





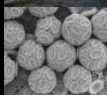



You are: The Organisms Directly Affected by Ocean Acidification

We figured that the animals need a voice too. You are that voice. With advanced new technology (isn't technology great) you will be able to attend and speak at the policy meeting along with the other stakeholders.

You can choose organisms as a whole, or focus on one group of organisms (for instance, you can be a group of corals).

Some background information on your group:

There are many different organisms that are directly affected by ocean acidification. These organisms are all calcifiers, algae or animals that use calcium carbonate to create their internal structure. As seawater becomes more acidic, carbonate becomes less available. This means that these calcifiers don't have the building blocks to create their shells or skeletons. Imagine what that would be for a snail if it couldn't make a thick shell. If the ocean becomes acidic enough, shells might even dissolve. Consider not only how these organisms might be affected by ocean acidification, but how other animals might be affected if any of those listed below were to disappear.

	Organism	Notes
	Coral	Coral reefs are important habitats for many different animals, some of which are commercially important (fish, shellfish, etc.).
	Bivalves	Bivalves are mollusks with two shells, such as oysters, clams, mussels, and scallops.
	Crustaceans	There are animals with jointed appendages and an exoskeleton, such as lobster, crab, shrimp, and krill.
	Marine snails	There are many different types of marine snails that vary in size and feeding strategies.
	Coccolithophores	These are microscopic single-celled algae (they photosynthesize!) with calcium carbonate in their scales; they can be found in such numbers that the turquoise color they turn the water can be seen from space.
	Foraminiferans	These microscopic single-celled protists are at the base of the food chain.
	Pteropods	Also at the base of the food chain, these small planktonic marine snails serve as food for herring and mackerel.
	Coralline algae	Found all over the oceans, this kind of red algae form habitats for small animals and are food for others.

You are: **Representatives of the Fishing Industry**

You are the fishermen (and/or fisherwomen, and their families) who make a living fishing from the sea. Your catch includes not only fish, but other marine animals typically eaten, such as oysters, clams, shrimp, lobster, squid, etc.

You can choose fishermen as a whole, or focus on one group (for instance, you can represent an urchin or a tuna fishery).

Some background information on your group:

- The United States is the 3rd largest seafood consumer.
- 1/5 of the world's population gets most of its protein from fish or shellfish.
- The fishing industry in Alaska alone provides jobs for over 650,000 people per year.
- Gross National Product (GNP) contribution from US fisheries in 2006: \$35 billion¹
- The nature and degree of the effects of ocean acidification are largely unknown; more studies need to be done on the effects of increasing acidity on marine life.
- Effects of ocean acidification are likely to be highly diverse, depending on the health of the ecosystems and fish species:
 - Some organisms have shown to increase growth with increased acidity, while others have shown decreased growth.
 - The effects may be different in an ecosystem that is healthy than in an ecosystem that is unhealthy. For example, an increase in acidity might be worse for a coral reef that is already facing bleaching than one that is doing well.
 - Early life stages of fish are likely to be vulnerable to change in acidity and in changes in their food supply (such as plankton that have calcium carbonate skeletons) and may reduce survival of these fish.
 - Growth might be affected by changes in food quality and quantity, reduced growth may affect fertility (for many marine organisms, the bigger you are, the more eggs you can produce), and reduced growth might affect how well you can escape predators.



