APPENDICES FOR REFEREES

Note: The manuscript provides a web address for the Beta version of the Internet surveys. In order to maintain anonymity, the APSR editor deleted this reference. The following three appendices provide the questions used and the information provided to respondents in the enhanced information splits:

Appendix A: Telephone Survey Instrument

Appendix B: Baseline Internet Survey

Appendix C: Information Menu and Pages

Appendix A: Telephone Survey Instrument

Question # 1 Page # 1

Hello, my name is _____. I'm calling from the University of XXXX.

We're conducting research regarding issues that face U.S. residents. This is not a sales call, and your telephone number was selected at random. Of the adults who are at least 18 years of age or older living in your household, may I please speak to the one who has had the most recent birthday?

[ORIGINAL RESPONDENT] Should you choose to participate in our survey, your answers to the questions will remain confidential. The University releases no information as to how any particular individual answers the survey, and does not sell or give away the lists of randomly generated phone numbers used in our research. You can refrain from answering any questions that make you feel uncomfortable, and you can end the survey at any time. This call may be monitored for quality control purposes. Should you have any questions regarding our research I can give you the telephone number of our director, Professor XXX. Would you complete a survey with me?

[NEW RESPONDENT OR APPT w/NAME] Hello, my name is _____. I'm calling from the University of XXX.

We're conducting research regarding issues that face U.S. residents. This is not a sales call, and your telephone number was selected at random. Are you the person at least 18 years of age who has had the most recent birthday?

Should you choose to participate in our survey, your answers to the questions will remain confidential. The University releases no information as to how any particular individual answers the survey, and does not sell or give away the lists of randomly generated phone numbers used in our research. You can refrain from answering any questions that make you feel uncomfortable, and you can end the survey at any time. This call may be monitored for quality control purposes. Should you have any questions regarding our research I can give you the telephone number of our director, Professor XXX. Would you complete a survey with me?

[ANSWERING MACHINES: Remember we only leave 2 messages!]
Hello, my name is _____. I'm calling from the University XXXX. This is not a sales call. Our research group is conducting a study on important national issues, and your participation would be greatly appreciated. Your phone number was selected at random and your answers will be kept confidential. We'll call back in the next day or two. Thank you.

[Quick Hangup Intro]
Hi, my name is _____. I'm a student at the University of XXX, and as part of a research project I am calling people like you about important national issues.

Are you the person in your household who has had the most recent birthday and who is at least 18 years of age?

[YES] Continue
[NO] May I please speak to that person?
[NO] Thank you for your time; have a nice evening.

Should you choose to participate in our survey, your answers to the questions will remain confidential. The University releases no information as to how any particular individual answers the survey, and does not sell or give away the lists of randomly generated phone numbers used in our research. You can refrain from answering any questions that make you feel uncomfortable, and you can end the survey at any time. This call may be monitored for quality control purposes. Should you have any questions regarding our research I can give you the telephone number of our director, Professor XXX. Would you complete a survey with me?

[HESITANT RESPONDENT INFO]
If respondent asks what survey is about, tell them issues facing U.S. residents. Also, this is an opportunity for them to express their opinion about public policy issues.

This is not a sales call.

Your telephone number was chosen at random.

This is academic research and all of your answers will be kept confidential.

If you have further questions, I can give you the telephone number of our director: Professor XXX (xxx) xxx-xxxx.

-Check List- (Number of items: 2 Min: 1 Max: 1)
1 Actual Survey
2 Technical Survey

SKIPS from Q1
IF q1=2 SKIP TO: 88

Question # 2 Page # 2
I would like to ask you a couple of background questions. First, what is the highest level of education you have completed, or the highest degree you have received?
[DO NOT READ]

-Check List- (Number of items: 9 Min: 1 Max: 1)
1 Less than high school
2 Completed some high school
3 High school graduate/GED
4 Completed some college, but no degree
5 College Graduate (B.A., A.A., B.S.)
6 Completed some graduate school but no degree
-99 Completed graduate school (M.S., M.D., Ph.D.)
-97 DK/NA
9 Dropout

Question # 3 Page # 3
How old are you?

-Dbase- (Number of items: 2)
Age [-99 = DKNA, -97 = Dropout]
«Integer: -99 ≤ i ≤ 999 »

Question # 4 Page # 4
As part of the survey, I am required to ask: are you male or female?

