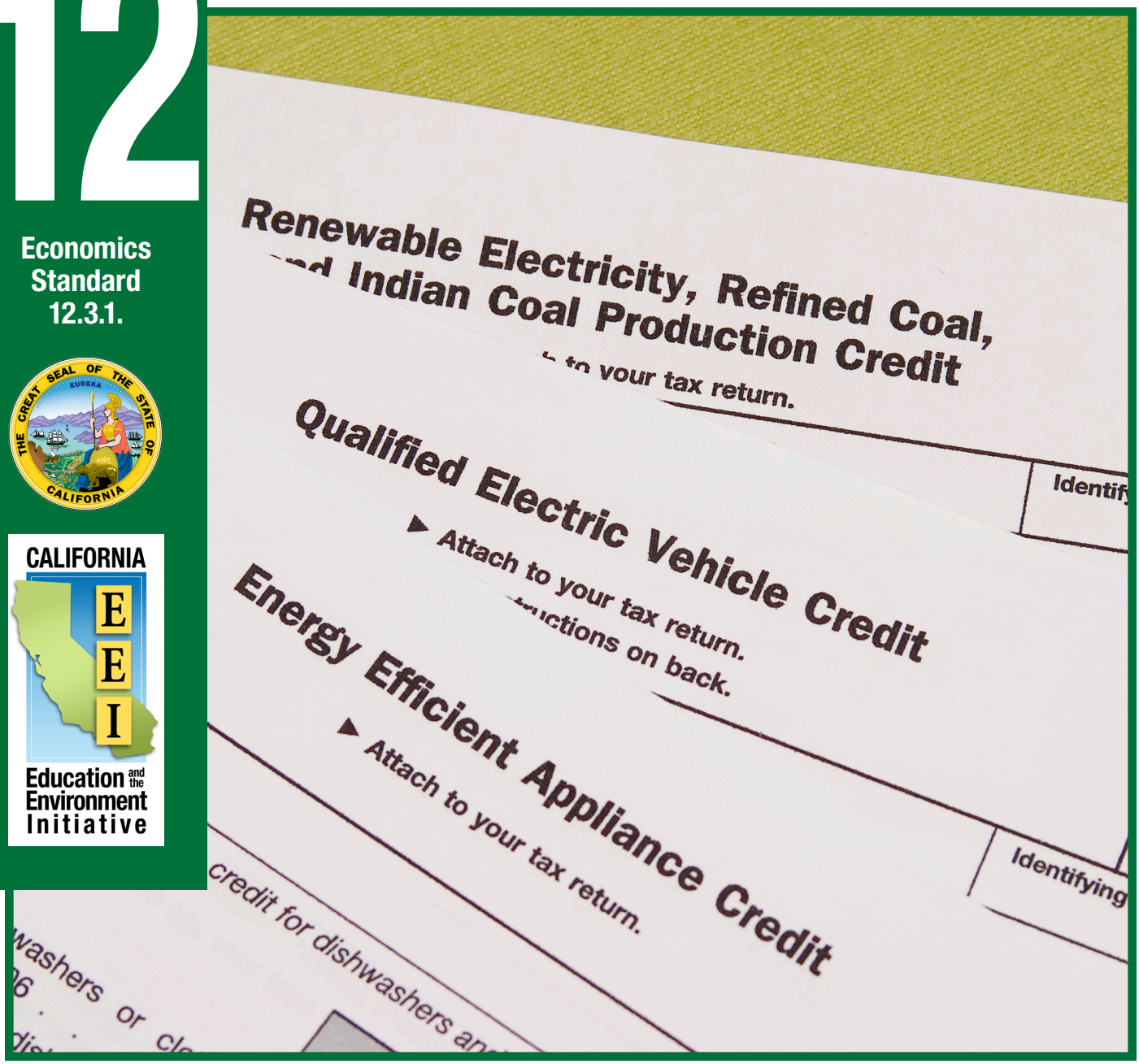
12

Economics Standard 12.3.1.

