the potential agro-economic benefits of solar-pollinator habitat.

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Table 2. Summary of Pollinator-Dependent Cropland near Existing and Planned USSEs in the United States: (A) Low and Moderately Dependent Crops (1−40% pollinator dependence); (B) Highly Dependent Crop Types (>40% pollinator dependence)[a]

(A) Low and Moderately Pollinator-Dependent Crops			
Crop	Insect Pollinator Dependence Rank[b]	Total Hectares of Cropland in USSE Foraging Zones, All States	States with Greatest amount of Croplandwithin USSE Foraging Zones[b]
Soybeans	2	149,364	North Carolina (75,883 ha), Minnesota (21,040 ha), New Jersey (9,747 ha)
Alfalfa	2	78,326	California (27,592 ha), Arizona (15,450 ha), Utah (7,744 ha), Oregon (4,782 ha)
Cotton	2	41,204	North Carolina (18,911 ha), California (6,081 ha), Texas (5,506 ha), Georgia (5,188 ha)
Citrus	1	20,781	Florida (13,400 ha), California (7,377 ha)
Tomatoes	1	10,202	California (10,067 ha)
Peanuts	1	8,573	Georgia (4,022 ha), North Carolina (3,589 ha), South Carolina (717 ha)
Onions	1	3,001	California (1,788 ha), Oregon (1,092 ha), Idaho (81 ha)
Beans	1	1,770	California (460 ha), Oregon (429 ha), Minnesota (238 ha), Idaho (169 ha)
Sunflower	2	340	California (219 ha), Colorado (63 ha)
Strawberries	2	292	California (186 ha), Florida (93 ha)
(B) Highly Pollinator-Dependent Crops			
Crop	Insect Pollinator Dependence Rank[b]	Total Hectares of Cropland in USSE Foraging Zones, All States	States with Greatest amount of Croplandwithin USSE Foraging Zonesc
Almonds[d]	3	29,718	California (29,718 ha)
Cranberries	3	1,904	Massachusetts (1,885 ha), New Jersey (11 ha)
Melons (Cantaloupes, Honeydew, Watermelon)	4	1,287	California (1,013 ha), Maryland (106 ha), Arizona (61 ha), North Carolina (36 ha)
Apples	3	867	North Carolina (397 ha), Massachusetts (157 ha), New York (126 ha)
Blueberries	3	521	New Jersey (202 ha), Michigan (93 ha), North Carolina (77 ha), Georgia (44 ha)
Plums	3	477	California (473 ha), New York (2 ha)
Cherries	3	418	California (408 ha), Oregon (5 ha), Michigan (3 ha)
Pumpkins/Squash/Gourds	4	351	New Jersey (115 ha), Massachusetts (106 ha), North Carolina (24 ha)
Peaches	3	189	California (53 ha), Georgia (40 ha), New Jersey (27 ha), North Carolina (22 ha)
Cucumbers	3	100	North Carolina (35 ha), New Jersey (30 ha), Michigan (10 ha)

[a]The ten most abundant crops (in terms of planting acreage) in each pollinator-dependency category within 1.5 km of USSEs are listed in these tables. See Supporting Information for a complete list of the pollinator-dependent crops near USSEs. [b]Insect pollinator dependence rank based on Aizen et al.[4] and Calderone:[38] 1 = >0 but <10% dependence on insect pollinators; 2 = 10−40% dependence on insect pollinators; 3 = 40−90% dependence on insect pollinators; 4 = >90% dependence on insect pollinators. [c]Values in parentheses (ha) represent the amount of land planted with the particular crop within 1.5 km of existing and planned USSEs within that state. [d]Almond pollination is largely accomplished by managed insect pollinators (e.g., honey bees). However, improved habitat near almond orchards may increase pollination by wild insects and improve the pollination efficiency of both managed and wild pollinators.[45]

Our assessment of the possible pollinator service implications for soybeans, almonds, and cranberries not only exemplifies the potential agro-economic value of solar-pollinator habitat, but we also identified several knowledge gaps that need to be addressed to better understand solar-pollinator habitat service values. Because of the geographic variation in insect communities, soil types, vegetation, and agriculture practices, spatially explicit analyses are needed to better understand the benefits of solar-pollinator habitat to nearby agriculture. To be effective, approaches should be developed in an ecosystem services evaluation framework that incorporates economic valuation models that enable the valuations to be based more accurately on crop-specific pollinator dependencies. Additional accuracy in the estimation of benefits could be obtained through utilization of field measurements from before−after solar-pollinator studies, such as changes in insect community abundance and diversity, changes in insect visitation to nearby agricultural fields, and, ultimately, changes in agricultural production.