-Check List- (Number of items: 4 Min: 1 Max: 1)

1 Male
0 Female
-99 DK/NA
-97 Dropout

SKIPS from Q4
IF q4=-97 SKIP TO: 85

Question # 5 Page # 5
[INTERVIEWERS: Give me your personal evaluation of the respondent's initial reluctance to be interviewed.]

-Check List- (Number of items: 4 Min: 1 Max: 1)
3 Very reluctant
2 Somewhat reluctant
1 Slightly reluctant
0 Not at all reluctant

Question # 6 Page # 6
Now I would like to ask about your attitudes regarding the environment.

Some people believe that pollution, population growth, resource depletion, and other man-made problems have put us on the brink of an environmental crisis that will make it impossible for humans to continue to survive as we have in the past. Others believe that these fears are overstated and that we are not in a serious environmental crisis.

On a scale from zero to ten where zero means that there is no real environmental threat to civilization and ten means that human civilization is on the brink of collapse due to environmental threats, what do you think about the current environmental situation?

-Check List- (Number of items: 13 Min: 1 Max: 1)
0 0 No real threat
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10 Brink of collapse
-99 DK/NA
-97 Dropout

SKIPS from Q6
IF q6=-97 SKIP TO: 85

Question # 7 Page # 7
Please indicate whether you strongly agree, agree, disagree, or strongly disagree with the following statement.

Where tradeoffs must be made between environmental protection and property rights, the emphasis should be on protecting property rights.

-Check List- (Number of items: 6 Min: 1 Max: 1)
4 Strongly Agree
3 Agree
2 Disagree, or
1 Strongly Disagree
-99 DK/NA
-97 Dropout

Question # 8 Page # 8
As you may know, the issue of global climate change has been the subject of public discussion over the last few years.

On a scale from zero to ten where zero means no attention and ten means close and constant attention, how much attention have you paid to the issue of global climate change?

-Check List- (Number of items: 13 Min: 1 Max: 1)
0 0 No Attention
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10 Close and Constant Attention
-99 DK/NA
-97 Dropout

Question # 9 Page # 9
Think for a moment about your discussions with other people and what you see or read in the news. On a scale from zero to ten where zero means not at all informed and ten means completely informed, how well informed do you think most Americans are about the issue of global climate change?

-Check List- (Number of items: 13 Min: 1 Max: 1)
0 0 Not at all Informed
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10 Completely Informed
-99 DK/NA
-97 Dropout

Question # 10 Page # 10

Using the same scale where zero means not at all informed and ten means completely informed, how well informed do you consider yourself to be about the issue of global climate change?

-Check List- (Number of items: 13 Min: 1 Max: 1)

0	0 Not at all Informed
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10 Completely Informed
-99	DK/NA
-97	Dropout

Question # 11 Page # 11

In your personal experience, over the past few years have average temperatures where you live been rising, falling, or staying about the same as previous years?

-Check List- (Number of items: 5 Min: 1 Max: 1)

1	Rising
-1	Falling, or
0	Staying about the same
-99	DK/NA
-97	Dropout

SKIPS from Q11
IF q11=-97 SKIP TO: 85

Question # 12 Page # 12

Scientists who specialize in the study of the earth's climate have debated the possible effects of climate change. Do most scientists expect any of the following changes in the global climate to take place?

[Randomized Pages: 13-17]

-Check List- (Number of items: 1 Min: 1 Max: 1)

1	CONTINUE

Question # 13 Page # 13

Do most scientists expect temperatures to rise?

-Check List- (Number of items: 4 Min: 1 Max: 1)

0	No
-97	Dropout
-99	DK/NA

1 Yes

Question # 14 Page # 14
Do most scientists expect ocean levels to drop?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No
-97 Dropout
-99 DK/NA
1 Yes

Question # 15 Page # 15
Do most scientists expect more frequent droughts?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No
-97 Dropout
-99 DK/NA
1 Yes

Question # 16 Page # 16
Do most scientists expect fewer floods?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No
-97 Dropout
-99 DK/NA
1 Yes

Question # 17 Page # 17
Do most scientists expect more severe weather storms, like hurricanes and tornadoes?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No
-97 Dropout
-99 DK/NA
1 Yes

Question # 18 Page # 18
Many scientists have argued that global average temperatures have risen slightly and will continue to increase for many years as a result of human activities. To the best of your knowledge:

[Randomized Pages: 19-23]

-Check List- (Number of items: 1 Min: 1 Max: 1)
1 CONTINUE

Question # 19 Page # 19
Do scientists believe exhaust from cars and trucks causes global temperatures to rise?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No
-97 Dropout
-99 DK/NA
1 Yes

Question # 20 Page # 20
Do scientists believe radiation from nuclear power plants causes global temperatures to rise?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No
-97 Dropout
-99 DK/NA
1 Yes

Question # 21 Page # 21
Do scientists believe disposal of toxic chemicals in landfills causes global temperatures to rise?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No
-97 Dropout
-99 DK/NA
1 Yes

Question # 22 Page # 22
Do scientists believe coal powered electricity plants cause global temperatures to rise?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No
-97 Dropout
-99 DK/NA
1 Yes

Question # 23 Page # 23
Do scientists believe the destruction of jungles and forests causes global temperatures to rise?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No
-97 Dropout
-99 DK/NA
1 Yes

Question # 24 Page # 24
To the best of your knowledge, how much do scientists think the average global temperature will increase over the next 50 to 70 years? Is it:

-Check List- (Number of items: 6 Min: 1 Max: 1)
1 Zero to One degree Fahrenheit
2 Two to Five
3 Six to Nine, or
4 Ten or more degrees Fahrenheit

-99 DK/NA
-97 Dropout

SKIPS from Q24
IF q24=-97 SKIP TO: 85

Question # 25 Page # 25

Some climate scientists think that average global temperatures are rising because gasses from burning coal, oil, and other materials are released into the atmosphere. These gasses have been called "greenhouse gasses" because they are believed to trap heat in the earth's atmosphere like the glass does in a greenhouse.

In your opinion, do greenhouse gasses from burning coal, oil, and other materials cause average global temperatures to rise?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 do
-97 Dropout
-99 DK/NA
1 do not

SKIPS from Q25
IF q25<0 SKIP TO: 27

Question # 26 Page # 26

On a scale from zero to ten where zero means not at all certain and ten means completely certain, how certain are you that greenhouse gasses from burning coal, oil and other materials «label (q25)» cause average global temperatures to rise?

-Check List- (Number of items: 13 Min: 1 Max: 1)
0 0 Not at all Certain
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10 Completely Certain
-99 DK/NA
-97 Dropout

Question # 27 Page # 27

Using the same scale where zero means not at all certain and ten means completely certain, how certain are climate scientists that greenhouse gasses from burning coal, oil and other materials cause global temperatures to rise?

-Check List- (Number of items: 13 Min: 1 Max: 1)
0 0 Not at all Certain
1 1
2 2
3 3

4 4
5 5
6 6
7 7
8 8
9 9
10 10 Completely Certain
-99 DK/NA
-97 Dropout

Question # 28 Page # 28

On a scale from zero to ten where zero means not at all important and ten means extremely important, how important is it that industrial nations reduce their production of greenhouse gasses?

-Check List- (Number of items: 13 Min: 1 Max: 1)
0 0 Not at all Important
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10 Extremely Important
-99 DK/NA
-97 Dropout

Question # 29 Page # 29

[Please pick the top option]

-Check List- (Random) (Number of items: 2 Min: 1 Max: 1)
1 Skip next two Q's
2 Don't skip next two Q's

SKIPS from Q29
IF q29=1 SKIP TO: 32

Question # 30 Page # 30

Now think about your average monthly income and expenses. After you have paid all the necessary bills for such things as housing, transportation, groceries, insurance, debt, and taxes, what percent of your income is left over for optional use on things like recreation, savings, and giving for charity and other causes?

-Dbase- (Number of items: 5)
Percent
«Integer: $-99 \leq i \leq 100$ »

SKIPS from Q30
IF q30:2<1 SKIP TO: 32

Question # 31 Page # 31
Now think about the portion of your total income available for optional uses. On average, what percent of that amount do you use for contributions to environmental causes, such as donations for specific programs or contributions and memberships to environmental advocacy groups?

Please remember that we are not asking for any money and that your answers will be kept completely confidential.

-Dbase- (Number of items: 5)
Percent
«Integer: -99 ≤ i ≤ 100 »

Question # 32 Page # 32
Have you heard about the proposed international treaty called the Kyoto Protocol?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No
-97 Dropout
-99 DK/NA
1 Yes

SKIPS from Q32
IF q32=-97 SKIP TO: 85
IF else SKIP TO: 34

Question # 33 Page # 33
Now I would like your views on a particular environmental treaty, the Kyoto Protocol. The Kyoto Protocol is concerned with addressing the issue of possible human causes of global climate change.