Student Workbook

California Education and the Environment Initiative



Government and the Economy: An Environmental Perspective

California Education and the Environment Initiative

Approved by the California State Board of Education, 2010

The Education and the Environment Curriculum is a cooperative endeavor of the following entities:

California Environmental Protection Agency
California Natural Resources Agency
Office of the Secretary of Education
California State Board of Education
California Department of Education
California Integrated Waste Management Board

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Key Partners:

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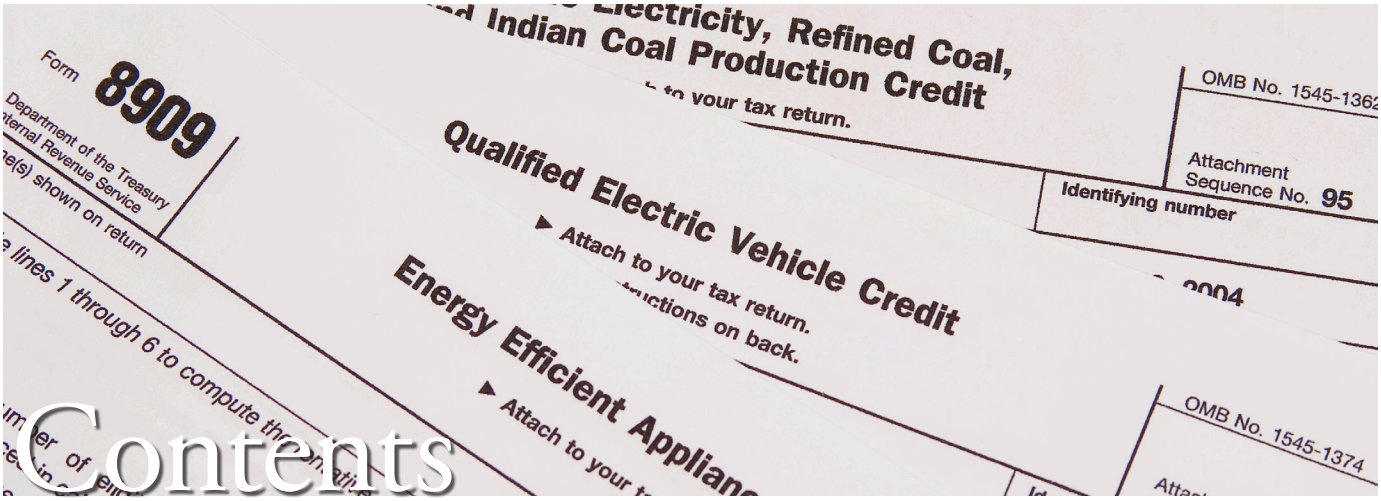

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Additionality: A condition for a project to qualify as a project under the Clean Development Mechanism (CDM) that requires proof that the project would not otherwise be built without the incentive of the sale of credits.

Biomass: Plant material (wood, grains, agricultural waste, vegetation) sometimes used as an energy source.

Cap and trade: A regulatory tool that utilizes market systems to achieve an environmental goal. The government establishes a level of acceptable emissions (a cap) and allows companies to trade emission allowances to comply with the law.

Carbon dioxide: A colorless gas that is a byproduct of respiration and combustion, and is absorbed by vegetation and phytoplankton.

Carbon monoxide: A colorless, highly poisonous gas and a byproduct of combustion.

Carbon offset: A financial instrument (measured in metric tons of carbon dioxide-equivalent) that represents verified reductions in carbon emissions.

Carbon sink: A carbon reservoir that takes up more carbon than it is releasing or emitting, such as a forest.

Clean Development Mechanism (CDM): A program created under the Kyoto Protocol that provides a method by which developing countries can undertake emission reduction projects and get paid for verified reductions in carbon emissions.

Command and control policies: Government regulations that limit or prohibit certain practices.

Crop rotation: Varying the crops on a piece of land in a planned series to save or increase the mineral or organic content of the soil, to increase crop yields, and to control or lessen insects and plant diseases.

Ecosystem services: The functions and processes that occur in natural systems, such as pollination, that support or produce ecosystem goods and help sustain human life, economies, and cultures.

Emission allowances: A permit to emit a unit of emission.

