

RESOURCE LIBRARY
LESSON

Our Change to Make!

Students explore the human effects of climate change and global strategies for mitigation and adaptation. Next, they track their own carbon footprint and interview school community members to identify key carbon-emitting behaviors. Finally, students design and present a Climate Change Challenge Pledge to help others in the school community commit to reducing their climate impact. This lesson is part of the [Climate Change Challenge](#) unit.

GRADES

6 - 8

SUBJECTS*Earth Science, Climatology, Engineering, Geography, Human Geography***CONTENTS**

5 Activities

ACTIVITY 1: ADAPTATION AND MITIGATION

1 50 MINS

DIRECTIONS

This activity is part of the [Climate Change Challenge](#) unit.

1. Show a video to help students explore the impacts of [climate change](#) on human communities.

- Ask students:

- *Who in the world do you think might be most affected by climate change? (Students' answers will vary, but may incorporate the impact of current climate conditions on future scenarios.)*

- Preview questions for students to consider while watching the U.N. Climate Summit video poem *Dear Matafele Peinem* (3:50):
 - *Where do the baby, Matafele Peinem, and her family live?* (Matafele Peinem lives in the Marshall Islands, within the Pacific Ocean.)
 - *Why is her family concerned about climate change?* (The video depicts other islands that have experienced flooding and storms, as a result of climate change.)
 - *What is her family committing to do to keep Matafele Peinem safe?* (They are committing to fight to slow and reverse the effects of climate change.)
- Project the video. After students have watched, solicit volunteers' responses to the questions. Use the video and students' responses to emphasize the impact of climate change on families around the world.
- Ask students in a Think-Pair-Share:
 - *What kind of strategies might we use to ensure that Matafele's family stays safe in their home in the coming years?*

2. Facilitate discussion of climate change mitigation using examples from videos.

- Distribute copies of the *Mitigation and Adaptation Meaning Maker* and the *Mitigation and Adaptation Strategizer* handouts.
- In a Think-Pair-Share, ask students to define climate change mitigation in their own words, reading the entry for *mitigation* in the dictionary or National Geographic glossary if necessary. (Mitigation involves taking steps to reduce a factor contributing to climate change.)
- Split students into small groups and assign each group to watch one of three videos on specific climate change mitigation stories. Complete Part A of their *Mitigation and Adaptation Strategizer* for their video only as they watch:
 - *A Race Against Time* (3:45): Use of solar power to replace gas/diesel.
 - *Safe Passage* (2:05): Autonomous electric cars to reduce traffic and emissions from fossil fuels.
 - *Uprising* (3:35): Replacing coal with renewable energy, such as solar.
- Discuss examples of climate change mitigation from the videos as a class, such that each student is able to complete Part A of the *Mitigation and Adaptation Strategizer*.

- Assign students to use this information to complete the remaining sections ("characteristics/illustration" and "non-examples") for 'Mitigation' in their *Mitigation and Adaptation Meaning Maker* handout.

3. Facilitate discussion of climate change adaptation using examples from videos.

- Explain that even if mitigation is successful, people still need effective ways to respond to changes in climate that are already starting to occur.
- In a Think-Pair-Share, ask students to define climate change adaptation in their own words, reading the entry for "behavioral adaptation" in the dictionary or National Geographic glossary, if necessary. (Adaptation involves taking steps to reduce the effects of climate change on human or natural systems.)
- Solicit students' definitions and record them in a visible location.
- Split students into small groups and assign each group to watch one of two videos on specific climate adaptation stories. Complete Part B of their *Mitigation and Adaptation Strategizer* for their video only as they watch:
 - [Saving Ocean Biodiversity: Coral Restoration](#) (6:35): Re-seeding of bleached reefs with heat-resistant corals, temporary no-dive zones, and scientific research.
 - [Mitigation and Adaptation: Human Stories of Hope](#) (7:25): Creation of breakwaters and natural resilient habitats in the face of sea level rise; use of local expertise to design solutions.
- When students have finished watching and recording adaptation strategies, reorganize students from each video group into jigsaw groups (made up of some students who watched the first video and some who watched the second). Assign students to share the information from their video with others to complete Part B of the *Mitigation and Adaptation Strategizer*. Their experience sharing out and recording information from videos in the previous step should provide a model for their interactions here.
- Assign students to use this information to complete the remaining sections ("characteristics/illustration" and "non-examples") for 'Adaptation' in their *Mitigation and Adaptation Meaning Maker* handout.
- Revisit the class *Know and Need to Know* chart, incorporating any new insights about the human dimension of climate change impacts, or the roles of mitigation and adaptation in our response to climate change.

Tip

Step 1: If the site hosting the [Dear Matafele Peinem](#) video is blocked within your school, consider using the encyclopedic entries for [Climate Refugees](#) and [Environmental Refugee](#) to help students begin understanding the human impact of climate change felt across the world.

