## Climate Change Mitigation Plan

**# of Days** 4  
**Prior Knowledge** Students will be able to compare and contrast climate change mitigation strategies (macro and micro) in light of environmental, economic, political, and ethical impact.  
**Lesson Objective** Mitigation Performance Assessment: Group & Individual Products  
**Materials Needed** Mitigation Diagram, Wedge Activity Packets including task cards, resource cards, and graphic organizers. Individual assessment prompt  
**Changes for Next Time** What Worked Well

### Time  
#### Day 1  
**15 min**  
**Learning Task or Activity** Mitigation Wedges Introduction  
- Define & illustrate mitigation wedges using diagram  
- Introduce the activity, goals, and procedures  
- in reviewing the first 4 strategies, ask students how that strategy may impact them.  
**Method & Notes** LECTURE  
Use 6.1.0 to guide the whole activity  
Use 6.1.2 Slides for Mitigation Stabilization Wedge Activity  
Optional - 6.1.3 Review the 4 strategies discussed previously

**35 min**  
**Learning Task or Activity** Expert Group Jigsaw  
- Students analyze 3-4 wedge strategies in expert groups to take back to their home groups.  
**Method & Notes** GROUP WORK  
- Have task cards, resource cards, and graphic organizers ready for groups  
6.1.3 Expert Groups Task Card #1  
6.1.4 Strategy Wedge Table  
6.1.5 Graphic Organizer  
6.1.6 Resource Cards

**HW**  
Students review their organize to present to their home groups tomorrow.

### Day 2  
**25 min**  
**Learning Task or Activity** Home Group Sharing  
- Experts divide into their home groups and give an overview from their graphic organizer about their particular wedge.  
**Method & Notes** GROUP WORK  
- Teachers monitor group progress
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<tr>
<th>Time</th>
<th>Activity</th>
<th>Notes</th>
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<tbody>
<tr>
<td>5 min</td>
<td><strong>Final Product Assignment</strong></td>
<td><strong>ASSIGNMENT</strong> 6.2.1 Student Handout Mitigation Project</td>
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<td></td>
<td>- Discuss the expectations for the final product from each group.</td>
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<tr>
<td>25 min</td>
<td><strong>Home Group Discussion</strong></td>
<td><strong>GROUP WORK</strong> 6.2.2 Home Group Assignment (Task Card #2) 6.2.3 Mitigation Plan Worksheet</td>
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<tr>
<td></td>
<td>- Home groups choose 5 strategies/ wedges based on the given parameters.</td>
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<td></td>
<td>- Students discuss the rationale of picking specific wedges.</td>
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<td></td>
<td>- <strong>Teachers monitor group progress.</strong></td>
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<tr>
<td>Day 3</td>
<td><strong>Home Group Wedges Finalization</strong></td>
<td><strong>GROUP WORK</strong> Review 6.2.1 Student Handout Mitigation Project, given out previously Poster making supplies</td>
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<tr>
<td>15 min</td>
<td>- Groups label the wedges on their final diagram that will be turned in and check over their group summary sheet.</td>
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<td></td>
<td>- Groups should turn in a consensus analysis of their plan by the end of the period.</td>
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<td></td>
<td>- Students create mitigation posters.</td>
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<tr>
<td>35 min</td>
<td><strong>Mitigation Plan Analysis</strong></td>
<td><strong>GROUP WORK</strong> 6.3.1 Mitigation Plan Group Assignment 6.3.2 Mitigation Plan Answers</td>
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<tr>
<td></td>
<td>- Students are given the graphic organizer to analyze their choices in light of two different perspectives.</td>
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<tr>
<td>Day 4</td>
<td><strong>Class Discussion of Plans</strong></td>
<td><strong>TEACHER-LED DISCUSSION</strong></td>
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<td>20 min</td>
<td>- Examine the posters.</td>
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<td></td>
<td>- Ask different groups to talk about how one wedge they chose affected one of the perspectives in each of the categories.</td>
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<tr>
<td>30 min</td>
<td><strong>Individual Assessment</strong></td>
<td><strong>SUMMATIVE ASSESSMENT</strong> 6.3.3 Individual Assignment Students will need their Mitigation Plan Worksheets (6.2.3)</td>
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<tr>
<td></td>
<td>- Given a standard mitigation plan, students will analyze the plan's consequences for a new perspective.</td>
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Lesson Plan 6
Climate Change Mitigation

