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**TITLE:**

Linking Social Studies History and Geography with Mathematics

**DIVISION:**

Junior

**STRAND:**

People and Environments: Political and Physical Regions of Canada

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**GRADE 4: STUDYING THE IMPACT OF WIND TURBINES**

These activities link People and Environments: Political and Physical Regions of Canada with data management expectations in math.

**BIG IDEA**

Wind turbine farms have become more popular in Canada over the last ten years and wind power has positive and negative environmental impacts.

**Guiding Question(s)**

How do we balance environmental stewardship with human needs/ wants?

**Framing Question(s)**

- Why have wind farms become more popular in Canada?
- What effects have the wind farms across Canada had on animal populations and other aspects of the environment?

**Learning Goals**

- explain the impact industrial development has on regional development and how the type of environment dictates the type of industry that is present
- demonstrate how natural resources led to the development of a region and the consequences of that development on the natural environment and society
- use an understanding of natural resource extraction to recognize consequences on the environment and the development of potential sustainable practices

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## CONCEPTS OF DISCIPLINARY THINKING

Cause and Consequence:

This concept requires students to determine the factors that affect or lead to something (e.g., an event, situation, action, interaction) as well as its impact or effects. Students study the causes and consequences of various types of events, situations, and interactions in both the natural environment and human society.

### **Social Studies Inquiry Process (Revised [2013] SSHG Curriculum page 23)**

Inquiry Process:

Students will review graphs, maps and charts on the use of wind turbines in Canada and the impact they can have on the environment. Students will then compare and contrast the data they review and look for trends and patterns. They will use the trends and patterns they discover through their inquiries to answer the guiding questions of the lesson.

The Social Studies Inquiry Process Model can be viewed on page 23 of the 2013 Social Studies Curriculum that can be viewed through the link below.

<http://www.edu.gov.on.ca/eng/curriculum/elementary/sshg18curr2013.pdf>

### **The Spatial Skills: Using Maps, Globes, and Graphs (Ontario Curriculum pages 24-25)**

Spatial Skill:

Students will review data from charts, graphs and maps and determine trends in the data. The students and the teacher will create a bar graph of the data from Canwea (<http://canwea.ca/wind-energy/installed-capacity/>) electronically to show the distribution of wind farms across Canada. The students will also build their own bar graphs of global bird death data from the Carbonbrief website.

<http://www.carbonbrief.org/blog/2013/04/wind-farms-and-birds/>

Canadian Bird death Data can be found at the following site:  
[www.ace-eco.org/vol8/iss2/art10/ACE-ECO-2013-609.pdf](http://www.ace-eco.org/vol8/iss2/art10/ACE-ECO-2013-609.pdf)

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## PRIMARY ACTIVITY

Students will participate in a diagnostic activity in which they will review and evaluate a map of wind power generation in Canada and create bar graph of this data with their teacher. They will then review data on wind power related deaths in birds and bats, build a bar graph of global bird deaths and their causes, and write a paragraph explaining whether or not they are in favour of wind farms.

The students will complete the following during this activity:

- Review the map of Canada from Canwea <http://canwea.ca/wind-energy/installed-capacity/> which shows Canada's installed megawatt capacity generated from wind farms, look for trends in the data, and create a bar graph of the data as a class as a diagnostic activity
- Review the graphic organizer which outlines estimated global bird deaths for 2013 and then take the data and build a bar graph of the data by hand or electronically using an app, Microsoft Excel or using the link below. <http://nces.ed.gov/nceskids/graphing/classic/bar.asp>
- Review the websites outlined below to review the impact wind turbines and wind farms are having on birds and bats

Wind Facts: the Effects of Windmills on Wildlife

<http://windfacts.ca/environment-wildlife>

Why Wind Turbines Endanger Bats

<http://wattsupwiththat.files.wordpress.com/2013/11/bats-graphic1.jpg>

Cats Are a Larger Threat to Birds Than Wind Turbines

<http://orendaenergy.com/a-study-shows-cats-are-the-biggest-bird-killers-not-wind-turbines/>

- Build their graph with the teacher and then students build their own independent graph on global bird deaths and reviewed data on the effects of wind turbines on animal life, they will be asked to form their own opinion on whether or not Canada should continue to invest in wind farms
- Write a detailed paragraph explaining why they think Canada should continue to invest in wind power generation or why it should not

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## DIFFERENTIATION SUGGESTIONS

Word prediction software could be provided to those students who need support with their writing when they answer the main questions of the activity. Students who have difficulty writing out their ideas could use word prediction software to type out their work or they could use an iPad application like Dragon Dictation, Dictamus, or the camera to record their oral explanations of their thinking. This activity could also be conducted with older "grade level buddies" similar to reading buddies. The older students could help keep the younger students on task and monitor them as they move from one room to the other.