-Check List- (Number of items: 1 Min: 1 Max: 1)
1 CONTINUE

Question # 34 Page # 34
Government officials in the US are currently considering a proposed international treaty that concerns global climate change, called the Kyoto Protocol. In 1997 representatives from the U.S. and approximately 150 other nations developed and signed the Kyoto Protocol, which calls for reducing the production of greenhouse gasses.

The U.S. has negotiated similar treaties with other nations to try to deal with other environmental problems, such as acid rain and ozone depletion. On a scale from zero to ten where zero means it is a very bad idea and ten means it is a very good idea, how do you view international treaties as a way to deal with environmental problems?

-Check List- (Number of items: 13 Min: 1 Max: 1)

0 0 Very Bad Idea
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10 Very Good Idea
-99 DK/NA
-97 Dropout

Question # 35 Page # 35

The U.S. currently produces about 36 percent of human-caused greenhouse gasses. Until the Protocol is ratified by a vote of two-thirds of the members of the U.S. Senate, the U.S. has no obligation to limit its greenhouse gas production. Since 1997, officials in the U.S. have been debating whether the U.S. Senate should ratify the treaty.

Do you believe the U.S. Senate will, at some point, ratify the Kyoto Protocol?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No
-97 Dropout
-99 DK/NA
1 Yes

Question # 36 Page # 36

On a scale from zero to ten where zero means not at all familiar and ten means completely familiar, how familiar are you with the provisions and requirements of the Kyoto Protocol?

-Check List- (Number of items: 13 Min: 1 Max: 1)
0 0 Not at all Familiar
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10 Completely Familiar
-99 DK/NA
-97 Dropout

Question # 37 Page # 37

Worldwide, the Kyoto Protocol calls for reducing annual greenhouse gas production to about 5% below the amount produced in 1990. The protocol would require 38 industrial nations, including the U.S., to promise to reduce their annual greenhouse gas production over the next 12 years.

To do this, exhaust from energy power-plants, vehicles, and other sources will have to be reduced or treated to remove greenhouse gasses. Different countries would promise to reduce greenhouse gasses by different amounts, with Japan reducing by a slightly greater percentage than the U.S., and the European Union by slightly less. Developing countries, such as China, India, Mexico, Brazil, and Argentina, would not be required to reduce annual greenhouse gas production.

Overall, does this appear to be a fair way to reduce the production of greenhouse gasses? On a scale from zero to ten where zero means completely unfair and ten means completely fair, how fair are the provisions of the Kyoto Protocol?

-Check List- (Number of items: 13 Min: 1 Max: 1)

0	0 Completely Unfair
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10 Completely Fair
-99	DK/NA
-97	Dropout

Question # 38 Page # 38

The Kyoto Protocol will require the U.S. to reduce annual greenhouse gas production below the levels produced in 1990. By the year 2010, that will mean reducing greenhouse gasses by one third below the amount that the U.S. would otherwise be expected to produce. On a scale from zero to ten where zero means you are certain the U.S. can not meet the treaty requirements and ten means you are certain the U.S. can, how certain is it that the U.S. can reduce greenhouse gasses as required by the Kyoto Protocol?

-Check List- (Number of items: 13 Min: 1 Max: 1)

0	0 Certain US CAN NOT
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10 Certain US CAN
-99	DK/NA
-97	Dropout

Question # 39 Page # 39

To meet the treaty requirements the U.S. would have to change the way it uses energy. Energy conservation and new technologies could help, and the treaty permits the U.S. to meet part of its obligations by helping reduce the amount of greenhouse gasses produced by other countries. Even with these changes, if the U.S. Senate ratifies the treaty, higher prices for energy and gasoline will result. The costs per household will vary, with greater costs being paid by households that use more gasoline, or that buy electricity from utilities that rely on coal or oil for electricity.

On a scale from zero to ten where zero means not at all important and ten means extremely important, how important do you think it is that members of the U.S. Senate take into account the views of people in their districts before voting on the Kyoto Protocol?