Teacher Guides/Student Worksheets:

6.0 List of Resources

6.1.0 Mitigation Activity Instructions and Teacher Guide
6.1.1 Mitigation Wedge Slides
6.1.2 Mitigation Review Slides
6.1.3 Expert Task Card
6.1.4 Mitigation Wedge Strategies Table MS
6.1.5 Expert Group Graphic Organizer
6.1.6 Resource Cards

6.2.1 Student Handout -Final Mitigation Plan
6.2.2 Home Group task card
6.2.3 Mitigation Plan Worksheet

6.3.1 Mitigation Plan Group Analysis
6.3.2 Mitigation Plan Group Answers
6.3.3 Individual Mitigation Analysis
6.1.0 Climate Change Mitigation Teacher Guide

Activity Instructions and Teacher Guide

This activity was adapted from the Princeton University Environmental Institute’s Stabilization Wedge Game, 2007. http://cmi.princeton.edu/wedges/

Activity Goal:
Students will be able to work in groups to create, analyze, and justify global mitigation plans in response to global warming. Students will learn about technologies currently available that can substantially cut carbon emissions.

Students will individually analyze a standardized plan as the final performance assessment.

Materials:
Group Activity:
Day 1: Task #1 Card, 1 set of Resource Cards, Graphic Organizer/student
Day 2: Task #2 Card, 1 mitigation plan worksheet,
Day 3: scissor, tape or glue

Individual Assessment: 1 standardized mitigation plan/student, 1 analysis template/student

Timeframe:
3-4 50-minute periods

Lesson Plan Overview:

<table>
<thead>
<tr>
<th>Time</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1:</td>
<td>Teacher-led Activity Introduction</td>
</tr>
<tr>
<td>25 min</td>
<td>- Connect to previous days’ lesson plans</td>
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<tr>
<td></td>
<td>- Define and illustrate Mitigation Wedges</td>
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<td></td>
<td>- Outline the Activity Goals &amp; Procedures</td>
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<tr>
<td>25 min</td>
<td>Student Jigsaw for Wedges – Expert Groups</td>
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<td></td>
<td>- Students are divided into groups of 5. Each member is responsible for becoming an expert on 3 wedges. (Graphic Organizer)</td>
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<td>Day 2:</td>
<td>Home Group Sharing</td>
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Day 3:
15 min
Home Group Wedges Finalization
- Groups label the wedges on their final diagram that will be turned in and check over their group summary sheet

35 min
Mitigation Plan Analysis
- Teacher models how to analyze the perspective of a teacher with the transportation conservation strategy.
- Students analyze their choices in light of two different perspectives on the Mitigation Plan Group Analysis.

Day 4:
20 min
Class Discussion of Plans

30 min
Individual Assessment
- Given a standard mitigation plan, students will analyze the plan's consequences for a new perspective

Detailed Lesson Plan

Day 1

Teacher’s Notes for the Introduction
The following provides a general outline of information and figures that may be helpful in preparation for the group activity. This information should not be read directly, but rather linked to previous material learned through questioning and class discussion.

Of greatest importance, at the end of the introduction, students understand the purpose of the group activity, what a wedge represents, why they will choose 5 wedges, and the sequence of tasks that groups will use to accomplish the goal.

Activity Introduction

As we have learned, the Earth’s climate is changing due mostly to human actions. In previous lessons, we examined the possible consequences of climate change and know that while humans must adapt their behavior to deal with the changes that are occurring, humans must also take active steps to mitigate future emissions.

Human-based greenhouse gas emissions are the major source for climate change. Unfortunately, worldwide greenhouse gas emissions, specifically carbon dioxide, increase each year. If this continues, with the same emission rate over the next 50 years, levels of carbon dioxide concentration would probably triple, reaching extremely dangerous levels.

