



Connecting with the Natural World
Junior Division Integrated Curriculum

Grade 5

Conservation of Energy and Resources Activities



in partnership with



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STAO Writing Team

Sheila Rhodes, Project Manager, Instructor, Faculty of Education,
University of Ontario Institute of Technology

Kimberly Arfo, Curriculum and Instruction, Peel District School Board

Sarah Feddema, Durham District School Board

Jocelyn Paas, Science and Biology Teacher, Peoples Christian Academy

Judy Wearing, Senior Editor, The Critical Thinking Consortium

Reviewers

Bonnie Anderson, Peel Field Centres, Peel District School Board

Corrine Brook-Allred, Pickering (Retired)

Victoria Winchester, Russell Public School

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Table of Contents

Overview for Grade 5 Conservation of Energy and Resources Activities.....	4
Lesson #1: Defining and Collecting an Inventory of Energy in the Community.....	4
Lesson #2: Acting Out Energy.....	4
Lesson #3: Conservation of Energy and Resources Blog.....	4
Lesson #4: Gathering Perspectives on Using Different Energy Resources	5
Lesson #5: Solar, Water, and Wind Energy Inquiries.....	5
Lesson #6: Governments, Energy, and the Environment.....	5
Lesson #7: Plan of Action to Support the Environment; Culminating Activity	5
Additional Activities.....	5
Science at a Run – see Resources section.....	5
Scenario Approach.....	6
Scenario #1.....	6
Scenario #.....	6
Lesson 1 - Defining and Collecting an Inventory of Energy in the Community.....	7
Minds On.....	9
Connections.....	9
Action.....	10
Connections.....	11
Consolidation.....	12
Connections.....	12
Collecting Energy Evidence in the Community.....	14
Lesson 2 - Acting Out Energy.....	15
Minds On.....	17
Connections.....	18
Action.....	18
Connections.....	19
Consolidation.....	20
Connections.....	21
Lesson 3 - Conservation of Energy and Resources Blog.....	22
Minds On.....	25
Connections.....	26
Action.....	26
Connections.....	27
Consolidation	28
Connections	28
Lesson 4 - Gathering Perspectives on Using Different Energy Sources.....	29
Minds On.....	31
Connections.....	32
Action.....	32
Connections.....	33
Consolidation.....	34
Connections.....	34

Lesson 5 - Solar, Wind, and Water Energy Inquiries.....	36
Minds On.....	39
Connections.....	40
Action.....	40
Connections.....	41
Consolidation.....	41
Connections.....	42
What We Know About _____ as an Energy Source	43
Lesson 6 - Governments, Energy, and the Environment.....	44
Minds On.....	47
Connections.....	47
Action.....	47
Connections	48
Consolidation.....	49
Connections	49
Lesson 7 - Plan of Action to Support the Environment: Culminating Activity.....	50
Minds On.....	52
Connections.....	53
Action.....	53
Connections.....	54
Consolidation.....	54
Connections.....	55
ICE Rubric.....	56

Overview for Grade 5 Conservation of Energy and Resources Activities

This integrated set of activities strives to incorporate learning out of doors, environmental connections to the grade 5 science topic of Conservation of Energy and Resources as well as big ideas from the Social Studies Grade 5 strand of Role of Government and Responsible Citizenship. By presenting integrated, inquiry based, and experiential activities to students, the learning that results is far greater than that which is simply learned from a book or computer researched. Students' natural sense of wonder and discovery is encouraged throughout this set of lessons.

Learning about the environment and the community out of doors provides an authentic atmosphere that students relate to. Tips for beginning an out of doors program for students can be found in the Overview section of the entire resource. Assessment opportunities are found within the lessons themselves and also as an introduction in the Overview section of the resource.

In order to promote a higher level of thinking, application, and social justice, environmental issues alongside social responsibilities have been interwoven into a student centred set of activities. Lessons include the following:

Lesson #1: Defining and Collecting an Inventory of Energy in the Community

Students will take two community walks in order to identify and discuss different energy forms and how energy is harnessed. Students will use their collective wisdom to construct new learning to their prior knowledge about what energy is and how it is harnessed using concrete examples they see in the school community.

Lesson #2: Acting Out Energy

Students act out different forms of energy without using letters or words, and other students must guess by their actions what the energy form is. A discussion about what the energy form is and why the actions selected helped others to ascertain what the energy form is will help students to build a deeper understanding of the energy form.

Lesson #3: Conservation of Energy and Resources Blog

Students will create a blog by posting articles, news, responses, and reflections of what and how they have learned about Conservation of Energy and Resources, and what all stake holders can do to help. Electronic pictures of outdoor learning will also be included in the blog. The blog could include a variety of records of student learning, specific activities completed by students and the new ideas they came away with after each lesson, students' educated opinions of different sources of energy, what politicians could be doing, and what the average citizen could do to help conserve energy and resources. This activity will occur over the length of the unit and be added to continually as the learning progresses. Students will be provided with time to respond to postings on the blog through their own postings.

Lesson #4: Gathering Perspectives on Using Different Energy Resources

Students will examine and evaluate different energy sources and from different perspectives. They will share the positive and negative aspects of each energy source, comparing the environmental impacts and perspectives from different stake holders.

Lesson #5: Solar, Water, and Wind Energy Inquiries

Students will deconstruct a variety of other inquiry projects linked to solar, wind or water powered energy in order to build an understanding of what others have done to test these renewable resources, and then craft their own inquiries on either solar energy, wind energy or water energy. The testing of these inquiries is best completed outside. Students will reflect on what they might wish to tell and ask their member of parliament in connection to the conclusions they make about energy consumption and alternative energy sources.

Lesson #6: Governments, Energy, and the Environment

Students will investigate the environmental platforms of various political parties and assess the impact of actions different stake holders might take. They will assess the information they discover and connect different actions to the complex impacts on the environment and on people that can occur both long-term and short-term as a result of the action.

Lesson #7: Plan of Action to Support the Environment; Culminating Activity

Students will use the knowledge and understanding they have gained around the Conservation of Energy and Resources, as well as Government and Responsible Citizenship, to apply a Plan of Action. Students will craft a way to convince a political party to listen to their Plan of Action in one of a variety of ways.

Additional Activities

Science at a Run – see Resources section

Scenario Approach

Using scenarios for students to play out as a participant is one more way to provide meaning and deeper learning for students. By introducing a storyline for students to play parts within, the learning becomes more meaningful and students become better able to relate to different perspectives within the scenario. Two possible scenario examples for the Conservation of Energy and Resources are provided below.

Scenario #1

You are a citizen in the future studying the impacts of decisions made on the environment and on people in the year 2014. You have access to a technological device that will allow you to send a message back in time to the year 2014. If you are a citizen in the year 3014, what will you thank the governments and the citizens of 2014 for doing about the environment? What decisions made an impact on the environment for people living in the year 3014? What advice would you give the people of 2014? What will you ask them to change to make the environment in the year 3014 a better place? What messages are you sending to the governments? What messages are you sending to the people?

Scenario #2

Your group has just come into a great deal of money to start up a new energy company. The company must defend the energy use as one that will support the environment and the people. What energy source will you decide upon? Why? What are the benefits of using your energy source? What are the downfalls? Why should the government support your energy source and research? What do you need to convince the government to support your energy source? What do you need to do in order to convince the public to buy your energy? How will you spend your money? Note the money given to your group must be spent on energy resources and development, and the building of your company as a viable energy company.

Prepare a presentation to show how you will spend your money, what and how you will convince the government to support your company, what your energy source is, and how you will convince the public to buy your energy.

Grade 5 Conservation of Energy and Resources

Lesson 1 - Defining and Collecting an Inventory of Energy in the Community

Lesson Overview

Students will take two community walks in order to identify and discuss different energy forms and how energy is harnessed. Students will use their collective wisdom to construct new learning to their prior knowledge about what energy is and how it is harnessed using concrete examples they see in the school community.

Connections to Environmental Education

Students will

- *Learn to identify energy forms and sources in their community*
- *Discover what energy choices have been made by people in their community*
- *Discuss and construct ideas around different energy choices, including renewable and non-renewable energy sources*

Curriculum Expectations

Science - Grade 5 Understanding Earth and Space Systems: Conservation of Energy and Resources

- OE3 Demonstrate an understanding of the various forms and sources of energy and the ways in which energy can be transformed and conserved
- SE3.1 identify a variety of forms of energy and give examples from everyday life of how that energy is used
- SE3.2 identify renewable and non-renewable sources of energy
- SE3.3 describe how energy is stored and transformed in a given device or system

Social Studies – Grade 5 People and Environments: The Role of Government and Responsible Citizenship

- OE B3 **Understanding Context:** demonstrate an understanding of the roles and key responsibilities of citizens and of the different levels of government in Canada (FOCUS ON: *Significance*)

Big Ideas

- When examining an issue, it is important to understand who the different stakeholders are and to consider their perspectives.
- Energy sources are either renewable or non-renewable.
- Energy can neither be created nor destroyed, but it can be transformed.

Learning Goals

- At the end of this lesson, students will know a variety of forms of energy and provide examples from the neighbourhood of how it is being used.
- At the end of this lesson, students will begin to identify renewable and non-renewable energy sources used within their community.
- At the end of this lesson, students will begin to understand the roles of citizens in their community in making decisions on the energy they use.