Emissions: The release of matter or energy into the environment including gases, particulates, noise, vibrations, light, heat, radiation, and odors.

E-waste: Unwanted electronic devices, such as old cell phones and outdated computers, that contain hazardous wastes, such as lead and mercury.

Excise tax: A tax levied on the manufacture, sale, or use of products based on the quantity of the product, typically applied to consumables, such as gasoline, tobacco, and alcoholic beverages.

Externality: Indirect effects or costs to third parties resulting from economic decisions.

Fiscal policy: An economic policy of the federal government that involves the use of taxes and spending to make adjustments in the economy.

Global climate change: A long-term significant change in Earth's climatic patterns.

Landfill: A disposal site where solid waste is buried between layers of dirt.

Marginal benefit: The additional benefit gained by producing one additional unit of a good.

Marginal cost: The cost incurred by producing one additional unit of a good.

Mercury: A highly toxic metal that is liquid at room temperature and has many industrial uses.

Natural resources: Materials, such as water, minerals, energy, and soil, that people use from nature and natural systems.

Natural system: The interacting components, processes, and cycles within an environment, as well as the interactions among organisms and their environment.

Opportunity cost: The foregone economic benefit from the next best action to be taken.

Policy: A broad statement that describes how groups, organizations, and governments intend to implement or enforce their rules, regulations, and laws.

Regulation: A specific rule created by a government agency or other legislative authority to implement and enforce laws and policies.

Subsidy: Government funds given to support an enterprise that is considered beneficial to the public.

Symbiosis: A relationship of mutual benefit or dependence.

Tax credit: A reduction in taxes or application of money spent as being credited toward taxes owed.

Tax shifting: A tax policy that eliminates or reduces one or more taxes and establishes or increases other taxes such that the overall revenue is the same.

User fee: A charge for the use of a publicly owned or operated facility, such as a national park.

Name: _____

Instructions: Read and answer each of the questions below. (3 points each)

1. What is e-waste? Provide two examples.

_____

_____

_____

_____

_____

2. What makes e-waste dangerous? Name two hazardous materials used in constructing electronics.

_____

_____

_____

_____

_____

3. How might these hazardous waste products cause health problems if they end up in a landfill?

_____

_____

_____

_____

_____

4. How does the Electronic Waste Recycling Act work to encourage recycling?

_____

_____

_____

_____

_____

Name: _____

5. What are three actions the government has taken to encourage the development of resource recovery (RR) parks and eco-industrial zones?

Instructions: Write a paragraph in response to the following question. (5 points)

6. Do you think businesses would participate in e-cycling, build eco-industrial zones, or RR parks without government action? Why or why not?

Name: _____

Instructions: After reading about the Zero Emission Vehicle (ZEV) Regulations, prepare to inform the class about this event by answering the following questions.

1. What board was created in 1947? What was its purpose?

_____

_____

_____

2. What are two activities that were restricted in Los Angeles County to limit air pollution?

_____

_____

_____

3. What does the U.S. EPA identify as the most common source of air pollution in the United Sates?

_____

_____

_____

4. What program did the California Air Resources Board (ARB) start in 1990?

_____

_____

_____

5. What did the program do?

_____

_____

_____

Name: _____

6. Were any cars produced that met the requirements?

_____

_____

_____

7. What happened to those cars?

_____

_____

_____

8. What happened to the law in 2003?

_____

_____

_____

9. What two reasons did the auto companies give for opposing the manufacturing of these cars?

_____

_____

_____

_____

_____

Instructions: After reading about the *Exxon Valdez* oil spill, prepare to inform the class about this event by answering the following questions.

1. What happened near Prince William Sound on March 24, 1989?

_____

_____

_____

Name: _____

2. What two parts of the region's economy have been severely affected?

_____

_____

_____

3. How did the spill affect the native people who lived near Prince William Sound?

_____

_____

_____

4. How did the spill affect people who fish for a living and rely on the Sound for their livelihood?

_____

_____

_____

5. Who do people who fish for a living blame for the accident?

_____

_____

_____

6. What did the Cordova Chamber of Commerce say about the spill?

_____

_____

_____

7. a. In the lawsuit against ExxonMobil, how much was awarded in damages and punitive damages?

