

Where is the Best Place to Locate a New Wind Farm? Teacher Guide

Wind is moving air and is a locally plentiful source of energy. In this activity, students will use My World GIS to examine wind speed patterns and land use in Pennsylvania to determine the best place to locate a new wind farm. They will

1. Examine wind speed patterns in Pennsylvania.
2. Examine land use patterns in Pennsylvania and in the Lehigh Valley.
3. Determine the best place to locate a new wind farm in the Lehigh Valley and in Pennsylvania.

Model the following procedural instructions with your students. It is recommended that you display your computer image at the front of the classroom.



Step 1: Download data.

- a. Open your Web browser. Go to www.ei.lehigh.edu/learners/energy/
- b. Click on **Where is the Best Place to Locate a New Wind Farm?**

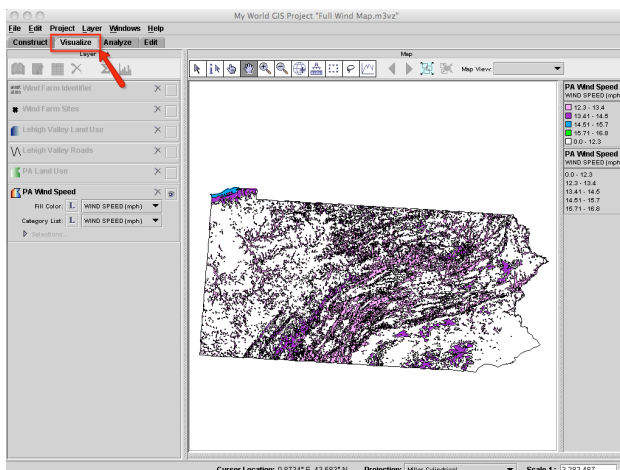
This downloads the **Wind Map.m3vz** file on to your desktop (see icon below).



Step 2: Load data in My World GIS.

- a. **Double click** on the **Wind Map.m3vz** icon to open the file in My World GIS.

The window below should open on your computer. Check to make sure you are in the **visualize** mode (see arrow below).

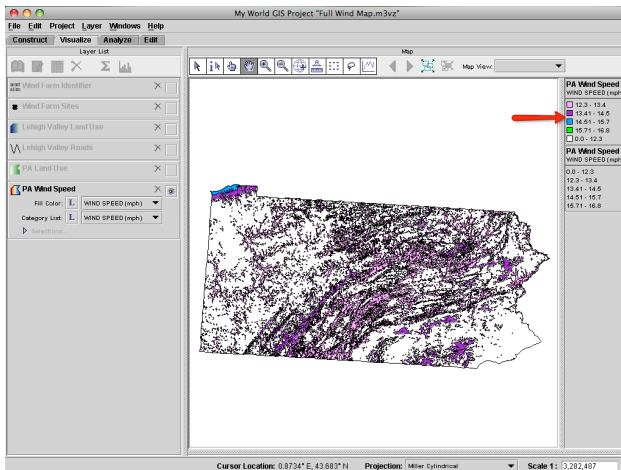




Step 3: Examine Patterns of Wind Speeds in Pennsylvania.

The map displays average wind speeds at 50 meters above the ground. In assessing optimal locations for a wind farm, it is better to examine wind speeds at 50 meters above the ground since surface wind speed and direction is influenced by surface roughness (ground, trees, buildings) or friction with the ground.

- Look at the different wind speeds on the map of Pennsylvania using the **PA Wind Speed** key in the panel on the right (see arrow below).



Instruct students to answer **question 1** on their investigation sheet.



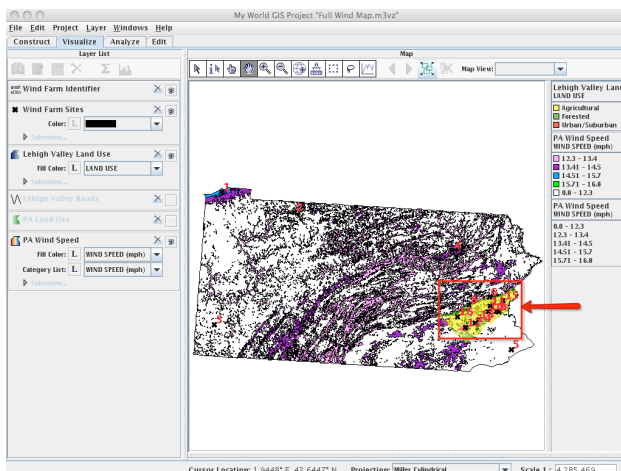
Step 4: Explore Wind Farm Sites.


Let's examine the wind speed and land use at the wind farm sites.