Instructional Components and Context

Readiness

- Students should be aware of safety rules and classroom management rules for taking community walks. This can be reviewed with students prior to the first walk.
- Cooperative group Norms of Collaboration should be reviewed with students prior to working in groups and discussing their findings.

Terminology

- energy
- electricity
- heat
- noise
- light
- radio waves
- mechanical
- sources, solar, wind, water, natural gas, battery, etc.

Materials

- Handout to record energy forms and sources
- Digital camera to take electronic records of different energy forms and to record the activity for future use
- Paper and pencils

Minds On

Community walk to collect evidence of energy sources or uses

Students will work in pairs or small groups to collect evidence of energy sources and energy uses while on a whole class community walk.

Prior to completing the walk, students will be asked prompting questions such as: What is energy? How do we use energy in our everyday lives? What might we see or hear to provide evidence of the energy being used in the community? What are some possible ways these energy forms might have been harnessed? How might we know how this energy was harnessed?

Students are expected to record as many examples or evidence of energy and how it might be harnessed as possible while on the walk. The examples will be recorded onto index cards during or after the walk in order for students to be able to organize the different examples of energy forms or uses. Students should be reminded to record one idea per section on the recording sheet to ensure they can organize their observations later in the lesson.

Once back in the classroom, students will ensure they have recorded one example/evidence of energy forms or uses on one index card or section of the recording sheet. They are to discuss with their partners what they discovered about the energy use in the community.

The recording sheets are to be cut out so that students may organize their ideas with one other group in the next section of the lesson.

Connections

Assessment

Because this is an introductory lesson, there are opportunities for Assessment for Learning (including diagnostic) in order to determine what extent of prompting questions and support might be offered to some or all students. Assessment for Learning (diagnostic) can be utilized to help teachers facilitate the discussion and to provide prompting questions during whole and group discussions. Teachers should pay particular attention to what students say about the energy forms, examples they record while out on their walk, and comments they make on how energy might be harnessed.

What do students say or not say about energy, examples of energy, and how it is harnessed? What are students' conceptions and misconceptions about energy? How is energy shown and/or used in the community and how might it be harnessed? What do students say about the choices around energy use in their community? What do students know about energy? What else do students need to build into their knowledge?

Differentiated Instruction

Explicit teaching of key vocabulary may be necessary for English learners.

Students having difficulty organizing their energy cards may be supported by allowing them to visit other groups (peer modelling).

Concept attainment of what energy is may support students who require more scaffolding to construct their understanding.

Action

Collective Wisdom of Energy in the Community

Students are to join and work with other students to make a larger group of about 6-8 students, combining the energy index cards they created as a result of the community walk. Students will be asked to examine the cards for similarities and differences, to remove any duplicates, and to decide upon different ways to organize the cards into different groups.

The teacher will prompt students to discuss observations and thoughts while they organize/classify their energy forms and ways to harness energy.

Sample prompting questions

- What is energy?
- What do you notice about the examples you have collected?
- What surprises you? Are you missing anything?
- What are the types of energy you noticed?
- What are some ways of harnessing energy forms or uses you noticed?
- Is there anything you might like to add to your collection?
- What are some ways that you could organize your collection of energy cards? What other ways might you organize them?

The teacher might wish to highlight any organization that is connected to renewable and non-renewable energy forms and ways to harness the energy. If one group of students has included this as an organizational method, the teacher should have this group share how they organized the energy cards and explain why they did this. A discussion around renewable and non-renewable energy sources should be facilitated by the teacher using examples such as these. The notion that the use of non-renewable energy sources can cause depletion in one form of energy and that bi-products of the conversion of certain forms of energy can be toxic to the environment should be included in the discussion.

If students do not begin to organize their energy evidence cards by renewable and non-renewable energy forms, the teacher may ask students what it means when we talk about renewable and non-renewable energy. Why should we care about renewable and non-renewable energy? Which is better

for people? Which is better for the environment? How do you know? How might you find out more information?

The teacher may select specific groups to share their discussions and highlights with the whole class in order to spark a whole class discussion around:

- What is energy?
- How is it harnessed in this community?
- What else might we look for to provide more evidence?
- What is renewable and non-renewable energy?
- Why might anyone care about renewable and non-renewable energy?
- What choices about energy do people in the community have?
- What incentives might help them to make better decisions about energy choices?
- How might this be connected to Conservation of Energy?
- How might this be connected to global warming?
- Why would we care about any of this? Why might it be important?
- To whom is it important? Why?

A list of energy forms and ways to harness energy could be generated as a whole class. Key ideas and points, and any questions about energy, could be recorded to summarize the ideas and learning. The charts can be referred to when students are reflecting on their learning about Conservation of Energy and responsible choices around energy choice and consumption throughout the unit.

Connections

Assessment

Assessment for Learning will help guide the prompting questions teachers may wish to ask students while they work on organizing their examples of energy. What did students record in their observation sheets while on their walk? Are they adding anything that they saw but did not originally record? What are students saying in their discussions with one another while organizing their energy examples? What are students' responses to the prompting questions? Are students showing a connection to renewable and non-renewable sources of energy? What are students saying and not saying about energy?

Assessment for Learning can be part of the whole group discussion around the prompting questions provided. Which students are sharing their ideas? What other students might require some prompting? What scaffolding might be required for some students?

What are students sharing? What are students not sharing in connection to the prompting questions and learning goals for this lesson?

Differentiated Instruction

Students who are not contributing may be more comfortable sharing in smaller groups. Providing more wait time for some students may encourage a wider range of student interactions.

Strategies such as Think/Pair/Share prior to responding to whole group discussions may also promote more sharing.

Allowing students, especially English Learners, to use sentence prompts to practice responses before sharing their ideas may provide a richer discussion and allow more students to contribute.

Consolidation

Inventory Evidence of Energy Forms and Ways to Harness Energy

Students will participate in a second community walk to create an inventory list of evidence of Energy Forms and Ways to Harness Energy. Students will be prompted to connect their inventory to Renewable and Non-renewable Energy, and what this means to the community.

Prior to the walk, students will be prompted:

- What is renewable and non-renewable energy?
- Why might we care about renewable energy and non-renewable energy?
- How might this be connected to the conservation of energy and resources?
- Why would anyone care about conservation of energy and resources?

Note: The discussion may already be discussed during the activity above which can be connected seamlessly to the second community walk. The second walk may occur in the same route or a different route, depending on where students may gather more evidence to support their questions, and discussions around renewable and non-renewable energy.

Note: For those classrooms writing articles, blogs, wikis or other technological consolidation of learning, taking digital records (pictures) of students actively involved with the activities will add a great deal of meaning to the blog or other technological entries.

Connections

Assessment

The second walk is a great way to see what new approaches students are able to take to the task. What new examples are students noticing? What new connections are students making to energy consumption? What connections to renewable and non-renewable energy? What new examples are students noticing on the second walk? What other new learning are students making?

Differentiated Instruction

Concept attainment of renewable and non-renewable energy sources may support students who require more scaffolding to construct their understanding of the concepts.

Collecting Energy Evidence in the Community

What is energy? How do we use energy in our everyday lives? What evidence might we see or hear in the community? What are some ways this energy might have been harnessed? What might the energy sources be? How might we know this?

Record each example or evidence of energy forms or uses you can find in the community in its own space below (i.e., one example per card). You and your partner may need to have more than one sheet in order to record all your evidence.

Grade 5 Conservation of Energy and Resources

Lesson 2 - Acting Out Energy

Lesson Overview

Students act out different forms of energy without using letters or words, and other students must guess by their actions what the energy form is. A discussion about what the energy form is and why the actions selected helped others to ascertain it, will help students build a deeper understanding of the energy form.

Connections to Environmental Education

Students will:

- *Identify energy forms and sources in their community and the global community*
- *Identify what energy choices could be made by people in the global community*
- *Discuss, construct, and consolidate ideas around different energy choices, including renewable and non-renewable energy sources*

Curriculum Expectations

Science - Grade 5 Understanding Earth and Space Systems: Conservation of Energy and Resources

- OE2 investigate energy transformation and conservation
- OE3 demonstrate an understanding of the various forms and sources of energy and the ways in which energy can be transformed and conserved
- SE2.4 use appropriate science and technology vocabulary, including energy, heat, light, sound, electrical, mechanical, and chemical, in oral and written communication
- SE2.5 use a variety of forms to communicate with different audiences and for a variety of purposes
- SE3.1 identify a variety of forms of energy and give examples from everyday life of how that energy is used
- SE3.2 identify renewable and non-renewable sources of energy
- SE3.3 describe how energy is stored and transformed in a given device or system

Social Studies – Grade 5 People and Environments: The Role of Government and Responsible Citizenship

- OE B3. **Understanding Context:** demonstrate an understanding of the roles and key responsibilities of citizens and of the different levels of government in Canada (FOCUS ON: *Significance*)

Big Ideas

- When examining an issue, it is important to understand who the different stakeholders are and to consider their perspectives.
- Energy sources are either renewable or non-renewable.
- Energy can neither be created nor destroyed, but it can be transformed.

Learning Goals

- At the end of this lesson, students will understand that energy can be derived from different energy resources and that the resources are either renewable or non-renewable.
- At the end of this lesson, students will understand that choices about using energy and resources can be utilized.
- At the end of this lesson, students will be able to apply and communicate their understanding of different energy forms, transformations, and sources in a variety of ways, including orally and kinaesthetically.