As we know, carbon emissions result from many activities that help us work, travel, grow crops, and relax. Cutting emissions requires difficult choices that will inevitably have significant consequences for large groups of people. Difficult choices must be made.
The following diagram shows the carbon emission rate (tons of carbon emitted per year) (Figure 1 The orange line from 1955 to 2005 shows the actual emission rate for that time period. The slope of the line indicates that emission rates increased over this period. The black dashed line shows that if this trend continues, then by 2055, carbon dioxide concentration will be on a path to tripling the preindustrial level.

Figure 1

The flat orange line starting in 2005 shows the carbon emission rate for each year remaining at 7 billion tons per year over the next 50 years. However, this requires sacrifices to be made in terms of future growth in carbon emissions. That is represented by the yellow stabilization triangle. If the carbon emission rate stays constant, the amount of carbon equal to the yellow triangle cannot be emitted. Difficult choices must be made.

Unfortunately, just leveling off the carbon emission rate will not stop some warming. Figure 2 is the same nearly the same as figure 1 except for the declining blue line from 2005 to 2055. Maintaining a stable emissions rate at the 2005 level does not mean that the temperature will not change. In order to stop warming we must eliminate an even larger wedge as shown by the triangle that occupies the area between the solid orange line and the solid blue line.

Stanford Climate Change Education Project, Lesson Plan 7, Climate Change Mitigation
DRAFT, 2010
Carbon emissions equal to the 2005 rate will still lead to increasing carbon dioxide concentrations in the atmosphere and further temperature increase. Concentrations, not just emissions, need to be stabilized to stop temperature increase. That is why many people argue not for just maintaining the current level of emissions, but for decreasing them. The dark blue line on the figure 2 represents decreased carbon emission rate. To decrease emissions, even more carbon emissions must be eliminated represented by the larger yellow wedge.

Figure 2

For this scenario, even more difficult decisions must be made. And you will all have the opportunity to make some of those decisions in this class.

Activity Procedures

(Keep Figure 2 projected for students to see while describing the goals and procedures for the activity.

This class will divide up into groups of 5 that represent policymakers. Your goal is to make decisions about what carbon emissions should be cut to reach the goal of reducing
emissions equal to the yellow triangle in Figure 2. To make it easier, this yellow triangle can be divided into 5 wedges (Figure 3).

![Stabilization Wedge Triangle](image)

**Figure 3**

Each wedge represents 1 billion tons of carbon that will not be emitted. Your group will receive information about 7 different ways to save a “wedge” of carbon emissions. You may use some wedges twice. Others you may choose not use at all, but in the end you must decide as a group what 5 wedges (5 billion tons of carbon emissions) are your mitigation plan. Then you will justify your decisions on why you chose this group of wedges and the impact it will have on the human behavior, the economy, and life styles. **There is no easy or “right” solution to the carbon and climate problem!**
Mitigation Strategies Activity Instructions

**Activity Goal:** As a group, construct a mitigation triangle using 5 wedge strategies keeping in mind the economic (cost) and social (how does it affect people) impact.

**Procedures**

1. **Meet in Expert Jigsaw**
   Each group is comprised of 5 members. Each member of the groups is responsible for becoming an expert about 3 of the possible strategies. You will first meet in your “expert” groups to learn more about your 3 wedge strategies. You will make a chart listing positive and negative aspects of each strategy.

2. **Meet in Home Groups**
   Next you will meet with your group members who learned about the other strategies. You will take turns briefly describing the wedge strategy and its positive and negative attributes.

3. **Develop the Mitigation Plan**
   A. Your group will develop the mitigation plan. You will start by going around the group. Each member gets to suggest one strategy to for the plan that they would like to discuss. The group then discusses the wedge strategy and either includes it or does not include it in the plan. This continues until all 5 wedges are chosen.
   
   B. Strategies can be used for more than one wedge. Prior to pasting and labeling the wedges on the Mitigation Plan, the group should look at the plan as a whole and see if any changes need to be made.

4. **Analyze the Mitigation Plan**
   Each group will receive a graphic organizer with which to analyze the Mitigation Plan. The group will discuss the questions and turn in only one copy of the analysis.