Pollinator habitat may be established throughout solar facilities (i.e., around and under the solar arrays), in undeveloped areas of the solar facilities, or within adjacent offsite areas. Decisions on the type of pollinator habitat to be created will vary by geographic region, as abiotic processes (e.g., precipitation), native vegetation, and insect pollinator communities also vary geographically. Project developers should consult with regional biologists to identify the appropriate vegetation suitable for the local insect pollinator community that can be feasibly grown among the USSE infrastructure. For example, in Minnesota, where legislation was passed in 2016 to establish a statewide standard for pollinator-friendly solar development,[30] over 930 ha of pollinator habitat has been established at existing solar facilities, consisting of flowering vegetation native to the Midwestern U.S. such as black-eyed

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susan (*Rudbeckia hirta*), purple prairie clover (*Dalea purpurea*), and partridge pea (*Chamaecrista fasciculate*).[50,51] Similarly, the establishment and maintenance of solar-pollinator habitat should be considered as part of the project design and long-term operations of USSE facilities planned in agricultural landscapes. For example, typical maintenance activities for pollinator habitat include periodic mowing or prescribed burning to remove undesirable weeds and woody vegetation.[52] Though infrequent mowing activities may occur in pollinator habitat established in on-site and offsite locations, prescribed fire might only be an appropriate maintenance activity in offsite habitat locations due to risks of damaging on-site solar infrastructure.

Increased insect pollination services are just one of several ecosystem benefits that could be provided through solar-pollinator habitat. Other ecosystem services resulting from the planting and development of pollinator habitat at USSE facilities may include, but are not limited to, improvements to local biodiversity, water control, and carbon storage. Future ecosystem services evaluation frameworks, therefore, could be expanded to quantify a broader suite of services for not only the solar energy sector but for the wind energy and transmission sectors as well, which could work toward an improved understanding of the landscape compatibility of large-scale energy developments.

■ ASSOCIATED CONTENT

Supporting Information

The Supporting Information is available free of charge on the ACS Publications website at DOI: 10.1021/acs.est.8b00020.

A detailed summary of results on the amount USSE development and pollinator-dependent agriculture within the 1.5 km foraging zones in each state. Tables summarize for each state: the amount of total 2016 agriculture production, total amount of USSE development and crop area within the 1.5 km foraging zones around USSE facilities, and amount of pollinator-dependent crop types within 1.5 km foraging zones around USSE facilities (PDF)

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Notes

The authors declare no competing financial interest.

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New Jersey Herald

Pollination and farming: It's all about bees

Photo by Tracy Klimek/New Jersey Herald Former U.S. Department of Agriculture Natural Resources Conservationist Tim Dunne speaks at the Sussex County Fairgrounds in Frankford about pollinators for agriculture at an event Wednesday.

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By GREG WATRY

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FRANKFORD — Of the more than 20,000 species of bees globally, over 400 call New Jersey home.

On Wednesday at the Sussex County Fairgrounds, The Nature Conservancy hosted a variety of presentations on “Farms, Forests and Rivers: Sustaining Our Way of Life.”

One panel of speakers focused solely on the beneficial effects pollinators, such as bees, have on agriculture production and how to combat the overall decline in bee population.

“They're basically flying dust bombs,” said Dan Cariveau, a postdoctoral research associate at Rutgers University's Department of Ecology, Evolution and Natural Resources.

On the screen, a picture from Cariveau's presentation showed a bee covered in pollen.

“We have a fantastic diversity of bees,” he said.

For their entire life cycle, from larvae to adulthood, bees rely on floral resources. About 87 percent of plants, Cariveau said, rely on bees for pollination. Furthermore, about two-thirds of all crop varieties require pollination for production.

“And they're important here in New Jersey as well,” he said.