Instructional Components and Context

Readiness

- Students should already have a beginning knowledge of different energy forms, vocabulary, and resources. The anchor chart from Lesson #1 can be posted for students to refer to in this lesson.
- Charades, Pictionary rules, and tips.
- Anchor charts of different energy forms and actions that might help indicate what the energy form is (to scaffold for some students)
- An example might be modeled for students so that all students understand how they might act out the energy form they have been provided with.

Terminology

- heat
- light
- electricity
- radio waves
- mechanical,
- sound, wind, solar, etc.

Materials

- Chart paper to record ideas
- Energy cards or Information sheets
- Anchor chart of the different energy forms, energy transformations, and resources, if students require this
- Rules and possible suggestions for the activity

Minds On

Brainstorming of Energy Forms, Sources, and Terms

Students can work in partners or small groups to brainstorm all the energy forms, whether they are renewable or non-renewable, energy sources, and how energy can be harnessed. Students should brainstorm a list dependent on what the Action part of this activity includes (i.e., if students will be expected to act out only energy forms, then energy forms can be brainstormed, but if students will be acting out renewable and non-renewable sources, then more will need to be brainstormed).

As a whole group, students can consolidate a collective brainstormed list of the energy terms and words they will need to complete the Action portion of this activity. The idea is to collect appropriate energy words/terms to act out in a game similar to the acting part of Pictionary or charades.

Once the list has been completed, students will share in the creation of Energy Word Cards required in the Action portion of this activity. These will be gathered and shuffled to ensure that students receive a random card to act out in the second part of this activity. (The teacher may strategically provide some students with specific energy cards if this will help to scaffold the success of this activity for particular students).

Students may need to learn how to play charades or the acting part of Pictionary. A sharing of the experiences students may have had with these games may be helpful for some students. A review of the rules of the games will be required. A modeled game, where students or the teacher act out an energy term/word while students guess the term/word, may help provide more understanding of how to act out different terms/words.

Students may also require some brainstormed ideas on what actions might be used to show different types of renewable and non-renewable energy sources. These could be recorded for students to refer to when planning how to act out their energy forms or energy terms.

Connections

Assessment

Assessment for Learning will be used as teachers observe what students are sharing in the brainstorming session. Those students who tend to share less during whole group discussions should be listened to during the partner portion of the brainstorming. What are students sharing about energy forms, transformation, and energy resources? What are students not saying? What concepts or misconceptions are being voiced? Which students require more encouragement to share their ideas?

Which students show a strong understanding of the material? Which students would benefit from more scaffolding? What prompting questions might support those students?

Differentiated Instruction

The teacher may selectively give some students cards (energy words) with which they will be successful.

Dependent on what the students know and are successful with, the parameters used to create the energy words may be larger or more restricted than what students can be successful with.

Groups of students that require higher or more restricted levels of energy words/terms may play separate games similar to Pictionary using the energy cards designed to meet their needs.

English learners may require more explicit teaching of the vocabulary prior to this game. Visuals may be provided for some students, such as English learners, who require more scaffolding of the vocabulary terms.

Action

Acting Out Energy

This is a great activity to do out of doors or in a larger space. Students remember what they have fun doing and this will help them to get to know the different forms of energy, renewable and non-renewable sources, and conservation of energy, depending on what students are asked to act out.

Have students work in groups to decide how to act out their energy form, source or other Energy word they are given, without using words or letters to spell out the energy form, source or word. Each group of students is given a different card with the energy word or words on it. (To scaffold this activity, students could also be provided with information on that energy form, source or energy-related word that they are to act out OR all students could be provided with information sheets of all the energy descriptions and information.) Students work within their group to act out the energy so that other

groups can tell what the energy word(s) is. Each group member may have different actions or the group may act in unison.

Once a group is performing, the other groups watch quietly, then have a group discussion on what they think the energy word(s) is and why they are deciding this. Each group records their decision/word(s) of the energy on a sign or small white board.

In unison, all groups show their energy cards at once. Each group then explains why they chose the energy they did. The group presenting can then explain what the energy they performed is and why they chose the movements they did.

Each group acts out their energy until all are described.

Modifications to Activity

This activity can be completed throughout the unit on Conservation of Energy. As a result, which cards a teacher decides to present to students may be different depending on how much students know about energy forms, sources or energy transfer. The activity may only include words describing energy forms the first time students play the game. Students might later act out a variety of ways to harness each energy form or act out different energy sources. Students might also act out whether the energy source is renewable or non-renewable. Conservation of the Energy, and responsible choices of citizens and government, could also be included and acted out. For students requiring more scaffolding in their learning about energy, the teacher may present students only with energy forms to begin with.

Connections

Assessment

Assessment for Learning may include observations of students' discussions and choices in how to show their energy forms, transformations, etc. while working in their groups. What are students considering in order to prepare their presentations? What concepts or misconceptions are being discussed? Which students are requiring more scaffolding? Which students might present first in order to provide examples for other groups?

During the presentations, the teacher may observe what is being presented but also the reactions of other students who are trying to decide what is being acted out. What resulting conversations are happening as a result of each of the presentations?

Differentiated Instruction

Students can be provided with anchor charts or written information about the energy form they are to act out.

Some students may require some tips on what actions might help them to connect to the energy description.

Students might be provided with descriptions of all the different energy forms to help them make connections to the actions being shown.

Students who are only able to identify the different forms of energy may be provided with those cards only (smaller groups may play different sets of the same game in this case).

Consolidation

Reflecting on Actions

In order to consolidate learning for this activity, a whole class discussion or brainstorming session will provide the information required to record a chart of what was learned.

Students can be prompted with questions such as:

- What did you notice? What did you learn about energy in this activity?
- What do we now know about energy forms, sources, renewable and non-renewable energy sources, and/or conservation of energy?
- Why might we care about knowing about different energy forms, sources, and ways to harness energy? Why is it important? To whom is it important?
- Why might we want to conserve energy and resources?
- What else did we learn?

A class anchor chart of the key information learned can be recorded for students' reference.

Students can then complete a prompt designed to help them reflect on their learning from this activity. A short reflection on two things that they learned and a question they have about energy is an exit ticket, or students might be asked to write a page in their science journal on what they learned about energy, and what they wonder about energy and the environment.

Some possible prompts to choose from:

- What did you learn about energy during this game? What do you still wonder about energy and the environment?
- What are two things you learned today, and a question you wonder about energy and the environment?
- How did this game help you understand energy better? What else are you still wondering about energy and the environment?
- Why might different people care about renewable and non-renewable energy sources? What might people be concerned about when thinking about conservation of resources and our environment? What do you still wonder?

Note: For those classrooms writing articles, blogs, wikis or other technological consolidation of learning, taking digital records (pictures) of students actively involved with the activities will add a great deal of meaning to the blog or other technological entries. Some students may wish to add their reflections into a blog setting as well.

Connections

Assessment

Students' responses and reflections upon their learning will provide the teacher with what students understand about energy and can apply to choices about renewable/non-renewable sources and the environment. It will also provide teachers with information about what further scaffolding might be required for students.

Differentiated Instruction

English learners may benefit from using sentence prompts and vocabulary lists in order to record their thinking into reflection logs or exit cards.

Some students may benefit from discussing their ideas with partners or small groups prior to reflecting independently.

Grade 5 Conservation of Energy and Resources

Lesson 3 - Conservation of Energy and Resources Blog

Lesson Overview

Students will create a blog by posting articles, news, responses, and reflections of what and how they have learned about Conservation of Energy and Resources and what all stake holders can do to help. Electronic pictures of outdoor learning will also be included in the blog. The blog could include a variety of records of student learning, specific activities completed by students and the new ideas they came away with after each lesson, students' educated opinions of different sources of energy, what politicians could be doing, and what the average citizen could do to help conserve energy and resources. This activity will occur over the length of the unit and be added to continually as the learning progresses. Students will be provided with time to respond to postings on the blog through their own postings.

Connections to Environmental Education

Students will investigate:

- *The dependency of our social and economic systems on the conservation of energy and resources;*
- *The scientific and human dimensions of environmental issues related to Conservation of Energy and Resources;*
- *The positive and negative consequences, both intended and unintended, of different energy uses, and the need for Conservation of Energy and Resources.*

Curriculum Expectations

Science - Grade 5 Understanding Earth and Space Systems: Conservation of Energy and Resources

- OE1 analyse the immediate and long term effects of energy and resource use on society and the environment, and evaluate options for conserving energy and resources
- OE2 investigate energy transformation and conservation
- OE3 demonstrate an understanding of the various forms and sources of energy and the ways in which energy can be transformed and conserved

Social Studies – Grade 5 People and Environments: The Role of Government and Responsible Citizenship

- OE B1 **Application:** assess responses of governments in Canada to some significant issues, and develop plans of action for governments and citizens to address social and environmental issues (FOCUS ON: *Interrelationships; Cause and Consequence*)
- OE B2 **Inquiry:** use the social studies inquiry process to investigate Canadian social and/or environmental issues from various perspectives, including the perspective of the level (or levels) of government responsible for addressing the issues (FOCUS ON: *Perspective*)

- OE B3 **Understanding Context:** demonstrate an understanding of the roles and key responsibilities of citizens and of the different levels of government in Canada (FOCUS ON: *Significance*)
- SE B1.1 assess the effectiveness of actions taken by one or more levels of government to address an issue of national, provincial/territorial, and/or local significance
- SE B1.3 create a plan of action to address an environmental issue of local, provincial/territorial, and/or national significance
- SE B2.1 formulate questions to guide investigations into social and/or environmental issues in Canada from various perspectives, including the perspective of the level (or levels) of government responsible for addressing the issues
- SE B2.2 gather and organize a variety of information and data that present various perspectives about Canadian social and/or environmental issues, including the perspective of the level (or levels) of government responsible for addressing the issues
- SE B2.4 interpret and analyse information and data relevant to their investigations, using a variety of tools
- SE B2.6 communicate the results of their inquiries, using appropriate vocabulary

Big Ideas

- Energy sources are either renewable or non-renewable.
- Energy can neither be created nor destroyed but it can be transformed.
- Choices about using energy and resources have both immediate and long-term impacts.
- Conservation (reducing our use of energy and resources) is one way of reducing the impacts of using energy and resources.
- Citizens and Governments need to work together in order to be able to address issues effectively and fairly.
- When examining an issue, it is important to understand who the different stakeholders are and to consider their perspectives.

Learning Goals

- At the end of this task, students will be able to assess the impacts of different actions of political parties and/or people on the environment and devise personal reflections on what the various plans of action should be.
- By the end of this task, students will be able to make a plan of action to convince a political party to make changes with positive impacts on the environment.
- At the end of this task (at the end of this mini-unit), students will be able to show learning in connection to the Learning Goals throughout the unit within the blog.

Instructional Components and Context

Readiness

- The readiness will change as the blog (and the mini-unit) progresses. Students will need to understand how to create a blog and how to post their articles, opinions, and responses to the different areas of the blog.

Terminology

- The terminology will depend upon the lesson that is being connected to.

Materials

- Computer access
- A variety of science blogs to assess
- Chart paper on which to consolidate what makes a good blog
- Chart paper to describe the directions for posting and responding to blog postings
- Schedule and list of who will post which type of article, visual or connection to the mini-unit

Blogs to investigate

<http://kidsblogs.nationalgeographic.com/blogs/>

<http://washingtonscienceblog.blogspot.ca/>

<http://www.studentsoftheworld.info/sites/pages.php>

<http://www.onlineschools.org/study-hall/100-best-book-blogs-for-kids-tweens-and-teens/>

Sites to help set up a blog for students:

<http://kidblog.org/home/>

http://www.hellokids.com/t_2856/blogs-for-kids

http://www.simplesite.com/pages/receive.aspx?partnerkey=ffgoogle:CA_Search_Blog_PM_Blogs&target=ftp3:crea

Minds On

What Makes a Good Educational Blog?

Students will investigate different educational blogs to determine what criteria are necessary for the best or more effective blog.

Once students have had a chance to investigate what they consider to be informative and good educational blogs, they will first work in small groups to brainstorm what it is that makes a good blog. Student groups will share their lists with the whole class, looking for commonalities among the lists. Consolidation and agreement of the criteria for the class blog will be recorded onto a chart paper for future reference.

Blogs to investigate

<http://kidsblogs.nationalgeographic.com/blogs/>

<http://washingtonscienceblog.blogspot.ca/>

<http://www.studentsoftheworld.info/sites/pages.php>

<http://www.onlineschools.org/study-hall/100-best-book-blogs-for-kids-tweens-and-teens/>

Other questions to prompt students' learning about blogs:

- What blogs did you investigate? What did you like about them? What did you not like?
- What are some internet safety issues we need to consider?
- How are other social media (i.e., wiki, twitter, etc.) integrated into the blogs? How do they work within the blog?
- What makes a good blog?
- How might we ensure our blog is the best it can be?
- What might we include in a blog about Conservation of Energy and Resources? How might we include our own learning?
- How might we organize our blog?
- Who will write and post our information? How will we ensure our postings are of high quality? What might be included?

Ideas for blog postings can be generated. Students should be reminded that the topics for the blog may very well change as the unit progresses. Students can work in groups, partners or individually to craft and post a contribution throughout the unit. All students should have opportunities to respond to the blog postings.

Note: Some boards have an internal blog system in place. Investigate this in your board. This may be the safest way to create a blog that is not open to the public. If using a public blog site, ensure parameters are set up for students to be safe on the internet.

Connections

Assessment

There is a great deal of evidence of learning that can be obtained through this ongoing blog section. Students are able to highlight what they know and what they learned as the unit unfolds. Teachers can take the information about how students respond to articles, news, and other postings in order to determine what students are able to connect to and what misconceptions they may still have.

Differentiated Instruction

Different students can play different parts in the creation of the blog. Ensure students are able to be successful in the role they have taken on in this venture.

Some students may be very successful as photographers or creating summaries of learning, while others may be able to provide more detail and in depth articles. Some students may have an aptitude for technological aspects of the blog. A wide variety of postings will make the blog more interesting.

Peer, self, and teacher feedback is crucial to creating high quality articles, news briefs, opinion, and reflection pieces to post in the blog.

Action

This activity should occur throughout the unit and be an ongoing building of the learning, thinking, and application of the learning to a blog site. Some helpful sites are listed below that can help the class set up their own blog site.

Once students have compiled the list of what they want in their own blogging site, decisions can be made about who will take digital pictures to support the articles being posted, who will post the first and subsequent articles, and what types of articles will be posted. It is suggested that a variety of articles that highlight the learning experiences that are taking place during this unit, as well as actual information about the Conservation of Energy, be posted. Students should also be given the opportunity throughout the unit to respond to different articles posted on the blog.

All students should have a part in the creation of the blog, but perhaps the teacher can facilitate which students take on which activities related to the blog to ensure that the blog is of high quality and that all students are successful with the endeavour.

A peer and teacher editing procedure should be set up to ensure that high quality finished products are posted on the blog as the initial articles. A strategic grouping of students into small groups or partnerships that are assigned different tasks for the blog may be one way to ensure that all students are successful and that the quality of the blog is kept at a maximum.

At the completion of each activity, one group of students could be responsible for creating a summary of the learning, and craft a creative way to share the pictures and information about the learning experience. Another group might be responsible for creating a visually appealing article on the information that is learned during the lesson or group of lessons. Pictures of students involved in the learning might be a positive and motivating way to make the blog more interesting.

Teachers will want to ensure that permission from parents to take pictures of their students is obtained prior to adding any pictures of students onto the blog. Check with school administration; often this permission is requested when the child registers at school and a form is retained in the student's OSR.

The blog is a good way to summarize the learning and have a record for students to refer to when required. It is also a great way for students to reflect upon different parts of the learning and respond with their thoughts.

Sites to help set up a blog for students:

<http://kidblog.org/home/>

http://www.hellokids.com/t_2856/blogs-for-kids

http://www.simplesite.com/pages/receive.aspx?partnerkey=ffgoogle:CA_Search_Blog_PM_Blogs&target=ftp3:crea

Connections

Assessment

The blog will provide an ongoing site for teachers to collect evidence of what students have learned, but also be able to 'listen' to what students' questions and ideas are around the unit and the learning itself.

Differentiated Instruction

Teachers should ensure that students are assigned to parts of the blog that they are able to be successful with. For that student who flourishes when asked to be creative with technology, this may be a great place for this student to set up the initial blogging site. This person might benefit greatly if he/she were to be the technology person that other students could go to for technology help when they are trying to post their finished articles on line.

Consolidation

Having students take time throughout the unit to actually read through what is posted in their own blog and to respond to the different postings will provide students with a deeper consolidation and review of everything they have been learning about Energy Conservation and Responsible Actions of Citizens and the Government. Students should be expected to reflect upon other postings and make some responses of their own.

Connections

Assessment

Teachers will be able to read through a number of ideas and reflections to determine whether or not students are connected to the information provided. Teachers should take note of what students are writing, not writing, and any misconceptions that are evident.

Differentiated Instruction

Students will be able to read through the different articles and topics that have been posted and respond to those that speak to that student. If required, students might want to discuss their responses with a partner before responding in print or on line.

Grade 5 Conservation of Energy and Resources

Lesson 4 - Gathering Perspectives on Using Different Energy Sources

Lesson Overview

Students will examine and evaluate different energy sources and from different perspectives. They will share the positive and negative aspects of each energy source, comparing the environmental impacts and perspectives from different stake holders.