5. **Presentation of Mitigation Plan:** Each group will create a poster displaying their wedge. (Handout will be given with specific details)

A list of states and land area might be helpful in land use comparisons.
http://www.worldatlas.com/aatlas/populations/usaareal.htm
Mitigation Strategies

LP 6.1.1

As we know the earth’s climate is changing due mostly to human actions. In previous lessons we examined the possible consequences of climate change and know that while humans must adapt their behavior to deal with the changes that are occurring, humans must also take active steps to mitigate future emissions.

Teacher ask questions: What is this graph showing us? Discuss
Teacher: As we know, carbon emissions result from many activities that help us work, travel, grow crops, and relax. Teacher leads students in discussion: what do these graphs show? What is the largest source of CO2 emissions? Etc...

Teacher: What does this show? Engage students in discussion about graph and implications
An example of a power plant

Teacher: Human based greenhouse gases are a major source for climate change. Worldwide, greenhouse gases—especially carbon dioxide—are increasing each year. If this continues at the same rate over the next 50 years, the level of CO2 will probably triple, reaching dangerous levels. This diagram shows the carbon emissions rate (tons of carbon emitted per year). The orange line is the actual (true) emission rate from 1955 to 2055. The black dashed line shows what the level of emissions will be if we don’t make changes (mitigate). The flat orange line shows the carbon rate if we remain at 7 billions tons (2005 level) per year. The Stabilization Triangle is what the students must decide how to get there. They will decide what mitigation strategies will be used for reducing the emission rates of carbon.
Each slice of the triangle can help us reduce carbon emissions. There are many different strategies that can be used to reduce emissions. Each student will have to look at different choices and select 5 wedges, or mini triangles to get the whole Stabilization Triangle. The image on the left is an example, students will work in groups to decide on how to fill in the labels on the right.
Mitigation Strategies Review

LP 6.1.2

Mitigation Strategy #1:
Transportation Efficiency

A car that gets 30 mpg releases 1 ton of carbon into the air for every 10,000 miles of driving.

Fuel efficient cars get more miles per gallon (mpg).

Increasing the fuel efficiency of cars will reduce the amount of CO2 emitted into the atmosphere.
Mitigation Strategy #2: Transport Conservation

With more cars on the road, the amount of CO2 emitted steadily increases.

Reducing the time and number of cars on the road will reduce emissions.

Increasing the use of public transportation would reduce the amount of individual driving time.

Mitigation Strategy #3: Building Efficiency

Providing electricity, transportation, and heat for buildings produces high levels of CO2 emission.

Reducing heating and energy use would reduce the amount of carbon released into the atmosphere.

Insulating buildings, using alternative energy sources, and solar water heating are ways to reduce emissions.
Mitigation Strategy #4: Efficient Electricity Production

25% of the world’s carbon emissions come from the production of electricity at coal plants.

Since nearly 50% of electricity comes from coal combustion, improving coal plant efficiency will significantly reduce carbon emission.

To do this requires alternative ways of using coal to produce electricity.
Expert Group Task Card #1

Activity Goal: Become an expert on the mitigation strategies provided to your group.

Discuss the following questions and summarize your discussion on the chart provided.

- This particular strategy addresses one kind of problem that causes carbon dioxide (CO₂) emissions. Describe the problem.
- How can this strategy be implemented?
- What are the effects and consequences of implementing this strategy? Think about social, political and economic effects both positive and negative.

Each person must complete their own chart 5.1.5. You will become an expert on the strategies explored in your group. You will share your expertise in your next group.
### Wedge Strategies Table

