

WebGame: The Race to Reach Net Zero

Grade Level:	Time Frame:
9th-12th	Day 1: 50 minutes Day 2: 50 minutes
Standards (ALCOS Science):	
<p>Earth and Human Activity: 1) Investigate and analyze the use of nonrenewable energy sources (e.g., fossil fuels, nuclear, natural gas) and renewable energy sources (e.g., solar, wind, hydroelectric, geothermal) and propose solutions for their impact on the environment.</p> <p>Earth and Human Activity: 13) Obtain, evaluate, and communicate information based on evidence to explain how key natural resources (e.g., water sources, fertile soils, concentrations of minerals and fossil fuels), natural hazards, and climate changes influence human activity (e.g., mass migrations).</p> <p>Earth and Human Activity: 15) Construct an explanation based on evidence to determine the relationships among management of natural resources, human sustainability, and biodiversity (e.g., resources, waste management, per capita consumption, agricultural efficiency, urban planning).</p>	
Objectives:	
<p>Students will utilize an online web game as a model to investigate and analyze the use of nonrenewables and renewable energy sources and the effects that informed decision-making has on human stability and world sustainability.</p> <p>Students will obtain, evaluate, and communicate information based on evidence to design models that propose to best manage natural resources, protect biodiversity, and mitigate climate change.</p>	
Background Information:	

Made Possible By:



<http://alcse.org/education>

Through passion, necessity, and expert use of technology, scientists have been able to predict scenarios of what the world might look like in the future and to determine what actions we need to take to support a sustainable world for now and future generations. The “Net Zero Emissions by 2050 Scenario” is a model created by the International Energy Agency (IEA) that shows a “narrow but achievable pathway” to achieve net zero CO₂ emissions by 2050 (IEA, 2021).

What in the world is **net zero**?--you might ask!

Net zero represents the concept of reducing the amount of greenhouse gas emissions to as near zero as possible, while also offsetting the small remaining amount released into the atmosphere by absorbing the equivalent.

According to the IEA, the global energy system must rapidly reduce its emissions to avoid the worst consequences of climate change and ensure a sustainable future (IEA, 2020). Achieving net zero-emissions requires immediate attention to and transformation of the methods we use to supply and use energy. Although the production and use of wind, solar, and electric cars has shown steady growth, net-zero emissions will require these technologies to be supported on a far greater scale (IEA, 2020).

The IEA suggests the following immediate actions to be taken to achieve net zero by 2050:

- innovation and immediate use of available technologies, such as sustainable bioenergy and others, and implementation of policies to use them
- cooperation of countries worldwide to work together towards achieving net zero
- orderly transition across the fuel and electricity energy sector to transition to methods that significantly reduce or eliminate emission of greenhouse gases (IEA, 2021)

In this activity, students will play an online interactive, learning game that uses role play and decision-making skills to consider critical questions related to climate change, energy technology, and the politics involved in achieving **net zero**. Students will make decisions regarding global warming, energy-related carbon dioxide emissions, greenhouse gases, rising sea levels, methane, and other environment topics.

The Climate Game by the Financial Times was developed using the Model for the Assessment of Greenhouse Gas Induced Climate Change v7+ climate model(MAGICC), paired with the IEA’s World Energy Model (WEM) and Energy Technology Perspectives (ETP) models (Financial Times, 2022).

Materials:

- FOR EACH STUDENT:
 - Access to iPads, laptops, or computer lab
 - Students can search for “The Climate Game” and “Financial Times” or use the link <https://ig.ft.com/climate-game/>
 - Pages from “(9th-12th) The Race to Reach Net Zero WebGame Student Guide” file

- Teacher can make the file available to be digitally edited by the student or print the pages to be hand-written
- FOR EACH GROUP OF STUDENTS (5 or 6 groups):
 - Poster
 - Colored markers
 - Black sharpies

Day 1 Activities

Engage (10 minutes):

1. **Discuss it!** As a class or in small groups, students should analyze the graphs from The Climate Game by the Financial Times and complete the **Part 1** section of the student guide by filling in the boxes of the graphical organizer while they play the game.
 - a. See "**Materials**" section for file information.

Explore (30 minutes):

1. **Play the game!** Students will use computer lab, laptops, or iPads to play The Climate Game by Financial Times <https://ig.ft.com/climate-game/>. They should complete the **Part 2** section of the student guide by filling in the boxes of the graphical organizer while they play the game.
 - a. See "**Materials**" section for file information.

Evaluate (10 minutes):

1. **Draw it!** Students will use their experience playing the game and their notes from **Part 2** to create a final drawing of their model scenario in the **Part 3** section of the student guide.
 - a. Note: when playing the game students will have different choices to make that will make their model scenario look different than that of another student. They should be encouraged to think about the decisions they made and how it affected their model world.

Day 2 Activities

Engage (10 minutes):

1. **Share it!** Students will use their Model Drawings from the **Part 3** section of the student guide to share with 2 different students in the classroom and discuss the following questions (teacher should write these on the board or show on screen):
 - a. How does your drawing look different from someone else's?
 - b. What decisions caused the biggest impact on your model?
 - c. If you were the creator of this model (game), what would you do differently?