Connections to Environmental Education

Students will investigate

- *The dependency of our social and economic systems on the conservation of energy and resources;*
- *The scientific and human dimensions of environmental issues related to Conservation of Energy and Resources;*
- *The positive and negative consequences, both intended and unintended, of different energy uses, and the need for Conservation of Energy and Resources.*

Curriculum Expectations

Science - Grade 5 Understanding Earth and Space Systems: Conservation of Energy and Resources

- OE1 analyse the immediate and long-term effects of energy and resource use on society and the environment, and evaluate options for conserving energy and resources
- OE2 investigate energy transformation and conservation
- OE3 demonstrate an understanding of the various forms and sources of energy and the ways in which energy can be transformed and conserved
- SE1.1 analyse the long-term impacts on society and environment of human uses of energy and natural resources, and suggest ways to reduce this impact
- SE2.2 use scientific inquiry/research skills to investigate issues related to energy and resource conservation
- SE2.4 use appropriate science and technology vocabulary, including energy, heat, light, sound, electrical, mechanical, and chemical, in oral and written communication
- SE3.1 identify a variety of forms of energy and give examples from everyday life of how that energy is used
- SE3.2 identify renewable and non-renewable sources of energy
- SE3.3 describe how energy is stored and transformed in a given device or system
- SE3.4 recognize that energy cannot be created nor destroyed but can only be changed from one form to another
- SE3.5 explain that energy that is apparently lost from a system has been transformed into other forms (usually heat or sound) that are not useful to the system

Social Studies – Grade 5 People and Environments: The Role of Government and Responsible Citizenship

- OE B1 **Application:** assess responses of governments in Canada to some significant issues, and develop plans of action for governments and citizens to address social and environmental issues (FOCUS ON: *Interrelationships; Cause and Consequence*)
- OE B2 **Inquiry:** use the social studies inquiry process to investigate Canadian social and/or environmental issues from various perspectives, including the perspective of the level (or levels) of government responsible for addressing the issues (FOCUS ON: *Perspective*)
- OE B3 **Understanding Context:** demonstrate an understanding of the roles and key responsibilities of citizens and of the different levels of government in Canada (FOCUS ON: *Significance*)
- SE B1.3 create a plan of action to address an environmental issue of local, provincial/territorial, and/or national significance
- SE B2.1 formulate questions to guide investigations into social and/or environmental issues in Canada from various perspectives, including the perspective of the level (or levels) of government responsible for addressing the issues
- SE B2.2 gather and organize a variety of information and data that present various perspectives about Canadian social and/or environmental issues, including the perspective of the level (or levels) of government responsible for addressing the issues
- SE B2.4 interpret and analyse information and data relevant to their investigations, using a variety of tools
- SE B2.5 evaluate evidence and draw conclusions about social and/or environmental issues, outlining the strengths and weaknesses of different positions on the issues, including the position of the level (or levels) of government responsible for addressing the issues

Big Ideas

- Choices about using energy and resources have both immediate and long-term impacts.
- Conservation (reducing our use of energy and resources) is one way of reducing the impacts of using energy and resources.
- Citizens and governments need to work together in order to be able to address issues effectively and fairly.
- When examining an issue, it is important to understand who the different stakeholders are and to consider their perspectives.

Learning Goals

- At the end of this lesson, students will be able to analyse the immediate and long-term effects of energy and resource use on society and the environment, and begin to evaluate options for conserving energy and resources.
- At the end of this lesson, students will begin to assess some responses of governments in Canada to issues around Conservation of Energy and Resources, and will begin to develop ideas that may lead to plans of action for government and citizens for addressing the issues.

Instructional Components and Context

Readiness

- Students should have an understanding of energy forms, energy transformations, renewable and non-renewable energy sources.
- Students should be able to investigate an energy source, the benefits and issues of using that energy source, and the different perspectives of all stakeholders. The inquiry process from both a Social Studies and the Science perspectives may need to be reviewed.

Terminology

- coal
- oil
- natural gas
- wind, solar power, water, biomass, nuclear, coal, geothermal, etc.

Materials

- Ball or other object to pass around in Making Energy Connections
- Journal or log into which students can reflect their learning
- List of energy forms and sources
- Computers with internet connections for inquiry research
- Other texts of information for student inquiry research
- Chart paper to record comparison findings

Minds On

Making Energy Connections

This activity can be done outside or where there is ample room to move. An object, such as a small globe, ball or stick, could be used for this activity. Something that symbolizes energy or the environment would be appropriate.

Students stand in a circle facing one another. This can be done as a whole class or in 2 smaller circles if that is more manageable. Students are given a name card with an energy source or an energy form on the card. They are to attach the name tag clearly on themselves so that others can see what is on their card. The first person to begin must read out their name tag while holding the object and state, "I am ... (i.e., water power) and I can generate ... (i.e., electricity)". The student who now holds the object then repeats the action by stating, "I am (i.e., electricity) and I can be generated by ... (i.e., wind energy)".

Students pass the object from one person to another as long as there is a connection of how energy is generated or what it is generated from.

This continues until everyone in the circle has had a chance to be part of the chain. If students understand that the goal is to have everyone participate at least once in the chain of statements, they will be more likely to help each other make connections.

Note: The list of energy sources and energy forms can be generated from a previous activity or can be brainstormed as part of this activity. Teachers should ensure that all students in each circle have a connection to at least one or two other cards to ensure all students can participate.

Connections

Assessment

Teachers should observe how well students are able to brainstorm the ideas to support this activity. Students may or may not benefit from scaffolding initially.

During the activity, observing how accurately students are able to make the connections between energy forms and sources will provide teachers with information about what scaffolding may need to be implemented to support students.

Valuable information for teachers can be observed while watching which students are able to confidently identify a variety of connections.

Differentiated Instruction

Some students may require an anchor chart or information sheets with the required information on it.

Some students may benefit by working in partners. Promote an atmosphere where students help each other to be involved with the game.

Action

Different Perspectives for each Energy Source

Have students select one or two types of energy sources and research them to determine the different perspectives of using the energy source. What are the positives of using the energy source and what are the downsides? What do different groups of people say? Who has the different perspectives? (i.e., Wind power is considered a clean energy and is renewable; what are the arguments against using this energy source? What impact does this type of energy have on humans and the environment? What is the cost of wind power?) How might we minimize the negative effects of using the energy source? Is it a renewable or non-renewable energy source? How do you know? How does using this energy source

impact the environment? How does it impact people? Who does it impact? What is your opinion about the use of this energy source compared to others? Why have you chosen this opinion? With what facts can you defend your opinion? What might the government do to ensure the best energy source is used more often, or to ensure that there is less impact on the environment with different energy sources?

Examples: Coal, oil, natural gas, wind, solar power, water, biomass, nuclear, geothermal, etc.

Students are to share their findings from as many perspectives as possible with the rest of the class. A comparison chart of the positives and negatives of each energy source can be created as a whole class. Each time a group presents their energy source, the chart becomes larger and more detailed.

Connections

Assessment

Teachers should examine students' progress while they research their energy source. How students are able to use the Social Studies and Science Inquiry Processes will provide information regarding lessons on using inquiry in these subjects. How well students are able to find information in the resources provided will provide direction on what research skills and resources might better help students. How students are able or not able to organize their work will provide information about what scaffolding teachers might provide in order that students successfully complete their inquiries.

Students' finished inquiry projects can be assessed for understanding, thoroughness, and applications to environmental and social issues around the use of this energy source. The finished product and/or presentation will provide a great deal of information about students' understanding of the energy they investigated. The whole class discussion will provide information about how well students are able to make meaningful comparisons of the benefits and downfalls of using each energy source. Students could also write a persuasive paragraph about a preferred energy source.

Differentiated Instruction

Some students may require the use of specific graphic organizers to help them organize their information. Some students may require preselected resources at their reading level in order to complete the assignment. Some students may require more consistent feedback and support while working on this activity to ensure a high level of product.

English learners may require a variety of preselected resources with attainable vocabulary, guided reading of those resources, and sentence prompts to record their information in written form.

A variety of graphic organizers should be made available for all students in order to select one that supports their organization.

A variety of text forms and resources for students to gather information at their reading level is important.

A variety of graphic organizers should be made available to support the organization of student inquiries.

Consolidation

Impacts of Energy Sources; what action might people take?

As a whole class, analyze the chart comparing the positive and negative effects of using the different energy sources.

Possible teacher prompts:

- What do you notice?
- What has the largest impact on the environment? How do you know?
- What has the least impact on the environment? How do you know?
- What energy source do we use the most often?
- What energy source should we use more of? Why do we not already use it more?
- If we were to ask our politicians about the energy sources we use, what might we ask them?
- What questions do you still have? What questions might we ask to help us learn more?

Have students discuss in small groups, then reflect in their science journals, one of the following prompts:

- What concerns you about our energy use? What makes you hopeful?
- What decisions might we make in order to have less impact on the environment?

What questions might you ask your government? What should everyone do to help lessen the impact on the environment? What should politicians do to help lessen the impact on the environment?

Connections

Assessment

What students contribute or do not contribute in the whole class discussion will provide information about how well students understand the different perspectives of using each energy resource. Those students who are not contributing as readily to classroom discussions may be provided with opportunities to discuss their ideas in small groups or with a partner, and observed in this setting.

The reflections written by students in journals or logs will provide information about how well students can apply their thinking to developing beginning ideas around Action Plans connected to energy resource choices and the environmental impact.

Differentiated Instruction

Some students may require time to discuss their ideas with a partner before recording them in their journals. Sentence prompts, graphic organizers or voice activated computer programs can also be used to support those students who have difficulty with written tasks.

Grade 5 Conservation of Energy and Resources

Lesson 5 - Solar, Wind, and Water Energy Inquiries

Lesson Overview

Students will deconstruct a variety of other inquiry projects linked to solar, wind or water powered energy in order to build an understanding of what others have done to test these renewable resources, and then craft their own inquiries on either solar energy, wind energy or water energy. The testing of these inquiries is best completed outside. Students will reflect on what they might wish to tell and ask their member of parliament in connection to the conclusions they make about energy consumption and alternative energy sources.

