

## Farmland: Where Vegetables, Honey bees, And Solar Can Exist In Harmony A Case Study of Dual Use Solar

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*Colocation is good for solar AND agriculture*

Solar energy offers a variety of benefits to the electricity grid, to our economy, and to our environment. Solar energy also provides individuals and businesses the option to choose distributed, locally produced energy that can be on a rooftop or on the ground. Traditionally, solar is installed to meet a customer's energy demands however, as more individuals and businesses are investing in solar energy the industry has been seeking new opportunities to offer win-win scenarios to meet customers diverse needs. Some of these win-win scenarios include solar plus storage and others incorporate 'dual use' practices to large scale solar farms.

Large scale solar farms, also known as utility-scale solar, allow the solar industry to achieve economies of scale, harvest energy from the sun where solar resources are high, and provide clean renewable energy to more customers with one system. In recent years, some communities across the U.S. have implemented bans on utility-scale solar development with the goal of protecting land designated for agriculture. What is missed in these impactful decisions is the opportunity to collaborate and give farmers another tool to keep their farmland intact, productive and economically sustainable. By working with both farmers and solar developers, solar energy can offer an additional income source that farmers can add to their fields which provides income and ancillary benefits to their community. Many utility-scale solar developers have incorporated "dual-use solar" to address concerns around both climate change and farmland protection goals. Sometimes called co-location, dual-use solar combines utility-scale solar arrays with conservation and agricultural activities to create a multifunction system with a variety of benefits. One particularly thoughtful dual-use interpretation is called SolarCulture™ .



*Dual Use pollinator friendly photo courtesy of Understory Consulting*

*A solar facility that works to preserve or improve the land it is placed on and provide a suite of benefits in addition to clean energy production.*

- Pollinator Friendly
- Grazing
- Agrivoltaics

SolarCulture™ is a Pine Gate Renewables (PGR) initiative. Based in North Carolina, PGR has been developing utility-scale solar projects across the country since 2014. Their goal is to use SolarCulture to redefine industry best practices for utility-scale solar to enhance environmental stewardship, promote sustainable agriculture, and collaborate with communities. The process started in 2017 with a group of employees knowing they could create a more conscientious method of solar development. The idea of incorporating permaculture practices on the land their solar farms would inhabit for the next 30 years inspired them to lean into the idea. "We developed a small internal working group of our most interested employees, identified a consultant with permaculture experience, conducted site visits, began meeting and collaborating with local and regional subject

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matter experts, and the initiative has been rolling since!” says Claudia Weeks - Site Operations Manager of Pine Gate Renewables.

There are four main types of dual-use solar: pollinator friendly, conservation, grazing, and agrivoltaics (crops and solar). SolarCulture uses either pollinator friendly, native plant restoration or agrivoltaics depending on the goals of each site. What makes SolarCulture unique from existing dual-use projects is incorporating permaculture principles and partnerships with local and national institutions, like the National Renewable Energy Lab (NREL), Oregon State University (OSU), Argonne National Labs, and The Nature Conservancy. By working with research institutions, research goals are built into their sites from the beginning. The research then informs best practices for any given region and has served as the foundation and future of the SolarCulture initiative. “Contractor availability is a primary determining factor for which SolarCulture approach is taken on a given site. If we find a local company or research institution that is knowledgeable on native plant restoration and

**Eagle Point (Jackson Co., OR)**

Previous Use	Dairy Grazing
Size	41 Acres restored with native pollinator habitat
Capacity	10 MW 1,575 Homes
SolarCulture Design Considerations	✓ 48 apiaries ✓ Native Prairie restoration
Research Partnerships	1 Acre NREL Plot Argonne Labs

**Valley Creek (Polk Co., OR)**

Previous Use	Dairy Grazing
Size	41 Acres restored with native pollinator habitat
Capacity	10 MW 1,575 Homes
SolarCulture Design Considerations	✓ 48 apiaries ✓ Native Prairie restoration
Research Partnerships	1 Acre NREL Plot Argonne Labs

equipped to implement a more intensive approach, we know that site will have high quality day to day management and long-term planning and monitoring process which leads to a successful site,” says Claudia Weeks - Site Operations Manager of Pine Gate Renewables.

What also excites the Pine Gate Renewables team is the general trend of interest from third parties who want to include a more holistic sustainability focus in their own portfolios. “We receive emails from external parties regarding anything permaculture related, because PGR is now associated with solar development that goes above and beyond standard best practices,” says Evan Bixby - Market Lead with PGR. PGR wants to redefine industry best practices to allow the industry to serve a larger, more productive role within the communities they work with for the long term. “As a renewable energy company we recognize the challenges our country and the world are facing as our climate continues to change, including challenges faced by our agricultural communities. We know land is a valuable commodity, we see the opportunities for the land under our panels to help address some of these challenges. We want solar farms to maximize the benefit we, and other solar developers, are offering communities.”