Explore (20 minutes):

1. **Research it!** Students will be divided up into 6 groups (or as needed) to focus, now, on specific topics that affected their world model. Some of the topics from The Climate Game are listed here but the teacher and students can add more of their own as needed:
 - a. Cars
 - b. Buildings
 - c. Industry
 - d. Land use
 - e. Public Campaigns
 - f. Adaptation and Infrastructure/preparing for Climate Change
2. Students will use computer lab, laptops, or iPads to research the topic assigned to their group and record in **Part 4** section of their student guide.
 - a. Example research topic questions would be:
 - i. What action needs to be taken to make ___(group topic)_____ the most sustainable for now and the future?
 - ii. What are some examples of sustainable designs or practices for your topic?

Evaluate (20 minutes):

2. **Model it!** Student will work in their groups to create a poster design to model the most sustainable designs or practices for their topic.

Extend (optional use):

Given more time/alternatively to creating a poster model, students could build a 3-D model of their sustainable designs using various materials. They would take more time to present their group/individual models with a gallery walk.

References:

Financial Times. *The climate game - can you reach net zero?* The Climate Game - Can you reach net zero? Retrieved September 20, 2022, from <https://ig.ft.com/climate-game/>

<https://ig.ft.com/climate-game/>

IEA (2021), World Energy Model, IEA, Paris <https://www.iea.org/reports/world-energy-model>

<https://www.iea.org/reports/world-energy-model/net-zero-emissions-by-2050-scenario-nze>

IEA (2020), Energy Technology Perspectives 2020, IEA, Paris

<https://www.iea.org/reports/energy-technology-perspectives-2020>

<https://www.iea.org/reports/energy-technology-perspectives-2020?mode=overview>

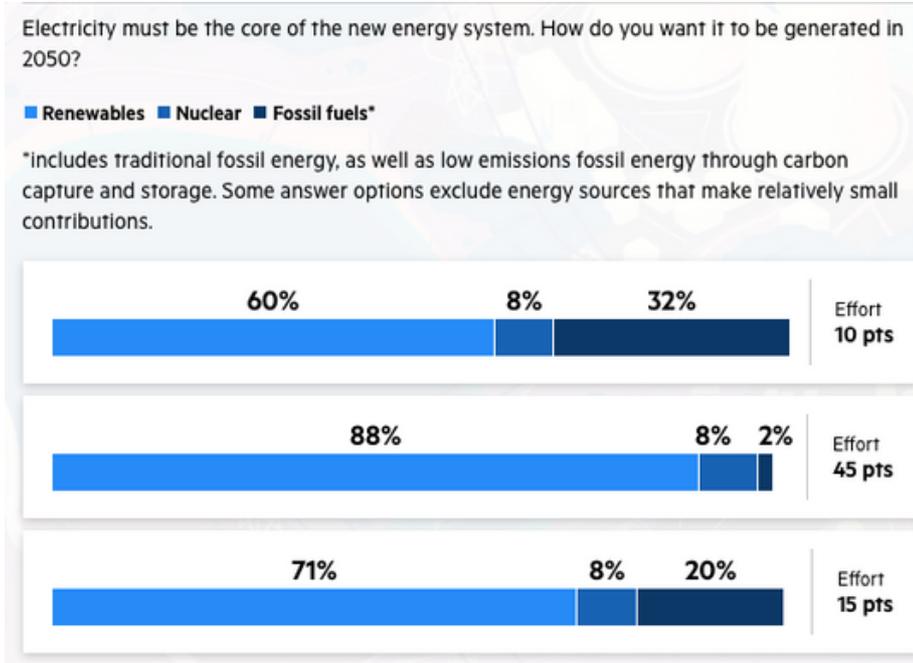
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Name: _____ Date: _____ Class : _____

Part 1, Discussing the Details:

In this activity, you will play a cool web game! Before you start, use the following bar graphs from the Climate Game by the Financial Times to reflect on the questions below:



<https://ig.ft.com/climate-game/>

1. According to the graphs, using a majority (88%) of Renewables to power the electric grid by 2050 would "cost" you how many "effort points (pts)" in the game?
2. Why do you think using Renewables for energy by 2050 would cost the most effort?
3. If there is a cost of effort for using Renewable energy, what would the benefits of using less Fossil fuels and using more Renewables be?
4. In each scenario, how much use of Nuclear energy is proposed? Why do you think it is the same amount in each scenario?
5. If you could think of another scenario to choose when playing the game what would the graph look like and how many effort points would it cost the player?

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Name: _____ Date: _____ Class: _____

Part 2, Collecting the Data:

While you play The Climate Game by the Financial Times, reflect on the terms below. Write down any definitions, thoughts, and experiences you have when learning about these concepts. You can even draw pictures to support your words! Use the following boxes:

net zero
&
greenhouse gases

energy-related carbon
dioxide emissions

technology

global warming
&
climate change

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Name: _____ Date: _____ Class : _____

Part 3, Analyzing the Evidence:

After playing The Climate Game by the Financial Times, draw a picture to represent the world model that you created. By investing in different technologies, industries and pathways to mitigate climate change, you made important decisions that affected your world. You did your best to prepare for a sustainable future!

Show what that world looks like here:

A large, empty rectangular box with a thick black border, intended for the student to draw their world model.

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Name: _____ Date: _____ Class : _____

Part 4, Preparing Your Model:

You have been assigned a topic that relates to world sustainability and human stability on earth. You saw how design and decision-making can mitigate the effects that we have on our world. If you were a scientist, engineer, politician, or other figure in charge of one of these critical tasks--what type of model would you design?

Research Question 1:

Research Question 2:
