

Where is the Best Place to Locate a New Solar Power Plant?

Solar energy comes from the sun. In this activity, you will use Web GIS to determine the best place to locate a new solar power plant. You will

1. Learn some basic features of Web GIS to visualize data and obtain information.
2. Analyze annual average sunshine data to determine good locations for solar plants.

Read **all** instructions and answer **each** question on your investigation sheet.







Step 1: Download Data

Open your Web browser. Go to www.ei.lehigh.edu/learners/energy/

Under **Solar Energy**, select "Where is the Best Place to Locate a New Solar Power Plant with Web GIS?"





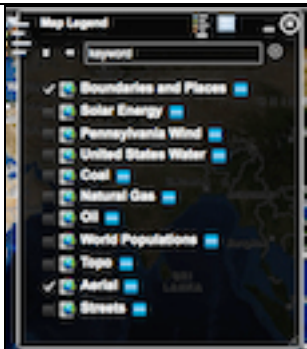


Step 2: Basic Features of Web GIS

<p>a. Your screen should open to a global view as shown in the picture to the right.</p> <p>b. To navigate in Web GIS you can use the navigational tools (# 1) or the hand (# 2). You can move around the map by selecting different areas or scrolling to them.</p> <p>c. You can zoom in on an area by using the zoom in tool options (# 3).</p> <p>d. You can find your exact location on the map by viewing the latitude and longitude location of your cursor in the bottom left corner of the map (# 4).</p>	
<p>e. You can also get back to the main view by using the Bookmark icon in the toolbar at the top of the screen (# 2). In the box that appears, select World View.</p> <p>f. The data for each activity can be activated using the Map Legend Tool (# 1). Click on the Map Legend Tool. The Map Legend window will appear. In the Map Legend window, activate a data layer that you wish to display by clicking in the checkbox. You can expand or shrink a legend item by clicking on the globe icon  next to each data layer label.</p> <p>g. To observe the legend for a specific data layer, select the globe icon next to that item in the list (# 3)</p> <p>h. You can also activate portions of the data layers by selecting options from the top toolbar menus.</p>	 



Step 3: Web GIS Tools

<p>a. Click on the Bookmark  tool. In the drop down box, select one of the options (World View, Continental USA, Pennsylvania, Lehigh Valley). What happens to the map? You should notice that the map zooms out to display the entire world when World View is selected and displays other specific geographic locations when selected. Click the "x" in the top right corner to close the Bookmark window.</p>	
<p>b. Click on the Zoom In  tool. Drag and draw a small rectangle over any area on the map. What happens to the map? You should notice that the map zooms in to the rectangular area.</p>	
<p>c. Click on the Move Map  tool. Click and drag the map to the left. Click and drag the map to the right. Click and drag the map upward. Click and drag the map downward. What happens to the map? You should notice that the map displays are re-centered at a new location. Look at the bottom left corner of your map display. The latitude and the longitude of the hand's location is displayed here.</p>	
<p>d. Click on the Zoom Out tool . Drag and draw a small rectangle over any area on the map. What happens to the map? You should notice that the map displays a larger area.</p>	
<p>e. Click on the the Map Legend tool (see arrow # 1). In the drop down box that appears select the check box next to Boundaries and Places.</p> <p>f. You can also query and analyze the data layers using the options in the toolbar menu (# 2).</p>	

- g. Activate the Solar data in the Map Legend box by selecting the **Solar Energy** check box.

What happens when you click on this layer?

To display the **Legend**, select the globe icon next to each data layer (# 1 in the picture to the right). If the entire legend is not displayed, use the scroll bars to move up and down the list (# 2).

This data layer displays the **average annual percentage of sunshine** an area receives.

Note: When you are done using a window you can close it by clicking the "x" in the top right corner.



Step 4: Analyze data related to solar power plants.

- Activate the **Solar Energy** layer in the Data Layers menu.
- Select the **Legend** in the toolbars menu as shown above (# 1 in the picture above).
- Using the legend, observe the color differences on your GIS map display. These colors indicate the average annual percentage of sunshine that an area receives.



Use the Web GIS map to answer **questions 1 - 5** on your investigation sheet.

Part 1: Use the **Bookmarks** tool to navigate to the state of Pennsylvania.

Activate the **Solar Plants** layer in the Map Legend tool.

In the top toolbar, select the **Solar** icon. Click on **Solar Power Plants**. The location of a solar plant in Pennsylvania is displayed. Place your mouse over the Pennsylvania solar plant and click on it. In the drop down menu select, **Percentage Sunshine** (Range). In the box that appears, select the **Draw Point** tool as shown in the picture below. Click to add a point on top of the Pennsylvania Solar Plant that you are viewing. The percent average annual sunshine is displayed.



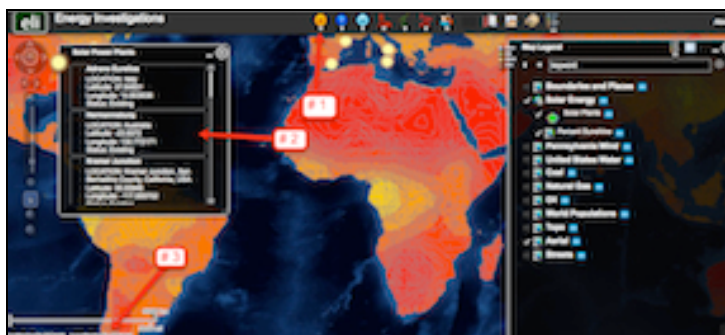


Answer **question 6 and 7** on your investigation sheet.

Part 2: Select **World View** from the Bookmark tool. In the top toolbars menu, select the **Solar** icon (# 1). In the drop down menu, select **Solar Power Plants**.

A new display box (# 2) appears with a list of plants and their locations. Use this information to complete the Solar Power Plants Data Chart on your Student Investigation Sheet.

The latitude and longitude can be determined by placing your mouse over each Solar Plant and recording the geographic locations that are displayed in the bottom left corner of the screen (# 3).



Make sure you record all of the information for each of 13 Solar Plants. The Pennsylvania Solar Park solar plant is completed as an example.

To determine the Annual Average Sunshine for each Solar plant you will need to reactivate the **Percent Sunshine** layer in the Data Layers.

You can navigate to each solar plant by double-clicking on each plant in the **Solar Power Plants** box or using the zoom-in tool.

In the top toolbar, select the **Solar** icon. In the drop down menu select, **Percentage Sunshine (Range)**. In the box that appears, select the **Draw Point** tool as shown in the bottom left picture. Click to add a point on top of the Solar Plant that you are viewing. The percent average annual sunshine is displayed. Record the displayed value in the box (# 1 in the bottom right picture) on your Student Investigation sheet in the appropriate column.

When you are ready to move to the next solar plant, click on **Select Features** (# 2) and begin the process again.



Helpful hint: Use the Bookmarks tool to return to the World View that displays the entire data set.



Use your Solar Power Plants Data Chart and the Web GIS map to answer **questions 8 – 15** on your investigation sheet.