_____

_____

_____

Name: _____

b. What happened to the amounts awarded in damages when ExxonMobil appealed the case, and then again, when the case went to the Supreme Court?

_____

_____

_____

8. From ExxonMobil's point of view, what and who would have suffered from paying the cost of the punitive damages?

_____

_____

_____

9. Who might actually have paid the cost of the damages?

_____

_____

_____

Name: _____

Instructions: Use information from today's lesson to answer the following questions.

The *Exxon Valdez*

1. How did the oil spill affect Alaska's economy? (1 point)

_____

_____

_____

2. How did the oil spill affect ExxonMobil? (1 point)

_____

_____

_____

3. What role did government regulations play in the *Exxon Valdez* case? (2 points)

_____

_____

_____

4. What role did the courts play? (2 points)

_____

_____

_____

5. a. How could ExxonMobil get the money to pay its penalties? (2 points)

_____

_____

b. How might market competition prevent such an outcome? (2 points)

_____

_____

Name: _____

The ZEV Regulations

1. How would the ZEV program benefit the people of California? (1 point)

_____

_____

_____

2. Who opposed the law? Why? (2 points)

_____

_____

_____

3. How did the state government change the law between 2003 and 2008? (2 points)

_____

_____

_____

4. What were the opportunity costs of California modifying the law? (1 point)

_____

_____

_____

5. If ZEV laws were applied to all auto companies doing business in the United States, how would they affect the competitiveness of the companies? (1 point)

_____

_____

_____

Name: _____

6. How might the automakers have benefited from the law if they had not fought it so hard? (1 point)

_____

_____

_____

7. In your opinion, supported by facts, why did the auto companies fight so hard to get the law changed? What had to be changed in the law to make it acceptable to them? (2 points)

_____

_____

_____

_____

Name: _____

Instructions: Answer the following questions as you view the presentation.

Economic and Environmental Costs

This is a photograph of downtown Los Angeles on a smoggy day.

What economic and environmental costs arise from this situation?

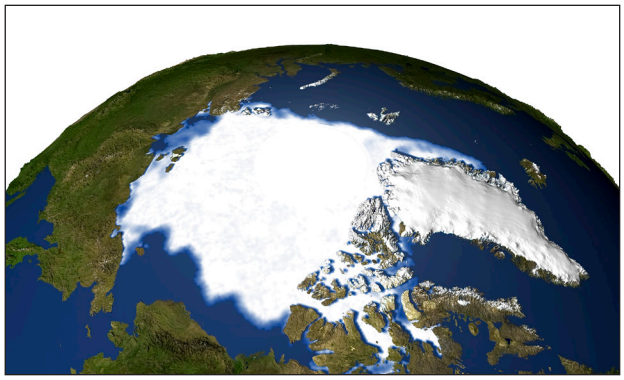
_____

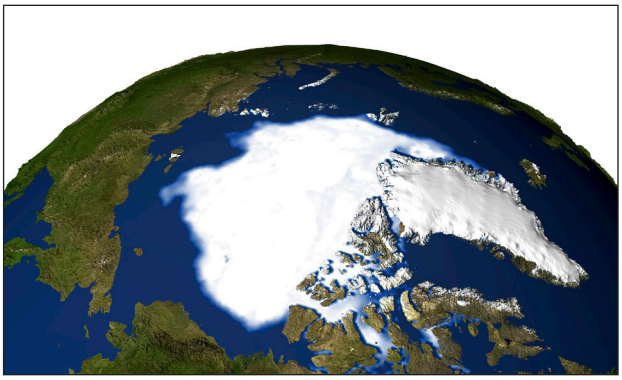
_____

_____

_____

Ice Coverage of the Arctic





These satellite photographs compare the ice coverage area of the Arctic region in 1970 and in 2008.

These pictures indicate there is a reduction in the ice coverage in the Arctic region. What might be some of the consequences of this change?

