

Public Opinion on Global Warming in the States

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Introduction

During more than a decade, numerous surveys have measured Americans' opinions about various issues related to global warming. Many of these surveys have involved interviewing truly random samples of the American adult population and have been designed to yield estimates of the distributions of opinions in the country as a whole. However, to be of most use to legislators interested in the opinions of residents of their states, measures of public opinion in each state are needed.

Fortunately, a collection of surveys have asked the same questions and can be combined to yield sufficient numbers of respondents, selected randomly, within almost all states in the country. This collection of surveys, conducted by Stanford University researchers in collaboration with partners or by other organizations, includes a mixture of national surveys and surveys of the residents of some individual states. In this paper, we report the results obtained from an analysis of this concatenation of data and explore variation in opinions across states.

Data

The surveys of nationally representative samples of American adults that we analyzed are listed by year of data collection in Table 1. Sponsors included Ohio State University, Stanford University, ABC News, Time Magazine, The Washington Post, New Scientist Magazine, Planet Green, and the Associated Press. Data were collected by Abt SRBI, GfK Custom Research (formerly known as Knowledge Networks), Ipsos, TNS, the American Life Panel, and the Ohio State University Center for Survey Research.

In most of these surveys almost all of the questions were about global warming. The remaining surveys were so-called "omnibus surveys" that included questions on many different

topics, only a few of which were about global warming. Most surveys involved random digit dial telephone interviewing, and a few involved data collected from random digit-dial recruited samples of adults who answered questions via the Internet. Some surveys were conducted during the summer (which we labeled as during hot temperatures), others were conducted during the winter (which we labeled as during cold temperatures), and others were conducted in the fall or spring (which we labeled as during moderate temperatures).

Data from a total of 22,046 respondents were analyzed.

Alaska, Hawaii, North Dakota, Wyoming, and the District of Columbia were omitted from the analyses reported here because insufficient numbers of interviews were conducted in those states. With regard to other states, results are not reported when fewer than 50 people answered a question in a state.

Methodologies of the surveys are described on the [PPRG Global Warming website](#).

Measures

The following 22 constructs were measured in a sufficient number of surveys to be used in the analyses reported here (years in which the construct was measured are listed in parentheses):

Fundamentals:

- 1) Global warming been happening (1997, 2006-2013)
- 2) Warming will continue in the future (2010-2012)
- 3) Past warming has been caused by humans (1997, 2006-2012)
- 4) Warming will be a serious problem for the U.S. (1997, 2006-2010, 2012)
- 5) Warming will be a serious problem for the world (2006, 2009-2010, 2012)
- 6) 5 degrees of warming in 75 years will be bad (2007-2010, 2012)

Policies

- 7) The government should limit greenhouse gas emissions (2009-2010, 2012)
- 8) The government should do more to address global warming (1997, 2006-2010, 2012)
- 9) The U.S. should take action regardless what other countries do (2008, 2010, 2012)
- 10) Government should reduce greenhouse gases by power plants (2006, 2007, 2009-2012)
- 11) Favor a national cap and trade program (2008-2010, 2012)
- 12) Tax breaks to produce renewable energy (2006, 2009-2012)
- 13) Tax breaks to reduce air pollution from coal (2009-2012)
- 14) Increase fuel efficiency of cars (2006, 2007, 2009-2012)
- 15) Build electric vehicles (2009-2012)
- 16) Build appliances that use less electricity (2006, 2007, 2009-2012)
- 17) Build more energy-efficient buildings (2006, 2007, 2009-2012)
- 18) Increase consumption taxes on electricity (2006, 2007, 2009-2012)
- 19) Increase consumption taxes on gasoline (2006, 2007, 2009-2012)
- 20) Tax breaks to build nuclear power plants (2006, 2009-2012)

Engagement

- 21) Warming is extremely important personally (1997, 2006-2012)
- 22) Highly knowledgeable about global warming (1997, 2006-2010, 2012)

Question wordings and coding of responses are described in the Appendix.

