

Fixing climate carries big costs

By Dan Vergano
USA TODAY

Global warming's demands on human ingenuity, and pocketbooks, will take center stage Friday in the latest international report on climate change.

Whether humans bury greenhouse gases, blunt them with new technology or buy them off with tax incentives, banishing the emissions responsible for global warming will take quick action, experts conclude in advance of the report.

The latest International Panel on Climate Change report, "Mitigation of Climate Change," examines fixes — or "mitigation" in climate lingo — to global warming, both technological and economic. The report will underline the environmental and financial benefits of quick action to cut emissions, says report co-author John Drexhage of Canada's International Institute for Sustainable Development.

But fixes also come with costs explored in the report. If governments, for example, impose fees on carbon dioxide emissions, it would raise the price of electricity for businesses and homeowners alike. For that reason, the USA and China, major users of coal, have objected to calls in the panel's draft report for quick action on just such a move, says Tony Kreindler of Environmental Defense, an environmental research and advocacy organization.

Problematic visions of the future

In the first of two reports earlier this year, the World Meteorological Organization-sponsored panel, which



features thousands of climate scientists reviewing studies, included a best estimate that average surface temperatures will rise roughly 3 to 7 degrees this century. In the second report, the panel concluded that environmental impacts of warming were already apparent in migrating species, earlier springtimes and sea-level rise. The summary warned of a future of increased droughts, floods and species extinctions.

"We have three choices: mitigation, adaptation or suffering," says Harvard's John Holdren, co-chair of the National Commission on Energy Policy. "And we are already starting to do a little of each one."

A summary of the third and latest report's scientific chapters will be released in Bangkok after review by political representatives of more than 100 nations, including the United States.

The key debate in Bangkok, Drexhage says, will center on a simple chart. The chart shows ways that fast economic moves worldwide, both in technology and in imposing taxes or fees on emissions, would limit global warming. The key goals are keeping this century's average surface temperature rise roughly below 3.6 degrees Fahrenheit, he adds. That's the point where many dangerous impacts, such as declining grain yields in Africa and the spread of tropical diseases toward the poles, almost certainly loom.

The report evaluates mitigation from a number of angles:

► Technologies ranging from better building design to nuclear power to carbon sequestration, which shunts

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greenhouse gases from smokestacks into underground rock formations.

- ▶ Future emission "scenarios," ranging from a "business as usual" world in which fossil fuel use continues unabated to ones with strict limits on greenhouse gases.
- ▶ Economic estimates from combinations of technologies, policies and scenarios.

A 'monumental' task

"The truth is we are facing a monumental challenge in climate change" tied to humanity's widespread reliance on fossil fuels for energy, says Vicki Arroyo of the Pew Center on Global Climate Change. Combined with cement production, which requires heating immense amounts of limestone in a process that releases carbon dioxide, that dependence adds more than 6 billion metric tons of carbon to the atmosphere annually. The next climate report, Arroyo says, "will make clear there are costs of not acting, and there are costs of acting, to deal with it."

Money, not science, becomes the point of debate over climate change with the release of the mitigation report, says report co-author Anthony Patt of Boston University.

On one side, Patt suggests, some will take the position outlined in February by Newsweek pundit Robert Samuelson that significantly changing emissions "would be costly, uncertain and no doubt unpopular." Others will agree with last year's Stern Review, an economic review of global warming's implications headed by the United Kingdom's chief economist, which argued that reducing carbon dioxide emissions would lower economic growth modestly this century, while inaction would trigger global recession by 2050 because of the environmental effects of runaway climate change.

"In my view, I think the report will make plain that a lot of avenues exist" for addressing climate change, Patt says.

No one technology or policy will address climate change by itself, Holdren says. The energy commission he co-chairs, for example, released an April report calling for charging businesses a steadily rising price per ton on carbon emissions, combined with government incentives and technology developments to lower emissions. "People are starting to notice climates changing, see it in their real lives," he adds. "It's too late to stop global warming. The real question is whether we can prevent catastrophic (man-made) interference with climate."

'Mitigation' glossary

- ▶ **Adaptation.** Spending money to live with the consequences of climate change. For example, building higher sea walls
- ▶ **Biofuels.** Energy sources, such as ethanol, made from farming byproducts or crops
- ▶ **Cap-and-trade.** A mandatory limit on carbon dioxide emissions that provides companies with incentives to reach that "cap" at the lowest possible cost.
- ▶ **Carbon sequestration.** Underground storage of smokestack carbon dioxide releases.
- ▶ **Carbon sink.** Anything that naturally reduces the concentration of carbon in the atmosphere, such as a growing forest, is a sink.
- ▶ **Carbon tax.** Charging businesses and individuals a price to emit carbon dioxide.
- ▶ **Fuel switching.** Moving from fuels that emit lots of carbon dioxide, such as coal, to ones using less, such as nuclear or natural gas.
- ▶ **Tragedy of the commons.** Individuals overexploiting a resource, such as the environment.
- ▶ **Wedge strategy.** Proposal to deploy any seven of 15 "wedges," existing technology fixes such as increased biofuel use or solar panels, which would bring greenhouse-gas emissions under control by 2050.

