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# University unveils huge solar array



PHOTO COURTESY OF IDEAL ENERGY An aerial photograph shows the immense size of the 1.1 megawatt solar array recently built to power Maharishi University of Management. The array, and accompanying battery storage system, will provide one-third of the university's electrical needs.



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With the flip of a switch, Maharishi University of Management has radically changed how it powers its campus.

The university inaugurated a massive 1.1 megawatt solar power array during a ceremony Friday. The array, located on the northwest side of campus near the Gateridge Building, is designed to provide one-third of the university's electric power.

The installation is truly one-of-a-kind. The 1.1 megawatt array is matched by an equally large battery energy storage system, making it the largest solar plus battery storage project in Iowa. The project will bring the university's renewable energy share to nearly 43 percent, and significantly reduce its utility bills.

According to the university's website, it already has solar panels on several of its buildings, and sports a wind turbine at its Sustainable Living Department building. It purchases additional electricity from Alliant Energy, which derives 16 percent of its power from wind farms.

The project is noteworthy for other reasons in addition to being large. It employs a couple cutting-edge techniques to maximize energy absorption and retention. One of those is obvious to the naked eye: the panels rotate, following the sun as it moves across the sky. According to a press release from the university, this "active solar tracking" as its known yields 20-25 percent more energy than a standard fixed-tilt array.

The rows of panels can move independently of one another because each has a motor. The panels are programmed to move at a different rate depending on the season, which affects how long the sun is in the sky. Not only that, but according to M.U.M.'s website, the panels can rotate vertically to shed snow, and rotate horizontally to avoid being flooded. They can withstand golf-ball sized hail and 115 mph winds.



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The other piece of modernity is the use of vanadium flow batteries. This combination of technology – active tracking panels and vanadium flow batteries – is rare. In fact, M.U.M. vice president Craig Pearson said this is the first solar installation in the United States to combine the two features.

Vanadium flow batteries are renowned for maintaining a high storage capacity during their entire 25-year lifespan, in contrast to other batteries such as lithium ion, whose capacity dwindles with age. Lithium ion batteries are better suited for delivering large amounts of energy in a short time, while vanadium flow batteries are designed to meet a more stable energy demand over an extended period.

Why are batteries important to a solar array? Batteries allow customers to shave their energy usage during peak times, avoiding expensive peak charges from their utility. Battery energy storage systems automatically detect when power usage exceeds a predetermined threshold and switch from the grid or solar panels to batteries until the additional demand is over. When demand is lower, the batteries recharge.

Fairfield company Ideal Energy constructed the array. Co-owner Troy Van Beek said M.U.M.'s installation is both the largest array and the largest battery storage system the firm has ever built.

"Solar power is amazing – it's a clean, renewable energy source that's going in all over the world," he said. "One of the biggest criticisms of renewable energy is that it's intermittent. The advantage of coupling the array with battery storage is that it provides a continual energy source."

Van Beek said batteries are especially important in Iowa, which has some of the highest peak demand charges in the nation.

Van Beek said he hopes M.U.M.'s installation will be a serve as a model to businesses, institutions and individuals, showing them what is possible with solar power.

M.U.M.'s vice president of operations, Tom Brooks, said the university expects to save \$40,000 per year for the next five years thanks to the array. The university's treasurer, Michael Spivak, estimated it could save \$2.5-\$3 million during the next 25 years, and possibly more if electric rates rise.

FEDA executive director Joshua Laraby explained that solar installations are becoming more and more prevalent, especially in Fairfield and Jefferson County. He said what sets this project apart from other installations is the battery storage piece.

"What sets this project apart from all other solar installations is the battery storage component paired with all of the other technologies tied in," he said. "It's the largest of its size and kind in Iowa and possibly in the Midwest. This project will demonstrate to the rest of Iowa what's possible with electric cost savings, especially with large commercial and industrial electric users who are subject to demand charges on their electric bill."

Laraby said he expects the savings from switching to solar to be invested locally, too.

"Over the next 12-18 months, in partnership with Iowa Economic Development Authority and Ideal Energy, we'll be taking a close quantitative look at the performance of the installation, with the intention to help lower energy costs for Iowa businesses and making Iowa a more competitive business environment."

Though the array is built and installed, Ideal Energy's work is not done. The company will collect data on its energy production, return on investment, battery performance and maintenance costs.

Fairfield Economic Development Association announced in the fall that it had received a grant for \$200,000 to facilitate research of M.U.M.'s solar array and another array in town, at Agri-Industrial Plastics. The array at Agri-Industrial Plastics is 517 kilowatts, employs fixed-tilt panels that do not move, and uses lithium ion batteries.

Ideal Energy will evaluate 12-18 months' worth of data from the two projects starting in 2019. The Iowa Economic Development Authority, which supplied the grant, will publish the results of the research when they become available.

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M.U.M. president John Hagelin and his predecessor Bevan Morris have signed the American College & University Presidents' Climate Commitment and Paris Climate Initiative, promising to make the campus carbon-neutral within a decade.

"This new solar field is a big step forward in that continuing effort to promote life in accord with natural law," stated the university's website.

Pearson said the university has been strongly committed to sustainability ever since it was founded. Other examples of the university's commitment include its bachelor's program in Sustainable Living, the first degree program of its type in the country.

"We also have the first undergraduate degree program in regenerative organic agriculture in the country," he said. "Our dining hall serves organic, vegetarian cuisine, which also means a significantly lower carbon footprint in this area, as well as healthier food."





**Andy Hallman**

*News Editor*



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