Solar Story

Jeremy King

Sustainability in Education

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Environmental Education Council of Ohio

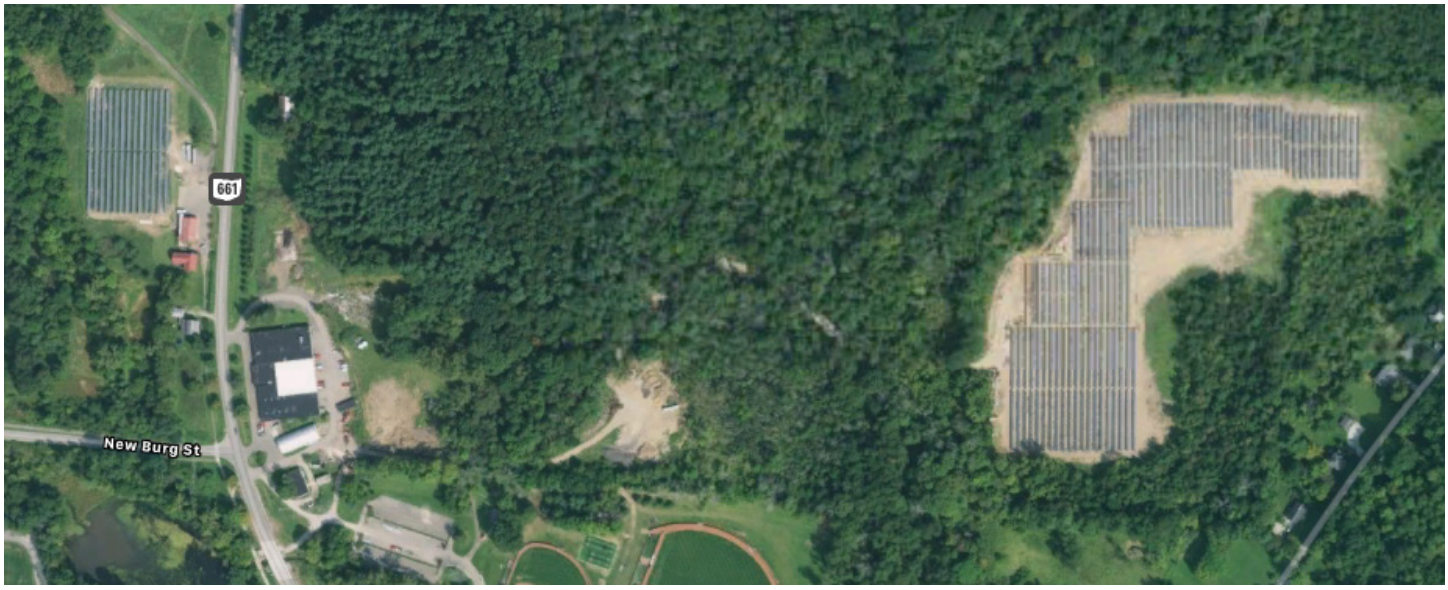
Back in 2014, Denison University made a decision to seriously consider a large ground mount solar array. As the college's Sustainability Coordinator, I felt like we were finally taking my work seriously. To be fair, the college had already made a commitment to be carbon neutral by 2030 and was making significant investments in energy efficiency. However, large scale solar is the holy grail for people in my line of work. I was elated and excited to dive in.

Denison worked with AEP Energy on the project. In this partnership, AEP Energy would own and operate the array and Denison would buy the power from it. These types of deals are called power purchase agreements, PPAs, and are fairly common for tax-exempt entities like colleges and k-12 schools that can't take direct advantage of federal incentives. By making the investment, AEP Energy was eligible to receive a 30% tax credit and accelerated depreciation on the array. Denison would have no capital outlay and would only need to provide a parcel of land on which to build the array.

As the Denison and AEP Energy team began exploring the project, we first looked at what size of array made the most sense for the college. In modeling our campus energy load, we decided that having an array that matched our baseload (the minimum amount of power we use at any point in time) would be ideal. This ensures that all of the power generated from the array gets used by our campus all of the time. While, Ohio, has decent net-metering rules right now, we didn't want to risk changes to those rules that might disincentivize putting power back on the electric grid.

Denison's baseload is around 2MW of power, thus an array in the 2.3 MW range would work nicely. Why the difference in power? Solar panels produce power as direct current (DC) and our buildings, like your homes, operate on alternating current (AC). Arrays need inverters to convert the power from DC to AC. If you remember back to your high school science days, you'll remember that energy conversions aren't perfect, and you always lose a little bit of power along the way.

Once we determined the size, we started looking at where to put it. Denison explored an old dump area, a couple of farm fields by the campus, and some athletic fields. None of these sites met our size criteria and some were not suitable for an array. I was frustrated as I saw the opportunity for a large array slowly slipping away. A rep



Array split into two sections.