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Category</th>
<th>Description</th>
<th>1 wedge could come from…</th>
<th>Cost</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Transportation Efficiency</td>
<td></td>
<td>Increase automobile fuel efficiency (2 billion cars)</td>
<td>doubling the efficiency of all the world’s cars from 30 to 60 mpg</td>
<td>$</td>
<td>Car size and power</td>
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<tr>
<td>2. Transportation Conservation</td>
<td></td>
<td>Reduce miles traveled by passenger cars and trucks</td>
<td>cutting miles traveled by all passenger vehicles in half</td>
<td>$</td>
<td>Increased public transportation, urban design</td>
</tr>
<tr>
<td>3. Building Efficiency</td>
<td></td>
<td>Increase insulation, furnace and lighting efficiency</td>
<td>using best available technology in all new and existing buildings</td>
<td>$</td>
<td>House size, consumer demand for appliances</td>
</tr>
<tr>
<td>4. Electricity Efficiency</td>
<td></td>
<td>Increase efficiency of power generation</td>
<td>raising plant efficiency from 40% to 60%</td>
<td>$</td>
<td>Increased plant costs</td>
</tr>
<tr>
<td>5. Wind Electricity</td>
<td></td>
<td>Wind displaces coal-based electric (30 x current capacity)</td>
<td>using area equal to ~3% of U.S. Land area for wind farms</td>
<td>$$</td>
<td>Competing land use, location disputes</td>
</tr>
<tr>
<td>6. Solar Electricity</td>
<td></td>
<td>Solar PV displaces coal-based electricity (700 x current capacity)</td>
<td>using the equivalent of a 100 km x 200 km PV array</td>
<td>$$$</td>
<td>PV cell materials</td>
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<tr>
<td>7. Biofuels</td>
<td></td>
<td>Biomass fuels from plantations, replace petroleum fuels</td>
<td>scaling up world ethanol production by a factor of 30</td>
<td>$$</td>
<td>Biodiversity, competing land use</td>
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CCS = Carbon Capture and Storage  
PV = Photovoltaic  
mpg = miles per gallon
<table>
<thead>
<tr>
<th>Strategy and Category</th>
<th>Problems Addressed</th>
<th>Implementation</th>
<th>Effects (social, economic, political) positive, negative, unintended consequences</th>
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<tbody>
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Resource Card #1  
Strategy: TRANSPORT EFFICIENCY

Category: Transportation

Today there are nearly 600 million cars in the world. A typical car getting 30 miles per gallon (mpg) releases 1 ton of carbon into the air for every 10,000 miles of driving. It’s predicted that there will be about 2 billion cars on the road in 50 years.

Cars that get more miles per gallon are considered fuel-efficient. Improved efficiency could come from using hybrid and diesel engine technologies, as well as making vehicles out of strong but lighter materials. The heavier a car is, the more fuel it needs to run. Lightweight cars require less energy.

2009 Toyota Prius which has a hybrid gas-electric engine gets 50 mpg.

**WEDGE STRATEGY:** A wedge of emissions savings would require increasing the fuel efficiency of all cars from 30 mpg to 60 mpg by the year 2055

COST: $
Resource Card #2
Strategy: TRANSPORT CONSERVATION
Category: Transportation

On average, Americans drive 10,000 miles per year. In a one year period, a car that gets 30 miles per gallon (mpg) releases 1 ton of carbon into the air. The number of cars on the road is expected to increase from 600 million to 2 billion over the next 50 years.

Reducing the amount of time traveled by cars would greatly reduce the amount of carbon released into the air. Increasing the use of mass transit such as buses, trains, and subways would greatly reduce the amount of driving.

Another way to reduce the amount of driving is for people to use more electronic communication such as video conferencing and email instead of face-to-face meetings.

**WEDGE STRATEGY:** A wedge of emissions savings would be achieved if we decreased the number of miles traveled by cars in half.

**COST:** $
Resource Card #3
Strategy: BUILDING EFFICIENCY

Category: Electricity and Heat and Fuel

Movie theaters, malls, apartments, houses, and even cars use a significant amount of heat and electricity. This energy use releases a large amount of carbon into the atmosphere.

Almost equal amounts of carbon emissions come from providing electricity, transportation, and heat for industry and buildings. The largest potential savings in the buildings sector are in space heating and cooling, water heating, lighting, and electric appliances.

Reducing the amount of space heating, air conditioning, water heating, lighting, and electric appliance use could help us cut emissions overall. Carbon savings will come from efficiency strategies, like increasing insulation, and using renewable energy strategies, like solar water heaters.

WEDGE STRATEGY: A wedge would be achieved if we cut emissions by 25% in all new and existing residential and commercial buildings.

COST: $
A significant amount of the electricity we use is produced by burning coal. Coal is used to generate more than half of all electricity in the United States. Power plants burn coal to make steam, which turns turbines (large machines that generate power) that help generate electricity.

The combustion (heating/burning) of coal releases several types of emissions including carbon dioxide (CO₂) into the atmosphere. Today’s coal-power plants produce about one-fourth of the world’s carbon emissions.

Since coal plants will continue to be an important source of energy, we must find ways to increase their efficiency. One way this can be accomplished is by reducing the amount of emissions in the conversion of coal to generate energy. This means finding alternative ways to generate energy such as better turbines and fuel cells. Fuel cells allow us to produce electricity from coal without burning it. A more even distribution of the energy demand would also increase conversion efficiency.

WEDGE STRATEGY: A wedge would of saving would be achieved by doubling the efficiency of the world’s current coal burning power plants.

COST: $$
Wind currently creates only about 1% of global electricity. Technologies are getting less expensive and electricity produced by wind farms is increasing by about 30% per year. Wind is a clean and renewable source of electricity. It produces no carbon dioxide (CO₂).

Wind machines generally are built tall and wide to collect the most wind. Typically they are 20 stories tall and have blades 200 ft across. The largest wind machines in the world have blades as long as a football field. The height and size can cause trouble for some migrating bird populations.

Based on current turbine spacing on wind farms, wind power for one wedge would require a combined area slightly smaller than the size of the state of California. However, land with wind machines can also be used for other purposes, mostly for crops or pasture.

**WEDGE STRATEGY:** To gain a wedge of emissions savings from wind displacing coal-based electricity, current wind capacity would need to be scaled up by a factor of 30.

**COST:** $$
Resource Card #6  
Strategy: SOLAR ELECTRICITY

Category: Electricity

Photovoltaic (PV) cells in solar panels convert solar energy from the Sun into electricity, providing a carbon dioxide-free source of renewable energy. Solar panels currently create less than 1% of the total electricity used in the United States.

Solar power systems can be small enough to charge your cell phone or house, or large enough to be a whole power plant.

Because the Sun does not shine all the time, there needs to be a way to collect and store solar energy. A large amount of space is required to install solar panels. Current solar energy technology is fairly expensive, at least 2-5 times more expensive than fossil fuel-based electricity.

Solar PV cells can be placed on roofs and the sides of buildings in order to increase the surface area available for panels.

WEDGE STRATEGY: A wedge of emissions savings could be achieved installing arrays equal to the size of the state of New Jersey (about 9000 square miles).

COST: $$$
Resource Card #7  
Strategy: BIOFUELS

Categories: Transportation and Heat and Fuel

Carbon dioxide (CO$_2$) is released into the atmosphere from many sources, especially burning of petroleum in cars. Some living plants, like corn or sugar cane, can be used to create the same fuels that normally require petroleum. Fuels from living plants are called “biofuels.”

![Plants](images/corn_sugar_cane_coal.png)

**Figure 1: Plants can be used to produce energy just like coal.**

Burning biofuels releases carbon dioxide (CO$_2$) into the environment, but living plants already took this carbon dioxide (CO$_2$) out of the atmosphere for photosynthesis. Thus, there is no overall (net) change in carbon dioxide (CO$_2$) in the atmosphere. The U.S. and Brazil currently produce over 9.75 billion gallons of biofuel per year. That is enough fuel to run 10% of all the cars in the U.S. each year.

![Diagram](images/co2_cycle.png)

**Figure 2: Burning biofuels does not increase the net concentration of CO$_2$**

Biofuels require a great deal of land. One wedge worth of biofuels would require an area of farmland roughly 1/3 the size of the United States. One-sixth of the world’s crops would have to be used for biofuels rather than food supplies.

**WEDGE STRATEGY:** A wedge of emissions savings would require increasing today’s biofuel production by 30 times and making it sustainable.