Tip

Steps 2-3: The [Mitigation and Adaptation Meaning Maker](#) is a version of the [Frayer Model chart](#). The video and resource linked here can help you adapt this vocabulary-building tool to meet the needs of your students.

Informal Assessment

Informally assess students' understanding of climate mitigation and adaptation on a personal and group level by examining their *Mitigation and Adaptation Strategizer* and *Mitigation and Adaptation Meaning Maker* handouts.

OBJECTIVES

Subjects & Disciplines

Earth Science

- Climatology
- Engineering

Geography

- [Human Geography](#)

Learning Objectives

Students will:

- Compare and contrast climate change adaptation with climate change mitigation.
- Gather and organize strategies for climate change adaptation and mitigation.

Teaching Approach

- Project-based learning

Teaching Methods

- Jigsaw
- Multimedia instruction
- Reading

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Information, Media, and Technology Skills
 - Information Literacy
 - Media Literacy
 - Learning and Innovation Skills
 - Creativity and Innovation
 - Life and Career Skills
 - Leadership and Responsibility
 - Productivity and Accountability
- 21st Century Themes
 - Environmental Literacy
 - Global Awareness
- Critical Thinking Skills
 - Remembering
 - Understanding
- Geographic Skills
 - Acquiring Geographic Information
- Science and Engineering Practices
 - Obtaining, evaluating, and communicating information

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS
& LITERACY

- **CCSS.ELA-LITERACY.RST.6-8.4:**

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

NEXT GENERATION SCIENCE STANDARDS

- **Crosscutting Concept 2: Cause and Effect:**

Cause and effect relationships may be used to predict phenomena in natural or designed systems.

- **MS-ESS3: Earth and Human Activity:**

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

- **Science and Engineering Practice 8:**

Obtaining, evaluating, and communicating information.

Preparation

BACKGROUND & VOCABULARY

Background Information

There are two main ways that humans can address climate change: mitigation and adaptation. Mitigation involves decreasing the amount of greenhouse gases emitted into Earth's atmosphere to lessen the pace or intensity of climate change. In contrast, adaptation involves responding to changes that are already occurring. Examples of mitigation strategies include switching to green energy sources and cutting back on emissions with more energy-efficient technologies. Examples of adaptation strategies include building seawalls to combat increased storm surges, often associated with sea level rise, and improving emergency response systems to handle extreme weather events. Ultimately, both mitigation and adaptation will be critical elements of the human response to climate change.

Some of the most effective individual strategies to reduce climate change involve diet, transportation, and energy use. However, there are also important group strategies at the local, state, and national levels that can have widespread impacts with regards to these same habits. For example, governments can fund research into cleaner, more efficient energy

technology, or regulate emissions standards for vehicles. Cities and towns can promote food recycling programs, such as composting. Because climate change is an international problem, it will ultimately require global cooperation to address.

Prior Knowledge

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Recommended Prior Activities

- [Carbon All Around](#)
- [Circulation of the Seas](#)
- [Global Trends](#)
- [Heating Up](#)
- [Local Emissions](#)
- [Meteorological Models](#)
- [Now and Then](#)
- [Ocean Acidification: The Evidence](#)
- [Oceanic Impacts](#)
- [Our Greenhouse](#)
- [Plot It!](#)
- [Sea Level: The Evidence](#)
- [Sea Temperature: The Evidence](#)
- [Weather Interconnections](#)
- [Weather, Meet Climate](#)

Vocabulary

Term	Part of Speech	Definition
adaptation	<i>noun</i>	a modification of an organism or its parts that makes it more fit for existence. An adaptation is passed from generation to generation.
carbon footprint	<i>noun</i>	total sets of greenhouse gas emissions caused by an organization, event, product or individual over a set period of time.
climate change	<i>noun</i>	gradual changes in all the interconnected weather elements on our planet.
climate refugee	<i>noun</i>	person forced to leave his or her home and community because of climate change.

Term	Part of Speech	Definition
environmental refugee	noun	person who has been forced to flee his home and community due to changes in the environment, such as drought.
global warming	noun	increase in the average temperature of the Earth's air and oceans.
mitigation	noun	process of becoming or making something milder and less severe.

ACTIVITY 2: OUR FOOTPRINTS | 50 MINS

DIRECTIONS

This activity is part of the [Climate Change Challenge](#) unit.