Analysis

Estimating state-level opinion distributions. To generate an estimate of the percent of people in each state holding each opinion in 2012/2013, a statistical modeling procedure was

implemented using the survey data. The conceptualization underlying the analysis is captured in this equation:

$$y_i = \alpha + \sum_{j=199, 2006-2012} \beta_j year_j + \sum_{\substack{k=50 \text{ states} \\ - \text{California,} \\ + \text{District of Columbia}}} \gamma_k state_k + \delta_1 mode + \delta_2 topic$$

where i indicates respondents, y is an opinion about global warming coded 1 or 0, $year$ is a set of dummy variables identifying the year when the respondent was interviewed (2013 is the omitted year for the “global warming has been happening” measure and 2012 for other), $state$ is a set of dummy variables indicating the state in which the respondent lived (California is the omitted category), $mode$ is a dummy variable indicating whether the respondent provided data via the telephone or the Internet, and $topic$ is a dummy variable differentiating surveys where almost all the question were about global warming vs. omnibus surveys in which just one or a few questions were about global warming. α is the intercept, and the β 's, γ 's, and δ 's are parameters to be estimated. The parameters of the equation were estimated for each measure of global warming opinions using logistic regression.

This procedure modeled differences between states, effects of survey mode and topic of the survey, and trends in opinions over years. Using the parameter estimates, predicted distributions of opinions in 2012/2013 (the measure “global warming has been happening” was asked in our 2013 survey while the rest of the measures were asked in our 2012 surveys) were generated, setting the interviewing mode as telephone, and the topic as a full-length interview about global warming. Specifically, for each global warming measure m , for each state, s , we generated a predicted probability estimate for each respondent in our combined sample by pretending the respondent was residing in state s and was interviewed in 2013/2012 asked of the survey question for the global warming measure, m (2013 for the measure “global warming has

been happening” and 2012 for other measures) on a telephone interview in a full-length survey about global warming; we aggregated the predicted probability estimate of measure m across all respondents adjusting for sampling weights and the result was the percentage of people from state s in 2013/2012 (2013 for the measure “global warming has been happening” and 2012 for other measures) who held the measure, m . We repeated the process for all the states for measure m , and we repeated the process for all global warming measures.

Table 1: Survey Characteristics

<u>Number</u>	<u>Year</u>	<u>Season</u>	<u>Mode</u>	<u>Topic</u>	<u>Firm</u>	<u>Sponsor 1</u>	<u>Sponsor 2</u>	<u>Sponsor 3</u>	<u>Reach</u>	<u>State</u>	<u>Respondents</u>
1	1997	moderate	RDD	full length	OSU	OSU			national		688
2	1998	cold	RDD	full length	OSU	OSU			national		725
3	2006	moderate	RDD	full length	TNS	Stanford	ABC News	Time	national		1,002
4	2007	moderate	RDD	full length	TNS	Stanford	ABC News	Washington Post	national		1,002
5	2007	moderate	Internet	full length	GfK	Stanford	New Scientist		national		1,491
6	2008	hot	RDD	full length	TNS	Stanford	ABC News	Planet Green	national		1,000
7	2009	moderate	RDD	omnibus	TNS	ABC News			national		1,001
8	2009	moderate	RDD	full length	GfK	Stanford	AP		national		1,005
9	2010	hot	RDD	full length	GfK	Stanford			national		1,000
10	2010	hot	RDD	full length	Abt SRBI	Stanford			state	Mass.	600
11	2010	hot	RDD	full length	Abt SRBI	Stanford			state	Maine	600
12	2010	hot	RDD	full length	Abt SRBI	Stanford			state	Florida	600
13	2010	hot	RDD	omnibus	GfK	Stanford			national		1,004
14	2010	moderate	RDD	full length	Abt SRBI	Stanford			national		1,001
15	2011	moderate	RDD	omnibus	Ipsos	Stanford	Reuters		national		1,075
16	2011	moderate	RDD	omnibus	Ipsos	Stanford	Reuters		national		1,055
17	2012	cold	RDD	omnibus	Ipsos	Stanford	Reuters		national		1,033
18	2012	moderate	RDD	omnibus	Ipsos	Stanford	Reuters		national		1,084
19	2012	hot	RDD	full length	Abt SRBI	Stanford	Washington Post		national		804
20	2012	moderate	RDD	omnibus	GfK	AP			national		1,002
21	2012	moderate	Internet	full length	GfK	Stanford			national		1,080
22	2012	moderate	Internet	full length	ALP	Stanford			national		1,020
23	2013	moderate	Internet	full length	GfK	Stanford			national		1,174

Appendix: Survey Question Wording and Coding of Public Opinion Measures

FUNDAMENTALS

Global warming been happening

2012-2013: What is your personal opinion? Do you think that the world's temperature probably has been going up over the past 100 years, or do you think this probably has not been happening?

