

Lesson 6
Climate Change



Unit Title: Carbon Cycles through Ecosystems	
Theme: Ecosystems & Cycles	Grade Level: 9-10
# of sessions for the unit: class period(s) 1-2 (~45min each)	Session #6: Nonrenewable and Renewable Energy
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Unit Description

Provided in a separate document. *Please see High School Curriculum Overview.*

Standard(s)

HS-LS2-5. Use a model that illustrates the roles of photosynthesis, cellular respiration, decomposition, and combustion to explain the cycling of carbon in its various forms among the biosphere, atmosphere, hydrosphere, and geosphere.

HS-LS2-7. Analyze direct and indirect effects of human activities on biodiversity and ecosystem health, specifically habitat fragmentation, introduction of non-native or invasive species, overharvesting, pollution, and climate change. Evaluate and refine a solution for reducing the impacts of human activities on biodiversity and ecosystem health.

Unit Goals

Students will understand the causes and effects and possible solutions of climate change with an emphasis on carbon sequestration (capture)

Lesson Objectives & Essential Vocabulary

Students will understand the difference between nonrenewable and renewable energy usage of fossil fuels and the effect of fossil fuels on rapid global climate change.

Essential vocabulary:

- nonrenewable energy
- fossil fuels
- energy
- combustion
- greenhouse gases
- greenhouse effect
- deforestation
- development
- ice core
- Hydrocarbons
- organic matter
- decomposition

NOTE:
If you can predict which students may not be able to achieve the goals, then you need to reduce barriers to maximize learning for all.

Note any potential barriers to the lesson — consider variability

vocab/reading ability — provide scaffolding, diagrams to clarify text, vocab assignments: word splash, etc.

Writing skills: solution provide writing prompts or sentence frames

NOTE:

Provide options — refer to the UDL guidelines as a way to ensure that all learners can demonstrate achievement of goals. For ideas: <http://bit.ly/1d5bjtS>

Evaluation/Assessment

(directly linked to the goals, i.e., Formative/Ongoing Assessment or Summative/End of Lesson Assessment)

Teacher check ins for understanding

Assessment of Quick write answers to questions: What are fossil Fuels and how do they contribute to global climate change?

NOTE: Consider the [UDL Guidelines](#) in selecting methods and materials to ensure that you provide options for engagement, representation, and action and expression.

Methods

(e.g., Anticipatory Set, Introduce and Model New Knowledge, Provide Guided Practice, Provide Independent Practice)

1. Pre teach vocabulary and activate prior knowledge: Link to KWL chart: https://docs.google.com/drawings/d/1t1YM_gjVtXiAKZFo_6DUFKxhoaJFozfFQaFfEL9jMXw/edit?usp=sharing

KWL Chart: Greenhouse Gases

Using the following key vocabulary terms, describe the terms you know in the "what I know" column and list the terms you want to know in the corresponding column. You will fill in the final, "what I have learned column" later.

KEY VOCABULARY: NONRENEWAL ENERGY, FOSSIL FUELS, ENERGY, COMBUSTION, GREENHOUSE GASES, GREENHOUSE EFFECT, DEFORESTATION, DEVELOPMENT, ICE CORE, HYDROCARBONS, ORGANIC MATTER, DECOMPOSITION

<u>What I KNOW</u>	<u>What I WANT to know</u>	<u>What I have LEARNED</u>

2. Teacher generated class discussion of energy use (fossil fuels as non-renewable sources of energy) A noted misconception is that students know and understand what fossil fuels are, where they come from and how they were produced. Be sure to correct this misconception! The website Reference.com has some quick, easy facts about fossil fuels if you're interested in a quick refresher. The link to that site is: [Reference.com/Fossil Fuels Facts](http://Reference.com/FossilFuelsFacts)
3. Combustion is a chemical reaction (provide simple chemical equation) as a Class demo, light a candle and cover the lit candle with a non flammable, air tight cover, removing oxygen source. Have students discuss the results, being sure to answer questions like, "What happened?", "Why did that happen?", "How did that happen?"
4. Ask students the following questions: Where does electricity come from? What do we use fossil fuels for? Listen to student responses and guide students to correct answers whenever necessary. The following YouTube Video explains: <https://www.youtube.com/watch?v=duVhnEfbTPO>
5. Discuss greenhouse gases/ greenhouse effect. Once again, listen to student responses and guide students to correct answers whenever necessary. See Video Link from the National Academies of Science, Engineering and Medicine: <https://www.youtube.com/watch?v=3JX-ioSmNW8&index=3&list=PL38EB9C0BC54A9EE2>
6. Explore Brain Pop or Jog Nog or other online quizzing sites to reinforce fossil fuels, how we use them
7. As an exit ticket, have students fill in the last column of the KWL chart listed above.

Materials

1. Text materials *Miller & Levine Biology chapter 4: Climate* but any Biology or environmental science text would suffice
2. access to online research (chromebooks, laptop cart, library/media center).
3. candle, glass cover, matches
4. online quizzing sites: jog nog, brain pop for example
5. clips from video link: 'Before the Flood' for enrichment <http://channel.nationalgeographic.com/before-the-flood/>