



Taking Care of our Future: The Environment We Live In

Lesson Plan for Grades: 6-8th Length of Lesson: 55 minutes
Authored by: UT Environmental Science Institute Date created: 02/22/2018
Subject area/course: <ul style="list-style-type: none">Environmental Science
Materials: <ul style="list-style-type: none">Explore materials: Paper, pencils, non-transparent bags of candy (2 bags per group of 2 students: both bags have 20 small candy pieces like M&Ms® or Hershey's® kisses)Elaborate materials: 1 day's worth of trash per each group of 3-4 students, safety, disposable, non-latex gloves for each student, extra hair ties, safety goggles (1 per student). Per group: 3 to 4 bags (1 per member in the group), and sharpies to label the bags. <p>→ ADVANCED PREPARATION FOR TEACHER: Trash must be pre-identified to ensure student safety prior to lesson being conducted. Remove any sharps, biohazard, or other dangerous material. Leave other trash un-sorted in bags on top of tarp (to prevent spills or messes).</p> <p>→ ADVANCED NOTICE FOR STUDENTS: have students bring closed toe shoes and wear long pants for this activity by informing them and their parents two-three days in advance. Make sure students with long hair have hair tied up, out of the way.</p>
TEKS/SEs: §112.18. Science, Grade 6, Beginning with School Year 2010-2011. (b) Knowledge and skills. (7) Matter and energy. The student knows that some of Earth's energy resources are available on a nearly perpetual basis, while others can be renewed over a relatively short period of time. Some energy resources, once depleted, are essentially nonrenewable. The student is expected to: (A) research and debate the advantages and disadvantages of using coal, oil, natural gas, nuclear power, biomass, wind, hydropower, geothermal, and solar resources; and (B) design a logical plan to manage energy resources in the home, school, or community. §112.20. Science, Grade 8, Beginning with School Year 2010-2011. (b) Knowledge and skills. (11) Organisms and environments. The student knows that interdependence occurs among living systems and the environment and that human activities can affect these systems. The student is expected to: (C) explore how short- and long-term environmental changes affect organisms and traits in subsequent populations
Lesson objective(s): Students Will Be Able To (SWBAT): <ul style="list-style-type: none">differentiate between renewable and nonrenewable resourcesasses methods to manage energy resources at home and in their schoolspredict the long-term effects of using non-renewable resources for the environment
Differentiation strategies to meet diverse learner needs:



Taking Care of our Future: The Environment We Live In

- The teacher should ask students whether they prefer to read or watch videos to learn about concepts; then have students learn in their preferred learning style. However, the teacher may assign students certain methods to improve their skills. For example, if a student prefers reading, teachers may have them watch a video and take notes to improve their listening skills.
- ELL students and students with learning disabilities should have multiple forms of instruction including visual and written instruction sheets as well as a verbal instruction and demonstration.

ENGAGEMENT (5 minutes)

- Ask students to name everything they can think of that uses energy in their lives (for 1 minute, in groups of 3-4 students). Have students write them down on a piece of paper.
- After the 1 minute, have students write down the corresponding type of energy used by each thing they came up with (1 minute). Ask: *“Are there more types of energy or things that you may have missed?”*
- Give another 30 seconds for writing down any remaining types of energy and/or things we use in our lives.
- Have each group present to the rest of the class their points (2 minutes).
- State: *“We need energy for all of these things you mentioned just now. You also listed out the different types of energy we use for these things. Does it matter on what type of energy we use? Are there some types that are better than others?”* Call on students to share their thoughts. Collect all papers as Summative Assessment (of prior knowledge).

TRANSITION:

“Today we will be looking at what it means for energy to be renewable or nonrenewable.”

EXPLORATION (10 minutes)

- Divide class into groups of 2 and give each student an Energy Handout. Explain directions: *“Each of you has to fill out the data tables and answer the questions. You will do these activities together, but you should both be recording the answers separately.”*
- *“First, hypothesize how many ‘years’ it’ll take to remove all the candies from the bag for both Data Tables. Each ‘year’ is one round of removing a set amount of candies.”* Teacher pauses and makes sure everyone writes down their estimated hypotheses in both Tables. *“Now, you’ll fill out the Data Table 1 as you remove candies, and answer Questions 1-4.”*
- At this time, the teacher should let the students explore and check individual progress (formative assessment).
- Now, have the students follow the directions for removing candy according to Data Table 2. Have the students fill out the entire Data Table 2 and answer Questions 5-7 as a pair.
 - The activity or activities should produce a shared common experience for the students.
 - Formative Assessment: Teachers should allow for student-directed learning during this time, but should also be highly engaged while students are performing activities, asking questions of the students one-on-one or while they are working in groups.

TRANSITION:

“Now that you all have finished collecting data and answered the questions, think about what type of bag do you think would be better to have for the long-term.”

EXPLANATION (15 minutes)



Taking Care of our Future: The Environment We Live In

- The teacher then has students volunteer to share their answers to the data and questions with the rest of the class.
- Students will explain how they got to their answers and their thoughts on which type of “bag” they would prefer to have as an energy source.
- The teacher will make sure to have students share whether it can ever be possible for a nonrenewable resource to use less energy than a renewable one. Students will share their reasoning.