1. Direct students to conduct a [carbon footprint](#) audit by examining their personal habits of carbon consumption.

- Prompt students to brainstorm reasons that we, as individuals, should decrease the amount of carbon dioxide we contribute to Earth's atmosphere. (Listen for students to mention both impacts on Earth's ecosystems and human impacts, such as those discussed in the [Adaptation and Mitigation](#) activity.)
- Review the National Geographic Glossary entry for [carbon footprint](#) with students, asking:
 - *How do you think your carbon footprint compares to your classmates'?*
 - *How do you think your carbon footprint compares to other people around the world?* (If necessary, prompt students to connect the concept of carbon footprint to carbon sources and sinks and their own habits and behavior.)
 - Demonstrate for students the decision-making necessary to track your carbon footprint using a carbon footprint calculator, such as the [Global Footprint Network Calculator](#). Note: students will need an email address to log in to this particular calculator.
- Give students time to use the calculator to determine their carbon footprint.
- Discuss students' carbon footprint findings as a class, asking the following questions:
 - *How did your footprint compare with your neighbor's or with the teacher's? (Students' responses will vary. Encourage students to avoid competition and seek solutions instead.)*

- *What factors do you think have the most impact on your carbon footprint?* (Students' responses will vary, but should center on some of the factors explored by typical carbon footprint calculators, such as diet, transportation, and energy use.)

2. Prompt students to explain how particular habits impact carbon consumption through online research.

- Divide the class into groups of three students.
- Within a group, have each student choose and research one of three factors that contribute substantially to carbon footprints: diet, transportation, or energy use. Direct students to record their findings in Part A of the *Our Footprints* handout:
 - Small and large footprint examples for this factor: (For example, eating poultry is a small footprint example and eating beef is a large footprint example for diet.)
 - How carbon is produced by large footprint examples of this factor: (For example, burning fossil fuels to generate electricity is how some carbon is produced during energy use).
- After students have completed their individual research for each factor, direct them to share their findings with group members. Complete Part A of the *Our Footprints* handout for all factors.
- As a class, discuss small and large footprint examples found during student research.

3. Support students as they read to generate additional strategies for minimizing carbon footprints.

- Challenge the class to generate a list of ways individuals and groups can minimize their carbon footprint. Have them make the list as long as possible.
- Point students to two online sources:
 - [The 35 Easiest Ways to Reduce Your Carbon Footprint](#) (lower-level reading and navigation)
 - [Project Drawdown](#) (higher-level reading and navigation)
- In their jigsaw groups from the previous step, assign students to focus on food, transportation, or energy use, as they explore one or both of these resources to identify as

many personal and group strategies for carbon footprint reduction as possible. Have them record their findings in Part B of their *Our Footprints* handout.

- Bring the class back together, projecting a copy of the chart from Part B of the *Our Footprints* handout. Soliciting strategies from all groups, digitally record as many carbon footprint reduction strategies as possible for all three categories (diet, transportation, and energy use) and save this list for use in the next activity.
- Assign students to use this knowledge, as well as their experience with the carbon footprint calculator, to reflect once more on their own carbon contributions, completing Part C of the *Our Footprints* handout.
- Return to the class *Know and Need to Know* chart, asking students to incorporate any new insights regarding carbon footprints and strategies for minimization on an individual or group level.

Informal Assessment

Informally assess students' understanding of the factors contributing to carbon footprints, as well as their sense of agency to reduce their own carbon footprint, using the *Our Footprints* handout.

Extending the Learning

The *New York Times* has a [weekly climate newsletter](#) for which you can sign up using an email address. Articles in this series may be appropriate for higher-level readers, and an opportunity to augment the media in this activity and others within the unit. Additionally, CNN has created a [climate change quiz](#) to help identify the most effective carbon-reduction strategies, which students might wish to take after listing and categorizing strategies in this step. Finally, students may wish to explore aspects of [youth climate activism](#) (6:45) to witness what other young people are saying and doing in an effort to slow and reverse the effects of climate change.

OBJECTIVES

Subjects & Disciplines

Earth Science

- Climatology

Learning Objectives

Students will:

- Evaluate their carbon footprint.
- Perform research to explain how particular habits impact carbon consumption.

Teaching Approach

- Project-based learning

Teaching Methods

- Discussions
- Multimedia instruction
- Reading

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Information, Media, and Technology Skills
 - Information Literacy
 - Media Literacy
 - Learning and Innovation Skills
 - Creativity and Innovation
 - Life and Career Skills
 - Leadership and Responsibility
 - Productivity and Accountability
- 21st Century Themes
 - Environmental Literacy
 - Global Awareness
- Critical Thinking Skills
 - Evaluating

- Remembering
- Understanding
- Geographic Skills
 - Acquiring Geographic Information
- Science and Engineering Practices
 - Obtaining, evaluating, and communicating information

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

• CCSS.ELA-LITERACY.RST.6-8.4:

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

NEXT GENERATION SCIENCE STANDARDS

• Crosscutting Concept 2: Cause and Effect:

Cause and effect relationships may be used to predict phenomena in natural or designed systems.