But over the past decades, the commercial honeybee population has seen a decline. According to a statement from the White House, over the past 60 years the commercial honeybee population in the United States has decreased from 6 million colonies in 1947 to 2.5 million today.

Between 2006 and 2009, beekeepers recorded overwinter honeybee losses between 26 percent and 48 percent in New Jersey, according to numbers from Bryn Mawr College and Rutgers University.

If nothing is done, that could spell trouble. In New Jersey, according to the Nature Conservancy, pollinators are responsible for a portion of gross revenues resulting from agriculture production. The dollar amount varies depending on crop, but for squash, pollinators are responsible for about $3,301 in gross revenue per acre; for tomatoes, the amount is $1,907; and for blueberries, $1,076.

Using blueberries as an example, Cariveau cited a Rutgers study where extra pollen was applied to certain blueberry plants while others were left to the whims of nature. The study found that blueberries with added pollen grew larger than those without.

“What this tells us is more bees is better,” he said.

While honeybees, which number around 50,000 per hive, may be the most frequently thought of when it comes to pollination, Cariveau emphasized that wild bees can be just as effective, if not better, pollinators.

From the common eastern bumblebee and small carpenter bee to the blue-green sweat bee and the squash bee, a number of species can be found in one's own backyard. But their continued survival is contingent on the actions of humans, and there are a number of practices farmers, and even those with just recreational gardens, can employ to help bolster bee populations and increase the amount of pollinator habitats.

Kelly Gill, a pollinator conservation specialist with the Xerces Society for Invertebrate Conservation and a partner biologist with the U.S. Department of Agriculture Natural Resources Conservation Service, recommended that landowners protect existing bee nesting sites.

According to the Xerces Society, a nonprofit organization that protects wildlife through conservation of invertebrates and their habitats, there are three common nesting strategies: those of ground nesting bees, wood nesting bees and bumblebees.

Ground nesting bee sites can be identified by small circular holes on sloped ground, surrounded by mounds of displaced dirt. Tilling soil in these areas can destroy these nests.

Wood nesting sites occur in rotting wood, small twig or vine centers, and existing cavities in wood. One can build such a nest by drilling small holes in wood, or by tying 10 to 20 hollow stems or paper straws together with one end closed. These units should placed 4 feet off the ground during the early spring.

Bumblebee nests can be found under leaves, in old rodent dens, and in cavities found above and below ground. Recommendations include minimizing mowing around grassy meadows and thickets and leaving excessive amounts of weeds in nesting areas.

Further, a variety of native plants, what Gill referred to as the “ice cream plants for bees,” support pollinators. Whether that means letting nature take its course on the land or planting a variety of plants is up to the landowner. Native plants include mountain mints, milkweed, goldenrod, false indigo and aster, among others.

“If everyone did just a small corner, our neighborhoods could be big buffets for pollinators,” Gill said. “We can all do our jobs here ... to make a pollinator friendly landscape.”

Tim Dunne, owner of Warren County's Woodsedge Tree Farm and a former USDA Natural Resources Conservation Service employee, has been beekeeping since 1980.

Honeybees, he explained, are European in origin and were brought over by those who colonized the United States. Modern hives began appearing in the 1850s, and honeybees started being used for pollination at the turn of the 20th century. But around the mid 2000s, colonies in the United States began dying. A variety of factors contributed to this, including the increased use of pesticides, poor nutrition, diseases from other countries, and pests, such as the varroa and tracheal mites.

Like Gill, Dunne recommended that people add a variety of plants and flowers to their land. Diversity is key, he said.

Funding opportunities are available to farmers who wish to have bee habitat restoration projects on their properties. Opportunities are available from the U.S. Department of Agriculture's Conservation Reserve Program, the Environmental Quality Initiatives Program and the Wildlife Habitat Incentives Program.

The point of Wednesday's event was to bring the discussion of conserving the Paulins Kill watershed and surrounding area to a wider audience, connect landowners with resources available and highlight conservation efforts and action steps.

“We're doing it so young kids can appreciate the environment that they live in,” said Charles Kuperus, an agriculture advocate, farmer and former New Jersey secretary of agriculture. “Let this discussion result in a measurable difference for future generations.”