TRANSITION:

The teacher will then ask a quick question, *“Now that you all seem to agree that renewable resources are better as a type of usable energy because it lasts longer, we will explore some other problems with using non-renewable resources in the real-world.”*

ELABORATION (20 minutes)

- Describe how students will develop a more sophisticated understanding of the concept.
- First hand out all safety gloves and goggles. Make sure that all students are wearing appropriate attire for this activity and that tarp is laid out on floor prior to the start of this activity. Then pass out the “One Man’s Trash is Another Man’s Treasure” Handout. Explain to students that they will in groups of 3-4 be given a bag full of trash and 3-4 empty bags (garbage sized, 1 per member in the group). The group will look at the trash and sort each item according to whether its trash (non-recyclable) or non-trash (such as paper, plastic, aluminum, etc.). Items that don’t fit perfectly into a category can go in “other.” Each sorted bag will be labelled by its category with a sharpie and the data table on the handout will be filled out.
- After all items are sorted, students will answer questions under the data table, as teacher monitors the classroom and conducts formative assessment of the students.
- As groups finish, clean up of trash and disposal of gloves will occur. Have students spend the last 10 minutes sharing their responses with the rest of the class.
- The teacher should connect the Explore activity with this one by connecting how renewable resources are those we can reuse and recycle. For energy, this means we can recycle the energy we use without causing negative effects on animals and the environment (unlike non-renewable ones)

TRANSITION:

“Let’s discuss any questions you may have, before we finish up.”

EVALUATION (last 5 minutes and throughout entire lesson)

- Students will answer questions on Energy Handout and will present their findings from the articles used.
- Evaluation will be embedded throughout the lesson as well as at the end of the lesson (last 5 minutes).
- Formative Assessment will be asking students questions during the Explore, Explain, and Elaborate.
- Summative Assessment for this Lesson includes Prior Knowledge at the end of the Engage and answers on Energy Handout.

SOURCES AND RESOURCES

- **Carter, Majora; Hayhoe, Dr. Katherine; Webber, Dr. Michael. *Hot Science--Cool Talks #110*, “Planet Texas 2050,” <http://www.esi.utexas.edu/talk/planet-texas/>**



Taking Care of our Future: The Environment We Live In

- **Renewable Energy Activities Choices for Tomorrow (R.E.A.C.T) - Activity 2: Renew-a-Bean**, <https://www.nrel.gov/docs/gen/fy01/30927.pdf>
- **SciGirls - Going Green - Activity Version for Families**
<http://www.scigirlsconnect.org/resources/going-green/>



Taking Care of our Future: The Environment We Live In

Name: _____

ONE MAN'S TRASH IS ANOTHER MAN'S...TREASURE

Data Table:

In My Bag There is...

Categories:	Trash:	Paper:	Plastic:	Aluminum:	Other:
List items under each category					
Total Number of Items:					
Total percentage of each category out of everything:					

Total Number of items in the bag: (Count everything! Even things that didn't fit in your table): There are _____ items in my bag.

1. What number and percentage of things in your bag were recyclable?



Taking Care of our Future: The Environment We Live In

2. Are these things similar to the candies we left in the bag in the earlier activity? Why or why not?

4. What are the non-recyclables similar to: the renewable or non-renewable resources?

5. How can we have more renewable items in our trash than non-renewable ones? List three things we can do as a class.

6. What effect can these “trash” items have for us and for our environment? List 3 effects (include some short term and long term).

7. Do energy resources that are non-renewable have a similar effect on the environment? Explain why.

Bonus: Draw a pie chart showing the different proportions of items to the total items in our trash.

Data Table 1:

Number of Years:

Consumption Level	Prediction: Years to Deplete	1	2	3	4	5	6	7	8	9	10	11	12	Total Years
Constant: Remove 2 candies each year		2	2	2	2	2	2	2	2	2	2	2	2	
Record # Candy Remaining in Container														
% Nonrew.														
% Renew.														

1. What does taking out the candy represent?

2. Why does the number of candies we start with decrease?

3. What would the relationship between time (in years) and number of candies left look like? How would you graph it?

4. Does this type of data represent mostly non-renewable energy or mostly renewable energy? Would this container be “clean” for using energy (think green, eco-friendly)?

Data Table 2:

Number of Years:

Consumption Level	Prediction: Years to Deplete	1	2	3	4	5	6	7	8	9	10	11	12	Total Years:
Constant: Remove 2 MORE candies each year		2	4	6	8	10	12	14	16	18	20	22	24	
Record # Candies Remaining in Container														
% Nonrew.														
% Renew.														

5. What's different about these two data tables (taking out 2 candies at a time for 12 years versus taking out 2, then 4, then 6, then 8,...for 12 years)

6. Which "container" represents cleaner energy? Why?

7. Is it possible to have a type of energy source that is 100% renewable? If possible, what would this be called? If not possible, why?