# Energy Dashboard Project

**OBJECTIVE:**

These three activities will familiarize students with the school's Energy Dashboard and will demonstrate the school's electricity, fuel, and water consumption. Students will use the internet and the Energy Dashboard to find answers.

In the first activity students will be introduced to the Energy Dashboard using a WebQuest. This will be used as a starting point for students to begin thinking about what each person can do as part of a school community to minimize human impacts on the environment and work toward a sustainable planet.
The second activity uses the initial Energy Dashboard activity to plan and implement an Energy Efficiency Campaign at the school.

The third activity is an analysis of Energy Dashboard data from the duration of the Energy Efficiency Campaign to measure the campaign effects. Students will explore the process of collecting data and making graphs in a meaningful context. Students will collect data from the school's Energy Dashboard and from individual classrooms or school areas using an Energy Meter. The data collected over the project period will empower students to make inferences and find conclusions based on their analysis.

## Activity 1: Energy Dashboard WebQuest

**TEACHER GUIDE:**

1. Provide each student with a copy of the WebQuest handout.
2. Students should use the URL for the Energy Dashboard in order to answer the questions on their paper.

**MATERIALS/EQUIPMENT:**

1. Access to Energy Dashboard and its URL
2. Computers with internet access
3. Handout
4. Pen/pencil

**WEBQUEST INTRODUCTION:**

1. Ask students: Does anyone know where the Energy Dashboard is at our school? What does it do?
2. Have a quick discussion and then take students to see it in the lobby of the school.
3. Stay long enough for the Energy Dashboard to scroll through each of the screens and briefly explain each one, and then return to the classroom or computer lab to complete the handout.

# Activity 2: Energy Efficiency Campaign

**TEACHER GUIDE:**

1. Divide class into groups of 3 or 4 students.
2. Provide each group with a copy of the Energy Efficiency Campaign handout.
3. Each group is responsible for their own Energy Efficiency Campaign. Educators should decide an appropriate duration for the campaign, possibly keeping in mind Activity 3, Data Collection & Analysis.

**MATERIALS/EQUIPMENT:**

1. Markers/Coloured Pencils
2. Possible other creative materials and tools based on students' campaign ideas
3. Paper

# Activity 3: Data Collection & Analysis

**TEACHER GUIDE:**

1. Provide each student with the handout for the Activity #3: Data Collection & Analysis. Students will be in groups of no more than four. If using the Activity 2: Energy Efficiency Campaign, use the same group configuration. Each group will be responsible for monitoring the energy usage of a classroom, room or section of the school. Assign sections/classrooms, and collaborate with other school staff where necessary.

2. Students will use an Energy Meter and regularly check electrical demand of every electrical device in use. When possible they should also try to monitor students charging their own electronic devices. Students will determine electrical consumption using the electrical demand of the device (data collected), the number of devices in use, the estimated time electricity is used by the device per day, and the number of days of the Energy Efficiency Campaign.

3. Each group will be responsible for collecting the Energy Meter readings from their designated classroom, room or section of the school twice per day, for example at the start of each day before classes begin and again at the end of each day.

4. Each group will analyze their data, create graphs based on the data and discuss how their findings relate to their Energy Efficiency Campaign, and what adjustments could be made for a more effective campaign.

5. Provide students with your school's Energy Dashboard data to complete the final portion of the activity using this link: http://hrsb.energydashboard.ca/data
If you need assistance with this information, ask a Green Schools NS Engagement Officer.

**MATERIALS:**

Energy Meter – extras often available at libraries
Computers
Graph Paper
Coloured Pencils
Rulers
Chart Paper
Calculators

**ACTIVITY #1: ENERGY DASHBOARD WEBQUEST**

Name: _____

**DIRECTIONS**

Complete the following assignment using your school's Energy Dashboard URL.

**A. Click on the lightning bolt icon and look at the school's "Daily Electrical Demand" graph and answer the following question:**

1. How many light bulbs could our school's "electrical draw" light right now? What do you think this means?

_____

_____

_____

**B. Click on the blue arrow (^) and navigate to the screen that says "Daily Electrical Consumption" and answer the following questions:**

1. Are we using as much electricity today as we were yesterday? Why do you think this is?

_____

_____

_____

2. How many pizzas could we bake based on the amount of energy we have used today so far? Does that seem like a lot or a little?

