

Teacher(s): Ken Walz	Unit Title: Energy Efficiency and Renewable Energy (EERE)
Subject: Physical, Env, and Social Sciences	Lesson Title: Energy Simulation Games
Grade Level(s): 6-12	Lesson Length: 1 hours (+ optional time outside class)
Date(s): 7/14/2014	

- **Learning Goal(s)**

By the end of this lesson, students will have a deeper understanding of Energy Management, Policy, and Decision Making.

- **Connection to Energy/ Renewable Energy**

In this assignment you will be using two different energy simulation tools to examine the effects of energy decision making on economics, environment, and standard of living. You will do this first on a local scale for a small imaginary municipality, and also for a large country or geographic region. In both cases, you will model energy use patterns over a 100 year interval.

BACKGROUND READING:

Read the article from National Geographic describing Costa Rica’s goal to become the world’s first carbon neutral country (see email attachment or Blackboard). The purpose of this assignment is to examine some of the challenges related to this goal in more detail.

- **Connection to Standards**

List local or national standards which will be met upon completion of this lesson.

- **Materials/Resources**

Computers with access to internet websites Electrocity and BBC Climate Challenge (make sure the sites are not blocked by filters)

- **Procedure**

PART 1.

In part one you will be using an online game, called ELECTROCITY, to examine issues related to energy management for a small municipality. ElectroCity is an online computer game that lets players manage their own virtual towns and cities, while teaching players about energy, sustainability and environmental management. The game was developed by Genesis Energy, a leading generator and retailer of energy in New Zealand. Genesis generates electricity from a range of sources including gas, coal, wind and water (But not nuclear power which is not allowed in New Zealand).

1. Go to: <http://www.electrocity.co.nz/HowToPlay/>
2. Read the instructions on HOW TO PLAY.

3. Start a new game, and give your town a name.
4. Continue playing the game by making changes to your city and clicking “next turn”. The game lasts for 150 turns.
5. At the end of the game, record your scores for: Energy management, Popularity, Population, Environment, and Overall Score
6. Click on the option to “Save and Show Off”.
Enter Your Name and Enter Teacher Code: KW19107
This will submit your results to your instructor.
7. If you would like to play the game more than once to improve your score you are welcome to do so.

Part 2.

In part two you will be playing another online game called Climate Challenge that was produced by the British Broadcasting Company. In this game, your role is the leader of the European Union (EU). Your objective is to manage the greenhouse gas emissions for Europe, while also maintaining vital resources (e.g. food, water, energy) and keeping a healthy economic environment. You will do this by implementing public policies for the EU at 6 different levels: National, Imports, Exports, Industry, Local, and Household. You will also be negotiating global greenhouse gas emissions with other regions of the world and attempting to influence both the U.S. and developing nations at international climate change summits. You may need to respond to catastrophic events caused by climate change, as well as other natural and manmade events, which may or may not be linked to climate change.

1. Go to: http://www.bbc.co.uk/sn/hottopics/climatechange/climate_challenge/
2. Click on the button in the red square cartoon that says “OPEN:
3. Go through the TUTORIAL to learn how to play the game, this will walk you through your first turn (a ten year decade) step by step with helpful text bubbles.
4. Continue playing the game by making changes to your to your policies and clicking “next turn”. Each turn lasts a decade (10 years) and your goal is to reduce your greenhouse gas emissions by the year 2100 (nine more turns).
5. When you complete the game, you will receive scores for three separate areas: Environment, Wealth, and Popularity. Record these scores to email to your instructor.
6. If you would like to play the game more than once to improve your score, you are welcome to do so.

- **Technology Integration**
Computer and Internet use.
- **Model/Guided Practice**
NA
- **Check for Understanding**

QUESTIONS FOR STUDENTS TO ANSWER:

1. Write a short paragraph reflecting on your experience managing the energy budget for your ElectroCity. What strategy did you adopt for development of your city? How did this affect your scores for the various areas? Did you find any aspects of the game to be particularly challenging, or surprising?
2. Write a short paragraph reflecting on your experience managing the greenhouse gas emissions for the European Union. Were you able to meet the goal of controlling greenhouse gas emissions by 2100? What challenges did you observe?
3. Did you learn anything interesting about any of the energy technologies that you used during the two simulations? Were there factors (pros or cons) that you had not previously considered or been aware of?
4. Of the various greenhouse gas control measures that you used in the Climate Challenge game, if you could implement THREE of these immediately in the United States which would they be? Explain your choices in a few sentences.
5. Write a short paragraph evaluating the stated goal of Costa Rica to be the world's first carbon neutral country. Do you think that they will be able to achieve this goal? Will they be able to do it in the time that they aspire? What challenges do you think that they might face?

- **Independent Practice**
Students can play again at home to try and improve their score.
- **Assessment/Closure**
You could set a minimum cut-off score that students must achieve in order to “pass-out” of the task.