COST: $
Final Project: Home Group Mitigation Plan

Introduction:

Worldwide, greenhouse gas emissions, specifically carbon dioxide, increase each year. If this continues, with the same emission rate over the next 50 years, the levels of carbon dioxide will probably triple, reaching extremely dangerous levels.

As we know, carbon emissions result from many activities that help us work, travel, grow crops, and even have fun. We must make some difficult choices.

Your task:

You will work in small groups to make decisions about what carbon emissions should be cut over the next 50 years. You have already worked in your expert groups. Now, you will work with your home group to discuss all 7 “wedges”; each wedge represents 1 billion tons of carbon that will NOT be emitted.

As a group, you must pick 5 wedges and these will be your suggested ‘Mitigation Plan’. You will need to explain why you chose your particular wedges for your plan to cut carbon emissions.

Procedures:

1) Each group member will share the information about each of their 3 wedges
2) Develop your mitigation plan: to do this, review the positives and negatives of each of the 7 wedges. Pick 5 of the wedges and these will become your “Mitigation Plan”.
3) Fill out each of the 5 pieces with the name of the specific wedge.
4) Create a poster displaying your mitigation plan that includes the following:
   a) your mitigation wedges labeled and glued down
   b) how each wedge will help mitigate climate change
   c) what each wedge requires (what will we have to do)
   d) what are some of the challenges associated with each wedge
   e) relative cost of each web (use $, $$, $$$)
5) Be sure that EVERYTHING is CLEARLY labeled.
6.2.2

**Home Group Task Card #2**

Policymaking Groups

**Activity Goal:** As a group, construct a mitigation triangle using 5 wedge strategies, keeping in mind the economic (cost) and social (how does it affect people) impact.

1. One at a time, share the strategies you researched in your first group. For each strategy give at least one positive and one negative aspect.

2. Take turns going around the group. Each member should suggest a strategy they would like to include on the mitigation plan. You can suggest any strategy, not only those you researched.

3. Discuss each possible strategy that is suggested and whether or not your group would like to include it on your plan. Continue until you have decided all 5 wedges.

4. Before filling in your final strategy on the Mitigation Plan, the group should look at the plan as a whole and make sure it follows the guidelines.

**Guidelines:**
The mitigation triangle can be made up of any 5 wedges.

5. Using the graphic organizer, analyze your mitigation plan. Discuss the questions and turn in one copy of the analysis for the entire group.
6.2.3

Mitigation Plan Worksheet

Record your strategies to reduce total fossil fuel emissions by 5 wedges by 2055.
(1 “wedge” = 1 billion tons carbon per year by 2055)

Calculate the total amount of relative money ($) and land coverage (space needed, land area).
These totals may be helpful as you justify your group’s Mitigation Plan decisions.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Sector (E, T, H, B)</th>
<th>Cost ($)</th>
<th>Space Needed</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
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<td><strong>TOTALS</strong></td>
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Stabilization Wedge Triangle
Mitigation Plan Group Analysis

I. Using the question prompts below, please justify your group’s Mitigation Plan decisions.

1. What are the two biggest strengths (positive impacts) of your Mitigation Plan? Please explain your answer.

2. What are the two biggest drawbacks (negative impacts) of your Mitigation Plan? Please explain your answer.

3. Look at the most (or one of the most) expensive wedge strategies that your group chose. Justify why you would choose this strategy over a cheaper option.
II. Choose 1 wedge strategy from your Mitigation Plan and state how you think your group’s mitigation plan will affect (A) a high school English Teacher and (B) an auto mechanic in the given categories of their lives.

**Wedge Strategy Choice**

<table>
<thead>
<tr>
<th></th>
<th>Middle School Teacher</th>
<th>Auto Mechanic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Tasks or Job Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social/Personal/Political</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic</td>
<td></td>
<td></td>
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</tbody>
</table>

III. Based on your comparison in the table, do you think the teacher or the auto mechanic is more negatively affected by the wedge strategy you chose? Why?
6.3.2
Mitigation Plan Group Analysis: ANSWERS

I. Directions: Using the question prompts below, please justify your group’s Mitigation Plan decisions.

1. What are the two biggest strengths (positive impacts) of your Mitigation Plan? Please explain your answer.

The Mitigation Plan takes a diverse approach by eliminating wedges from many different sectors. That way the impact of mitigation will be spread across citizens and the economy.

