2017

University of Minnesota Campus PV Development Roadmap

SUN Delegation Visit to NREL

Energy Transition Lab

UNIVERSITY OF MINNESOTA

Driven to Discover℠

University of Minnesota SUN Delegation

University of Minnesota

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CAMPUS PV DEVELOPMENT ROADMAP

The Solar Endowment: A PV Investment Roadmap for U.S. Universities and Foundations

Solar energy provides Universities with the opportunities to expand experiential learning and research, diversity and increase the resiliency of campus infrastructure, engage alumni, donors and prospective students/faculty, advance sustainability goals, and enjoy monetary savings. In 2015, the University of Minnesota's Energy Transition Lab created the SUN Delegation with guidance from MREA and Institute on the Environment. Between 2015 and 2017, the Delegation worked with University staff and faculty to identify pathways to invest in solar energy. These efforts were an instrumental catalyst in encouraging University decision makers to invest in solar. Since the SUN Delegation was formed in 2015 the University has taken the following steps to invest in solar:

Community Solar Gardens (CSG): In 2016, the University subscribed to two megawatts (MW) of solar power from a CSG developed by Geronimo Energy. This investment will save the University approximately $800,000 and offset ~55,300 metric tons of greenhouse gases over 25 years. In 2017, UMN subscribed to a total of 22.5 additional MW. The additional subscriptions are expected to produce 1,095,187,000 kWh of electricity and generate $35,661,070 in savings over 25 years.

On-Site Solar: Ameresco, Inc will install 2.255 MW of solar panels on the Twin Cities campus. The University's new Bell Museum will also include several small educational solar arrays. Delegation students also developed a transportable solar testbed that students will be able to use on campus.

Duluth Campus Student Services Fee: UMD students successfully petitioned and received $100,000 from the Duluth Campus Student Services Fee and another $50,000 from UMD's Revolving Loan Fund. The funds will be used to install an 11kW PV array on campus in 2016.

Xcel Energy Renewable Connect: UMN recently signed up to participate in Xcel Energy's program, which allows ratepayers to subscribe to energy produced from wind and solar.

The University recognizes this as a step forward towards sustainability and a wise financial investment. This campus roadmap describes the process that UMN students, faculty and staff undertook to investigate and invest in solar. The SUN Delegation compiled this roadmap to guide other higher education institutions considering a path to solar.

The SUN Delegation Team

Over the course of the project the SUN Delegation consisted of nearly 100 Undergraduate, Masters and Doctoral students from diverse academic backgrounds. Students broke into groups to work on specific tasks including Legal/Regulatory Analysis, Site Assessments; Finance; Outreach etc. To keep students engaged, the SUN Delegation became a formally recognized campus group and offered students opportunities to receive academic credit, participate in internships, take MREA's online PV Site Assessment courses, and attend conferences. Students also visited the National Renewable Laboratory (NREL) to receive guidance from the lab's top experts. These opportunities for experiential learning incentivized participation and were excellent growth and networking opportunities. Several students have secured solar jobs through connections they made through the SUN Delegation.

SUN Delegation Students at NREL

Decision-Making Process and Key Stakeholders

As a first step, SUN Delegation students identified the concerns of key stakeholders. Energy Transition Lab Director Ellen Anderson met with University decision makers to tell them about the project and prepare them for upcoming proposals. These conversations helped inform the Delegation's strategy and the pre-briefings ensured that University leaders felt this was a cooperative effort. Based upon multiple conversations with priority decision makers, students identified concerns about solar energy investment, including the ability to generate and use Renewable Energy Credits (RECs), grid integration, compatibility with existing infrastructure, changing solar regulations, solar industry turnover, reputation, and the University's sustainability commitments.

Identifying Priority PV Development Sites on Campus

The Delegation identified sites with the solar potential by researching buildings' solar insolation, history, construction schedules, and infrastructure. For each site, the team conducted an assessment, estimated system size, production, and costs; identified non-financial benefits, and consulted University staff.

Students Conducting Site Assessments at UMORE Park

Costs, Risks and Legal/Regulatory Considerations

Students investigated utility interconnection requirements, the University's planning process, and permitting/zoning requirements. Students also identified state and regional policies that reduce the cost of solar and incentivize developers, financers, and utilities to collaborate with the University to maximize its solar investment. These policies include Renewable Energy Standards (RES), Community Solar Legislation, incentive and rebate programs, Value of Solar rates, Solar Easement Laws, and Net Metering policies. Declining solar prices combined with a favorable policy landscape incentivized the University to explore solar investments. Students prepared Requests for Proposals (RFPs) based upon University decision makers' concerns, old RFPs and solar projects conducted by local municipalities. Using the student work as a foundation, the University underwent a continuous redrafting process and developed RFPs for both GSG subscriptions and on-site solar installations.

Project Financial Goals and University Investment Opportunities

UMN utilized the following financing models to fund solar investment due to their ability to maximize the University's financial gains while minimizing costs:

Community Solar: A CSG is an arrangement where a developer owns a PV array and sells electricity subscriptions. Subscribers receive a bill credit for each kWh produced. Students prepared a CSG Subscription Roadmap that explains the process UMN went through to obtain CSG subscriptions.

Third Party Finance/Power Purchase Agreement (PPA): Under this model, a third party finances and owns the project and the University purchases the electricity. A PPA is an agreement to purchase power from a project for a set period at a pre-agreed price. The UMN utilized this financing model for on-site solar installations because collaborating with a developer allowed the University to take advantage of tax credits that are not directly available to nonprofit institutions.

Case Purchase: The UMN typically only uses direct cash purchases for small-scale projects.

Green Fees: Green fees can be mandatory or optional fees for a specific purpose or part of routine budget cycle. In 2016, Delegation students petitioned the UMD Student Services Fee Committee and received $100,000 in capital improvement funds for student-led solar deployment on campus.

Revolving Loan Fund (RLF): A RLF provides capital for projects that create some level of return or cost savings that then are used to repay the fund until the full project cost has been paid off. The most common source of seed capital is administrative funds but student fees, student government funds, pre-existing efficiency savings, and donations have also been used to seed RLFs. UMD has a Green Revolving Fund which the Delegation utilized to help fund on-site solar on the Duluth campus.

Students were able to use MREA's Solar Project Builder calculator to compare the financial benefit of various financing options for solar installations.

Recommendations and Conclusion

The Delegation identified several policy recommendations that, if implemented, would facilitate additional renewable energy investment and encourage university research, teaching, and outreach related to solar. These recommendations include:

- Include solar installations on University printed materials to show UMN's sustainability commitment and attract students/donors.
- Ensure that all new construction and renovations are solar-ready.
- Fund solar installations from the electricity budget. This would allow the University to analyze solar investment opportunities compared to alternative energy opportunities more directly.
- Adjust UMN Investment Policies so they reflect the University's sustainability commitment.
- Adopt internal carbon prices to ensure the UMN is accurately considering the true costs and benefits of renewable energy.

The University's efforts resulted in a total investment of 26.755 MW of solar through CSG subscriptions and on-site solar. These investments will have significant benefits over time including cost savings, advanced sustainability goals, improved educational and research opportunities, improved infrastructure resilience, and a positive public image. These investments also demonstrate the UMN's commitment to sustainability and establish the University as a national model for higher education institutions. This roadmap outlines the process that UMN took to investigate and ultimately invest in solar, and demonstrates some of many ways that other Universities can make environmentally, socially, and economically wise solar investments.