Left is the Red Barn array producing 0.40 MW through 1170 panels

Right is the East Creek array producing 1.93 MW through 5580 panels

Array Details

- Operational - December 2017
- 6750 REC 345w panels
- ~2.33 MW DC
- Single-axis tracking
- Projected to offset 15% of Denison's annual electric load – 2850 MWh annual production
- Designed to match Denison's baseload energy use
- Entire area was replanted as pollinator habitat

from AEP looked at our campus map and pointed to a 10-acre parcel of land and said, "what about here?" Little did he know that he was pointing to a piece of land located on the south east corner of Denison's 350-acre biological reserve. I shook my head and said, "that site is going to go over like a ton of bricks."

Much to my surprise though, our biology faculty were supportive of this site. It was previously a farm field and then in the 1980's, the college stripped away much of the topsoil to build a baseball/softball complex. The field was then left to the whims of natural succession. As you can imagine, over the next 30 years, invasive and nuisance species took over much of the site. Denison saw an opportunity to put this land into more productive use, by clearing it and installing a large solar array that would provide 15% of the college's annual electric usage.

The site itself is across the street from where I live and a number of houses (my neighbors) back up to the site. I told the planning team that we needed to reach out to the neighbors to get their feedback. Much to my chagrin, their response was immediately negative. To be fair, these neighbors have property that backed up to Denison's bio reserve. They saw the reserve as an extension of their backyards and were upset that Denison was going to develop it into an industrial energy plant (their words, not mine).

The design and layout, however, would put the array no closer than 300 feet from anyone's home and that the space between was already filled with trees and shrubs and would continue to be so. In essence, few of the neighbors would even be able to see the array. Nevertheless, nine of the thirteen neighbors launched a legal battle fighting the Village of Granville's zoning approval. We spent the next two years stuck in litigation.

The neighbors eventually dropped the lawsuit once it became clear that they weren't going to win. The project finally moved forward in the spring of 2017, and panels started going up in July. During the installation, the site manager from the firm hired to build the array, Third Sun Solar, stopped me one day and told me about an article he had read about pollinator-friendly plants being planted in and around solar arrays in Minnesota. It seemed like a perfect idea for our array site.

We quickly formed a team of stakeholders in the project and sought the advice of U.S. Fish & Wildlife and our local Soil & Water Conservation District. Over the next few months we met, planned, and finally come up with a list of species and a timeline.

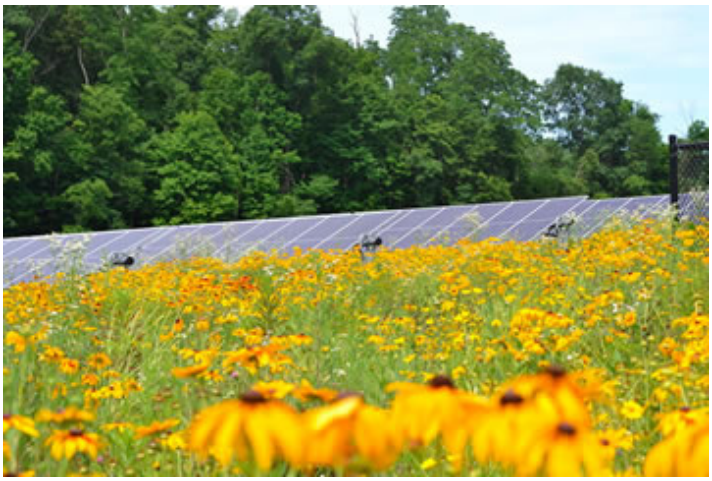
The array was completed in December 2017 and consists of 6,720 panels with single-axis tracking – meaning they move with the sun over the course of the day. It produces 2.8 million kWh of electricity each year; enough to power 2,000 homes.

In May 2018, the area between rows of panels, under panels, and around the array was planted with a native species mix that included 16 types of flowering plants and few grasses. The 10-acre site became the first solar array pollinator habitat project in Ohio.

These types of plantings generally take three to four years to get fully established and ultimately lead to less maintenance cost around the array. Instead of mowing grass around the array every few weeks, we mow the wildflower prairie just once per season.

Now in its second growing season, the site features more than 1 million pollinator-friendly plants. We have successfully taken a biologically unproductive and problematic parcel of land and turning it into something more environmentally friendly. It's a unique marriage of technology and ecology that allows us to produce clean power for our campus while also providing high quality habitat for pollinators.

In the coming years we'll be conducting a number of ecological studies at the site and adding a bird observation deck, as well as a number of interpretive trails around the array. This isn't just a solar farm with some wildflowers, it's an educational site and hopefully a model for others to follow.



Large array site was planted as pollinator habitat – May 2018

Partnership with U.S. Fish & Wildlife, Pheasants Forever, Licking Soil & Water, & Third Sun Solar

Contact

Jeremy King
Denison University
Director of Sustainability
& Campus Improvement
kingje@denison.edu
740-587-8680
https://denison.edu/campus/green

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Environmental Education Council of Ohio

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