Connections to Environmental Education

Students will investigate:

- *The positive and negative consequences, both intended and unintended, of different energy uses, and the need for Conservation of Energy and Resources*

Curriculum Expectations

Science - Grade 5 Understanding Earth and Space Systems: Conservation of Energy and Resources

- OE1 analyse the immediate and long term effects of energy and resource use on society and the environment, and evaluate options for conserving energy and resources
- OE2 investigate energy transformation and conservation
- OE3 demonstrate an understanding of the various forms and sources of energy and the ways in which energy can be transformed and conserved
- SE1.2 evaluate the effects of various technologies on energy consumption and propose ways in which individuals can improve energy consumption
- SE2.2 use scientific inquiry skills to investigate issues related to energy and resource conservation
- SE2.3 use technological problem-solving skills to design, build, and test a device that transforms one type of energy into another
- SE3.2 identify renewable and non-renewable sources of energy
- SE3.3 describe how energy is stored and transformed in a given device or system

Social Studies – Grade 5 People and Environments: The Role of Government and Responsible Citizenship

- OE B1 **Application:** assess responses of governments in Canada to some significant issues, and develop plans of action for governments and citizens to address social and environmental issues (FOCUS ON: *Interrelationships; Cause and Consequence*)

- SE B1.3 create a plan of action to address an environmental issue of local, provincial/territorial, and/or national significance
- SE B2.1 formulate questions to guide investigations into social and/or environmental issues in Canada from various perspectives, including the perspective of the level (or levels) of government responsible for addressing the issues
- SE B2.2 gather and organize a variety of information and data that present various perspectives about Canadian social and/or environmental issues, including the perspective of the level (or levels) of government responsible for addressing the issues
- SE B2.5 evaluate evidence and draw conclusions about social and/or environmental issues, outlining the strengths and weaknesses of different positions on the issues, including the position of the level (or levels) of government responsible for addressing the issues
- SE B2.6 communicate the results of their inquiries, using appropriate vocabulary
- SE B3.3 describe the shared responsibility of various levels of government for providing some services and for dealing with selected social and environmental issues
- SE B3.5 describe key actions taken by different levels of government to solve some significant national, provincial/territorial, and/or local issue

Big Ideas

- Energy can be neither created nor destroyed but can be transformed.
- Choices about using energy and resources have both long-term and immediate impacts.
- Canadians need to understand their rights and responsibilities as well as how governments work.
- When examining an issue, it is important to understand who the different stakeholders are and to consider their perspectives.

Learning Goals

- At the end of this lesson, students will understand various forms and sources of energy (solar, wind, and water powered) and the ways in which the energy can be transformed and conserved.
- At the end of this lesson, students will be able to use scientific skills to investigate issues/questions related to energy and resource conservation, specifically renewable energy sources such as solar, wind, and water powered energy sources.

Instructional Components and Context

Readiness

- Students should understand and be able to use the scientific inquiry model to design, build, and test their ideas.
- Students should be able to work in groups to deconstruct and analyse other inquiry projects in order to formulate their own good questions for their own inquiry.

Terminology

- Solar energy
- wind energy
- water powered energy
- transformation
- conservation
- insulation, etc.

Materials

- Materials specified by students to conduct their inquiries
- Scientific Inquiry Model for students to follow
- Some sites to get you started. By searching for wind, solar or water energy projects, there are many inquiry projects that have been documented on line.

Solar Energy Inquiry Projects

<http://www.re-energy.ca/solar-oven>

<http://www.builditsolar.com/Projects/Educational/NCKidsSolarAct-1.pdf>

<http://www.altenergyhobbystore.com/marshmallow%20roaster.htm>

Wind Energy Inquiry Projects

<http://www.re-energy.ca/wind-turbine>

http://www.windstuffnow.com/main/one_hour_projects.htm

<http://www.picoturbine.com/>

Water Energy Inquiry Projects

<http://www.re-energy.ca/hydro-generator>

Others

<http://www.re-energy.ca/biogas-generator>

KLEW chart

Minds On

Solar, Wind, and Water Power Inquiry Investigations:

Students can work in one of three areas. One third of the class can investigate inquiry projects on wind power, another third of the class can look at inquiry projects on solar power, and the last third of the class can examine inquiry projects completed on water power. The aim of this activity is for students to gain as much information from work already completed, and to generate questions and wonderings that may become their own inquiry projects on one of the three energy sources.

Students can work in small groups or with partners to examine and learn about a variety of other student inquiry projects, one of either solar, wind or water power activities. Students can work together to fill in a modified KWL chart, such as the KLEW graphic organizer that helps students examine different projects and organize their thoughts into what they think they know, what was learned, what evidence they have, and what they are still wondering.

Some sites to get you started. By searching for wind, solar or water energy projects, there are many inquiry projects that have been documented on line.

Solar Energy Inquiry Projects

<http://www.re-energy.ca/solar-oven>

<http://www.builditsolar.com/Projects/Educational/NCKidsSolarAct-1.pdf>

<http://www.altenergyhobbystore.com/marshmallow%20roaster.htm>

Wind Energy Inquiry Projects

<http://www.re-energy.ca/wind-turbine>

http://www.windstuffnow.com/main/one_hour_projects.htm

<http://www.picoturbine.com/>

Water Energy Inquiry Projects

<http://www.re-energy.ca/hydro-generator>

Others

<http://www.re-energy.ca/biogas-generator>

Selected KLEW charts can be shared with the whole class. Those students who did not share with the whole class can share any added information. (Sheila, can we get copyright for the KLEW organizer? It is in the Financial Literacy STAO document)

As a whole class, a list of good inquiry questions relating to one of the three energy sources can be listed on three different chart papers: one for Solar Energy Inquiry Questions, a second for Wind Power Inquiry Questions, and the third for Water Power Inquiry Questions. Students are to articulate why they feel these questions are conducive to inquiry projects.

The lists can be used for the Action Phase of the lesson.

Connections

Assessment

Analysis of the KLEW charts will provide information of what preconceptions and misconceptions students have around inquiries and energy sources (solar, wind or water).

Observations of the types of inquiry questions will provide a great deal of information about how much students know about effective inquiry questions and about Solar, Wind and/or Water Power Energy sources.

Differentiated Instruction

Group readings of the inquiry projects will allow all students to access the texts.

If possible, provide choice as to the energy source that students wish to examine.

Action

Solar, Wind and/or Water Power Inquiry Projects

Students are to select one of the inquiry questions on one of solar, wind or water power lists. They are to work in partners or groups to design and carry out their own inquiry projects. These projects are to be tested out of doors where there is more room, sunlight, and areas where water can be used. Waiting for a sunny, warm day with a breeze might work best for all three types of inquiry projects to be tested.

Students are to craft fair tests from good inquiry questions and test materials and/or designs around the energy source they selected.

Students will share their findings to the rest of the class to compare information and ask questions about the findings. Students will be asked as a whole group, what does this tell us? Was there something we could do differently next time? What other questions do you now have?

Connections

Assessment

Observations of how students approach their inquiry projects, the questions they ask, what variables they set, and how they follow the science inquiry process will provide a great deal of information for teachers.

How students make connections to science facts and concepts with their findings and conclusions will enable teachers to collect evidence of student learning.

Discussions and explanations students provide to one another and in response to teacher prompting will also provide a great deal of valuable information.

Differentiated Instruction

Students may work in groups or with partners. Some students may require some strategic partnerships with the direction of the teacher.

Some guided work with the teacher to set up the inquiry plan and to record meaningful discussions and/or conclusions may be required with some students.

An anchor chart to show the scientific inquiry model will help many students. A graphic organizer to help some students set up their inquiry may be helpful.

Consolidation

Consolidation of Information and Questions for Inquiries

A summary of what was learned; new questions that have arisen and what other inquiries students might wish to investigate would be beneficial. Having students provide meaningful feedback to one another would help students improve their inquiries.

By prompting students to ensure the inquiry discussions and conclusions are linked to the inquiry question and to evidence is important.

Create a summary of what was learned and how we can apply this to what we know about Conservation of Energy and Resources. This will be useful to students to help consolidate their thinking and can be used in subsequent lessons.

Students can reflect upon their learning by creating a comparison of what they learned in a chart of their choice. Students should also be considering what they might be suggesting to various levels of governments. What questions might students want to ask their member of parliament?

Connections

Assessment

Reflection of what the student learned can provide information about how well the student achieved the learning goals.

Differentiated Instruction

Students can use the summary chart to help consolidate their reflections. Some students may benefit from discussing their ideas orally before recording their thoughts in written form.

What We Know About _____ as an Energy Source:

Energy source our group is investigating: _____

K What We Think We Know	L What We Learned	E What Evidence We Have	W What We Still Wonder

Grade 5 Conservation of Energy and Resources

Lesson 6 - Governments, Energy, and the Environment

Lesson Overview

Students will investigate the environmental platforms of various political parties and assess the impact of actions different stake holders might take. They will assess the information they discover and connect different actions to the complex impacts on the environment and on people that can occur both long-term and short-term as a result of the action.

