Our school district, Erie Consolidated Unit School District (CUSD) #1 in Erie, Illinois, has a wind turbine to power all of our buildings in our district. Would your district or building benefit from having a wind turbine? You can explore our production of wind vs. our consumption of energy to see how we benefit. Live usage and production is shown, as well as historical data by year, month, and day. (Directions below.) Then, research your own district’s (or school’s) usage. How much energy is consumed in your school each month? Each year? Next, research whether a wind turbine would be feasible in your area. Is it windy? Do you have land/space for it? How much would it cost? Finally, present your data to your school decision-makers (administrators, school board members, headmasters, tax–payers, etc.). Providing factual data is the first step to a persuasive argument, and a very convincing one. Perhaps you can convince them that the power of wind has too many benefits to ignore. Good luck!

Begin your research by going to our information kiosk: http://wind.ecsd.greentouchscreen.com. Click on the “Explore” button.
To view our live data at Erie CUSD #1, **click** on the “Energy Consumption” graph.

You can choose to view the data by year, month, or day. This shows how much electricity we are consuming.

Next, go back to the “Live Data” menu and choose “Energy Production.”

Continued on next page...
This shows how much electricity we are producing. If you move your cursor over the bars in the graph, a window pops up with the data for that particular bar.

Finally, go back to the “Live Data” menu and choose “Total Difference.”

This shows either the excess of wind energy produced (negative number) or the excess of energy consumed.

Anything above “0” on the bar graph indicates an excess in consumption.

Anything below “0” on the bar graph indicates an excess in production, which is then sold back to ComEd for profit.
Wind Power Student Activity

For more information about wind turbines and their benefits, click on the “Benefits of Wind Energy” or “Turbine Animation” icons.

Click on the “Learn More” button to see all the working parts of a turbine & the function of each.
Wind Power Student Activity

Location of Erie, Illinois (A), courtesy of Google Maps:
Wind Power Student Activity

Student Worksheet

NAME: ____________________________
DATE: ____________________________

Answer the following questions about the Erie Community Schools kiosk information on the http://wind.ecsd.greentouchscreen.com/ website:

1. How much electricity is being consumed right now? ____________________________
2. How much electricity was consumed last month? ____________________________
3. How much electricity was consumed last year? ____________________________
4. Which months seem to consume the most electricity? ____________________________
5. Based on the location of the turbine (Erie, Illinois), why might more energy be consumed during those months? ____________________________

6. How much electricity is being produced right now? ____________________________
7. How much electricity was produced last month? ____________________________
8. How much electricity was produced last year? ____________________________
9. Are there any months that seem to produce more electricity than others? ____________________________
10. Based on the location of the turbine (Erie, Illinois), why might more energy be produced during these months? ____________________________

11. What is the current total difference between consumption and production? ____________________________
12. Did Erie Community Schools produce more (or less) energy than it consumed last month? ____________________________
13. Did Erie Community Schools produce more (or less) energy than it consumed last year? ____________________________
14. What is the total lifetime energy production (in kWh) for our turbine? (Hint: Can be found on the “Turbine Animation” window.) ____________________________
Wind Power Student Activity

Student Worksheet, continued

NAME: ____________________________
DATE: ____________________________

Answer the following questions about the benefits of wind energy on the http://wind.ecsd.greentouchscreen.com/ website:

1. List three environmental benefits of wind energy: _____________________________________
________________________________________________________________________________________
________________________________________________________________________________________

2. How do wind farms benefit rural areas and farmers? ________________________________
________________________________________________________________________________________

3. How could a wind farm directly help a school in a rural community? __________________
________________________________________________________________________________________

4. Small wind turbines can be used to power ____________________________,
__________________________, and ____________________________.

5. How can wind energy be useful in remote areas? ________________________________
________________________________________________________________________________________

6. Wind turbines make electricity when the wind turns the _____________________, which
spin a ___________________, which connects to a ____________________ and makes
electricity.