_____

_____

_____

_____

_____

_____

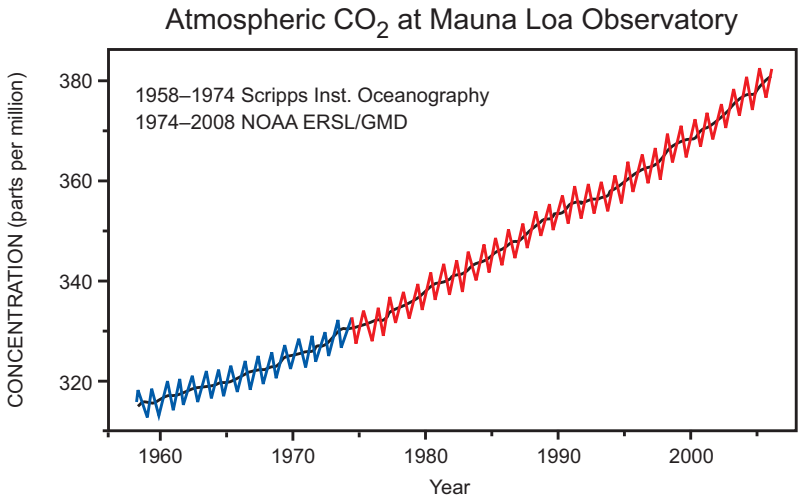
Name: _____

Carbon Dioxide Levels

This graph shows carbon dioxide levels in the atmosphere from 1960 to 2000. What do you notice about the levels of carbon dioxide?

Many people believe that carbon dioxide levels are a factor in climate change.

Although there are many natural sources of carbon dioxide, levels of carbon dioxide in the atmosphere significantly increase when humans burn fossil fuels in the production of electricity and the powering of automobiles.



Climate Change and the Economy

What makes global climate change an economic problem?

_____

_____

_____

_____

_____

What are some possible solutions to this problem? What would you recommend?

_____

_____

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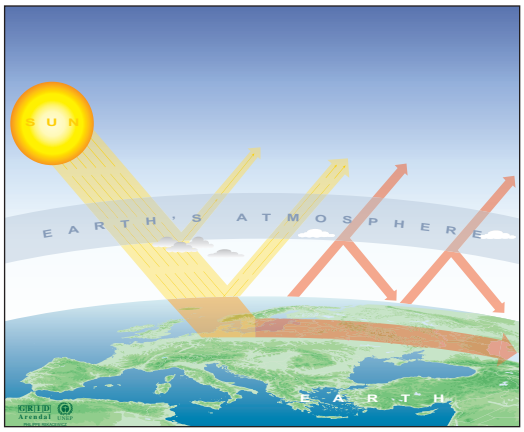
Name: _____

The Greenhouse Effect



How the greenhouse effect works:
When solar radiation gets to Earth, some of it passes through the atmosphere and is absorbed by Earth and some of it is reflected out into space.

The atmosphere contains "greenhouse gases," such as water vapor, carbon dioxide, and methane. Increases in greenhouse gases cause the atmosphere to absorb more energy.

When the heat from Earth's surface rises, greenhouse gases reflect it back to the surface, further warming Earth.

Reducing Carbon Emissions

What would be ways that the government might get industries to reduce their carbon emissions?

_____

_____

How effective do you think they would be?

_____

_____

What would the costs be?

_____

_____

Could taxes be used? How would they work?

_____

_____

Could subsidies be used to encourage new energy sources? How effective would they be?

_____

_____

_____

Name: _____

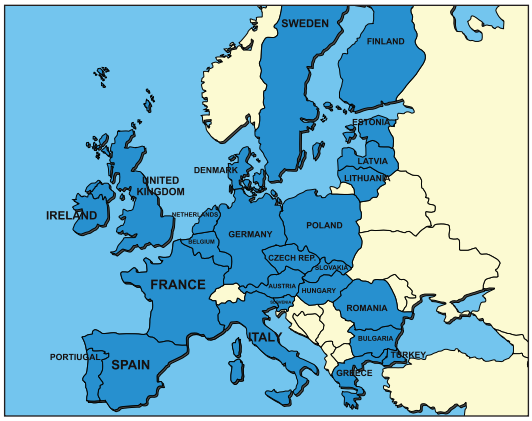
Cap and Trade

What is cap and trade?

