Lesson Planning Tool for Climate Change

Title of Lesson: Renewable Energy Sources - 6A

Grade Level: 7th, 8th
Subject: Climate Change Science, Environmental Science

Source(s) of the lesson: PBS NOVA LABS:
http://www.pbs.org/wgbh/nova/labs/videos/#energy

Yale Lesson Plans: http://teachers.yale.edu/curriculum/viewer/initiative_13.05.01_u
U.S. Energy Information Administration:
http://www.eia.gov/energy_in_brief/article/major_energy_sources_and_users.cfm

Essential Question(s): What are the advantages and disadvantages of renewable and non-renewable energy? Which energy sources are used in the highest amounts and why?

Massachusetts Curriculum Frameworks Science Standards:
7.MS.ESS3-4: Construct an argument supported by evidence that human activities and technologies can mitigate the impact of increases in human population and per capita consumption of natural resources on the environment. Clarification Statements: • Arguments should be based on examining historical data such as population graphs, natural resource distribution maps, and water quality studies over time.

Content Objectives	Practice Objectives	Language Objectives
Students will analyze renewable and non-renewable energy as sources of energy by placing energy sources in order 2 ways and comparing the orders in order to determine U.S. Energy and Environmental Practices as related to the cause of climate change.	8) Constructing explanations and designing solution	I can explain the various ways of energy use in the US.
		I can explain various ways to reduce my carbon imprint.

Important Vocabulary:
Tier 2 - coal, petroluem, natural gas, solar power, wind, biomass, geothermal, renewable energy, non-renewable energy, climate change, consumption

Materials Needed: Chart of U.S. Energy Consumption, Energy Profile Cards,

Other Resources: (websites, videos, books, etc.)
Monthly Review Showing Energy Consumption Amounts tracked by the EPA:
http://www.eia.gov/totalenergy/data/monthly/index.cfm

Background Information for Teacher: Energy use by the United States can be found through the Environmental Protection Agency (EPA).

Background Information the Student Needs to Access the Lesson: It is recommended that students have some knowledge of the definition of renewable and non-renewable energy. Renewable energy is energy that is naturally occurring and replenished through earth's natural process over time without human interference. These include wind, solar, geothermal,hydro (water) and biomass. Non-renewable energy is any energy source that comes from fossil fuels. These include coal, petroleum, natural gas and uranium.

Lesson Structure

Lesson Launch (Do Now)	Start class by showing the PBS NOVA Video #1: Growing Appetites, Limited Resources. Have students answer following questions while watching the video. Suggested that these be provided on a half sheet of paper for students. Go over the answers before beginning the main activity. 1. Coal, oil and _____ supply about 80% of the energy we currently use. 2.Why are we concerned about our use of energy? _____ _____ 3. 2 important things about Carbon Dioxide: How it gets released: _____ Where it goes when released: _____ 4. Name the two issues that have increased the need for alternatives to fossil fuels.
Background Instruction (pre-activity)	Teacher should watch all 4 video of the PBS NOVA Series prior to doing the lesson with the students. All 4 could eventually be shown to students, but not necessary for this lesson. The 4 video will provide

	teacher with a more comprehensive understanding of renewable and non-renewable energy. Lesson Prep: Teacher needs to print the Energy Profile Cards to have a set for each group. These do not need to be in color. Also needs to pre-cut the energy sources slips for each group.
Activity	Students should complete the following steps: 1. Read each energy card and as a group place them in an order the group views as the most harmful energy source to the least harmful energy source. 2. Once placed in order teacher should engage class in an analysis, asking: a) What did your group place as the least harmful energy source? Why? b) What did your group place as the most harmful energy source? Why? c) What was difficult in making decisions on the order of the energy sources? d) Which sources are renewable energy? What does that mean? e) Which sources are non-renewable energy? What does that mean? f) Which energy sources do you think we use the most for our energy needs in the US? Why? 2) Teacher should make sure the class fully understands the difference between renewable and non-renewable energy before moving on. 3) Next, handout the pre-cut energy source slips to each group and provide with instructions to place them in order according to Consumption by Source Percentage. 4) Have students do a comparison analysis of their order from most harmful to least harmful (activity 1) to the order of consumption by asking the following questions. This may be a written assignment completed by each student or used as a group discussion, depending on class time. i) What energy source does the U.S. use the most? What the pros and cons of it? ii) Where did you rank it in your most to least harmful list? iii) Were you surprised by the order of energy consumption by source? Give an example. iv) Does the U.S. use more renewable or non renewable energy sources? v) Make a chart showing all of the non-renewable and renewable energy sources and their amounts. vi) Should the U.S. consider using more renewable energy resources? Give 2 reasons after answering Yes or No. vii) What percentage amounts do you think we SHOULD be using from each energy source? Add a column to your chart

	showing your suggested new amounts. Remember, it must add up to 100 to be a percent. PRACTICE GRAPHING: Create a BAR Graph the shows the use of Actual U.S. Energy Consumption by Source versus your groups Ideal Energy Use by Source. Here is an example
Discussion/ Debrief	1. Ask students to think about where all this energy comes from. (The burning of fossil fuels for most and the by changing kinetic energy from one form to another such as mechanical or thermal.) 2. Show the PBS NOVA LABS Video 3 and have students answer the following questions: **Video 3: Putting energy to Use** 1. Energy comes in many different _____. 2. We can _____ energy from one form to another all the time. 3. What is another name for oil, coal and natural gas? _____ 4. Three kinds of energy humans use: a. Thermal energy: use to _____ b. Mechanical energy: used to _____ c. Electrical energy: used to _____
Formative Assessment	Use the PBS Video LABS as a formative assessment to the lesson. Exit Ticket: What is one major take away from the lesson today that you think the greater public who might be unaware of energy consumption should know?

Notes:

When I make class sets of things that are small, store them in a Ziploc bag or envelope in order to keep them in good condition. Have one student per table group responsible for making sure all items get placed back and returned to the designated location.

Make your own worksheets by taking the questions in a lesson plan and embedding them into my own format that students are more familiar with. It also helps to streamline it all onto 1 document and save paper. Or go paperless and have students answer them online by creating it as Google Classroom assignment!