7. How many blades do most turbines have? ________________________________

8. Why are taller towers able to capture more electricity? ________________________________
________________________________________________________________________________________

9. Which device measures wind speed? ________________________________

10. Turbines cannot operate at wind speeds above ____________ miles per hour (mph).

✏ WRITE... On a separate sheet of paper, write whether or not you think a wind
turbine would benefit your school district. Use facts and data to support your position.
**Wind Power Student Activity**

**Note to teachers:**
- The data on the kiosk is live, therefore the answers for the “current” consumption & production of energy will always vary—even from class to class throughout the day.

- Our turbine was not fully operational until last fall (2009), therefore, the yearly data may actually be data collected over less than 12 months, depending on when you use this lesson.

**Teacher’s Answer Key for Student Worksheet:**

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How much electricity is being consumed right now?</td>
<td>Answers will vary based on when you do the activity.</td>
</tr>
<tr>
<td>2. How much electricity was consumed last month?</td>
<td>Answers will vary.</td>
</tr>
<tr>
<td>3. How much electricity was consumed last year?</td>
<td>Answers will vary.</td>
</tr>
<tr>
<td>4. Which months seem to consume the most electricity?</td>
<td>During the winter months (November, December, January, February), we tend to consume more energy.</td>
</tr>
<tr>
<td>5. Based on the location of the turbine (Erie, Illinois), why might more energy be consumed during those months?</td>
<td>Erie is located in the midwest, in the northwestern part of Illinois (see map). We have cold winters and hot summers. We are air conditioned, but school is not in session during June and July, so the buildings don’t use as much power (lights are off in the classrooms, commons, cafeteria, etc.; air conditioning does not run as often). Therefore, our winter month electrical consumption is much higher.</td>
</tr>
<tr>
<td>6. How much electricity is being produced right now?</td>
<td>Answers will vary based on when you do the activity.</td>
</tr>
<tr>
<td>7. How much electricity was produced last month?</td>
<td>Answers will vary.</td>
</tr>
<tr>
<td>8. How much electricity was produced last year?</td>
<td>Answers will vary.</td>
</tr>
<tr>
<td>9. Are there any months that seem to produce more electricity than others?</td>
<td>Winter months produce more, typically.</td>
</tr>
<tr>
<td>10. Based on the location of the turbine (Erie, Illinois), why might more energy be produced during these months?</td>
<td>The wind is actually stronger during the winter months in the midwest than any other time.</td>
</tr>
<tr>
<td>11. What is the current total difference between consumption and production?</td>
<td>Answers will vary based on when you do the activity.</td>
</tr>
</tbody>
</table>
Wind Power Student Activity

12. Did Erie Community Schools produce more (or less) energy than it consumed last month?  
   Answers will vary.

13. Did Erie Community Schools produce more (or less) energy than it consumed last year?  
   Answers will vary.

14. What is the total lifetime energy production (in kWh) for our turbine? (Hint: Can be found on the “Turbine Animation” window.)  
   Answers will vary.

Answer the following questions about the benefits of wind energy on the [http://wind.ecsd.greentouchscreen.com](http://wind.ecsd.greentouchscreen.com) website:

(From “Benefits of Wind Energy” window)
1. List three environmental benefits of wind energy:
   - Does not generate any emissions
   - Does not produce hazardous waste
   - Does not use up any limited resources (such as coal, oil, gas)
   - There is no environmental damage through resource extraction (such as mining or drilling)
   - There is no environmental damage through transportation (such as the shipping of oil, gas, coal)

2. How do wind farms benefit rural areas and farmers? Jobs are created and maintained in rural areas and farmers can earn land lease revenue (rent their land to utility companies). The land can still be used to farm crops and livestock around the turbines, so very little acreage is lost.

3. How could a wind farm directly help a school in a rural community? The local tax revenue is increased and that money goes to school and counties.

4. Small wind turbines can be used to power homes, businesses, and farms.

5. How can wind energy be useful in remote areas? It can be used to pump water, make ice, power telecommunications sites, and replace the use of diesel fuel in villages.

(From the Turbine Animation Window)
6. Wind turbines make electricity when the wind turns the blades, which spin a shaft, which connects to a generator and makes electricity.

7. How many blades do most turbines have? Two or three

8. Why are taller towers able to capture more electricity? Towers can capture more electricity because wind speed increases with height.