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Objectives

Students will:

- ▶ Read the article “Fixing climate carries big cost.”
- ▶ Analyze the article through questions and discussion.
- ▶ Develop a implementation plan to lower carbon emissions on a national level.
- ▶ As a class, identify three ways students and their families can help lower carbon emissions.

Preparation

Each student will need:

- ▶ A copy of the article and activity for “Fixing climate carries big cost.”

20 minutes – Read and discuss it

After reading the article, answer the following discussion questions.

- ▶ The author says creativity, funding and technology are all needed in order to reduce global warming. What are some general solutions he lists in the article?
- ▶ The story refers to a report called “Mitigation of Climate Change” which says swift action can result in financial and ecological benefits. What are some of those benefits?
- ▶ According to a report by the World Meteorological Organization, what might happen if quick action is not taken? What is happening already due to global warming?
- ▶ Do most people agree or disagree that global warming is a problem? Why do you think that? What, if anything, are the roadblocks for implementing solutions?
- ▶ After reading the article, do you think global warming is a problem now? Why or why not? Will it be a problem for you in your lifetime? Why or why not?

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30 minutes – Analyze it: Global Warming Congress

Break into groups of three. Assign each group member one of the following roles: Albert Einstein (scientist), President of the United States (leader) or Thomas Edison (inventor).

Your task at this global warming gathering is to look at the options currently available (see chart below) to lower carbon emissions and use the graphic organizer on the next page to create a specific plan to decrease global warming. Cost is no object and sometimes the best solutions are the most creative. Keep in mind you have three powerful people gathered with a variety of great skills—use them! Chart your solutions below. Be prepared to share your solutions with the class.

Sector	Key mitigation technologies and practices currently commercially available
Energy supply [4.3, 4.4]	Improved supply and distribution efficiency; fuel switching from coal to gas; nuclear power; renewable heat and power (hydropower, solar, wind, geothermal and bioenergy); combined heat and power; early applications of Carbon Capture and Storage (CCS, e.g. storage of removed CO ₂ from natural gas).
Transport [5.4]	More fuel efficient vehicles; hybrid vehicles; cleaner diesel vehicles; biofuels; modal shifts from road transport to rail and public transport systems; non-motorised transport (cycling, walking); land-use and transport planning.
Buildings [6.5]	Efficient lighting and daylighting; more efficient electrical appliances and heating and cooling devices; improved cook stoves, improved insulation ; passive and active solar design for heating and cooling; alternative refrigeration fluids, recovery and recycle of fluorinated gases.
Industry [7.5]	More efficient end-use electrical equipment; heat and power recovery; material recycling and substitution; control of non-CO ₂ gas emissions; and a wide array of process-specific technologies.
Agriculture [8.4]	Improved crop and grazing land management to increase soil carbon storage; restoration of cultivated peaty soils and degraded lands; improved rice cultivation techniques and livestock and manure management to reduce CH ₄ emissions; improved nitrogen fertilizer application techniques to reduce N ₂ O emissions; dedicated energy crops to replace fossil fuel use; improved energy efficiency.
Forestry/forests [9.4]	Afforestation; reforestation; forest management; reduced deforestation; harvested wood product management; use of forestry products for bioenergy to replace fossil fuel use.
Waste management [10.4]	Landfill methane recovery; waste incineration with energy recovery; composting of organic waste; controlled waste water treatment; recycling and waste minimization.

Source: Intergovernmental Panel on Climate Change

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In the graphic organizer below, list the various aspects of your solution in the first column. Then, in the column of the person who would be responsible for implementing the solution, indicate what he/she must do. For instance, if you mandate all people who live within one mile of their jobs must walk to work to reduce global warming, you would need to have the President create a policy to implement that mandate.

Solution aspects	Scientist	President	Inventor
Ex. People who live within one mile of their jobs must walk to work.		Create policy, get it passed	

20 minutes – Apply it

As a class, consider what this new information may mean to you.

- ▶ Each group should share their solution for lowering carbon emissions.
- ▶ Could any of the solutions be implemented on a local level immediately? If so, which ones? How could they be implemented locally?
- ▶ With information from the article, the activity, and your own knowledge, what are at least three ways students can help lower carbon emissions?