

## Smart Solar? Worksheet

### Engage:

Many people assume that building solar panels is always a smart idea. But is it?

Your engineering task is to analyze solar energy data from the Renewable Energy Living Lab to determine if solar panels are always a smart choice.

In the space below, explain what you know about solar energy.

---



---



---

Why do you think it is good/bad to build solar panels?

---



---



---

### Explore:

1. Go to the Renewable Energy Living Lab at <http://extra.teachengineering.org/livinglabs/>.
2. Enter the Renewable Energy Living Lab and choose your age group (K-8 or 9-12).
3. Using the icons in the upper right corner of the map, explore the five types of renewable energy: hydropower, biomass, geothermal, wind and solar.
4. Use the plus/minus scale in the upper left corner of the map to zoom in and find your home town.

What is the solar potential in your town? (Include units!) \_\_\_\_\_  
Explain:

### Part 1: Solar Potential

Zoom in on the following locations and determine their potential for solar power.

Location	Potential for Solar Power
Minneapolis, Minnesota	
Las Vegas, Nevada	
Portland, Oregon	
San Antonio, Texas	

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: \_\_\_\_\_

### Stop and think!

Of the cities listed above, which is the most likely candidate for solar? Why do you predict that one?

---

---

---

What criteria do you think you need to consider in order to determine if each of these cities is a good candidate for solar panels? Explain your thinking.

---

---

---

---

---

### Elaborate:

#### Part 2: Energy Generation

For each of the locations above, calculate the amount of energy that will be produced in one month. Base your calculations on the following design parameters:

- You have room on the roof of your building to install 200 m<sup>2</sup> of solar panels.
- Average solar panels on the market today are able to convert 12% of the potential energy into electricity.

Location	Amount of electricity generated per month
Minneapolis, Minnesota	
Las Vegas, Nevada	
Portland, Oregon	
San Antonio, Texas	

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: \_\_\_\_\_

Stop and Think!

Explain how you calculated the amount of energy generated per month.

---

---

---

### **Part 3: Energy Offset**

Now it is time to think about the money needed to install the solar panels. The cost of installation per square meter of solar panels is \$1,075.

How much would it cost to install 200m<sup>2</sup> of solar panels?

---

The government in each of the states above helps to subsidize the cost of installing the solar panels. Assume that the government subsidizes 60% of your initial investment.

How much of the cost will the government subsidize?

---

How much of the cost will you have to cover?

---

The average cost for energy in your area is \$0.15/kWh. How much savings will solar panels in each of the cities above save per year?

City	Amount Saved
Minneapolis, Minnesota	
Las Vegas, Nevada	
Portland, Oregon	
San Antonio, Texas	

How many years will it take for you to “save” back the portion of your costs you had to pay to install the solar panels?

City	Years
Minneapolis, Minnesota	
Las Vegas, Nevada	
Portland, Oregon	
San Antonio, Texas	

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: \_\_\_\_\_

Looking at your cost analysis, do you think that solar is a smart solution everywhere? Why or why not?

---

---

---

---

---

---

### Evaluate:

#### *Part 4: Alternatives*

Return to the Renewable Energy Living Lab. For each city, determine if an alternative form of energy might be a better choice to pursue. Explain your reasoning.

City	Is there an alternative form of energy that is a better choice? Which one(s)? Why or why not?
Minneapolis, Minnesota	
Las Vegas, Nevada	
Portland, Oregon	
San Antonio, Texas	