9. Which device measures wind speed? An Anemometer

10. Turbines cannot operate at wind speeds above 65 miles per hour (mph).
Write... On a separate sheet of paper, write whether or not you think a wind turbine would benefit your school district. Use facts and data to support your position. Student responses will vary.

Additional Resources:

American Profile article about Bureau Valley High School's wind turbine. BV's wind turbine inspired our school district to use wind energy. While BV was the first to power a school in Illinois, our district became the first to power all of our buildings. The article quotes superintendents of both districts regarding financial costs and savings. http://www.americanprofile.com/heroes/article/28270.html


On the following page:

Erie Community Unit School District No. 1: Erie, Illinois
Small school district thinks big with wind generation

Background:
Erie Community School Unit District No. 1 includes an elementary school, middle school, high school and administration building on one property. The district has only 700 students, but it’s making a big name for itself through an innovative renewable energy project.

Opportunity:
Johnson Controls designed and installed a 230-foot wind turbine that generates more than enough energy to power the schools and administration building. The project is expected to save the district millions in energy costs while teaching students valuable lessons about the environment. Before building the turbine, Johnson Controls improved the energy efficiency of the district’s buildings, installing a building management system, new HVAC equipment, lighting upgrades, and better insulation and windows. The building management system provides for real-time monitoring of the wind turbine’s energy production, delivering additional educational value to the students.

Results: $5.5 million energy savings; $3 million net revenue
The wind turbine will decrease the school district’s purchased electrical energy consumption by 87 percent, which represents approximately $5.5 million in total energy savings over 30 years. The turbine’s 97-foot blades generate up to 1.2 megawatts, giving the school district enough capacity to power more buildings in the future. Just as important, the school district anticipates $3 million in net revenue by selling excess energy to the local energy provider for placement on Commonwealth Edison’s distribution grid.

Efficiency makes sense for everything from the wallet to the environment. Efficiency measures can be accomplished quickly, they’re relatively easy, and there’s a real payback. The world needs efficiency, and Johnson Controls has everything necessary to provide it. We’ve got the experts, we’ve got the technology, and we’ve got ingenuity and integrity built into everything we do.
For more examples of energy and operational solutions for buildings around the world, visit johnsoncontrols.com/efficiencynow.

www.johnsoncontrols.com/efficiencynow
Could a wind turbine be in your future?

Even if it is not feasible, there are other ways to conserve energy and become a “greener” school district. Here are some other initiatives our school has taken:

- **Conserve Energy:** Our school district has automatic (motion sensor) lights in each room, so if someone leaves the room without turning off the lights, they turn off automatically after a few minutes of non-movement.

- **Recycle:** Each room has a recycling bin for collection of paper, plastic, and metal materials. We have an environment club that takes care of emptying the recycling bins into the recycling dumpster every two to three days. Students also participate in an Envirothon competition, which is sponsored by Canon. Join here: [http://www.envirothon.org/index.php?option=com_content&view=article&id=113&Itemid=85](http://www.envirothon.org/index.php?option=com_content&view=article&id=113&Itemid=85)

- **Apple 1:1:** All of our students have MacBook Pro laptops (9–12th grades in 2009, 5–12th grades in 2010). We are taking steps to make our school district a “paperless” school. All new textbook orders will have an option for an electronic (PDF) copy to be installed on the computers, therefore eliminating the need for students to bring books home. Each teacher will have a classroom set, but each student’s copy will be on their laptop. (I have not been sold on the idea of reading a novel on the computer yet, so we are still allowed to purchase “real” copies of those, however.)

- **Plant trees and bushes:** Look into which plants would be best for your area. Trees can provide shade, food and shelter for wildlife, clean the air by absorbing toxins, clean the water, and so much more. Encourage graduating seniors to donate legacy money toward landscaping/grounds beautification. Allow the students to help plant the trees and bushes themselves. The rewards for both them and the school will be lifelong--students who return to visit always notice the tree they planted and how much it has grown. Elementary and middle school students can do the same during their last year of attendance for that building.

For more lessons, check out my Teachers Pay Teachers product listings: [http://www.teacherspayteachers.com/Store/Tracee-Orman-10/Products](http://www.teacherspayteachers.com/Store/Tracee-Orman-10/Products)