2012: What is your personal opinion? Do you think that the world's temperature probably has been going up slowly over the past 100 years, or do you think this probably has not been

happening? **2012:** What is your personal opinion? Do you think that the world's temperature probably has been going up over the past 100 years, or do you think this probably has not been

happening? **1997-2011:** You may have heard about the idea that the world's temperature may have been going up slowly over the past 100 years. What is your personal opinion on this - do you think this has probably been happening, or do you think it probably has not been happening?

Coding: 1 = "has probably been happening", 0 = otherwise.

Warming will continue in the future

2012: If nothing is done to prevent it, do you think the world's temperature probably will go up slowly over the next 100 years, or do you think the world's temperature probably will not go up

slowly over the next 100 years? **2012:** If nothing is done to prevent it, do you think the world's temperature probably will go up over the next 100 years, or do you think the world's temperature

probably will not go up over the next 100 years? **2010-2011:** If nothing is done to prevent it, do you think the world's temperature probably will go up slowly over the next 100 years, or do you

think the world's temperature probably will not go up slowly over the next 100 years?

Coding: 1 = "will probably go up", 0 = otherwise.

Past warming has been caused by humans

2012: Do you think a rise in the world's temperature is being caused mostly by things people do, mostly by natural causes, or about equally by things people do and by natural causes? **2012:** Do you think that the increase in the world's temperature over the past 100 years was caused mostly by things people did, mostly by natural causes, or about equally by things people did and by natural causes? **2012:** Assuming it's happening, do you think a rise in the world's temperature would be caused mostly by things people do, mostly by natural causes, or about equally by things people do and by natural causes? **2012:** If the world's temperature did increase over the past 100 years, do you think this increase was caused mostly by things people did, mostly by natural causes, or about equally by things people did and by natural causes? **1997-2011:** Do you think a rise in the world's temperature is being caused mostly by things people do, mostly by natural causes, or about equally by things people do and by natural causes? **1997-2011:** Assuming it's happening, do you think a rise in the world's temperature would be caused mostly by things people do, mostly by natural causes, or about equally by things people do and by natural causes?

Coding: 1 = "caused mostly by things people do" or "about equally by things people do and by natural causes", 0 = otherwise.

Warming will be a serious problem for the U.S.

2012: If nothing is done to reduce global warming in the future, how serious of a problem do you think it will be for THE UNITED STATES – very serious, somewhat serious, not so serious, or not serious at all? **2012:** Assuming it's happening, if nothing is done to reduce global warming in the future, how serious of a problem do you think it would be for THE UNITED STATES – very serious, somewhat serious, not so serious, or not serious at all? **1997-2011:** If nothing is done to reduce global warming in the future, how serious of a problem do you think it will be for THE UNITED STATES – very serious, somewhat serious, not so serious, or not serious at all? **1997-2011:** Assuming it's happening, if nothing is done to reduce global warming in the future, how serious of a problem do you think it would be for THE UNITED STATES – very serious, somewhat serious, not so serious, or not serious at all?

Coding: 1 = “very serious” or “somewhat serious”, 0 = otherwise.

Warming will be a serious problem for the world

2012: If nothing is done to reduce global warming in the future, how serious of a problem do you think it will be for THE WORLD – very serious, somewhat serious, not so serious, or not serious at all? **2012:** Assuming it's happening, if nothing is done to reduce global warming in the future, how serious of a problem do you think it would be for THE WORLD – very serious, somewhat serious, not so serious, or not serious at all? **1997-2011:** If nothing is done to reduce global warming in the future, how serious of a problem do you think it will be for THE WORLD – very serious, somewhat serious, not so serious, or not serious at all? **1997-2011:** Assuming it's happening, if nothing is done to reduce global warming in the future, how serious of a problem

do you think it would be for THE WORLD – very serious, somewhat serious, not so serious, or not serious at all?

Coding: 1 = “very serious” or “somewhat serious”, 0 = otherwise.

5 degrees of warming in 75 years will be bad

2011-2012: If the world’s average temperature is about five degrees Fahrenheit higher 75 years from now than it is now, overall, would you say that would be good, bad, or neither good nor bad? **1997-2010:** Scientists use the term “global warming” to refer to the idea that the world’s average temperature may be about five degrees Fahrenheit higher in 75 years than it is now.