Image from NOAA photo library

¹ http://www.scor-int.org/High_CO2_II/Presentations/Fossa.pdf

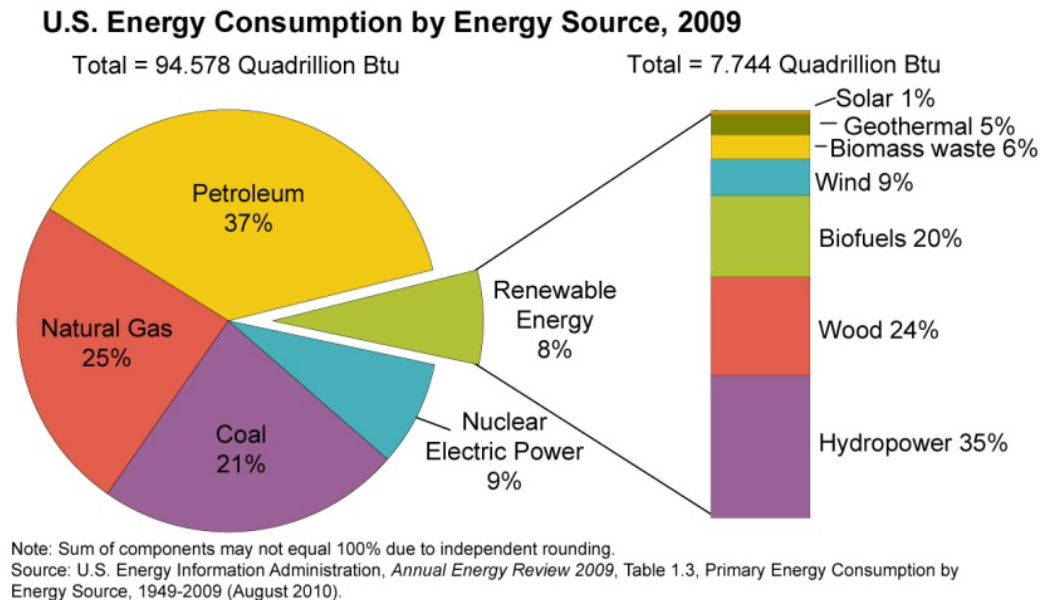
You are: **Representatives from Energy Companies**

You are the voice of the energy companies. This includes not only energy from nonrenewable resources (such as coal and oil), but from renewable resources (such as solar, wind, nuclear, etc.)

You can choose energy companies as a whole, or focus on one type of energy (for instance, you can represent a coal plant).

Some background information for your group:

- Fossil fuels (coal, oil, natural gas) currently provide more than 85% of all the energy consumed in the US – nearly 2/3 of our electricity, and virtually all of our transportation fuels are from fossil fuels. According to the US Department of Energy, US reliance on fossil fuels will increase over the next 2 decades even with aggressive development of new renewable and nuclear technologies.
- Coal is used to create almost half of all electricity generated in the US. These power plants burn coal to make steam. The steam turns turbines that generate electricity. CO₂ is one of the 5 main byproducts (SO₂, NO₂, particulates, CO₂, and mercury) created by burning coal.
- The Clean Air Act and the Clean Water Act require industries to reduce pollutants released into the air and water. The industry has found ways to reduce sulfur, nitrogen oxides, and other impurities, but is still working on reducing CO₂ emissions.
- Renewable energy has its pros and cons as well. While many forms of renewable energy do not produce CO₂ as a byproduct, there can be other environmental, political, and financial concerns.



You are: **Representatives from the Transportation Industry**

You are the voice of the transportation industry. This includes trucking, railroads, boating and shipping, recreational vehicles, public transportation, private transportation, etc.

You can choose transportation as a whole, or focus on one type (for instance, you can represent the trucking industry).

Some background information for your group:

- Fossil fuels (coal, oil, natural gas) currently provide more than 85% of all the energy consumed in the US – nearly 2/3 of our electricity, and virtually all of our transportation fuels. According to the US Department of Energy, US reliance on fossil fuels will increase over the next 2 decades even with aggressive development of new renewable and nuclear technologies.
- The burning of these fossil fuels in our cars, trucks, etc., through the transportation industry accounts for 15% of the total global green house gas emissions, according to a report by the International Transport Forum.
- However, transportation creates a lot of jobs, and transportation-related goods and services contribute \$1.38 trillion (9.5%) to the US Gross Domestic Product in 2008. According to the US Department of Labor, employment in transportation and material moving (jobs such as trucking where materials get moved from one place to another) occupations is projected to grow by 1.1 million between 2004 and 2014. 2/5 of new jobs will be for truck drivers and driver/sales workers.
- One way to reduce vehicle emissions from the trucking industry is to switch to alternative fuels. According to the Environmental Protection Agency, almost any gasoline or diesel-powered vehicle can be converted to run on natural gas. However, this can be expensive. There are some Federal and State tax deductions for Alternative Fuel Vehicles.
- Only 36% of transportation companies have put carbon and energy reduction plans in place, compared to 51% of Global 500 companies across all types of companies.