While efforts are under way, he noted, “It's something that we have to do in a larger, more coordinated way.”

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Highly compatible: pollinator-friendly solar projects and farming

By Katie Siegner, Scott Wentzell and Whitney Mann | 04/02/2019

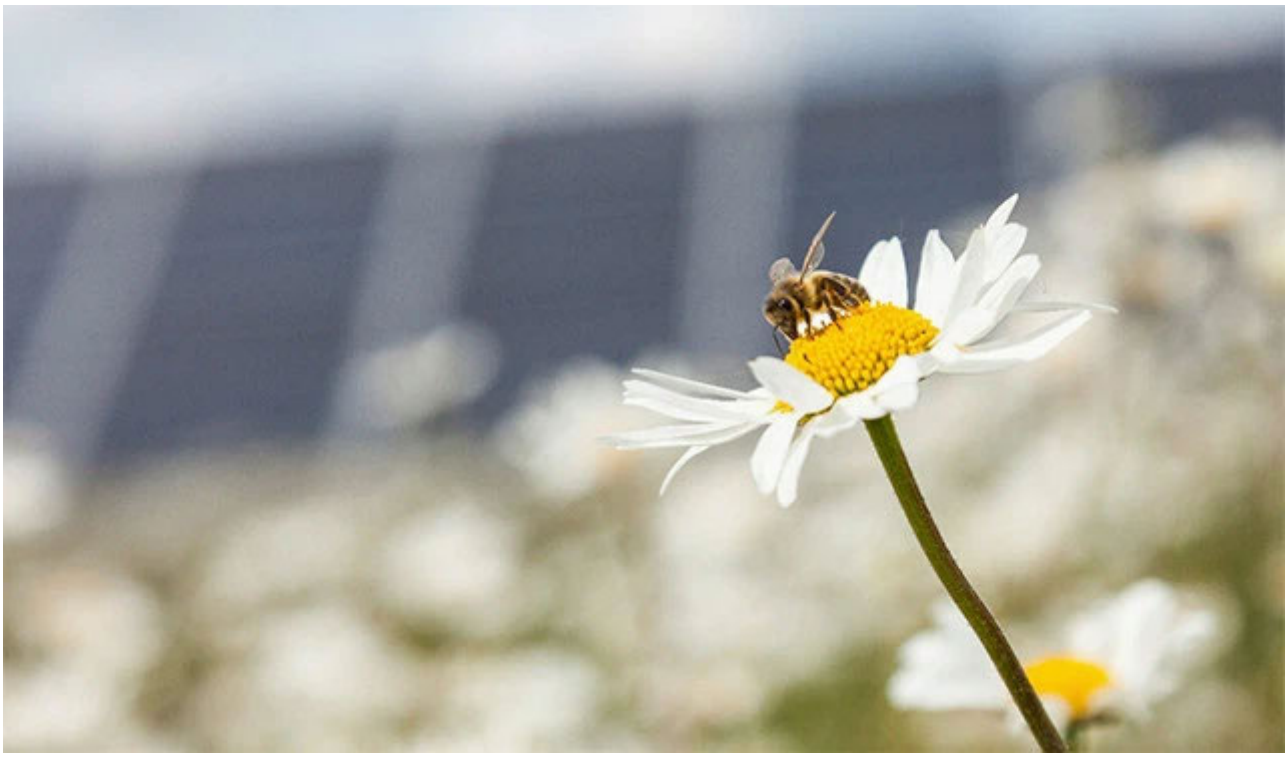

Photo by Rob Davis, Fresh Energy

Pollinator-friendly solar sites are proliferating in Minnesota and around the country.

Taking farmland out of production to increase harvests might seem counterintuitive. But new and ongoing research suggests that trading some farmland for deep-rooted prairie vegetation can provide habitat for wild insect pollinators and boost overall crop yields.

Increasingly popular pollinator-friendly solar projects, which cultivate low-growing meadows underneath the panels, present an opportunity to increase food production and clean energy generation at once. For a state like Minnesota, where farming is prevalent and the solar industry is

expanding, this kind of compatibility between agriculture and solar energy production is a most welcome development.