_____

_____

**C. Click on the blue arrow (^) and navigate to the screen that says "Weekly Energy Consumption" and answer the following questions:**

1. Have we used more or less energy this week compared to last week? Why do you think this might be?

_____

_____

_____

2. What day have we used the most energy this week? Why do you think this is?

_____

_____

_____

3. What day have we used the least energy this week? Why do you think this is?

_____

_____

_____

4. What are two things that everyone in our school could do to reduce the amount of electricity that we use every day?

_____

_____

_____

**D. Click on the blue arrow (^) and navigate to the screen that says "Daily Fuel Consumption" and answer the following questions:**

1. How many kilometers could we have driven with the amount of fuel we have used today so far?

_____

_____

2. What does our school use oil for?

_____

_____

_____

3. Why do you think the school's oil consumption changes throughout the day?

_____

_____

_____

**E. Click on the blue arrow (^) and navigate to the screen that says "Daily Water Consumption" and answer the following questions:**

1. How many bathtubs could we fill with the amount of water we have used at school so far today?

_____

_____

2. Name four ways that we use water in our school.

_____

_____

_____

_____

3. Explain two things we can do at school to reduce the amount of water that we use.

_____

_____

_____

_____

**F. Click on the blue arrow (^) and move to the screen that says "Weekly Water Consumption" and answer the following questions:**

1. Why would the school use water on the weekends when students and staff are not usually here?

_____

_____

_____

2. Have we used more or less water this week than last week? Why do you think this is?

_____

_____

_____

3. If your cursor hovers at the top of a bar in the graph, more information pops up. How many litres of water have we used in one week at the school? Does this seem like a lot or a little?

_____

_____

**G. Click on the blue arrow (^) and navigate to the screen that says "Report Card" and answer the following questions:**

1. What school has the worst energy report card? What could be some reasons for this? Give specific examples.

_____

_____

_____

2. What school has the best report card?  What could be some reasons for this? Give specific examples.

_____

_____

_____

3. Is your school closer to the best or worst report card? Explain why you think this is.

_____

_____

4. What can be done to decrease energy use in your school?

_____

_____

**ACTIVITY #2: ENERGY EFFICIENCY CAMPAIGN**

Group members' names:

_____
_____
_____
_____

**DIRECTIONS**

1. **Reflect** on the assignment that uses the Energy Dashboard. Think about all of the ways that a school uses the Earth's resources like energy, fuel, and water.

2. **Brainstorm** with the group a list of ways individuals can make the school more energy efficient and environmentally friendly. Record as many strategies as you can that could be put into action as a school community. Consider all possible roles: student, teacher, Educational Program Assistant, administrator, cafeteria operator, custodian etc.

3. **Decide** as a group which strategy you would like to put into action.

4. **Name your Campaign.** (i.e. Energy Hunters, Efficiency Experts, Conservation Crusade)

5. **Set a Goal.** State what you would like to accomplish. For example, you could try setting a goal that is measurable using the Energy Dashboard, such as a reduction energy usage by 20%.

6. **Create a Plan.** Decide what the group is going to do in order to get the whole school community to participate in order to reach the goal. Record the steps of your plan.

7. **Assign Jobs.** A group member is going to be responsible for each of the actions included in the plan.

8. **Action.** Now it's time to put your plan into action. If you are completing Activity #3: Data Collection & Analysis, read the assignment to find out how you will measure the progress of your campaign.

**ENERGY EFFICIENCY CAMPAIGN RUBRIC**

Name**: _____**

| | | | |
|---|---|---|---|
| __ Participation: Student participated fully in the group project by completing the assigned tasks. Was focused and not distractive.<br>__ Campaign name stated<br>__ Campaign goal recorded<br>__ Steps of plan are detailed and recorded<br>__ Every student was given a role in carrying out the plan | | | |
| **Overall**: Student is able to recognize the characteristics of supportive environments for environmental sustainability. | 1 | 2 | 3 |
| **Comments:** | | | |

**ACTIVITY #3: DATA COLLECTION + ANALYSIS**

During the Energy Efficiency Campaign, you will collect data during the campaign, and following the campaign you will analyze that data.