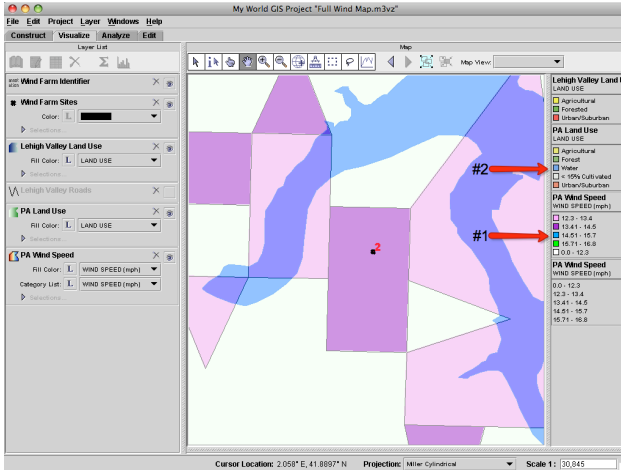
- Turn on the **Wind Farm Identifier**, **Wind Farm Sites**, and **Lehigh Valley Land Use** layers. **Helpful hint:** Click on the small squares at the right end of each of those layers.

16 sites on the map are displayed (with red numbers) where you could place a wind farm. Eleven sites are in the Lehigh Valley (see arrow below) and 5 sites are in other locations in Pennsylvania.

NOTE: There are no actual wind farms located at these sites today.

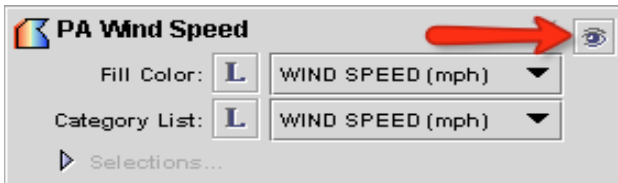


- b. Zoom in  closely to wind farm site 2.
- c. Use the **PA Wind Speed** key to determine the wind speed at wind farm site 2 (see arrow #1 below).



Instruct students to record the wind speed in the **Wind Farm Sites Data Chart** on their investigation sheet.


- d. Click the eye to turn the **PA Wind Speed** layer off (see arrow below).




- e. Turn the **PA Land Use** layer on. Use the **PA Land Use** key to determine the land use type at wind farm site 2 (see arrow #2 above).

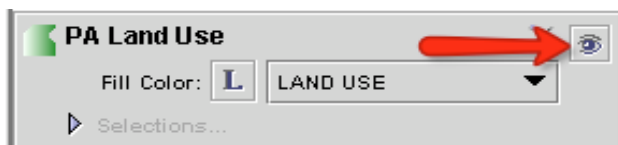


Instruct students to record the land use type in the **Wind Farm Sites Data Chart** on their investigation sheet.

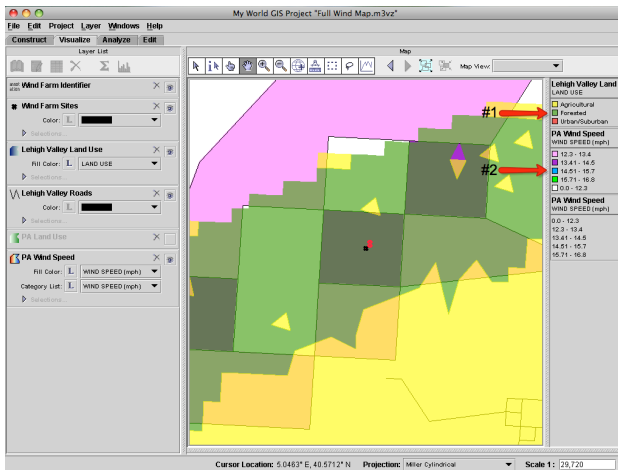
- f. Click on the Zoom To All tool  to view the entire map.
- g. Click the square at the right end of the **Lehigh Valley Roads** layer to turn it on (see arrow below).



- h. Zoom in  closely to wind farm site 8.
- i. Click the eye to turn the **PA Land Use** layer off (see arrow below).



- j. Use the **Lehigh Valley Land Use** key to determine the land use type at wind farm site 8 (see arrow #1 below).




Instruct students to record the land use type on the **Wind Farm Sites Data Chart** on their investigation sheet.

- k. Turn the **Lehigh Valley Land Use** layer off.
- l. Turn the **PA Wind Speed** layer on. Use the **PA Wind Speed** key to determine the wind speed at wind farm site 8 (see arrow #2 above).



Instruct students to record the wind speed in the **Wind Farm Sites Data Chart** on their investigation sheet.

- m. Click on the Zoom To All tool  and then select wind farm site 15.
- n. Use the **PA Wind Speed** key to determine the wind speed at wind farm site 15.



Instruct students to record the wind speed in the **Wind Farm Sites Data Chart** on their investigation sheet.

- o. Turn the **PA Wind Speed** layer off.
- p. Turn the **Lehigh Valley Land Use** layer on. Use the **Lehigh Valley Land Use** key to determine the land use type at wind farm site 15.



Instruct students to record the land use type in the **Wind Farm Sites Data Chart** on their investigation sheet.



Instruct students to use their **Wind Farm Sites Data Chart** and the My World GIS map to answer **questions 3 – 8** on their investigation sheet.