Cap and trade is a regulatory tool that places a mandatory cap on emissions while providing sources flexibility in how they comply. The goal of cap and trade is to steadily reduce carbon dioxide and other greenhouse gas emissions in a cost-effective manner. Because it may be easier for some businesses to reduce their emissions more than others, these businesses may sell, or trade, their allowances to businesses less able to reduce their emissions. Over time, the limits become stricter. This system rewards efficient businesses and ensures that the cap can be met with the lowest possible cost to businesses.

Emissions Trading Systems

The European Union (EU) has the largest emissions trading program, called the EU emissions trading system (ETS). It has been in operation since 2005.



Problems with Emissions Trading Systems

Phase one of the EU's ETS was not a complete success. Some critics claimed that too many carbon allowances were circulated, meaning that air quality would not improve substantially.

Phase two of the ETS began in January 2008, and many improvements have been made. Recent studies indicate that an emissions trading regime can help to reduce greenhouse gas emissions. It appears that this approach has facilitated the development of the market.

Do you think the emissions trading system could work in spite of the problems that critics point out about the European program? Why or why not?

_____

_____

_____

_____

_____

Name: _____

Carbon Offsets

Carbon offsets are financial instruments (measured in metric tons of carbon dioxide-equivalent) that represent reductions in carbon emissions. These instruments can be traded or purchased to help businesses maintain their emissions levels below an established cap.

Voluntary markets involve selling carbon offsets to consumers, businesses, and institutions. They differ from compliance markets, in which the government mandates emission reductions and offsets serve as a tool for meeting emission reduction targets.

Factories can buy offsets from other countries or receive credits for supporting projects that could be completed for lower costs than within the country. The **Clean Development Mechanism (CDM)** program is an example of this strategy.

In order to be a CDM, the project must meet the approval of inspectors. One of the project features they look for is **additionality**. An additionality requires proof that the project would not otherwise be built without the incentive of the sale of credits.

Clean Development Mechanism

What is a Clean Development Mechanism (CDM)?
CDM is a program created under the Kyoto Protocol. It provides a method by which developing countries can undertake emission reduction projects and get paid for verified emission reductions. For example, an industrialized country with a greenhouse gas reduction commitment could invest in a carbon-reducing project in Kenya, where the cost of building a solar power plant would be cheaper than building one in Europe.

Additionality is one criterion adopted by the CDM program for offset projects.

Additionality

What is additionality?
The criterion of additionality requires proof that a project would not otherwise be built without the incentive of the sale of credits.

The assessment of additionality is an important part of the process because it is one of the standards for reviewing CDM projects.

Name: _____

Carbon Sinks

A "carbon sink," such as a forest, is a natural absorber of carbon because trees naturally take in carbon and store it. Because the growth of new trees can reduce carbon levels in the atmosphere, some countries allow such projects to be counted as carbon offsets.

In some cases, it might cost less to plant a forest than to make a factory emit fewer emissions. The carbon sink has the extra benefit of giving a forest monetary value, other than just for lumber.

Costs and Benefits of Carbon Sinks

What is a carbon sink?

_____

_____

_____

_____

What is the benefit to industry of a carbon sink?

_____

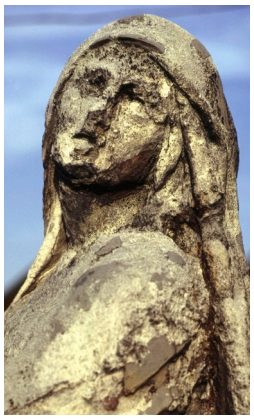
_____

Are there any costs to industry in using carbon sinks?

_____

_____

Acid Rain



In the 1980s, acid rain—the contamination of rain with sulfur oxide and nitrogen oxide—became recognized as an environmental problem. Acid rain damages buildings and monuments, affects forests and lakes, and causes health problems.

What are the costs of acid rain?