• MS-ESS3: Earth and Human Activity:

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

• Science and Engineering Practice 8:

Obtaining, evaluating, and communicating information.

Preparation

BACKGROUND & VOCABULARY

Background Information

A carbon footprint is the amount of greenhouse gases that are necessary to support human activities. A single person's carbon footprint can be estimated by thinking about their habits. In particular, the types of food they eat, as well as the transportation and energy that they

use, are important. For example, eating poultry typically generates less greenhouse gas than eating beef, biking generates fewer greenhouse gases than driving, and turning down the heat can help prevent the generation of these gases in the first place. Knowing which habits contribute to one's personal carbon footprint can be a first step towards reducing that footprint.

Some of the most effective individual strategies to reduce climate change involve diet, transportation, and energy use. However, there are also important group strategies at the local, state, and national levels that can have widespread impacts with regards to these same habits. For example, governments can fund research into cleaner, more efficient energy technology, or regulate emissions standards for vehicles. Cities and towns can promote food recycling programs, such as composting or recovery of edible food before it is discarded. Because climate change is an international problem, it will ultimately require global cooperation to address.

Prior Knowledge

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Recommended Prior Activities

- [Adaptation and Mitigation](#)
- [Carbon All Around](#)
- [Circulation of the Seas](#)
- [Global Trends](#)
- [Heating Up](#)
- [Local Emissions](#)
- [Meteorological Models](#)
- [Now and Then](#)
- [Ocean Acidification: The Evidence](#)
- [Oceanic Impacts](#)
- [Our Greenhouse](#)
- [Plot It!](#)
- [Sea Level: The Evidence](#)
- [Sea Temperature: The Evidence](#)
- [Weather Interconnections](#)
- [Weather, Meet Climate](#)

Vocabulary

Term	Part of Speech	Definition
carbon footprint	<i>noun</i>	total sets of greenhouse gas emissions caused by an organization, event, product or individual over a set period of time.
climate change	<i>noun</i>	gradual changes in all the interconnected weather elements on our planet.
global warming	<i>noun</i>	increase in the average temperature of the Earth's air and oceans.

ACTIVITY 3: CLIMATE QUESTIONING | 1 HR 40 MINS

DIRECTIONS

This activity is part of the Climate Change Challenge unit.

1. Introduce students to the unit's final product criteria for success.

- Write the word "pledge" in a visible location, and ask students to consider the following questions, and discuss volunteers' responses as a class:
 - *When in your life have you made a pledge or a promise?*
 - *Why did you choose to do this?*
 - *How did making the pledge or promise change your actions?*
- Remind students of the project for the Climate Change Challenge unit: to communicate the relevance and reality of climate change, and to design a Climate Change Challenge Pledge, asking community members to help slow and reverse its effects on planet Earth.
- Project and review the criteria for success for the final product from the Climate Change Challenge: Final Product Rubric.
- Allow students time to access their final portfolios with graphical representations of data from Lessons 2-3, and to choose the one they believe will be most compelling to an audience of non-scientists, to complete the first criteria of the final product.
- Inform students that they will present their final products in the final activity of the unit (Community Consciousness). Introduce the format and audience for students' presentations. Emphasize that they have an opportunity to depict the relevance and reality of climate

change. This is a chance for them to help people commit to making important changes in their habits (as students likely discussed earlier in this step):

- Students place their final products around the room to create a gallery walk for the audience.
- Students accompany their products, using their representations of climate data and explanatory paragraphs to help convince audience members to commit to their Climate Change Challenge Pledge.
- Audience members can sign and print their names on a student's Planet Pledge Collector to indicate their willingness to try to abide by the pledge in the coming months and to receive support from the student on how to do so.

2. Direct students to develop questions that examine school community members' key carbon footprint contributors.

- Introduce students to the goal of today's activity: to understand the carbon footprints of school community members to design an appropriate Climate Change Challenge Pledge.
- Inform students that they will design and conduct climate interviews to achieve this goal.
 - Pair students and ask each set of partners to develop three questions they believe will most improve their understanding of school community members' carbon footprints, both in and out of school.
 - Prompt students to use the questions in the carbon footprint audit from Our Footprints activity and the strategies from the Adaptation and Mitigation activity as starting places for generating their questions. For example, students might ask, "How do you get to school?" or "What do you eat for lunch?"
 - Then prompt pairs to split up and circulate the classroom, recording four to six peers' responses to their three questions.
 - Return students to their pairs to compare and contrast the responses they received, and to revise questions as necessary for clarity and completeness.
- Solicit pairs' interview questions and record them, rewording to encompass multiple perspectives, and avoiding redundancy when possible. Allow students to vote for their favorite three to five questions to create a list of five to 10 short-answer questions to be used in a standard class interview.
- Review the list of "Tips for interviewing people" from the Geo-Inquiry Student Workbook: #12. Conducting Interviews handout. Ensure that all students have written down the class questions, and are prepared with notebooks and recording equipment, if possible.

