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Americans Cool on Geoengineering Approaches to Addressing Climate Change

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Given the political and economic challenge of reducing greenhouse gas emissions, there is growing interest in finding alternative methods of dealing with climate change. Among the options beyond mitigation through emissions reduction are increased efforts to adapt to a warmer planet and the exploration of methods to reduce global temperatures through engineering techniques. The latest version of the National Survey of American Public Opinion on Climate Change (NSAPOCC) examines the attitudes of Americans regarding adaptive and geoengineering approaches to climate change. The results indicate high levels of doubt among U.S. residents about the ability of society to adapt to a hotter climate and deep concerns about the safety and effectiveness of geoengineering options.

Adaptation

With expanding concern that climate change is already impacting environments around the planet there has been increasing discussion and planning for methods of climate adaptation. From measures to fortify coastal areas from rising sea levels to research on agricultural practices during prolonged droughts, climate adaptation efforts are intensifying on an international level. Given the limited success in efforts to mitigate increasing temperatures, some have suggested that governments would be better served if they concentrated on finding ways to adapt to a warmer planet rather than trying to stop warming from happening. This could involve a wide range of initiatives such as adjusting to higher temperatures or rising sea levels. The results of the NSAPOCC, which was fielded in December of 2011, indicate that the American public largely rejects the notion that governments should stop mitigation efforts and turn to adaptation measures. Two out of every three Americans said that they do not agree that we should shift attention away from trying to stop global warming and instead focus on adaptation.

Solar Radiation Management (SRM)
This geoengineering approach focuses on decreasing the net amount of short-wave solar radiation received by the planet through the deflection of sunlight or through increasing reflectivity of the atmosphere. Among the most prominent forms of SRM are surface-based efforts that rely on the use of materials such as mirrors, paints and paving materials to increase reflectivity. Atmospheric based forms of SRM include modification of clouds to increase reflectivity and the injection of particles into the upper atmosphere to reflect a small percentage of incoming solar radiation.

TABLE ONE

Levels of Agreement with the Statement:

"Instead of trying to stop global warming from occurring we should focus on adapting to a warmer climate."

	Percent Responding
Strongly Agree	6%
Somewhat Agree	23%
Somewhat Disagree	30%
Strongly Disagree	36%
Not Sure	5%

Most Americans also reject the notion that adaptation to global warming will be relatively easy for humanity to achieve. Only 3 out of 10 U.S. residents believe that humans will be able to adapt to a hotter climate without making significant changes to their lifestyles. There is intense opposition to the notion that adapting to a warmer planet will not require major changes in lifestyle, with nearly two thirds of Americans disagreeing with such a claim (see Table Two).

TABLE TWO

Levels of Agreement with the statement:

"Humans will be able to adapt to a hotter climate without making significant changes to their lifestyles."

	Percent Responding
Strongly Agree	6%
Somewhat Agree	24%
Somewhat Disagree	25%
Strongly Disagree	40%
Not Sure	4%

Geoengineering

Geoengineering options are increasingly being examined as a way to address global warming. Options such as solar radiation management and carbon dioxide removal from the atmosphere would involve deliberate changes to the Earth's environment in the hope of minimizing future temperature increases. Geoengineering efforts have thus far been largely limited to experimental or pilot projects with no wide-scale implementation. Supporters of increased geoengineering efforts, such as the Institution of Mechanical Engineers, argue that the failure of climate mitigation policies requires alternative means that include both adaptive measures and geoengineering options. Critics of geoengineering approaches regularly cite factors such as the uncertainty of the impact of

Carbon Dioxide Removal (CDR)
This approach seeks to reduce global temperatures through methods that remove carbon dioxide from the atmosphere. Among the techniques that fall into this category are ocean nourishment methods such as iron fertilization that seek to increase the ability of oceans to sequester carbon dioxide from the atmosphere during the process of photosynthesis. Another form of CDR is through the expansion of biochar. Biochar is the use of charcoal as a soil amendment that increases the ability of soil to capture and hold carbon dioxide.

these approaches, possible risks of unintended consequences, and moral hazards as the leading reasons for opposition to these alternatives. The results of the NSAPOCC provide evidence that Americans generally maintain skepticism and concern in regard to the use of geoengineering as a method of confronting climate change.

A solid majority of Americans do not believe that scientists will be able to find ways to alter the climate to limit problems caused by global warming. Only about 3 out of 10 Americans agreed that if global warming does take place they have confidence that scientists would be able to find ways to alter the climate in a way that limits problems (see Table Three). Conversely, 6 out of 10 Americans disagree with the contention that scientists can find ways to alter the climate to limit problems caused by global warming, with over half of this group strongly disagreeing with this point.

TABLE THREE

Level of Agreement with the Statement:

"If global warming does take place I have confidence that scientists would be able to find ways to alter the climate in a way that limits problems."

	Percent Responding
Strongly Agree	5%
Somewhat Agree	26%
Somewhat Disagree	25%
Strongly Disagree	35%
Not Sure	10%

Confidence in geoengineering options improves slightly when framed as a means for humans to correct problems they have caused. When asked to report their level of agreement with the statement that "if human activity leads to global warming then humans will also be able to find ways to reduce temperatures on the planet through atmospheric engineering methods," 38% of Americans agreed with the claim while 45% disagreed (see Table Four). Given the substantive similarities between this statement and the one cited in Table Three it is notable that there are significant differences in public reactions to the claims. The differences may be attributable to the framing of the methods to address global warming with "actions by scientists" versus "atmospheric engineering" drawing varied levels of confidence from respondents.