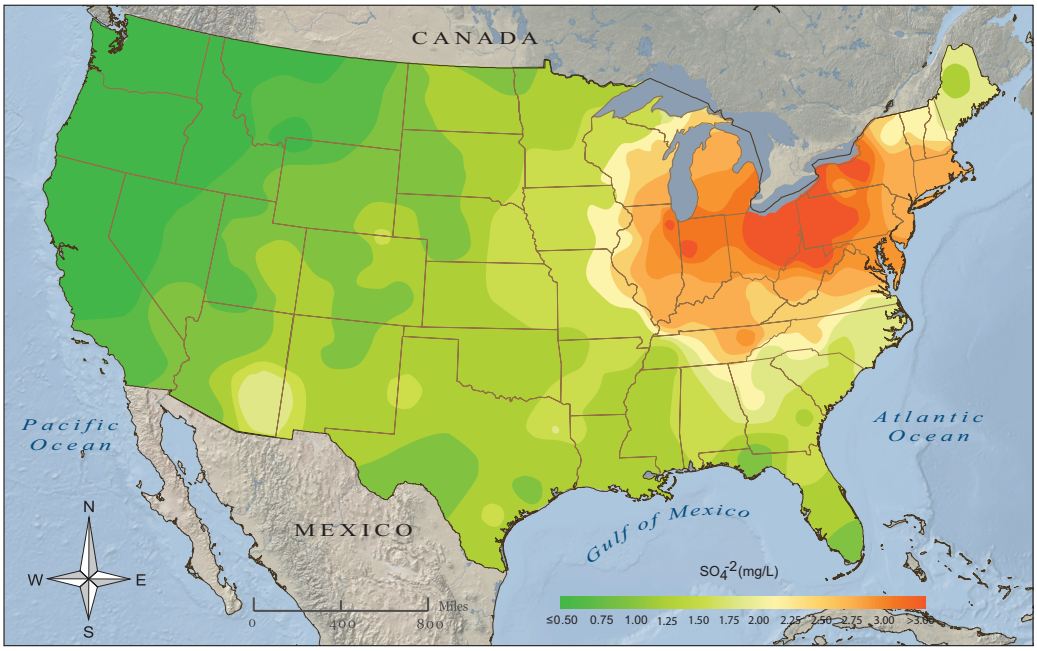
_____

_____

_____

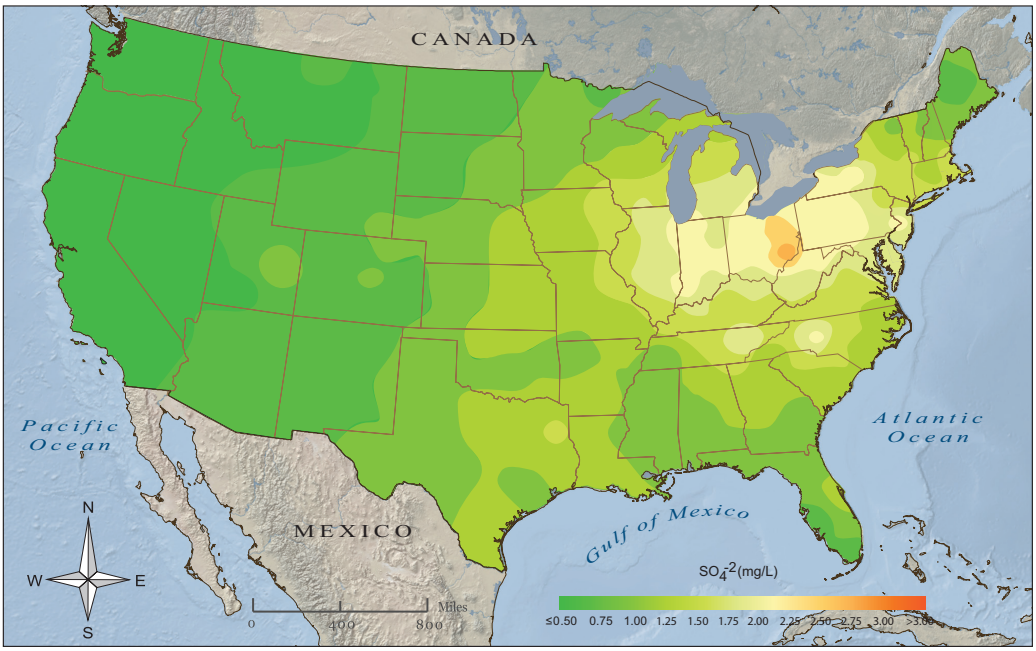
Name: _____

Sulfate Ion Concentrations in 1985



In 1985, the highest concentrations of sulfate ions in the atmosphere were in the northeastern region of the U.S.