3. Support students as they interview school community members to identify their key carbon footprint contributors.

- Assign students in pairs to visit and interview peers, teachers, and administrators regarding their carbon footprint. Students need to keep in mind that their goal is to use this information to design a carbon-mitigation pledge that addresses the particular carbon footprints of school community members.
 - One student should conduct an interview as another takes notes (and/or records) on responses.
 - Remind students to invite the people they interview for the final presentations for the unit.
 - Prompt students to return to the classroom with responses at least 15 minutes before the end of the class period.
- While students are conducting interviews, create and share a class online interview-response chart (see *Setup*).
- As students return in pairs from conducting interviews, assign them to record the responses they gathered in the class online interview-response chart.
- Save a copy of the class online interview-response chart for use in the next activity.
- Conclude by asking students to reflect on their interviews with the following questions:
 - *What did you learn from school community members that surprised you?*
 - *In what ways were your interview participants' carbon footprints similar to yours?*
 - *In what ways were they different?*
 - Student responses will vary but look for their developing sense of what carbon-increasing habits are common to many people.

Tip

Step 2: For additional information on developing interview questions with students, visit [*Youth-led Participatory Action Research \(YPAR\)*](#).

Tip

Step 3: It may also be helpful to secure interview participants a few days ahead of this activity (preferably with student input and assistance).

Tip

Step 3: Students may take the carbon footprint interviews more seriously if they are able to interview participants outside of the classroom. Consider pairing with a different class, or interviewing school administrators.

Informal Assessment

Informally assess students' understanding of carbon footprint contributors by examining their interview questions in Step 2 and listening to reflection responses in Step 3.

Extending the Learning

In addition to members of the school community, students may also wish to interview members of the larger community, such as businesspeople, friends, and family. This will give them a more comprehensive sense of local citizens' carbon footprint contributions.

OBJECTIVES

Subjects & Disciplines

Earth Science

- Climatology

Learning Objectives

Students will:

- Review the criteria and rubric for the unit project and final presentations, and choose the data representations from their portfolio to include in their presentations.
- Write effective questions to identify key carbon footprint contributors from school community members.
- Interview school community members and accurately record their responses.

Teaching Approach

- Project-based learning

Teaching Methods

- Cooperative learning
- Discussions
- Experiential learning

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Information, Media, and Technology Skills
 - Information Literacy
 - Information, Communications, and Technology Literacy
 - Media Literacy
 - Learning and Innovation Skills
 - Communication and Collaboration
 - Creativity and Innovation
 - Life and Career Skills
 - Initiative and Self-Direction
 - Leadership and Responsibility
 - Social and Cross-Cultural Skills
- 21st Century Themes
 - Environmental Literacy
 - Global Awareness
- Critical Thinking Skills
 - Applying
 - Creating
 - Evaluating
- Science and Engineering Practices
 - Obtaining, evaluating, and communicating information

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

- CCSS.ELA-LITERACY.SL.7.1.C:

Pose questions that elicit elaboration and respond to others’s questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

NEXT GENERATION SCIENCE STANDARDS

- Crosscutting Concept 2: Cause and Effect:

Cause and effect relationships may be used to predict phenomena in natural or designed systems.

- MS-ESS3: Earth and Human Activity:

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

- Science and Engineering Practice 8:

Obtaining, evaluating, and communicating information.

Preparation

BACKGROUND & VOCABULARY

Background Information

Conducting an interview is one way to learn helpful information about an individual person’s thoughts and behaviors. When the same interview is conducted with many different subjects, the information can be used to understand themes from members of a community. During the interview process, it’s critical to determine goals and questions ahead of time and decide whom to interview. Once interviews have been conducted, the responses can be analyzed to identify key trends in the data.

A carbon footprint is the amount of greenhouse gasses that are necessary to support human activities. A single person’s carbon footprint can be estimated by thinking about their habits. In particular, the types of food they eat, as well as the transportation and energy they use, are important. For example, eating poultry typically generates less greenhouse gas than

eating beef, biking generates fewer greenhouse gasses than driving, and turning down the heat can help prevent the generation of these gasses in the first place. Knowing which habits contribute to one's carbon footprint can be a first step towards reducing that footprint.

