



EVERY ACTION MATTERS

CLASSROOMS TAKE CHARGE

Service-Learning Lesson Plan

Project: Human Energy

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Project Overview: Our first goal was to inform the public about greenhouse gas emissions. Our second goal was to encourage people to reduce emissions by registering for actions on the Taking Charge website. We wanted to make a difference by reducing greenhouse gas emissions around Seattle.

Learning Objectives

Describe the transfers and transformations of matter and energy in an ecosystem. Explain how fossil fuels form and how combustion plays a huge role in global warming. Describe the cycle of carbon through an ecosystem. Explain how human activity can contribute to climate change.

How were the learning objectives evaluated?

Through worksheets, the rubric on the project, informal oral questions and the post test.

Service Objectives

Tell others about the impact of carbon dioxide on the environment and encourage them to reduce carbon dioxide production.

How were the service objectives evaluated?

By tracking progress on the Take Charge website.

Subject Areas: Biology, Ecology

Grade Levels: 9th, 10th, 11th and 12th

Materials Needed:

- Access to computers, poster supplies

Key Partners:

- Someone to put the information in the school newsletter.

Time Required to Complete Project:

- The project took seven school days within the Human Energy Unit.

Human Energy Systems Units Used (For lesson plans visit: carbontime.bsccs.org)

- **Activity 3.3** Why We Care About the Keeling Curve
- **Activity 4.1** Finding the Carbon
- **Activity 4.2** The Organic/Inorganic Swap
- **Activity 4.3** The Seasonal Cycle
- **Activity 4.4** Zooming Into Fossil Fuels
- **Activity 4.5** Follow the Carbon
- **Activity 5.1** Carbon Emissions Jigsaw
- **Activity 5.2** Energy Scenarios
- **Activity 5.3** The Upward Trend
- **Activity 6.1** How We Use Organic Carbon
- **Activity 6.2** Extreme Makeover: Lifestyle Edition
- **Activity 6.3** Secrets Revealed

Lessons & Activities (See below.)

- Service Learning Assignment
- Make a poster
- Service Learning Project Reflection

Project Milestones

- Teach Human Energy Systems
- Sign consent forms
- Students participate in Take charge website
- Students plan and conduct project
- Students complete reflection
- Students complete post test

Service Learning Project

Name _____

The goals of this human energy service learning project are two-fold. First, you want to inform the public about carbon dioxide emissions and tell them how to limit these harmful emissions. Second, you want to encourage people to go to the Taking Charge website and sign up on ways they can limit carbon dioxide emissions and track it. We want to make a difference by bringing down greenhouse gas emissions around Seattle.

You can complete this project by yourself or with a partner. You can choose from any of the following projects: poster, radio announcement, newsletter, tabling, letter to the editor, presentation, song, or play. You need to spend at least 4 hours on your project. We have to cover many of these as a class so each group will need to do something different. No matter what you pick the same kind of information will need to be included. You will research the answers to the following questions and then create your project using the information from your research.

1. What is carbon dioxide?
2. Where does carbon dioxide come from? List at least 5 actions that contribute to the release of carbon dioxide.
3. Describe how one of the actions you listed release carbon dioxide. You could draw a matter diagram to show it. (Hint: you could use the carbon pools or the matter and energy tracking document.)
4. How is carbon dioxide affecting the atmosphere? Describe this in a paragraph.