Image taken by Atwater Village Newbie
<http://www.flickr.com/photos/atwatervillage/842866223>

You are: **Representatives from the Recreation/Travel Industry**

You are the voice of the recreation/travel industry. This includes airlines, travel and tourism, recreation and leisure activities.

You can choose travel industries as a whole, or focus on one aspect (for instance, you can represent airlines or hotels).

Some background information for your group:

- According to the Travel & Tourism Competitiveness Report 2008, cost and convenience are still the key factors in travel decisions, but the environmental impact of travel is becoming an important third factor for companies and individuals.
- Delegates from the Second International Conference on Climate Change and Tourism in 2007 agreed that the industry must:
 - Reduce greenhouse gas emissions, and the effects of these emissions, derived especially from transport and accommodation activities
 - Adapt tourism businesses and destinations to changing climate conditions
 - Apply existing and new technology to improve energy efficiency
 - Secure financial resources to help poor regions and countries
 - Create ways to accurately measure the how much the industry contributes to greenhouse gas emissions.
- Aviation produces around 2% of the total world greenhouse gas emissions. In 2005, air travel accounted for 3% of carbon emissions in the US, and 6.3% in the United Kingdom.
- Though aircraft fuel efficiency is growing at a rate of about 1-2%/year, while actual air traffic is growing at around 5%/year.
- Currently, aircraft are often put on extended holding patterns around airports until it is clear for them to land. The International Air Transport Association predicts that carbon emissions from aircraft could be reduced by 12% with more efficient air traffic control.
- Hotels can be run with more eco-friendly policies.
- Coastal areas that rely on tourism might be affected by ocean acidification. For example, an island nation might have fewer tourists because the corals are dying due to ocean acidification.



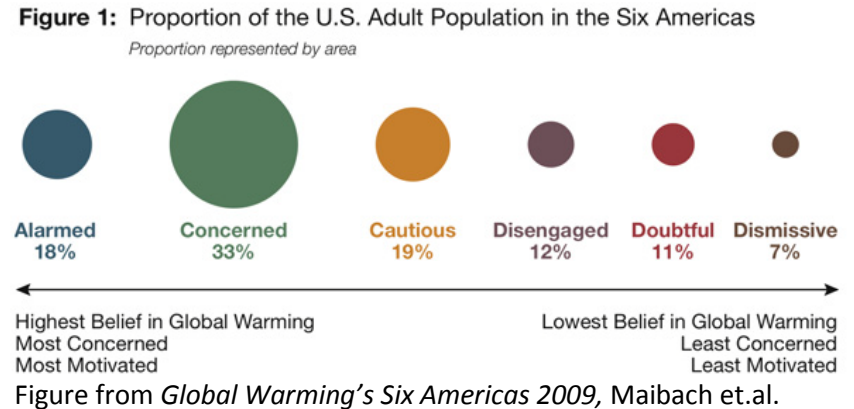
Photo from anujpradhan.com

You are: **Representatives from the Public**

You are the voice of the public. This includes people who live on the coast and people who don't, people who enjoy the ocean and people who don't, people who love the environment and people who don't have any interest in the environment, people all along the socioeconomic spectrum and along the political spectrum - essentially anyone and everyone.

Some background information for your group:

One way to look at the American public's response to increased CO₂ emissions is through the results of a study called "Global Warming's Six Americas 2009". Though this study dealt specifically with global climate change, we can use these ideas in our discussion of ocean acidification, because both ocean acidification and global climate change are the result of increased CO₂ emissions. Researchers found that they could describe the attitudes and actions of the public by grouping them into 6 categories, or 'Americas'.



- The Alarmed are fully convinced of the reality and seriousness of climate change and are already taking individual, consumer, and political action to address it.
- The Concerned are also convinced that global warming is happening and a serious problem, but have not yet engaged the issue personally.
- The Cautious, the Disengaged, and the Doubtful represent different stages of understanding and acceptance of the problem, and none are actively involved.
- The Dismissive are very sure that it is not happening and are actively involved as opponents of a national effort to reduce greenhouse gas emissions.

How do you think members of the public will engage in political activism, consumer activism, energy conservation, energy efficiency improvements in their households, and try to influence others in regards to these decisions?