Prior Knowledge

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Recommended Prior Activities

- [Adaptation and Mitigation](#)
- [Carbon All Around](#)
- [Circulation of the Seas](#)
- [Global Trends](#)
- [Heating Up](#)
- [Local Emissions](#)
- [Meteorological Models](#)
- [Now and Then](#)
- [Ocean Acidification: The Evidence](#)
- [Oceanic Impacts](#)
- [Our Footprints](#)
- [Our Greenhouse](#)
- [Plot It!](#)
- [Sea Level: The Evidence](#)
- [Sea Temperature: The Evidence](#)
- [Weather Interconnections](#)
- [Weather, Meet Climate](#)

Vocabulary

Term	Part of Speech	Definition
carbon footprint	<i>noun</i>	total sets of greenhouse gas emissions caused by an organization, event, product or individual over a set period of time.
climate change	<i>noun</i>	gradual changes in all the interconnected weather elements on our planet.
global warming	<i>noun</i>	increase in the average temperature of the Earth's air and oceans.

Term	Part of Speech	Definition
pledge	verb	to guarantee or promise.

ACTIVITY 4: PLANET PLEDGE | 50 MINS

DIRECTIONS

This activity is part of the [Climate Change Challenge](#) unit.

1. Support students as they synthesize carbon footprint interview responses to design pledges.

- Ask students:
 - *Do you have any behaviors or habits that you want to change?*
 - *What strategies do you use to decrease the strength of these behaviors or habits in your life?*
- Discuss volunteers' responses briefly as a class, and distribute the [Planet Pledge Designer handout](#) to all students.
- Prompt students to review the responses to the interviews in [Climate Questioning](#) as they begin Part A of their *Planet Pledge Designer* handout.
 - Have students choose three behaviors that seem to be a source of carbon emissions for many members of the school community, and record these in the first column. (For example, many students and staff drive to school without carpooling.)
 - For each of the behaviors listed, have students identify at least two related strategies that members of the community could use to reduce their carbon emissions, and record these in the second column. (For example, members of the school community could carpool, walk, or bike.)
- Next, ask volunteers to share out a behavior and the associated mitigation strategies, writing them in a visible location.
- Introduce the concept of "constraints" by asking students:
 - *Why might some people have a hard time using the first strategy?*
 - *Are there reasons why some people might have a hard time using the second? (Work through the strategies, prompting students to consider the constraints associated*

with time, physical ability, convenience, expense, and knowledge, writing their ideas on the board.)

- Prompt pairs to complete the third column of Part A from the *Planet Pledge Designer* handout, listing all of the constraints they can imagine associated with each strategy. They may wish to revise their strategy in response to these constraints.
 - For example, students may wish to specify that someone might bike to school in the spring and fall, and carpool in the winter.
- Direct students to decide which of the strategies they believe represents the best way to mitigate carbon emissions from each of the three habits. Students record their choices as the first pledge in Part B of the *Planet Pledge Designer* handout.
 - For example, the first element of a student pledge might be "I pledge to ride my bicycle to school when I can, and carpool when I cannot."
 - Direct students to be ready to defend these choices based on the constraints—explaining why they think the strategy they identified is both accessible and effective.

2. Prompt students to add Planet Pledges to their final products.

- Revisit the criteria for success for the final product.
- Ask students:
 - *What representation of climate data did you choose for your final product, and why?*
 - *What three strategies did you select to help your community members pledge to cut their carbon emissions, and why?*
- Discuss volunteers' answers briefly as a class.
- Prompt each student to organize their graphical representation of climate data (saved in their portfolio), tabular representation of emissions data, and all three elements of their Planet Pledge from Part B of the *Planet Pledge Designer* handout on their final product in a format that will be easily accessible to their audience for the final presentations. (The form of this final product will differ depending on your classroom's unique resources and student skills. The products may, therefore, range from posters with the named elements arranged and labeled by students to online presentations digitally organized into slides.)

3. Direct students to explain the relationship between the climate data representation and the pledge for an audience of non-scientists.

- Revisit the format for the presentation of final products in the final activity of the unit (*Community Consciousness*). Again, emphasize that the presentations are an opportunity to depict the relevance and reality of climate change, and help people commit to making important changes in their behavior.
- Ask students:
 - *What information do you think your audience during the next activity will need to feel motivated to sign your pledge?* (Help students recognize that the last element of the criteria for success, their explanatory paragraph, will help an audience who may not have seen climate data before experience the understanding and motivation necessary to sign and follow their pledge.)
- Prompt students to consider the questions in Part C of the *Planet Pledge Designer* handout, and to draft a sentence response for each question.
 - These questions leverage students' knowledge recorded in previous activities, including the evidence-based comparisons and predictions that accompanied their representations of climate data in *Local Emissions*, *Plot It!*, and *Sea Level: The Evidence*, as well as the constraints-based choices they made during Step 1 of this activity.
- When students have finished drafting responses to the questions in Part C of the *Planet Pledge Designer* handout, prompt them to combine these into a single paragraph, and to record this paragraph in the last section of their final product.