Sulfate Ion Concentrations in 2005



By 2008, although the highest concentrations of sulfate ions in the atmosphere were still highest in that region, as a result of better emission controls, the concentration had decreased substantially. Thus, reducing some of the problems associated with acid rain.

Name: _____

Sulfur Dioxide Reduction Program

Cap and trade programs can work!

In 1990, Title IV of the Clean Air Act amendment created a program to address the acid rain problem. Title IV's goal was to reduce sulfur dioxide in the atmosphere to below 1980 levels.

The Sulfur Dioxide Reduction Program was a success. In 1980, sulfur dioxide emissions were at 25.9 million tons, and in 2005, they were measured at 15 million tons.

This program used a cap and trade scheme.

Environmental Protection and the Economy

No Longer "Environment" vs. "Economy"

The Sulfur Dioxide Reduction Program was criticized by many who thought, at first, that the program would hurt the economy. A report from the U.S. EPA about the U.S. experience using economic incentives to achieve environmental protection states that, "Economists have long understood that economic incentives have the potential to reduce pollution at a cost below that imposed by traditional regulations. The national experience of using economic incentives over the past decade reinforces this point of view."
This bolsters the case of those who argue that programs, such as cap and trade can be a way for the government to protect the environment and support the economy.

Name: _____

Instructions: Use information from today's lesson to answer the following questions. (5 points each)

1. What is a "cap and trade" program?

_____

_____

_____

_____

2. What role does the government play in making a cap and trade program successful?

_____

_____

_____

_____

_____

3. What is an example of a successful cap and trade program? What was its goal? Give details of what it accomplished.

_____

_____

_____

_____

_____

4. Instead of reducing the carbon emissions from its factories, a company pays someone to grow or maintain a forest. Does this help solve the carbon emissions problem? Why or why not?

_____

_____

_____

_____

_____

Name: _____

Instructions: Fill in the following chart as you read and discuss the two case studies.

Case Study	Program Description	Type of Program	Problems with Program
Partnership for a New Generation of Vehicles			
Environmental Tax Shifting			

Name: _____

Instructions: In this lesson you studied ways that governments encourage and discourage certain practices as a way of protecting the natural environment. Use the chart completed in class with the information from the case studies to write a one-paragraph response to each of the following sets of questions. (10 points each)

1. What type of fiscal policy is used in the Partnership for a New Generation of Vehicles (PNGV)? Using PNGV as an example, what are the benefits of this type of fiscal policy? What are the limitations? How did PNGV affect the market? How effective was PNGV?

Name: _____

2. What type of fiscal policy is Environmental Tax Shifting an example of? Using plastic bags as an example, what are the benefits of this type of fiscal policy? What are the limitations? How does/did the policy affect the market? How effective has Environmental Tax Shifting been?

Name: _____

Instructions: As you read the scenario that your group was given, complete the following:

- Summarize the problem.
- Decide which policy or combination of policies would work best to resolve the environmental issue.
- Identify potential costs and benefits to businesses of your proposed solution. Include opportunity costs, marginal costs, and marginal benefits.

Scenario #_____

Problem summary: _____

Proposed solution: _____

Name: _____

Costs and benefits to businesses of the proposed solution (include opportunity costs, marginal costs, and marginal benefits):

Name: _____

Instructions: Write an essay comparing the effects of three governmental fiscal polices on one of the environmental problems discussed during class. (10 points per section, 30 points total)

- Identify and describe one of the four environmental problems presented in this lesson;
- Describe three fiscal policies (subsidies, taxes, and command and control) and the possible effects of each on the problem that you chose;
- Explain which governmental policy(ies) you think would be best to implement and why.

Name: _____

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