



## TOPIC OF STUDY

Intro to PV System Design



## KEY TERMS

array size  
string sizing  
voltage drop  
derate factors  
kWh/KW/year  
temperature coefficient

## LESSON

Intro to Photovoltaic (PV) System Design

## BIG IDEA(S)

Photovoltaic system design utilizes knowledge from many disciplines. The PV system design process must take many different variables into consideration.

## TASK LIST SUBCATEGORY

Level 1 students will:

- 401 Identify solar mechanical and electrical components
- 402 Select appropriate components to design a solar system
- 416 Use solar industry vocabulary

## OVERVIEW

Level 1 students will receive an introduction to design. This lesson will introduce students to the wide array of variables that impact PV System designs. These variables include roof characteristics, existing electrical systems, available components, manufacturers' specifications, and sun characteristics of the site.

## STANDARDS

### PA

- 3.4.10.A1.** Illustrate how the development of technologies is often driven by profit and an economic market.
- 3.4.10.E7.** Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.

## INSTRUCTIONAL

### TEXT/REFERENCES

Solar Electric Handbook: Photovoltaic Fundamentals and Applications; Solar Energy International; Pearson 2013

### MATERIALS NEEDED

**Teacher Presentation:** [Presentation 400-6](#)

**Content:** Handouts, Installation Manuals, Plan Sets, Three Line Diagrams, Online Resources / Videos / Manufacturer's Websites, Books, PowerPoint Presentation, Installation Pictures, Lab / Hands-On, Field Trips

**Technology:** Computers with internet

## OBJECTIVES

Students will:

- Identify the variables that impact PV system system design
- Identify which variables are a high priority for PV System Design



## IMPLEMENTATION (LESSON PLAN)

### ENGAGE

- Ask student teams to brainstorm all of the variables that might affect the design of a PV system on a client's roof.

### EXPLORE

1. In advance prepare a set of index cards for each group. On each card should be one of the variables from the presentation (i.e. client power consumption, roof type, roof condition, rafter spacing, fire code, roof tilt, shading, existing electrical panel, etc...).
2. Have each team sort through the deck and sort the variables into high priority and low priority. Which variables are deal breakers for the client? Which variables if not within a certain range prevent the installation? (i.e. roof structure, peak sun, etc...)

### EXPLAIN

- Have student groups explain their rationale to the class for their sorting choices.

### EXTEND

1. Student teams should revisit cards and come up with 2-3 key reasons each variable plays a role in the overall PV System Design.
2. Assign one variable to each team for further investigation. Have teams use internet to research their assigned variable.
3. Have students report back to whole group to teach each other what they learned.
4. Teacher wraps up class by going through the power point presentation as a review to bring it all together.

### EVALUATE

- Develop a short matching quiz for the variables and the reason for their importance.