4. Facilitate students' self- and peer-evaluation of final products in preparation for presentations.

- Distribute two copies of the *Climate Change Challenge: Final Rubric* to each student.
- Assign students to complete the first three rows of one rubric copy examining their own work, and give them time to make any revisions necessary based on insights from their self-assessment.
- Pair students, and assign each to practice presenting their Climate Change Challenge final product.
- Ask pairs to complete all rows of the second rubric copy assessing their partner's work and presentation, and to discuss their thoughts. Again, give students time to make any final

revisions or to conduct additional presentation practice, based on insights from peer assessment.

- Ensure that all revised final products are saved in an easily accessible digital location so that you may print them for student presentations in the next activity.

Tip

Step 1: For additional information on coding and analyzing interview responses with students, visit [Youth-led Participatory Action Research \(YPAR\)](#).

Rubric

Informally assess students' ability to synthesize climate change knowledge as they design a pledge from interview responses. Motivate that pledge with an explanatory paragraph, recorded in their *Planet Pledge Designer* handout.

OBJECTIVES

Subjects & Disciplines

Earth Science

- Climatology

Learning Objectives

Students will:

- Consider common carbon-emitting behaviors, as well as constraints on why people are challenged to change those behaviors.
- Design a Planet Pledge, based on action steps that individuals can take to change their carbon-emitting behaviors.
- Create a final product for the Climate Change Challenge unit, including both visuals and text, to communicate about climate change and related action steps to audience members.

Teaching Approach

- Project-based learning

Teaching Methods

- Discussions
- Information organization
- Reflection

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Information, Media, and Technology Skills
 - Information Literacy
 - Information, Communications, and Technology Literacy
 - Media Literacy
 - Learning and Innovation Skills
 - Creativity and Innovation
 - Life and Career Skills
 - Initiative and Self-Direction
 - Leadership and Responsibility
 - Productivity and Accountability
- 21st Century Themes
 - Environmental Literacy
 - Financial, Economic, Business, and Entrepreneurial Literacy
 - Global Awareness
- Critical Thinking Skills
 - Analyzing
 - Creating
 - Evaluating
- Science and Engineering Practices
 - Constructing explanations (for science) and designing solutions (for engineering)
 - Obtaining, evaluating, and communicating information

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

- CCSS.ELA-LITERACY.W.7.1:

Write arguments to support claims with clear reasons and relevant evidence.

NEXT GENERATION SCIENCE STANDARDS

- Crosscutting Concept 2: Cause and Effect:

Cause and effect relationships may be used to predict phenomena in natural or designed systems.

- MS-ESS3: Earth and Human Activity:

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

- Science and Engineering Practice 6:

Constructing explanations and designing solutions

- Science and Engineering Practice 8:

Obtaining, evaluating, and communicating information.

Preparation

BACKGROUND & VOCABULARY

Background Information

Pledges are one way to help people change their behavior. Pledges can be as simple as an individual agreeing to turn out the lights when they leave the room, and as complicated as a national government committing to keep global warming under 2°C. To be effective, pledges should be easy to understand and clearly justified. Many local businesses and governments have made key pledges to reduce their climate impact. Who is next?

Young people are beginning to raise global awareness of climate change. Activists, such as teenager Greta Thunberg of Sweden, have spoken to audiences around the world. Power also comes in numbers; kids and teens are well-represented at climate rallies. However, it's not necessary to hit the streets to make one's views known. Many youths use social media as a platform to demand action from decision-makers on climate change.

Prior Knowledge

☐ Recommended Prior Activities

- [Adaptation and Mitigation](#)
- [Carbon All Around](#)
- [Circulation of the Seas](#)
- [Climate Questioning](#)
- [Global Trends](#)
- [Heating Up](#)
- [Local Emissions](#)
- [Meteorological Models](#)
- [Now and Then](#)
- [Ocean Acidification: The Evidence](#)
- [Oceanic Impacts](#)
- [Our Footprints](#)
- [Our Greenhouse](#)
- [Plot It!](#)
- [Sea Level: The Evidence](#)
- [Sea Temperature: The Evidence](#)
- [Weather Interconnections](#)
- [Weather, Meet Climate](#)

Vocabulary

Term	Part of Speech	Definition
carbon footprint	<i>noun</i>	total sets of greenhouse gas emissions caused by an organization, event, product or individual over a set period of time.
climate change	<i>noun</i>	gradual changes in all the interconnected weather elements on our planet.
global warming	<i>noun</i>	increase in the average temperature of the Earth's air and oceans.
pledge	<i>verb</i>	to guarantee or promise.

ACTIVITY 5: COMMUNITY CONSCIOUSNESS

I 50 MINS

DIRECTIONS

This activity is part of the Climate Change Challenge unit.

