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HOW FARMING THE SUN OFFSETS ENERGY LOADS

SOLAR'S FINANCIAL AND ENVIRONMENTAL PAYBACK

By Megan Schilling
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The power of the sun captured passively in solar arrays boosts energy independence and economic returns on the farm.

While solar has been cost-prohibitive in the past, the rising cost of electricity and the dropping cost of solar installation has created a compelling crossroads where the investment and payback make financial sense.

Jeremy Lipinski, managing partner of Emergent Solar Energy located in the Purdue Research Park in West Lafayette, Indiana, says the solar projects his company has designed and built in the past year have had five-year paybacks with the proper utilization of tax credits and grants.

"A payback under seven years becomes very compelling because the components we install generally have a 25-year production warranty from the manufacturer and a 30-year economic life," Lipinski explains.

Avoided costs of utility expense can reach into the hundreds of thousands of dollars depending on the size of the operation. Saving that money over the course of 30 years is then a resource for the farm that can mean security for the next generation.

ON-FARM SOLAR ECONOMICS

The initial step to determine if solar makes sense is an analysis of the energy load. Lipinski recommends first reducing your energy load and applying solar second.

"If you can change how you run your grain dryers, for example, which are run heavily in the fall and not used for a large portion of the year, you can reduce the kilowatt demand charges," Lipinski says.

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The demand charges may be a large part of the bill if the customer uses a lot of power over a short period of time, and a smaller part of the bill if the customer uses power at a fairly constant rate throughout the month.

Lipinski says the goal is to shave the demand peaks, thereby reducing the energy spikes from the grain operations induction motor starts. Solar can help offset some of these peaks depending on when they occur. Time of operation changes and energy efficiency upgrades will also have a positive impact on the demand portion of the bill.

Hog barns are uniquely suited for solar because their energy load resembles are arc from day to night. A steady load like this throughout the year is charged by the utility in kilowatt hours, which can be eliminated with solar.

“The typical farm we see has around two 4,000-head hog barns, a 100,000-500,000-bushel grain storage system, a number of outbuildings buildings, and a house,” Lipinski says.

Lipinski takes into account the tax liability, ability to use the solar tax credits in a timely manner, and if there are USDA grants available. He also designs solar projects to ensure they achieve a high percentage of energy load offset, usually between 75-90%. The higher the offset, the better the project returns will be, and the likelihood of getting funding from a USDA grant increases.

Energy consumption data determines the offset percentage with that information, Lipinski builds an economic proposal. “We start with the optimal size to get the highest economic returns and work our way down to an investment amount the farmer is comfortable making and that is suitable for the specific operation,” he says.

On-farm solar projects, especially applications like hog barns, do well when grid-tied for the reliability. The alternative requires battery storage, which is generally cost-prohibitive. Most farms do not consume all the energy produced from the solar array, so the net metering benefits the project economics as well.

THE HARLOW FARM

William Harlow is a sixth-generation farmer in Tipton County, IN, where he grows corn and soybeans on about 2,500 acres. In 2019, he worked with Emergent Solar to design and install a 124kW array that offsets 90% of the farm's total energy load.

The Harlow farm consists of finishing hog barns, a grain handling system for storage, outbuildings including a shop and dog kennel business, and the family's home.

Prior to starting his solar project, Harlow researched the potential for other green energy applications on his farm, including wind. Solar just made sense.

"Unfortunately, the farm economy is now squeezing from both directions with high equipment costs and fertilizer inputs, and the market not being anywhere near what we want," Harlow says. "Anything I can do, even if it means spending money in the short term to eliminate spending a lot more money in long term, that's something I'm definitely interested in."

One input Harlow has eliminated with the solar project on the farm is mowing and spraying the space around the array. This is thanks to the seeded pollinator habitat that Lipinski incorporated into the final project.

The Bee & Butterfly Habitat Fund out of Minnesota provided Lipinski a custom seed mix of native vegetation to support the environment and ecosystem needs in central Indiana.

Ground-mounted solar arrays typically span one to two acres and are built-in fallow ground between barns or set back from a field to avoid shade from a corn crop.

"The array and the pollinator habitat both are a 'set it and forget it mentality.'" Fixed ground solar has no moving parts and we only we do a semi-annual diagnostic for the farmer," Lipinski says.

Pairing solar with a wildlife habitat amplifies the green energy on the farm.

"As a farmer in the plant business, I know that having plants and pollinators work side by side with the farm is a mutual benefit," Harlow says. "I don't have to mow, I'm getting the benefits of a wildflower field, and it's yielding me solar energy."

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FUTURE OF SOLAR

“Every farm that can go solar will go solar as the installation costs continue to drop,” Lipinski says.

The nationwide average increase in grid electricity is 3%, according to Lipinski. “How many 3% annual increases do you need to afford solar? Lowering your input costs to get the same output is worth pursuing.”

While right now, many solar projects are retrofitted into operations, in the future, solar will be designed, optimized, and built into structures from the onset, even further reducing costs.

“Although I focus on project economics, I don’t want to diminish the environmental impact that solar has,” Lipinski says.

Harlow is driven by the power of technology and clean energy and looks forward to the long-term benefits of both. “Do your research on solar, don’t just jump in. But like a lot of things, if it is something you’re interested in, then it’s something you should probably do.”

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Learn more about on-farm solar power economics and applications:

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