PennTAP 2
Solar Feasibility for K-12 Schools

Overview
Energy consumption and efficiency for K-12 education are some of the most important engineering tasks for modern engineers. Our team was tasked with developing a system to analyze the feasibility of potential solar PV systems across 18 different Pennsylvania School Districts. We faced challenges in tailoring the feasibility study to the specific size and budget needs of the various schools across the different school districts.

Objectives
Our team objective was to create feasibility reports for the utilization of solar photovoltaic systems in schools across 18 different school districts that would serve as a dynamic model for all schools that PennTAP will be able to expand from. We generated a customizable software simulation tool where values such as electricity cost and system size can be adjusted in order to generate a feasibility report for a prospective solar PV system.

Approach
- Gathered the electricity load profile of the schools, and approximated by scaling for area when information was unavailable
- Researched electricity rates, demand charges, solar installation rates, and funding sources specific to each school
- Determined a solar panel scalability factor with Helioscope used for creating a feasibility report of any size desirable, within rooftop area limits
- Created an excel spreadsheet that explores and graphs feasibility of school districts either owning systems or establishing a PPA
- A VBA macro was created in the excel spreadsheet to further the sensitivity analysis of feasibility for each school and run multiple scenarios at the click of a button
- The solar capacity of the system towards the school’s load was also measured to show the impact the system would have on the school

Outcomes
The final outcome of the project is a
- Dynamic Excel workbook for the solar energy investment
  - Generate a cash flow
  - Calculate NPV and payback period
  - Gives a recommendation, indicating whether the full ownership option is feasible, or if a PPA route should be considered
  - Inputs: kWh/kW, installation cost ($/Watt), and total energy consumption of the school buildings

PennTAP can use this excel file to determine the feasibility of these investment. PennTAP was also have access to the inputs and will be able to make alterations, or add on to the schools included in our study.