TABLE FOUR

Level of Agreement with Statement:

"If human activity leads to global warming then humans will also be able to find ways to reduce temperatures on the planet through atmospheric engineering methods."

	Percent Responding
Strongly Agree	9%
Somewhat Agree	29%
Somewhat Disagree	18%
Strongly Disagree	27%
Not Sure	17%

While generally skeptical about the ability of humans to counteract temperature increases on the planet, Americans are in fairly high levels of agreement that efforts to reduce global warming through the addition of materials to the atmosphere will lead to more harm than good for the environment. Just under 7 out of 10 Americans agreed that "attempts to reduce global warming by adding materials to the atmosphere will cause more harm than good for the environment," with only 17% disagreeing with this statement (see Table Five).

TABLE FIVE

Level of Agreement with Statement:

"Attempts to reduce global warming by adding materials to the atmosphere will cause more harm than good for the environment."

	Percent Responding
Strongly Agree	41%
Somewhat Agree	28%
Somewhat Disagree	11%
Strongly Disagree	6%
Not Sure	14%

Looking more closely at public perceptions of geoengineering there are notable differences among those who believe climate change is occurring and those who do not. The survey results indicate that Americans who do not believe global warming is occurring are significantly more negative about geoengineering than their counterparts who believe global warming is happening.While 38% of those who think global warming is happening have confidence that scientists can find ways to alter the climate if global warming occurs, only 16% of those who do not think global warming is occurring maintain the same position (see Table Six).

TABLE SIX

Level of Agreement with the Statement:

"If global warming does take place I have confidence that scientists would be able to find ways to alter the climate in a way that limits problems."

by Views on the Existence of Global Warming

Position on Existence of Global Warming	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Not Sure
Is Occurring	7%	31%	24%	30%	8%
Is Not Occurring	3%	13%	27%	49%	8%

Those who believe global warming is occurring are also more likely than non-believers to maintain the view that humanity can use geoengineering methods to reduce anthropogenic induced global warming. In fact twice as many global warming believers (46%) as non-believers (23%) indicate confidence in geoengineering as a means to address climate change (see Table Seven).

TABLE SEVEN

Level of Agreement with Statement:

"If human activity leads to global warming then humans will also be able to find ways to reduce temperatures on the planet through atmospheric engineering methods"

by Views on the Existence of Global Warming

Position on Existence of Global Warming	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Not Sure
Believe Global Warming is Occurring	10%	36%	19%	22%	13%
Do Not Believe Global Warming is Occurring	9%	14%	22%	41%	15%

When it comes to views on the effects of adding materials to the atmosphere as a means of controlling global warming, both those who believe in global warming and those who do not are generally negative towards the option. However, Americans who do not believe in global warming are nearly twice as likely as their believing counterparts to strongly agree that more harm than good will come from atmospheric geoengineering efforts (see Table Eight).

TABLE EIGHT

Agreement with Statement:

"Attempts to reduce global warming by adding materials to the atmosphere will cause more harm than good for the environment."

by Views on the Existence of Global Warming

Position on Existence of Global Warming	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Not Sure
Is Occurring	34%	28%	16%	7%	16%
Is Not Occurring	66%	22%	3%	3%	6%

CONCLUSION

With progress on measures to mitigate global warming limited on both the domestic and international fronts, increased attention has been given to adaptation and geoengineering approaches. The latest version of the NSAPOCC provides evidence that Americans do not believe that adaptation measures should be used as a substitute for mitigation efforts and that adapting to a hotter planet will require significant lifestyle changes. Americans also maintain broad and deep concerns regarding geoengineering options for combating climate change. In the spring version of the NSAPOCC that will be released shortly, the current standing of public support for a variety of mitigation policies will be examined.

METHODOLOGY

The following key findings report summarizes data collected in atelephone survey of residents of the United States between December 4 and 21,2011. Individual households and cell phones throughout the United States wereselected randomly for inclusion in the study. The sample of phone numbers usedin the survey was generated by Genesys Sampling Systems of Ft. Washington,PA. Interviewing was conducted bythe staff of the Muhlenberg College Institute of Public Opinion, with 887 surveyscompleted. Of the 887 surveys 639were completed on land lines and 248 were completed on cell phones. The totalnumber of completions results in a margin of error of +/- 3.5% at the 95%confidence interval. However the margin of errors for sub groups (i.e. women,income groups, age categories) is larger due to smaller sample size. Percentages throughout the survey havebeen rounded upward at the .5 mark, thus many totals in the results will notequal 100%. The American Association of Public Opinion Research (AAPOR)cooperation rate (COOP3) for the survey was 26% and the AAPOR response rate(RR3) was 18% for the survey The data has been weighted by the followingcategories: age, gender, educationalattainment, race and region. The instrument was designed by Christopher Borickof Muhlenberg College and Barry Rabe of the University of Michigan inconsultation with Erick LaChapelle of the University of Montreal.

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