Edugains outlines many effective ways to differentiate lessons, links to these resources are provided below.

<http://www.edugains.ca/newsite/index.html>

Edugains – Differentiated Instruction - DI educators package – DI scrapbook:  
<http://www.edugains.ca/newsite/di2/edupackages/2010educatorspackage.html>

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## TECHNOLOGY INTEGRATION OPPORTUNITIES

Bar graphs can be easily generated through Microsoft Excel, Mac Numbers, or a variety of iPad applications. Students will also be using the Internet to collect the required information to graph and they will also use it to conduct further inquiries based upon the data they graph to help them answer the three main guiding questions of the activity.

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## ASSESSMENT



The teacher and students will review the map of Canada from Canwea which shows Canada's installed megawatt capacity generated from wind farms. The students and the teacher will review the following questions:

1. Where is most wind power generated in Canada?
2. Why might these regions of Canada produce the most wind power?
3. Where is the least amount of wind power generated?
4. Why might these regions of Canada produce less wind-generated power?

The teacher could also work with the students on a Smartboard to develop an electronic bar graph using the link listed below. This activity will enable the teacher to determine the students' ability to interpret data, build a bar graph, and look for trends in the data as a diagnostic assessment before the students review other sets of data, build their own graphs and write their persuasive argument as to whether or not they feel Canada should continue invest in more wind farms.

<http://nces.ed.gov/nceskids/graphing/classic/bar.asp>



Anecdotal notes can be used to track students' progress throughout the activity. Teachers could also develop anchor charts with their students that outline how to construct the graphs, analyse trends in the graphs and their abilities to use the data they graphed and other inquiries to answer the three main questions of the activity.

Descriptive feedback is another assessment strategy teachers could use to provide students with the constructive criticism they need to improve their work.





The ability to review the required graphs, determining trends in the data, and the accuracy of the students' answers in relation to the main questions for the activity could be assessed using a rubric that could be teacher generated or teacher and student generated. A checklist would also be effective.

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## OVERALL EXPECTATIONS

Social Studies:

**B1. Application:** assess some key ways in which industrial development and the natural environment affect each other in two or more political and/or physical regions of Canada

**B2. Inquiry:** use the social studies inquiry process to investigate some issues and challenges associated with balancing human needs/wants and activities with environmental stewardship in one or more of the political and/or physical regions of Canada (FOCUS ON: *Perspective*)

Math- Data Management:

Overall Expectations #1: collect and organize discrete primary data and display the data using charts and graphs, including stem-and-leaf plots and double bar graphs

Overall Expectations #2: read, describe, and interpret primary data and secondary data presented in charts and graphs, including stem-and-leaf plots and double bar graphs

## SPECIFIC EXPECTATIONS

Grade 4: Social Studies:

**B1.2** assess aspects of the environmental impact of different industries in two or more physical and/or political regions of Canada

**B2.4** interpret and analyse information and data related to their investigations, using a variety of tools

**B2.5** evaluate evidence and draw conclusions about issues and challenges associated with balancing human needs/wants and activities with environmental stewardship in Canada

Grade 4 Math- Data Management:  
Collection and Organization of Data

#2 – collect and organize discrete primary data and display the data in charts, tables, and graphs (including stem-and-leaf plots and double bar graphs) that have appropriate titles, labels (e.g., appropriate units marked on the axes), and scales



(e.g., with appropriate increments) that suit the range and distribution of the data, using a variety of tools (e.g., graph paper, simple spread- sheets, dynamic statistical software)

### Data Relationships

#1 – read, interpret, and draw conclusions from primary data (e.g., survey results, measurements, observations) and from secondary data (e.g., temperature data in the newspaper, data from the Internet about endangered species), presented in charts, tables, and graphs (including stem-and-leaf plots and double bar graphs)

## **CITIZENSHIP EDUCATION FRAMEWORK**

Structures:

- Develop an understanding of the dynamic and complex relationships within and between systems
- Develop an understanding of how political, economic, and social institutions affect their lives

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## **RESOURCES**

- Canada's Installed Windmill Capacity  
<http://canwea.ca/wind-energy/installed-capacity/>
- Wind Facts: the Effects of Windmills on Wildlife  
<http://windfacts.ca/environment-wildlife>
- Why Wind Turbines Endanger Bats  
<http://wattsupwiththat.files.wordpress.com/2013/11/bats-graphic1.jpg>
- Cats Are a Larger Threat to Birds Than Wind Turbines  
<http://orendaenergy.com/a-study-shows-cats-are-the-biggest-bird-killers-not-wind-turbines/>
- Global Bird Death Statistics  
<http://www.carbonbrief.org/blog/2013/04/wind-farms-and-birds/>