The Mitigation Plan will create many jobs. The new technologies will require more workers to get them set up and maintain them.

2. What are the two biggest drawbacks (negative impacts) of your Mitigation Plan? Please explain your answer.

The plan is quite expensive. Overall, a majority of the wedges are either $\$\$ or $\$$\$. It is unclear if these new technologies will create enough jobs to offset the start up costs. And investing in these technologies might send the nation into more debt or increase taxes significantly.

The reliance on nuclear power rests on the fact that the by-products of nuclear power will not be used for creating a nuclear arsenal. Given constant tensions in world relationships, this could be a permanent looming threat.

3. Look at the most (or one of the most) expensive wedges your group chose. Justify why you would choose this wedge over a cheaper option.

The Solar Energy wedge is quite expensive ($\$$\$). Yet, it is technology that could provide a continuous supply of electricity without burning coal. The solar panels would require large plots of land in sunny areas, but over time these could be placed on the tops of buildings which is unused space. In the long-run, the start-up cost could be offset by cheaper and cleaner electricity.
II. Choose 1 wedge from your Mitigation Plan and state how you think your group’s mitigation plan will affect A) a high school English Teacher and B) an auto mechanic in the given categories of their lives.

Wedge Choice _______ Transport Conservation

<table>
<thead>
<tr>
<th>Job Tasks or Job Environment</th>
<th>High School English Teacher</th>
<th>Auto Mechanic</th>
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</thead>
<tbody>
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<td></td>
<td>If mass transit becomes more reliable, some teachers might actually save time in their workplace by grading papers on the train. The amount of time at school and extra-curricular activities may be affected, though by train schedules.</td>
<td>Fewer automobiles on the road would mean fewer cars that would need to be fixed. Demand for an auto mechanic would likely drop.</td>
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</table>

| Social/Personal/Political    | - Taking the train may result in increased time in transit and less time at home. Having to leave at specific times may cause increased stress as a missed train could result in the teacher being late to school. - Cutting transportation may also affect vacation plans. - The teacher may take a greater interest in the local planning of mass transportation and look at a candidate’s vision for cheap, consistent, and convenient mass transportation. | Socially, the auto mechanic would be affected similarly to other citizens. Any constraints on travel may affect travel, leisure, and social plans. The mechanic may favor politicians that support car manufacturing in order to maintain their business. Or they might support politicians who push for public transportation, but provide tax breaks to those in the auto industry for developing efficient cars. |

| Economic                    | Mass transit could save money by eliminating the cost of a car, the insurance, and gas money. Most likely, individuals or families would still own cars, but use them less if public transportation were a viable option. Some money would be saved, but public transportation would need to be affordable. Also, the increase in public transportation would probably raise taxes. | Annual earnings would probably decrease based on less car maintenance needed. Personally, the auto mechanic would face the same issues of other citizens – is the mass transportation affordable and convenient? Does it affect annual taxes? |
III. Based on your comparison in the table, do you think the teacher or the auto mechanic is more negatively affected by the wedge you chose? Why?

The auto mechanic is more negatively affected by transportation conservation because it affects him deeply in his job. It basically will make him redefine his livelihood – perhaps forcing him to go back to school to learn how to fix other machines or modes of transportation. Also, on the personal level, he will be affected by the same issues as the high school English teacher.
6.3.3 INDIVIDUAL ANALYSIS

**Directions:** Read over your groups’ Mitigation Plan Worksheet

1) Analyze the impact of your plan on:
   - a) a farmer and
   - b) a construction worker.
   For each category, give one positive impact and one negative impact.

<table>
<thead>
<tr>
<th>category</th>
<th>Farmer</th>
<th>Construction Worker</th>
</tr>
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<tbody>
<tr>
<td>Job Tasks or Job Environment</td>
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<tr>
<td>Economic</td>
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2. Based on your comparison in the table, do you think the construction worker or the farmer is more negatively affected by the Mitigation Plan? Why?