Scoring Rubric

Criteria	Excellent	Good	Average	Needs Improvement
Description of carbon dioxide (1-3)	Detailed description of what carbon dioxide is, including the atoms and bonds that make it up. Lists 5 actions that produce CO ₂ . Describes an action that contribute to carbon dioxide being released and why it is released that talks about the matter and energy involved.	Description of what carbon dioxide is including the atoms that make it up. Lists 4 actions. Describes an action that contribute to the release of carbon dioxide and why it is released.	Describes what carbon dioxide is. Lists 3 actions. Describes an action that contributes to the release of carbon dioxide.	Tells what carbon dioxide is. Lists 5 actions that contribute to the release of carbon dioxide.
Explanation of how carbon dioxide affects the atmosphere (4)	Gives a detailed explanation how carbon dioxide affects the atmosphere with four examples and why people should care about it. Written in paragraph form with all elements included.	Explains how carbon dioxide affects the atmosphere with three examples and why people should care about it. Written in paragraph form but missing one element.	Explains how carbon dioxide affects the atmosphere with two examples and why people should care about it. Written in paragraph form but missing two elements.	Vaguely explains how carbon dioxide affects the atmosphere and tells why people should care about it. Not written in paragraph form.
Description of actions that can reduce carbon dioxide emissions (5 & 6)	Describes one action in detail and explains how it will save carbon dioxide. Explains how the calculations were done. Includes a list of five other actions that will also save carbon dioxide.	Describes one action in detail and explains how it will save carbon dioxide. Includes a list of five other actions that will also save carbon dioxide.	Describes one action or explains how it will save carbon dioxide. Includes a list of three other actions that will also save carbon dioxide.	Either lists five carbon saving actions and/or gives a brief description of one carbon dioxide saving action.
Creativity of call to action	Takes a new perspective on the project. Project is out of the box and creative. Draws attention to the website and explains why people should go there.	Project is original and grabs the attention of the audience. Draws attention to the website and explains why people should go there.	Project follows the guidelines laid out. Mentions website.	Project does not meet the expectations that are laid out. Website missing.
Hours spent on project	Four or more documented hours spent on project.	Three documented hours spent on project.	Two documented hours spent on project.	Less than one hour spent on project or hours were undocumented.

Presentation	Project is professional looking or professionally performed. There are no errors. Students can answer all questions asked of them.	Project looks good or is well rehearsed. Students are knowledgeable on topic. There are a few errors.	Project is fair with some errors or presentation is choppy. Students can answer a few questions but there are holes in their knowledge.	Project looks like a rough draft. Students can only answer general questions and cannot be specific.
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Hours Spent on Project

Date	Hours spent	Description

Make a poster of one of the three rules

1. What rule did you choose?
2. What does it mean in your own words?
3. Define atom, carbon, or energy.
4. Describe how your rule is related with energy and/or matter.
5. Give an example of your rule.
6. Make your poster you can use the template below or make your own. Use one picture and use color.

Your rule printed here.

Definition

Relationship

Example with picture (maybe)

Your rule in your own words

Service Learning Project Reflection

Name _____

1. What actions did you say you would try to do this month to save carbon dioxide emissions?
2. Did you accomplish your goals? Be specific for each one.
3. How much carbon dioxide did you save? You need to look on the website <http://communitiestakecharge.org>
4. How did your actual savings compare with what you expected to save?
5. How many people registered as a result of your service learning project?
6. What did you like best about this project?
7. What did you like least about this project?
8. What improvements would you make if you were to do this project again?
9. What two trends can you see on the Keeling Curve? What is the cause for each trend?

10. Why did Keeling choose Mauna Loa in Hawaii to measure carbon dioxide levels?

11. Can the Keeling curve's trends be applied to what is occurring in Washington? Why or why not?

12. List 5 actions that contribute to carbon dioxide being released to the atmosphere.

13. Why does burning fossil fuels release carbon dioxide?

14. Determine whether the following are true or false.

- a. Charging a cell phone releases carbon dioxide.
- b. Carbon atoms come from the heat and light energy during burning.
- c. Carbon atoms come from the sunlight.
- d. Carbon atoms are found in the air.
- e. Carbon atoms come from decomposing material.
- f. Carbon atoms store chemical energy in the bonds of inorganic material.
- g. Carbon is a type of molecule.
- h. Carbon is in water.
- i. Carbon is in soil.
- j. Carbon can disappear.