Connections to Environmental Education

Students will investigate

- *The dependency of our social and economic systems on the conservation of energy and resources;*
- *The scientific and human dimensions of environmental issues related to Conservation of Energy and Resources;*
- *The positive and negative consequences, both intended and unintended, of different energy uses, and the need for Conservation of Energy and Resources.*

Curriculum Expectations

Science - Grade 5 Understanding Earth and Space Systems: Conservation of Energy and Resources

- OE1 analyse the immediate and long term effects of energy and resource use on society and the environment, and evaluate options for conserving energy and resources
- OE2 investigate energy transformation and conservation
- SE1.1 analyse the long term impacts on society and the environment of human uses of energy and natural resources, and suggest ways to reduce these impacts
- SE1.2 evaluate the effects of various technologies on energy consumption and propose ways in which individuals can improve energy consumption
- SE2.2 use scientific inquiry/research skills to investigate issues related to energy and resource conservation
- SE3.2 identify renewable and non-renewable sources of energy

Social Studies – Grade 5 People and Environments: The Role of Government and Responsible Citizenship

- OE B1 **Application:** assess responses of governments in Canada to some significant issues, and develop plans of action for governments and citizens to address social and environmental issues (FOCUS ON: *Interrelationships; Cause and Consequence*)

- OE B2 **Inquiry:** use the social studies inquiry process to investigate Canadian social and/or environmental issues from various perspectives, including the perspective of the level (or levels) of government responsible for addressing the issues (FOCUS ON: *Perspective*)
- OE B3 **Understanding Context:** demonstrate an understanding of the roles and key responsibilities of citizens and of the different levels of government in Canada (FOCUS ON: *Significance*)
- SE B1.1 assess the effectiveness of actions taken by one or more levels of government to address an issue of national, provincial/territorial, and/or local significance
- SE B1.3 create a plan of action to address an environmental issue of local, provincial/territorial, and/or national significance
- SE B2.1 formulate questions to guide investigations into social and/or environmental issues in Canada from various perspectives, including the perspective of the level (or levels) of government responsible for addressing the issues
- SE B2.2 gather and organize a variety of information and data that present various perspectives about Canadian social and/or environmental issues, including the perspective of the level (or levels) of government responsible for addressing the issues
- SE B2.4 interpret and analyse information and data relevant to their investigations, using a variety of tools
- SE B2.5 evaluate evidence and draw conclusions about social and/or environmental issues, outlining the strengths and weaknesses of different positions on the issues, including the position of the level (or levels) of government responsible for addressing the issues
- SE B2.6 communicate the results of their inquiries, using appropriate vocabulary
- SE B3.3 describe the shared responsibility of various levels of government for providing some services and for dealing with selected social and environmental issues
- SE B3.5 describe key actions taken by different levels of government to solve some significant national, provincial/territorial, and/or local issue

Big Ideas

- Choices about using energy and resources have both immediate and long-term impacts.
- Conservation (reducing our use of energy and resources) is one way of reducing the impacts of using energy and resources.

Learning Goals

- At the end of this lesson, students will be able to assess actions of different governments in regard to conservation of energy and resources, and begin to make plans of action for governments and citizens.
- At the end of this lesson, students will be able to analyse the immediate and long-term effects of energy and resource use on society and the environment, and evaluate options for conserving energy and resources.

Instructional Components and Context

Readiness

- Students should have a basic knowledge of who the political parties in Ontario and in Canada are. A basic knowledge of what a political platform is and how parties come into power may need to be reviewed. What, if anything, binds a political party to its promised platform? Throughout this lesson, students will investigate how to find out what each party's platform is.
- Students may need some instruction on how to write a formal letter that is appropriate to send to political parties.
- Students should have an understanding of how to use the Social Studies inquiry process.

Terminology

- platform
- Green, Liberals, Progressive Conservative, New Democratic Party,
- energy conservation,
- incentives
- production
- development,
- clean energy

Materials

- Information about the different platforms of political parties in Ontario and Canada
- Computers with internet access
 - <http://www.ontarioliberal.ca/OurPlan/Platform.aspx>
 - <http://www.itstimeforgreen.ca/>
 - <http://www.ontariopc.com/>
 - <http://ontariondp.com/en/>

Future Wheels:

- <http://www.emergentfutures.com/wpdl/Emergent%20Futures%20Consequence%20Wheel%20Tool%20Download.pdf>.

Minds On

What Can Governments Do?

Students will work with partners and then small groups to brainstorm what the government could do to help support better energy conservation, the environment, and alternative (renewable) sources of energy. They may also brainstorm what the community might do and what each individual might do to support energy conservation, the environment, and the use of renewable energy.

This can be shared with the whole class in order to make up a list of actions that each stake holder might be able to do to support the environment and resources.

Connections

Assessment

Ideas that students share from their brainstorming session will provide information about what prior knowledge students come to this task with.

Differentiated Instruction

Strategic groupings and teacher-guided brainstorming sessions can help support some students who are having trouble getting started. Graphic organizers or sentence stems may help promote ideas for some students.

Action

What are Government Platforms on Energy?

Investigate the platforms of different political parties in Ontario and Canada. What are the parties doing for our environment? What are they doing about energy conservation, production or development of clean energy? How much will this cost Ontario residents?

Students can work in groups to investigate one or more parties. They can then share their findings with the class and determine what other questions they need to ask the political party they investigated. Addresses can be obtained through the different political party internet sites.

Students can compile their work in groups and then share with the whole class to determine what information is missing and what questions they have for each of the political parties.

<http://www.ontarioliberal.ca/OurPlan/Platform.aspx>

<http://www.itstimeforgreen.ca/>

<http://www.ontariopc.com/>

<http://ontariondp.com/en/>

<http://oee.nrcan.gc.ca/calendarclub/lessons/3881>

Write letters to the different local party leaders asking what their platforms on energy conservation and production are. Or ask for more details about what they are planning to do for our environment, specifically in the area of energy conservation and production. What are they doing about clean energy? What are they doing to ensure more businesses have incentives to be Green? Do the parties need anything more in their websites to help others understand their platforms? Is there anything else students wish to ask the parties?

Make a comparison of replies. Students may wish to reflect upon their ideas and assessments of the different political parties' platforms in connection to the environment.

Connections

Assessment

How students use the Social Studies inquiry process can be observed. The information that students are able to summarize and share with the class will provide information about how they approach the Social Studies inquiry process. The questions students formulate in connection to the information from the websites will provide information about concepts students understand or misconceptions they may have.

Differentiated Instruction

Some students may need to read the website they are examining in a group setting to ensure all students can access the material. Graphic organizers may support students in organizing the information they are looking for. Sentence prompts may also support some students in finding meaningful information. The teacher can preview the websites of the different parties and assign websites dependent on accessibility of information to specific students to ensure success for all students.

Some students may require more scaffolding in order to write formal letters to political parties. Guided writing groups may support those students who require more scaffolding with letter writing. Sentence prompts set up in a formal letter format may also support some students, especially English learners.

Consolidation

Futures Wheel of Energy Consumption

Have students create a Futures Wheel connecting all impacts (large and small) of using a particular energy source. Or create a Futures Wheel to show what might happen if the current political party mandated one action connected to conservation of energy, or one mandated action for the promotion of clean energy (note: students might need to discuss possible actions that governments might make).

<http://www.emergentfutures.com/wpdl/Emergent%20Futures%20Consequence%20Wheel%20Tool%20Download.pdf>

Students can use the Futures Wheels to discuss what government could do to better support the environment and sustainable energy use.

As a follow-up activity, students can reflect upon their learning and make their own assessment of the platforms of the different political parties.

Some journal prompts may include:

- What have you learned about the platforms of the political parties that you examined? What platform do you like the best? Why? What is hopeful? What else do you feel the government should do to support the environment? What are one or two actions that could be added to the platform? How might this impact society and the environment?

Connections

Assessment

Students' understanding and misconceptions about how one decision or action can impact the environment in multiple ways can be determined by what students include or do not include in the Futures Wheels.

Students' reflection and assessment of responsibilities of the government and citizens in connection to the conservation of energy and resources can be ascertained in the journal reflection. What a student includes or does not include and any misconceptions can be determined in the reflection. A conversation about any missing pieces can be used as a follow-up, if required.

Differentiated Instruction

The complexity expected in the Future Wheels will be determined by the ability of the students to make complex connections from one action to different aspects of the environment.

Grade 5 Conservation of Energy and Resources

Lesson 7 - Plan of Action to Support the Environment: Culminating Activity

Lesson Overview

Students will use the knowledge and understanding they have gained around the Conservation of Energy and Resources as well as Government and Responsible Citizenship to apply a Plan of Action. Students will craft a way to convince a political party to listen to their Plan of Action in one of a variety of ways. This lesson may take several classes to complete.