Overall, would you say that if the world’s average temperature is five degrees Fahrenheit higher in 75 years than it is now, would that be good, bad, or neither good nor bad?

Coding: 1 = “bad”, 0 = otherwise.

ENGAGEMENT

Warming is extremely important personally (and is likely to influence voting)

How important is the issue of global warming to you personally – extremely important, very important, somewhat important, not too important, or not at all important?

Coding: 1 = “Extremely important”, 0 = otherwise.

Highly knowledgeable about global warming

How much do you feel you know about global warming - a lot, a moderate amount, a little, or nothing?

Coding: 1 = “A lot” or “A moderate amount”, 0 = otherwise.

POLICIES

The government should limit greenhouse gas emissions

2012: As you may have heard, greenhouse gases are thought to cause global warming. In your opinion do you think the government should or should not limit the amount of greenhouse gasses that U.S. businesses put out? **2008-2011:** Some people believe that the United States government should limit the amount of air pollution that U.S. businesses can produce. Other people believe that the government should not limit air pollution from U.S. businesses. What about you? Do you think the government should or should not limit air pollution from U.S. businesses?

Coding: 1 = “should limit”, 0 = otherwise.

The government should do more to address global warming

2009-2012: How much do you think the U.S. government should do about global warming? A great deal, quite a bit, some, a little, or nothing? **2009-2012:** How much do you think the U.S. government is doing now to deal with global warming? A great deal, quite a bit, some, a little, or nothing? **2008:** Do you think the federal government should do more than it’s doing now to try to deal with global warming, should do less than it’s doing now, or is it doing about the right amount?

Coding: 1 = “should do” is greater than “is doing” in 2009-2012 and “should do more” in 2008, 0 = otherwise.

The U.S. should take action regardless what other countries do

Do you think the United States should take action on global warming only if other major industrial countries such as China and India agree to do equally effective things, that the United States should take action even if these other countries do less, or that the United States should not take action on this at all?

Coding: 1 = “the United States should take action even if these other countries do less”, 0 = otherwise.

Government should reduce greenhouse gases by power plants

2012: For the next items, please tell me for each one whether it’s something the government should require by law, encourage with tax breaks but not require, or stay out of entirely. Each of these changes would increase the amount of money that you pay for things you buy. Lowering the amount of greenhouse gases that power plants are allowed to release into the air? **1997-2011:**

For the next items, please tell me for each one whether it’s something the government should require by law, encourage with tax breaks but not require, or stay out of entirely. Lowering the amount of greenhouse gases that power plants are allowed to release into the air?

Coding: 1 = “should require by law” or “encourage with tax breaks but not require”, 0 = otherwise.

Favor a national cap and trade program

There’s a proposed system called “cap and trade.” The government would issue permits limiting the amount of greenhouse gases companies can put out. Companies that did not use all their permits could sell them to other companies. Companies that need more permits can buy them, or these companies can pay money to reduce the amount of greenhouse gases that other people or

organizations put out. This will cause companies to figure out the cheapest way to reduce greenhouse gas emissions. This type of permit system has worked successfully in the past to reduce the air pollution that companies put out. For example, in 1990, the federal government passed a law like this, called the Clean Air Act, which caused companies to put out a lot less of the air pollution that causes acid rain. Would you favor or oppose a cap and trade system to reduce the amount of greenhouse gases that companies put out?

Coding: 1 = “favor”, 0 = otherwise.

Tax breaks to produce renewable energy

2012: For each of the following, please tell me whether you favor or oppose it as a way for the federal government to try to reduce future global warming. Each of these changes would increase the amount of money that you pay for things you buy. Do you favor or oppose the federal government giving companies tax breaks to produce more electricity from water, wind, and solar power? **1997-2011:** For the next items, please tell me whether you favor or oppose it as a way for the federal government to try to reduce future global warming. Do you favor or oppose the federal government giving companies tax breaks to produce more electricity from water, wind, and solar power?

Coding: 1 = “favor”, 0 = otherwise.

