10 Step Guide to Creating a Solar Photovoltaic Roadmap

Steven Ansorge and Kenneth Walz

In 2018, a team from Madison College participated in a course organized by the Midwest Renewable Energy Association to develop a solar roadmap for the institution. The project was funded in part by the U.S. Department of Energy SunShot Initiative. The solar roadmap established institutional priorities, and evaluated all of the school's campus locations and buildings to prioritize future investments in solar photovoltaic installations. The Madison College Solar Roadmap is a 60 page document that has been incorporated in the Madison College Facilities Master Plan, to guide solar projects to be completed by the college over the next decade.

This 10 step guide was created to help other schools and school districts to learn from Madison College's experience. We hope that this will help to lower the learning curve for others, and help to accelerate the adoption of solar energy technology at other colleges and K-12 schools in Wisconsin and nationwide.

10 Steps to a Solar Roadmap for Educational Institutions

1. **Identify Team and Articulate Purpose:** Assemble a team consisting of individuals that representing key groups: facilities operations manager, renewable energy faculty/subject matter expert, institutional financial officer, and students. It is important to have representation from each of these parts of the institution, because they will all be affected by the roadmap. Equal representation on the team ensures valuable input from multiple perspectives. It is also helpful to define the scope of the Roadmap planning process at this stage, so that everyone agrees on the goals, and understands the intended outcome.

2. **Motivating Objectives:** Once the team is assembled, identify what the institution's primary reason(s) are to pursue solar energy. Objectives may include ambitions such as cost savings, learning opportunities for students, energy budget certainty, social and environmental goals, energy resilience for critical electrical loads, and "green" visibility. Objectives can be ranked, weighted or prioritized in some way so that they can be used to assess potential solar projects. The team may wish to have individual members rank priorities to capture the point of view of various constituents, and then use some method of averaging to arrive at a consensus.

3. **Identify Stakeholders:** Figure out who all will be impacted by the solar plan. From students, faculty, staff, different offices from the institution, utilities, community, etc. This list will help guide the process on who to work with and when. The stakeholder list will also facilitate communications when executing the plan, to make sure that everyone is kept informed.

4. **Quantify Energy Usage and Costs:** At this step, the team begins to gather information on the energy consumption of their institution and the associated costs. If the institution has multiple campuses and buildings, the data collection and analysis will be more complex. Some

organizations may also wish to consider external costs (e.g. costs to the community's health due to power plant emissions), although these are much harder to quantify.

5. **Document Energy Management Practices**: Identifying what the institution is already doing to reduce energy costs and environmental impact is important. It is usually most cost effective to first make a strong commitment to energy efficiency and energy management before implementing solar projects. If the total amount of energy required by a facility is reduced, then a solar system of a given size can offset a larger portion of the facility's energy needs.

6. **Assess Sites for Solar:** The team must identify possible locations and structures where solar can be placed. It will be necessary to explore the available solar resource, to identify landscape features such as trees that might cause shading, and to research building factors such as orientation and the age and structure of the roof. Local permitting and regulatory issues may also be considered (e.g. interconnection rules, zoning restrictions, airport restrictions, etc). If the institution has more than one electrical meter, it will also be desirable to compare electrical loads and electrical rate structures for each potential solar location.

7. **Funding:** Identifying sources of funding is another important part of the Solar Roadmap team's tasks. This typically would include either operational or capital funds, or perhaps a mix of both. The team may explore financing options such as bonding and tax equity financing. Pursuit of grants and other incentives can also help to improve project economic benefits.

8. **Model and Prioritize Projects:** The team will want to use tools such as SolarProjectBuilder, NREL's PV Watts, System Advisor Model, and/or ReOpt to model the energy and economic performance of potential projects. The energy generation potential for each of the candidate solar sites should be modeled, and economic parameters such as simple payback period, internal rate of return, and net present value estimated. After these steps have been completed, the team formulates a priority list for the Solar Roadmap. Projects should be ranked based on the Motivating Objectives that were establish in Step 2 of the Solar Roadmap process.

9. **Disseminate the Plan:** Once the roadmap is finalized, work to disseminate the plan, sharing it with the various stakeholders from step 3. The roadmap provides a guide for college leadership, and it will likely influence the institution's Facilities Plan, Academic Plan and Sustainability Plan. It also serves as a document for communicating the institution's goals and objectives to potential partners and community supporters who might be able to assist with future solar projects.

10. **Implement Projects:** The prioritized list of projects are executed by the parts of the institution that were identified in step 3. The projects will likely not happen all at once, but can be acted on over time as resources allow. When executing projects, the team will want to be sure to plan for future operations and maintenance. Solar panels are warrantied for 25 years, but there will be O&M costs that occur during that timeframe. Ideally, the Roadmap can be published as a "living document" so that it can be updated as projects are completed, and priorities can be adjusted as situations change (for example if a roof is replaced on a building, that might bump it up in the rankings).