-Check List- (Number of items: 13 Min: 1 Max: 1)

0	0 Not at all important
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10 Extremely Important
-99	DK/NA
-97	Dropout

Question # 40 Page # 40

It is very difficult to predict the effects of the Kyoto Protocol on actual climate change. Estimates are that the treaty requirements would slow the increase in average global temperatures by 4 to 7 percent over the next century. This would lessen some of the predicted effects of global warming, such as rising sea levels, more extreme weather, and damage to plant and animal habitats and food production. It is currently very difficult to predict the size or location of these changes. Effects are expected to vary greatly by region of the world, and countries will differ greatly in their ability to adapt to the predicted changes.

Supporters of the Kyoto Protocol say that the predicted slowing of the rise in global temperatures is an important first step, and will buy time to take later steps to halt or adapt to global warming. Supporters also say that the Protocol will encourage other important benefits, like increased energy efficiency and reductions in pollution.

Opponents of the Kyoto Protocol say it requires us to move too fast, too soon, and that it will impose excessive costs on consumers and taxpayers in return for uncertain benefits. Other critics point out that the Protocol leaves out the major developing countries, which are expected to be major producers of greenhouse gasses in the future.

On a scale from one to seven where one is very poor and seven is excellent, what kind of job has the national news media done in fairly presenting all sides of this issue?

-Check List- (Number of items: 9 Min: 1 Max: 1)

1	1 Very Poor
2	2
3	3
4	4
5	5
6	6
7	7 Excellent
-99	DK/NA
-97	Dropout

SKIPS from Q40
IF q40=-97 SKIP TO: 85

Question # 41 Page # 41
Choose me!!!!!

-Check List- (Random) (Number of items: 13 Min: 1 Max: 1)

6	$$$6
12	$$12
25	$$25
75	$$75
150	$150
225	$225
300	$300
500	$500
700	$700
900	$900
912	1200
918	1800
924	2400

Question # 42 Page # 42
The U.S. Senate has not yet voted on whether to ratify the Kyoto Protocol. If the U.S. does not ratify the treaty, it is very unlikely that the Protocol can be successfully implemented.

Suppose that a national vote or referendum were held today in which U.S. residents could vote to advise their Senators whether to support or oppose ratifying the Kyoto Protocol. If U.S. compliance with the treaty would cost your household «label(q41)» dollars per year in increased energy and gasoline prices, would you vote for or against having your Senators support ratification of the Kyoto Protocol? Keep in mind that the «label(q41)» dollars spent on increased energy and gasoline prices could not be spent on other things, such as other household expenses, charities, groceries, or car payments.

-Check List- (Number of items: 4 Min: 1 Max: 1)

1	For
0	Against
-99	DK/NA
-97	Dropout

Question # 43 Page # 43
Suppose that a national vote or referendum were held today in which US residents could vote to advise their Senators whether to support or oppose ratifying the Kyoto Protocol, and that the treaty would cost your household «label(q41)» dollars per year in increased energy and gasoline prices. Where would you place yourself on a scale where zero means you are absolutely certain that you would vote against the Kyoto Protocol and 100 means you are absolutely certain that you would vote for it?

-Dbase- (Number of items: 2)
Enter NUMBER between 0 and 100
«Integer: $-99 \leq i \leq 100$ »

Question # 44 Page # 44
On a scale from zero to ten where zero means it is certain that the Senate would not seriously consider the results of a national vote or referendum and ten means it is certain that they would seriously consider the results, how certain is it that the Senate would give the results serious consideration in deciding how to vote on the Kyoto Protocol?

-Check List- (Number of items: 13 Min: 1 Max: 1)
0 0 Certain NOT to Consider
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10 Certain To consider
-99 DK/NA
-97 Dropout

Question # 45 Page # 45

In your view, would a national referendum be a good way for citizens to express their preferences regarding the Kyoto Protocol to the U.S. Senate?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No
-97 Dropout
-99 DK/NA
1 Yes

Question # 46 Page # 46

Frequently, U.S. residents are asked about their willingness to pay in donations or higher prices to address environmental problems such as global climate change. The answers are often provided to government officials to assist in developing policies to address these problems.

Is this a good way for government officials to make policy choices about global climate change?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No
-97 Dropout
-99 DK/NA
1 Yes

Question # 47 Page # 47

I am going to list some of the arguments that are made against relying on residents' willingness to pay through donations or higher prices as a way to inform government decisions on issues like global climate change. On a scale from zero to ten where zero means you completely disagree with the argument, and ten means you completely agree with it, please indicate your level of agreement for each of the following arguments:

-Check List- (Number of items: 1 Min: 1 Max: 1)
1 CONTINUE

Residents from poor households can afford to pay less, so their views will have less weight than those from rich households.