Katie Siegner

Installed solar capacity in Minnesota crossed the 1-gigawatt threshold last fall, and is set to grow sixfold by 2030 to meet the state's 10 percent solar energy goal. The management of the land below the panels — most commonly seeded with turf grass — offers an important opportunity to provide multiple environmental and agricultural benefits in addition to carbon-free energy generation.

Illuminating results

Last fall, our team of graduate students at the Yale School of Forestry & Environmental Studies conducted a cost-benefit analysis of solar development on farmland in Minnesota, and the results were illuminating. By developing projects as pollinator-friendly — the practice of planting deep-rooted grasses and wildflowers throughout a project site — solar developers have the potential to provide habitat for threatened pollinator species, restore important prairie ecosystems, and boost the crop yields of nearby fields. That's right: Our model suggests a net gain in food production is possible when highly pollinator-dependent crops are grown near pollinator-friendly solar projects — even when accounting for the land taken out of production by the solar project.


Scott Wentzell

While unexpected, this result has sound basis in research and practice. Iowa State University research extending over 10 years has shown that prairie strips in agricultural areas increase the abundance of native pollinators while also decreasing runoff and increasing soil and nutrient retention; crop pollination scientists in New Jersey and Michigan have published peer-reviewed research showing that an increased abundance of wild pollinators boosts yields for specialty crops. Now we have the potential to add solar to the mix.

As solar development expands throughout Minnesota, so too is attention toward the land use under the panels. Solar projects require roughly 7 acres of land per megawatt of energy production, meaning that projects installed to date occupy roughly 7,100 acres of land in the state. While that's less than 0.03 percent of Minnesota's 26 million acres of farmland, the compatibility of solar projects and farming is important for the continued sustainable development of the two industries.

Minnesota: first to establish standard

In 2016, Minnesota was the first state in the nation to establish a flexible and science-based standard for pollinator-friendly solar development, and several states have since implemented their own

standards to encourage the practice. Last fall, Xcel Energy announced that it will require use of Minnesota's pollinator-friendly solar standard in responses to all future solar RFPs.


Whitney Mann

In addition to the public benefits, our model indicates that pollinator-friendly solar projects could generate higher private returns for solar site owners and investors. This is mostly thanks to an estimated panel efficiency gain from the cooler microclimate created by the perennial vegetation. That also means more clean energy powering Minnesota homes and industry. Additionally, once a low-growing meadow is established under the panels, the vegetation requires less mowing and maintenance, leading to operating cost savings over the life of the project. Finally, we hypothesize that the aesthetic appeal of pollinator-friendly solar can smooth the permitting process for developers and create added benefit for the surrounding community. A field of wildflowers and solar panels seems like a pretty good neighbor to us.

Finally, our team monetized and modeled several key ecosystem services generated by pollinator-friendly solar projects: the deep-rooted plantings under the panels build soil health, improve water quality, recharge groundwater, and reduce erosion, as best practice guidance demonstrates.

Implications: Habitat plus economic boost

The implications of these findings are significant. Not only could pollinator-friendly solar development provide habitat to threatened native pollinator species, the practice could also provide a needed economic boost to Minnesota farmers. And if Minnesota met the remainder of its 2030 solar installation target with pollinator-friendly projects, the monetized environmental co-benefits range from $30-515 million, depending on the composition of surrounding farmland.

Further research is needed to more precisely quantify the ecosystem and agricultural services that pollinator-friendly solar may provide, and this is a topic of ongoing study at University of Minnesota and the National Renewable Energy Laboratory. Meanwhile, pollinator-friendly solar sites are proliferating in Minnesota and around the country, offering fertile ground for research and assessment of their economic and environmental impacts. So far for Minnesota, they are a sweet deal.

Katie Siegner, Scott Wentzell and Whitney Mann are second-year Master of Environmental Management (MEM) candidates at the Yale School of Forestry & Environmental Studies. Hallie Kennan and Maria Urrutia (also MEM candidates at Yale FES) contributed to this article as well. The group completed a semester-long economic analysis of pollinator-friendly solar development in fall 2018 for an Energy Economics & Policy Analysis class. The final paper can be found here.

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THURSDAY, AUGUST 29TH 2019

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Alexa score finds out the dual purpose of these solar panel fields in Minnesota.