## ***The Business Case for Dual Use...***

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*“I want to conserve farmland over development but I feel there is a place for solar and farming. I don’t believe [dual use] removes land from farming practices but actually enhances diverse pollinator habitats and encourages diverse farming practices.” – Sean Prive co-owner Understory Consulting*

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SolarCulture has been in the networks developed through this initiative and that impact has been immeasurable. “The PGR network has grown organically as partners learn about the initiative, make connections, and identify new opportunities and collaborators,” says Evan Bixby - Market Lead with PGR.

Sean Prive and his wife Kathryn, co-founders of Understory Consulting, got involved with PGR’s SolarCulture a few years ago. They provide site prep and diverse seed mixes which includes native seeds for vegetation management, or weed control. Historically, Understory Consulting worked with BLM to restore disturbed land, such as fire restoration and road maintenance, using a cache of native seed gathered and stored over the years. With Oregon’s fire season lengthening, the native seed mix dwindled quickly. As Understory Consulting also began working with solar developers, he quickly discovered the bottleneck was sourcing native seed mix, so he and his wife started Understory Initiative, a non-profit dedicated to finding funds to set up pollinator habitat on private land. The goal is to encourage farmers to grow native species for seed mix and help bolster local economies and help Understory source local native seeds for their restoration and dual-use work. Sean says that these experiences with dual use practices have led him to not advocate for farmland conservation in the traditional sense but rather, “I want to conserve farmland over development but I feel there is a place for solar and farming. I don’t believe [dual use] removes land from farming practices but actually enhances diverse pollinator habitats and encourages diverse farming practices.”

Understory Consulting works with PGR on an on-going contract which is a three to five-year commitment for proper site prep for vegetation management. “Pine Gate has been very genuine to their commitment to the Dual Use model, they sincerely want to do the work the right way and they have committed to multiple years of effort to get it right,” says Sean Prive. “It has given us the security as a new company to engage with the process, to learn and grow”.

PGR sees SolarCulture as an additional benefit their projects can bring to the communities they are working with and so far, this additional benefit has been well received. In many cases, SolarCulture community benefits have been very attractive to the

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Redefining best practices has been a process not without challenges. PGR has worked hard to better understand and streamline the front-end investment needed for successful SolarCulture sites. The front-end costs on these projects are greater based on the time needed to develop relationships, source native seeds, identify and train specialized contractors to take on the vision and goals, and to properly prepare the site. Despite the risks of early stage investments, PGR has remained confident that with proper implementation and subsequent reduced vegetation management, they could recoup much, if not all, of those costs over the life of the project while giving back to the land and community. The real value gained from

## ***From a Research Perspective...***

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### ***Pollinator-friendly***

*– In OR, 24.7 acres of ag land could benefit per 1 acre of solar planted with pollinator-friendly species. NREL (Walston 2018)*

*- Pollinator-friendly plantings = cooler microclimates, increasing panel efficiency. OSU (Higgins 2019)*

### ***Grazing***

*- Growing sheep forage under panels extends growing season. OSU (Higgins 2018)*

*- Possible better nutrition, health outcomes. OSU (Higgins, pending)*

### ***Agrioltaics***

*-Combined output of solar+ag compared to output of single use on same-size site*

*value >1 indicates more efficient production. Land Equivalency Ratios (Dupraz & Marrou 2011)*



individuals and businesses living in the area. Community benefits include increased pollinator services, decreased pesticide use, increased native pollinator habitat and population, increased soil and water health, local clean energy production, county tax benefits, and increased local job opportunities. PGR strives to conduct quarterly site visits to each SolarCulture project, but otherwise relies on their qualified contractors in the region for operations and maintenance. In Oregon, these collaborators include Understory Consulting, Lomakatsi Restoration Project, Aspen Creek Landscaping, and Old Sol Apiaries, among others. Researchers from OSU and NREL also assist in managing their test plots onsite. An additional community benefit PGR hopes to implement on SolarCulture sites are site tours for community members and decision makers, so they can directly experience a successful site and have their questions about Dual Use answered in person.

The future of dual use solar is bright. PGR considers incorporating it in as many sites as possible to provide added benefits to the land, opportunities for research and collaboration with the communities where they work. PGR's approach to solar development has pushed the envelope for utility-scale solar development best practices to include a holistic approach to distribute environmental benefits to as many community members as possible. Understory Consulting also sees opportunity in dual use solar, "I know that ag producers are worried about farmland being taken out of production. I hope there is more of a recognition that this isn't eliminating opportunities, it is creating them. I hope that awareness spreads. I think there is a place for land conversion that is more hospitable to honeybees and vegetable production," says Sean Prive. With concerns about land-use increasing, this model offers common ground for solar, farming, and land-use communities to come together and create benefits for all.



*Dual Use Solar with Agrivoltaics photo courtesy of Old Sol Apiaries*

**About Pine Gate Renewables** is a utility-scale solar developer, owner, and operator with 400+ MWs of operational sites across the country. PGR is intent on contributing to the broad transformation of our nation's energy model based on the belief that renewable power is both sensible and practical, and that locally-generated clean energy is not merely an alternative, it is the only way forward. To learn more about PGR and their mission to Get Solar Done, visit [www.pgrenewables.com](http://www.pgrenewables.com).

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