Question # 48 Page # 48

-Check List- (Number of items: 13 Min: 1 Max: 1)
0 0 Completely Disagree
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10 Completely Agree
-99 DK/NA
-97 Dropout

SKIPS from Q48
IF q48=-97 SKIP TO: 85

Re-Read scale if necessary.

Government officials should rely on scientific expertise about global climate change, not on the preferences of ordinary residents.

Question # 49 Page # 49
-Check List- (Number of items: 13 Min: 1 Max: 1)
0 0 Completely Disagree
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10 Completely Agree
-99 DK/NA
-97 Dropout

Re-Read scale if necessary.

We all have a right to the preservation of a safe and stable global environment and should not have to depend on peoples' willingness to pay to get it.

Question # 50 Page # 50
-Check List- (Number of items: 13 Min: 1 Max: 1)
0 0 Completely Disagree
1 1

2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10 Completely Agree
-99 DK/NA
-97 Dropout

Re-Read scale if necessary.

I already pay far too much in taxes and contributions to consider paying more to address global climate change.

Question # 51 Page # 51
-Check List- (Number of items: 13 Min: 1 Max: 1)
0 0 Completely Disagree
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10 Completely Agree
-99 DK/NA
-97 Dropout

Re-Read scale if necessary.

I don't trust most residents to have well informed views on environmental issues like global climate change.

Question # 52 Page # 52
-Check List- (Number of items: 13 Min: 1 Max: 1)
0 0 Completely Disagree
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8

9 9
10 10 Completely Agree
-99 DK/NA
-97 Dropout

Re-Read scale if necessary.

Question # 53 Page # 53

Suppose that the Kyoto Protocol was ratified by the Senate and the U.S. worked with other industrialized countries to reduce greenhouse gas emissions. On a scale from zero to ten where zero means you are certain that the Kyoto Protocol will have no effect on global warming and ten means you are certain it will reduce global warming, how likely is it that the treaty would reduce global warming?

-Check List- (Number of items: 13 Min: 1 Max: 1)
0 0 Certain to have no effect on Global Warming
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10 Certain to reduce global warming
-99 DK/NA
-97 Dropout

Question # 54 Page # 54

As you know, the campaign for the 2000 Presidential election is currently underway. If the election were held today, and you could choose among the following candidates, for whom would you vote:

-Check List- (Number of items: 8 Min: 1 Max: 1)
1 George W. Bush
2 Al Gore
3 John McCain, or
4 Bill Bradley
5 Someone Else
6 Would not Vote
-99 DK/NA
-97 Dropout

Question # 55 Page # 55

To the best of your knowledge, which of the current presidential candidates have taken the strongest position in favor of making international agreements to reduce the production of greenhouse gases ?

[Reread if necessary]

-Check List- (Number of items: 8 Min: 1 Max: 1)

1 George W. Bush
2 Al Gore
3 John McCain, or
4 Bill Bradley
5 Someone Else
6 None of them
-99 DK/NA
-97 Dropout

Question # 56 Page # 56

Finally, I need some basic background information about you. On average, how many times a week do you watch news on television?

[DK/NA = -99
Dropout = -97]

-Dbase- (Number of items: 2)
Times/week watch TV news:
«Integer: -99 ≤ i ≤ 99 »

What is the zip code at your residence?

[DK/NA = -99]
[Dropout = -97]

Question # 57 Page # 57

-Dbase- (Number of items: 2)
Enter all five digits
«Integer: -99 ≤ i ≤ 99999 »

[Interviewers:
Please CONFIRM zip code.]

Question # 58 Page # 58

Including yourself, how many people currently live at your residence?

[DK/NA = -99; Dropout = -97]

-Dbase- (Number of items: 2)
Enter number in household
«Integer: -99 ≤ i ≤ 99 »

SKIPS from Q58
IF q58:2<2 SKIP TO: 60
IF q58:2=-97 SKIP TO: 85
IF q58:2=-99 SKIP TO: 60

Question # 59 Page # 59

How many of those are 18 or older?