Tax breaks to reduce air pollution from coal

2012: For each of the following, please tell me whether you favor or oppose it as a way for the federal government to try to reduce future global warming. Each of these changes would increase the amount of money that you pay for things you buy. Do you favor or oppose the federal

government giving tax breaks to companies that burn coal to make electricity if they use new methods to reduce the air pollution being released from their smokestacks? **1997-2011:** For the next items, please tell me whether you favor or oppose it as a way for the federal government to try to reduce future global warming. Do you favor or oppose the federal government giving tax breaks to companies that burn coal to make electricity if they use new methods to put the air pollution they generate into underground storage areas instead of letting that air pollution go up the smokestacks at their factories?

Coding: 1 = “favor”, 0 = otherwise.

Increase Fuel efficiency of cars

2012: For the next items, please tell me for each one whether it’s something the government should require by law, encourage with tax breaks but not require, or stay out of entirely. Each of these changes would increase the amount of money that you pay for things you buy. Building cars that use less gasoline? **1997-2011:** For the next items, please tell me for each one whether it’s something the government should require by law, encourage with tax breaks but not require, or stay out of entirely. Building cars that use less gasoline?

Coding: 1 = “should require by law” or “encourage with tax breaks but not require”, 0 = otherwise.

Build electric vehicles

2012: For the next items, please tell me for each one whether it’s something the government should require by law, encourage with tax breaks but not require, or stay out of entirely. Each of these changes would increase the amount of money that you pay for things you buy. Building

cars that run completely on electricity? **1997-2011:** For the next items, please tell me for each one whether it's something the government should require by law, encourage with tax breaks but not require, or stay out of entirely. Building cars that run completely on electricity?

Coding: 1 = "should require by law" or "encourage with tax breaks but not require", 0 = otherwise.

Build appliances that use less electricity

2012: For the next items, please tell me for each one whether it's something the government should require by law, encourage with tax breaks but not require, or stay out of entirely. Each of these changes would increase the amount of money that you pay for things you buy. Building air conditioners, refrigerators, and other appliances that use less electricity? **1997-2011:** For the next items, please tell me for each one whether it's something the government should require by law, encourage with tax breaks but not require, or stay out of entirely. Building air conditioners, refrigerators, and other appliances that use less electricity?

Coding: 1 = "should require by law" or "encourage with tax breaks but not require", 0 = otherwise.

Build more energy-efficient buildings

2012: For the next items, please tell me for each one whether it's something the government should require by law, encourage with tax breaks but not require, or stay out of entirely. Each of these changes would increase the amount of money that you pay for things you buy. Building new homes and offices that use less energy for heating and cooling? **1997-2011:** For the next items, please tell me for each one whether it's something the government should require by law,

encourage with tax breaks but not require, or stay out of entirely. Building new homes and offices that use less energy for heating and cooling?

Coding: 1 = “should require by law” or “encourage with tax breaks but not require”, 0 = otherwise.

Increase consumption taxes on electricity

2012: For each of the following, please tell me whether you favor or oppose it as a way for the federal government to try to reduce future global warming. Each of these changes would increase the amount of money that you pay for things you buy. Do you favor or oppose the federal government increasing taxes on electricity so people use less of it? **1997-2011:** For the next items, future global warming. Do you favor or oppose the federal government increasing taxes on electricity so people use less of it?

Coding: 1 = “favor”, 0 = otherwise.

Increase consumption taxes on gasoline

2012: For each of the following, please tell me whether you favor or oppose it as a way for the federal government to try to reduce future global warming. Each of these changes would increase the amount of money that you pay for things you buy. Do you favor or oppose the federal government increasing taxes on gasoline so people either drive less, or buy cars that use less gas?

1997-2011: For the next items, please tell me for each one whether it’s something the government should require by law, encourage with tax breaks but not require, or stay out of entirely. Do you favor or oppose the federal government increasing taxes on gasoline so people either drive less, or buy cars that use less gas?

Coding: 1 = “favor”, 0 = otherwise.

Tax breaks to build nuclear power plants

2012: For each of the following, please tell me whether you favor or oppose it as a way for the federal government to try to reduce future global warming. Each of these changes would increase the amount of money that you pay for things you buy. Do you favor or oppose the federal government giving companies tax breaks to build nuclear power plants? **1997-2011:** For the next items, please tell me whether you favor or oppose it as a way for the federal government to try to reduce future global warming. Do you favor or oppose the federal government giving companies tax breaks to build nuclear power plants?

Coding: 1 = “favor”, 0 = otherwise.