1. Welcome audience members and introduce the Climate Change Challenge unit.

- As the audience settles into the classroom (or in another public space within the school, such as a hallway or cafeteria), hand out final products, assigning students to a presentation position within the space (see *Setup*).
- To introduce audience members to the Climate Change Challenge unit, and support students in feeling a sense of pride in their work, show the Causes of Global Warming Explained video (2:49) a second time.
- Ask students to help the audience members get an initial sense of their learning by answering the following questions:
 - *What are some examples of climate data that we examined during this unit?*
 - *What do you know about the effects of climate change on weather or on the ocean?* (If necessary, prompt students to consider their final products to answer these questions).

2. Facilitate final product presentations.

- Distribute one copy of the Planet Pledge Collector to each student.
- Prepare students and the audience for presentations by announcing the format:
 - Students accompany their products, using their representations of climate data and explanatory paragraphs to help convince audience members to commit to their Planet Pledge.
 - Audience members can sign and print their names on a student's *Planet Pledge Collector* to indicate their willingness to attempt abiding by the pledge in the coming months and receive support from the student.
- Encourage audience members to move around the room, listen to a student's short presentation, ask questions, decide whether or not to sign their pledge, and then move on

to learn from additional students. It may be helpful to note that audience members should feel free to sign multiple pledges if they feel that the commitment is reasonable!

- Turn the “mic” over to students, and roam the room with audience members; you can pledge as well!
- After each student has presented and gained a maximum of six signatures, thank audience members for their time and ask students to return to their seats within the classroom.

3. Prompt students to reflect on the Climate Change Challenge unit.

- Collectively revisit the class *Know and Need to Know* chart. Students can now likely answer many of the questions they had at the beginning of the unit—celebrate their growth!
- Ask students to respond individually to the following prompts:
 - *What will you remember about examining climate data? Why?*
 - *What is the most important thing you learned during the Climate Change Challenge unit?*
- Distribute copies of the *Climate Change Challenge Collaboration Rubric* for students to assess themselves and/or peers on their collaboration skills throughout the unit.

Tip

A few days may be required to reach out to a school community audience ahead of time. You may consider inviting the same people students interviewed during the *Climate Questioning* activity.

Modification

If the classroom is too small to conduct student presentations comfortably, you may consider moving to a larger public space, such as a hallway or cafeteria. Leaving final products posted in a visible place may also help students and audience members be reminded of their commitments.

Rubric

Formally assess student outcomes using the *Climate Change Challenge: Final Product Rubric*.

Extending the Learning

Opportunity for Action: Students can distribute their Planet Pledge depictions in local businesses, and design an online platform to collect pledgers' information. They can track their own pledge progress and follow-up with others to ensure they have the necessary information and motivation to keep their commitment to the pledge.

OBJECTIVES

Subjects & Disciplines

Earth Science

- Climatology

Learning Objectives

Students will:

- Present their climate data representation and pledge to an audience of non-scientists.
- Convince others of the impact and importance of climate change.
- Reflect on their learning in the Climate Change Challenge unit.

Teaching Approach

- Project-based learning

Teaching Methods

- Discussions
- Hands-on learning
- Reflection

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes

- Information, Media, and Technology Skills
 - Information Literacy
 - Information, Communications, and Technology Literacy
 - Media Literacy
- Learning and Innovation Skills
 - Creativity and Innovation
- Life and Career Skills
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National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

- **CCSS.ELA-LITERACY.SL.7.4:**

Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.

NEXT GENERATION SCIENCE STANDARDS

- **Crosscutting Concept 2: Cause and Effect:**

Cause and effect relationships may be used to predict phenomena in natural or designed systems.

- **MS-ESS3: Earth and Human Activity:**

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

- **Science and Engineering Practice 6:**

Constructing explanations and designing solutions

- **Science and Engineering Practice 8:**

Obtaining, evaluating, and communicating information.

Preparation

BACKGROUND & VOCABULARY

Background Information

For science to help individuals make better decisions, people need to be informed, and communication is a key part of the scientific process. Scientists communicate with each other and with the public in a variety of ways: they publish papers, give presentations, and use many other forms of media, such as television and magazines. For these reasons, many scientists spend time learning to communicate clearly and effectively by practicing their visual, written, and verbal skills. In the *Climate Change Challenge* unit, students participate authentically in the scientific process. As such, it is critical that they share their findings with others.

Young people are beginning to raise global awareness of climate change. Activists, such as teenager Greta Thunberg of Sweden, have spoken to audiences around the world. Power also comes in numbers; kids and teens are well represented at climate rallies. However, it's not necessary to hit the streets to make one's views known. Many youths use social media as a platform to demand action from decision-makers on climate change.

Prior Knowledge

[]

Recommended Prior Activities

- Adaptation and Mitigation
- Carbon All Around

- [Circulation of the Seas](#)
- [Climate Questioning](#)
- [Global Trends](#)
- [Heating Up](#)
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