[DK/NA = -99; Dropout = -97]

-Dbase- (Number of items: 2)
Enter number 18 or older
«Integer: -99 ≤ i ≤ 99 »

Question # 60 Page # 60
How many different residential phone lines do you have in your household? By this we mean phones with different numbers, but do not include business lines or cellular phones.

[DK/NA = -99; Dropout = -97]

-Dbase- (Number of items: 2)
Enter number of phone lines
«Integer: -99 ≤ i ≤ 99 »

Question # 61 Page # 61
Do you have regular access to a computer at your residence?

-Check List- (Number of items: 4 Min: 1 Max: 1)
1 Yes
0 No
-99 DK/NA
-97 Dropout

Question # 62 Page # 62
Do you have regular access to a computer outside of your home, such as at work or school?

-Check List- (Number of items: 4 Min: 1 Max: 1)
1 Yes
0 No
-99 DK/NA
-97 Dropout

SKIPS from Q62
IF (q61<1)&(q62<1) SKIP TO: 66
IF (q61<1)&(q62>0) SKIP TO: 63
IF (q61>0)&(q62<1) SKIP TO: 63
IF q62=-97 SKIP TO: 85

Question # 63 Page # 63
Do you ever use the internet?

-Check List- (Number of items: 4 Min: 1 Max: 1)
1 Yes
0 No
-99 DK/NA
-97 Dropout

SKIPS from Q63
IF q63<1 SKIP TO: 66

Question # 64 Page # 64
Approximately how often do you log on to the internet?

Is it:

[DO NOT READ DK/NA or DROPOUT]

-Check List- (Number of items: 7 Min: 1 Max: 1)
5 Every day,
4 Several times a week,
3 About once a week,
2 Several times a month, or
1 Less than once a month
-97 Dropout
-99 DK/NA

Question # 65 Page # 65
Do you use the internet for:

[Check all that apply; pause after reading each option]

[Do NOT read DK/NA or DROPOUT]

-Check List- (Number of items: 5 Min: 1 Max: 3)
1 Email
2 Making purchases
3 Gathering information
-97 Dropout
-99 DK/NA

With what political party do you identify?

[DO NOT READ OPTIONS]

Question # 66 Page # 66
-Check List- (Number of items: 8 Min: 1 Max: 1)
1 Democratic party
2 Republican (GOP) party
4 Other party
0 No party affiliation
3 Green party
-99 DK/NA
5 Reform party
-97 Dropout

SKIPS from Q66

IF q66=0 SKIP TO: 68
IF q66=4 SKIP TO: 68
IF q66=-97 SKIP TO: 85
IF q66=-99 SKIP TO: 68
IF else SKIP TO: 67

[If Respondent says: "INDEPENDENT" ask] Do you mean you are not a member of any party or you are a member of a political party called "the independent party?

Question # 67 Page # 67
Do you completely, somewhat, or slightly identify with the «label(q66)»?

-Check List- (Number of items: 5 Min: 1 Max: 1)
1 Completely
2 Somewhat
3 Slightly
-99 DK/NA
-97 Dropout

Question # 68 Page # 68
On a scale of political ideology, individuals can be arranged from strongly liberal to strongly conservative.

Which of the following categories best describes your views?

Would you say that you are:

[READ OPTIONS]

-Check List- (Number of items: 9 Min: 1 Max: 1)
1 Strongly liberal
2 Liberal
3 Slightly liberal
4 Middle of the road
5 Slightly conservative
6 Conservative, or
7 Strongly conservative
-99 DK/NA
-97 Dropout

Question # 69 Page # 69
Are you currently registered to vote?

-Check List- (Number of items: 4 Min: 1 Max: 1)
1 Yes
0 No
-99 DK/NA
-97 Dropout

Question # 70 Page # 70
Do you belong to any environmental groups or organizations?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No
-97 Dropout
-99 DK/NA
1 Yes

Question # 71 Page # 71
Which of the following best explains your employment status?

-Check List- (Number of items: 11 Min: 1 Max: 1)
1 Employed full-time
2 Employed part-time
3 Self-Employed
4 Not employed, but looking for work
5 Not employed, but NOT looking for work
6 Retired
7 Disabled
8 Student
9 Homemaker
-99 DK/NA
-97 Dropout

Question # 72 Page # 72
Are you of Hispanic origin, such as Mexican-American, Latin American, Puerto Rican, or Cuban?

