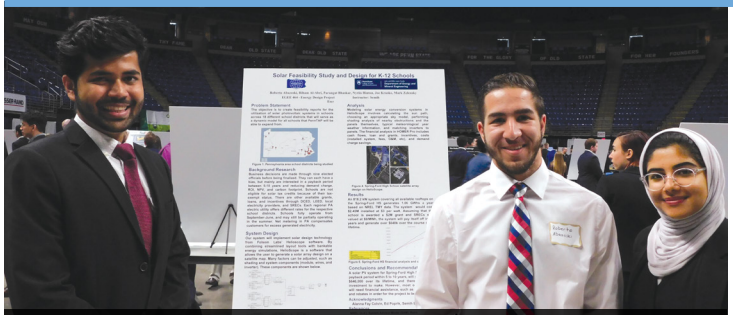
PennState

PennTAP
Pennsylvania Technical Assistance Program

Creating a Solar Energy Feasibility Tool for Pennsylvania Schools



Penn State students (l-r): Parangat Bhaskar, Roberto Abazoski, and Riham Al-Abri. Not pictured: Nyriis Hinton, Joe Krusko, and Mark Zelensky.

"This project helped these students to effectively apply their in-classroom learning to create real-world solutions for problems that Pennsylvania schools currently experience. I was very impressed with the level of knowledge and professionalism they displayed as they presented project findings and solutions. This was a truly stellar example of student-engaged scholarship."

— Richard Smith,
Director, Community Engagement, Penn State

The Need

As carbon-free energy becomes more and more popular, school districts in Pennsylvania are exploring the financial feasibility of installing solar photovoltaic (PV) systems. These schools need a tool to help them evaluate the move to a solar PV system.

The PennTAP Connection

A team of Penn State College of Engineering students, working through the Bernard M. Gordon Learning Factory, collaborated with a PennTAP technical advisor to create a solar PV evaluation tool designed specifically for Pennsylvania schools. PennTAP currently engages school districts and local government municipalities through the Building Re-Tuning training program; a program aimed at identifying no-cost/low-cost building operational corrections to reduce energy waste. This design project supports school districts that are ready to take "the next steps" in their sustainability programs.

The Project

To begin the project, the students gathered the electricity load profile of a number of Pennsylvania schools, approximating the figure when data was unavailable. They then researched electricity rates, demand charges, solar installation rates, and funding sources for each school. As the project progressed, the team determined solar panel scalability to create a feasibility report of any size desired, within rooftop area limits.

The students created an Excel spreadsheet that explores and graphs feasibility for school districts to buy a system or establish a power purchase agreement. A Visual Basic for Applications (VBA) macro was created to allow users to run multiple scenarios with the click of a button. The spreadsheet also measured the capacity of the solar PV system in relation to the school's total energy load to illustrate the impact that the system would have on the school.

The Outcome

The final result of the project was an Excel-based tool that can be used to size a rooftop solar PV system. It includes specific local data for 20 school districts in the state of Pennsylvania. The tool is a PV system designer and advisory model. It allows the user to select a Pennsylvania school district from a drop-down menu and answer 15 simple questions to produce usable data points. Based on the user's inputs, the tool runs a simulation over a 25-year period, returning a set of results and recommended line of action. The results include the net present value of the system, rate of return, payback period, and annual expected electricity savings.

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