Connections to Environmental Education

Students will investigate:

- *The dependency of our social and economic systems on the conservation of energy and resources;*
- *The scientific and human dimensions of environmental issues related to Conservation of Energy and Resources;*
- *The positive and negative consequences, both intended and unintended, of different energy uses, and the need for Conservation of Energy and Resources.*

Curriculum Expectations

Science - Grade 5 Understanding Earth and Space Systems: Conservation of Energy and Resources

- OE1 analyse the immediate and long term effects of energy and resource use on society and the environment, and evaluate options for conserving energy and resources
- OE2 investigate energy transformation and conservation
- OE3 demonstrate an understanding of the various forms and sources of energy and the ways in which energy can be transformed and conserved

Social Studies – Grade 5 People and Environments: The Role of Government and Responsible Citizenship

- OE B1 **Application:** assess responses of governments in Canada to some significant issues, and develop plans of action for governments and citizens to address social and environmental issues (FOCUS ON: *Interrelationships; Cause and Consequence*)
- OE B2 **Inquiry:** use the social studies inquiry process to investigate Canadian social and/or environmental issues from various perspectives, including the perspective of the level (or levels) of government responsible for addressing the issues (FOCUS ON: *Perspective*)
- OE B3 **Understanding Context:** demonstrate an understanding of the roles and key responsibilities of citizens and of the different levels of government in Canada (FOCUS ON: *Significance*)

- SE B1.1 assess the effectiveness of actions taken by one or more levels of government to address an issue of national, provincial/territorial, and/or local significance
- SE B1.3 create a plan of action to address an environmental issue of local, provincial/territorial, and/or national significance
- SE B2.1 formulate questions to guide investigations into social and/or environmental issues in Canada from various perspectives, including the perspective of the level (or levels) of government responsible for addressing the issues
- SE B2.2 gather and organize a variety of information and data that present various perspectives about Canadian social and/or environmental issues, including the perspective of the level (or levels) of government responsible for addressing the issues
- SE B2.4 interpret and analyse information and data relevant to their investigations, using a variety of tools
- SE B2.5 evaluate evidence and draw conclusions about social and/or environmental issues, outlining the strengths and weaknesses of different positions on the issues, including the position of the level (or levels) of government responsible for addressing the issues
- SE B2.6 communicate the results of their inquiries, using appropriate vocabulary
- SE B3.3 describe the shared responsibility of various levels of government for providing some services and for dealing with selected social and environmental issues
- SE B3.5 describe key actions taken by different levels of government to solve some significant national, provincial/territorial, and/or local issue

Big Ideas

- Energy sources are either renewable or non-renewable.
- Energy can neither be created nor destroyed but it can be transformed.
- Choices about using energy and resources have both immediate and long-term impacts.
- Conservation (reducing our use of energy and resources) is one way of reducing the impacts of using energy and resources.
- Citizens and Governments need to work together in order to be able to address issues effectively and fairly.
- When examining an issue, it is important to understand who the different stakeholders are and to consider their perspectives.

Learning Goals

- At the end of this task, students will be able to assess the impacts of different actions of political parties and/or people on the environment and devise personal reflections on what the various plans of action should be.
- By the end of this task, students will be able to make a plan of action to convince a political party to make changes with positive impacts on the environment.

Instructional Components and Context

Readiness

Students will be expected to use the Social Studies Inquiry Process and, therefore, should have an understanding of it. Students should have a basic understanding of what political parties exist in Canada and what their general platforms regarding the environment are.

Students should have an idea of what the impact of various actions on the environment can be.

Materials

- Anchor charts and information students collected over the course of this mini-unit
- ICE Rubric
- Materials required for students' individual project completion
- Computer access may be required for some projects

Minds On

Conservation of Energy and Resources, and Political Parties' Platforms

Have students work individually first and then in groups to brainstorm the different choices that political parties in Ontario and/or Canada can make in relation to the environment, especially connected to the Conservation of Energy and Resources.

Once the groups have worked to brainstorm as many choices and plans that political parties are doing or could be doing to help support the environment, especially with the Conservation of Energy and Resources, a compilation of the list can be constructed as a whole class.

The whole class can also compile a list of plausible ways to convince a political party to take on your Plan of Action.

A co-constructed list of criteria for what would make a plausible and positive Plan of Action for a political party to take on should be completed. The criteria should be guided by the ICE rubric included with this activity, but should be co-constructed with students to ensure that all understand what is expected through this assessment task.

The brainstorming and the co-constructed list of criteria can become anchor charts for the Action portion of this lesson.

Connections

Assessment

Because this is a culminating task, the evidence of learning from this activity can be used as part of the Assessment of Learning for this unit. What students contribute or do not contribute can be considered evidence of learning from the Minds On activity. Students should be listened to while they work in groups in order to assess students individually in this task. Evidence of learning as described in the ICE rubric and also from the co-constructed list of criteria can be recorded as data.

Differentiated Instruction

Teachers may wish to listen to specific students from whom they require more evidence of learning. Prompting questions can help reluctant students share what they are thinking.

Action

Students can be presented with the task described below. Teachers should ensure that all students understand what is expected of them and what the task is asking them to do. The criteria should be co-constructed using the directions and the ICE rubric as guides. Once students understand the task, the teacher may have students conference or explain their plans and their progress from time to time to ensure that they experience success with the assignment.

Instructions

Convince a government level official, politician or political party to make better choices regarding the environment in their platform. Design a presentation and informative letter or handout of how they might help to conserve energy and resources in Canada. Include what they can do and what citizens should do.

What tool will you create to share with the government or political party? To whom will you present or send this? Why do you want to send it to this person or party? Consider one of the following suggestions in order to show everything you know about energy, renewable and non-renewable energy, conservation of energy, resources that are used and/or affected by the use of this form of energy consumption, and what the impacts are for all stake holders (including the short and long term environmental impacts). What is the important vocabulary you will use?

Include in your presentation

1. An informative letter or hand-out to give to the politician, political party or government that convinces them to listen to your views
2. A presentation tool, such as one of the following:

- Concept map (show all levels and examples)
 - PowerPoint or Prezi presentation
 - Video (you may ask volunteers to help you present your work)
 - Comic book (detailed sections with examples and all perspectives)
 - Detailed brochure (2 sided on 11X17)
 - Picture book (fiction or nonfiction but must show all information required)
 - Play or set of tableaux scenes that show all details of your action plan in the script (note: you can ask volunteers to help you present your work, if you wish)
 - Another idea with permission from your teacher
3. A presentation to share all the information. (How will you convince a politician or government official to follow through with your ideas?)
 4. A self-assessed rubric to show you have included everything at all levels

Connections

Assessment

Teachers should use the ICE rubric and the co-constructed criteria to collect evidence of learning for each student. Observations of what students explain and are completing while the project is in process, the resulting presentation of their work, and any responses to questions should be included. In some cases, the teacher should conduct student conferences to ensure they have all the information of what the student is thinking and can do.

Differentiated Instruction

The product should take on the form in which the student is most likely to be successful. For some students who do not show all that they know, the teacher may need to ask prompting questions and conduct a conference to determine what the student is capable of.

Consolidation

A comparison of the information and action plans can be conducted as a whole class to determine the different options and different perspectives. A chart can be created to show the comparisons. A class discussion can come from students explaining what they see and notice from different students' ideas and perspectives.

Students should take time to reflect upon what they learned from this task and what is important. Journal entry time or a reflection in their portfolios would help students to consolidate their learning.

Connections

Assessment

Students' reflections can serve as valuable information about what they know and can apply to their learning. Their contributions to class discussions about the comparisons of ideas and perspectives can also serve to be part of the evidence of learning.

Note: Remember that the teacher will have a number of pieces of student work, observations, and information from conversations with students. The culminating task is just one more piece of data to add to the evidence before making a judgment on a student's mark.

The teacher will use the ICE format for co-creating the rubric. (Ideas, Connections, Extensions). ICE places student learning on a continuum by describing the quality and depth of a student's understanding (from superficial to deep) at different phases of development. The framework for ICE should be shared with students to ensure they understand how important it is to make deep connections to their learning and not simply parrot back content facts. In order to reach the highest levels of an ICE rubric, students must be able to make connections to globalized big ideas. The primary concern is what the student does with the content rather than just showing the content alone.

Differentiated Instruction

Sentence prompts may help some students record their thoughts into writing. Allowing students to discuss their ideas with a partner may also help them organize and consolidate their thinking before committing it to paper.

ICE Rubric:

Note: this rubric should be on a single page in landscape format.

ELEMENT/CATEGORIES	IDEAS	CONNECTIONS	EXTENSIONS	
	Level 1	Level 2	Level 3	Level 4
<p><i>Knowledge and Understanding: (facts, terminology, definitions, concepts)</i></p> <p><i>How is the content used?</i></p>	<ul style="list-style-type: none"> -provided basic definitions of renewable and nonrenewable resources -identified energy forms that can be transformed -provided basic definition of conservation of resources -identified forms and sources of energy 	<ul style="list-style-type: none"> -examples provided to support definitions -everyday activities connected to renewable and nonrenewable energy sources, energy transformations, etc. -explained the pros and cons of each source of energy 	<ul style="list-style-type: none"> -suggestions proposed for the conservation of energy -suggestions proposed for the conservation of resources -identified how the proposed plan of action will impact the environment and different stake holders 	<ul style="list-style-type: none"> -explained what might be done differently from different perspectives (i.e, citizen’s responsibilities and governments’ responsibilities) -fully explained what everyone can do -fully developed action plan described for governments and for citizens -able to defend the proposed plan of action and connect the plan to positive and negative impacts to different stake holders
<p><i>Communication: (expression and organization of ideas and information)</i></p>	<ul style="list-style-type: none"> -appropriate science and technology vocabulary used correctly -ideas expressed in an 	<ul style="list-style-type: none"> -thinking expanded to connect ideas to information from personal experiences and other sources 	<ul style="list-style-type: none"> -explained how and why personal (informed) thinking has changed -linked the 	<ul style="list-style-type: none"> -new questions asked -others (classmates, adults, political parties, etc.) asked to

	<p>organized and logical manner</p>		<p>proposed plan of action to personal thinking and experience</p>	<p>participate -communication and contact to other stake holders with clearly communicated questions and plans of action -supported different perspectives and clearly communicated pros and cons of each action for each stake holder</p>
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