In groups of no more than four, you will be responsible for monitoring the energy usage of an assigned classroom, room or section of the school. If you have a group from the Energy Efficiency Campaign, continue with the same group.

Use an Energy Meter and regularly check electrical demand of every electrical device in use in the assigned classroom or area. Include charging electronic devices in your monitoring. Collect Energy Meter readings twice per day, for example at the start of each day before classes begin and again at the end of each day.

Determine total electrical consumption for the duration of the project using the electrical demand of the device, the number of devices in use, the estimated time electricity is used by the devices per day, and the number of days of the project.

Using your data, create an analysis using the following instructions:

1. Construct and label up to 3 different types of graphs using the data collected.
    - For each graph, write a brief summary outlining your findings.

2. Calculate the total energy consumption for the project duration. What percentage of energy was used by each device that was monitored? Show each device's usage in a circle graph.

- Write a conclusion for this circle graph. Discuss your findings and suggest ways to reduce that classroom's energy consumption and improve efficiency.
- Present this data to the teacher of the classroom that was being monitored.

At the end of the project, access the school's data record, recorded by the Energy Dashboard. Using this information:

1. Construct and label up to 2 different types of graphs to represent the schools total energy consumption (with at least one graph relating it your data collection)

- For each graph, write a brief summary outlining your findings.

2. Create a graph and write a brief summary for:

- The trend in the school's total energy usage over the project period.
- The trend in the monitored classroom's overall energy usage over the project period.

3. Optional: Choose your best two graphs and create them on chart paper with a statement explaining the graph. These should be drawn to scale and in colour.

4. Discuss the group's findings with the class. In conclusion, what adjustments could be made for a more effective Energy Efficiency Campaign?

**CURRICULUM**

**Grade 9 Mathematics**

**SP03** Students will be expected to develop and implement a project plan for the collection, display, and analysis of data by

- Formulating a question for investigation
- Choosing a data collection method that includes social considerations
- Selecting a population or a sample
- Collecting the data
- Displaying the collected data in an appropriate manner
- Drawing conclusions to answer the question [C, PS, R, T, V]

**Performance Indicators SP03.01** Create a rubric to assess a project that includes the assessment of:

- A question for investigation
- The choice of a data collection method that includes social considerations
- The selection of a population or a sample and the justification for the selection
- The display of collected data
- The conclusions to answer the question

**SP03.02** Develop a project plan that describes

- A question for investigation
- The method of data collection that includes social considerations
- The method for selecting a population or a sample
- The methods for display and analysis of data

**SP03.03** Complete the project according to the plan, draw conclusions, and communicate findings to an audience.

**SP03.04** Self-assess the completed project by applying the rubric

**Grade 10 Science**

**SCO: Sustainability of Ecosystems**

- Select, compile and display evidence and information from various sources, in different formats, to support a given view in a presentation about ecosystem change (214-3, 213-7)
- Communicate questions, ideas and intentions, and receive, interpret, understand, support and respond to the ideas of others in preparing a report about ecosystem change (215-1)

**Grade 11 Mathematics**

**GCO** Students will be expected to develop statistical reasoning.

**SCO** Performance Indicators - Use the following set of indicators to determine whether students have met the corresponding specific curriculum outcomes.

- S01 Students will be expected to solve problems that involve creating and
- interpreting graphs, including bar graphs, histograms, line graphs, and
- circle graphs. [C, CN, PS, R, T]
- S01.01 Determine the possible graphs that can be used to represent a given data set and explain the advantages and disadvantages of each.
- S01.02 Create, with and without technology, a graph to represent a given data set.

- S01.03 Describe the trends in the graph of a given data set.
- S01.04 Interpolate and extrapolate values from a given graph.
- S01.05 Explain, using examples, how different graphic representations of the same data set can be used to emphasize a point of view.
- S01.06 Solve a contextual problem that involves the interpretation of a graph.

**Grade 12 Physics**

**CO Skills: Students will be expected to**

- **212-1** Identify questions to investigate that arise from practical problems and issues
- **215-2** Select and use appropriate numeric, symbolic, graphical, and linguistic modes of representation to communicate ideas, plans, and results.
- **213-5** Compile and organize data, using data tables and graphs to facilitate interpretation of the data.