-Check List- (Number of items: 4 Min: 1 Max: 1)
0 No, Not of Hispanic Origin
-97 Dropout
-99 DK/NA
1 Yes, of Hispanic Origin

From the following options do you consider yourself to be:

Question # 73 Page # 73
-Check List Open- (Number of items: 10 Min: 1 Max: 1)
1 White
2 Black
3 African American
4 Asian or Pacific Islander
5 Native American or Alaskan Native
6 of Mixed racial background, or
-99 DK/NA
-98 Refused
-97 Dropout
10 Something else? «»

SKIPS from Q73
IF q73=6 SKIP TO: 74

IF else SKIP TO: 75

If Something else: How would you describe your racial or ethnic background?

Question # 74 Page # 74

You said you consider yourself to be of a mixed racial background. With which of the following racial groups do you most closely identify?

-Check List Open- (Number of items: 9 Min: 1 Max: 1)

1 White
2 Black
3 African American
4 Asian or Pacific Islander
5 Native American or Alaskan Native, or
6 DK/NA
-99 Refused
-98 Dropout
-97 Something else? «»

Question # 75 Page # 75

Was the estimated annual income for your household for 1999 less than $50,000; between $50,000 and $99,999; or $100,000 or more?

-Check List- (Number of items: 5 Min: 1 Max: 1)

0 Less than $50,000
1 Between 50 and $99,999
-99 DK/NA
-97 Dropout
2 $100,000 or more

SKIPS from Q75

IF q75=0 SKIP TO: 76
IF q75=1 SKIP TO: 77
IF q75=2 SKIP TO: 78
IF q75=-99 SKIP TO: 82
IF q75=-97 SKIP TO: 85

Question # 76 Page # 76

I'm going to read you some broad income categories. Please STOP me when I get to the one which includes the estimated annual income for your household for 1999.

Was it:

(If the R interrupts you with their income go ahead and enter the value.)

-Check List- (Number of items: 12 Min: 1 Max: 1)

1 Less than $5,000,
2 $5,000 to less than $10,000
3 10 to less than 15,
4 15 to less than 20,
5 20 to less than 25,

6 25 to less than 30,
7 30 to less than 35,
8 35 to less than 40,
9 40 to less than 45,
10 45 to less than $50,000
-99 DK/NA
-97 Dropout

SKIPS from Q76
IF q76=1 SKIP TO: 82
IF else SKIP TO: 82

Question # 77 Page # 77
I'm going to read you some broad income categories. Please STOP me when I get to the one which includes the estimated annual income for your household for 1999.

Was it:
(If the R interrupts you with their income go ahead and enter the value.)

-Check List- (Number of items: 12 Min: 1 Max: 1)
11 $50,000 to less than $55,000
12 55 to less than 60,
13 60 to less than 65,
14 65 to less than 70,
15 70 to less than 75,
16 75 to less than 80,
17 80 to less than 85,
18 85 to less than 90,
19 90 to less than 95, or
20 95 to less than $100,000
-97 Dropout
-99 DK/NA

SKIPS from Q77
IF q77=1 SKIP TO: 82
IF else SKIP TO: 82

Question # 78 Page # 78
Was it: less than $150,000; between $150,000 and $199,999; or $200,000 or more?

-Check List- (Number of items: 5 Min: 1 Max: 1)
0 Less than $150,000
1 Between 150 and $199,999
-99 DK/NA
-97 Dropout
2 $200,000 or more

SKIPS from Q78
IF q78=0 SKIP TO: 79
IF q78=1 SKIP TO: 80
IF q78=2 SKIP TO: 81
IF q78=-99 SKIP TO: 82
IF q78=-97 SKIP TO: 85

Question # 79 Page # 79

I'm going to read you some broad income categories. Please STOP me when I get to the one which includes the estimated annual income for your household for 1999.

Was it:

(If the R interrupts you with their income go ahead and enter the value.)

-Check List- (Number of items: 12 Min: 1 Max: 1)

21 $100,000 to less than $105,000
22 105 to less than 110,
23 110 to less than 115,
24 115 to less than 120,
25 120 to less than 125,
26 125 to less than 130,
27 130 to less than 135,
28 135 to less than 140,
29 140 to less than 145, or
30 145 to less than $150,000
-97 Dropout
-99 DK/NA

SKIPS from Q79
IF q79=0 SKIP TO: 82
IF else SKIP TO: 82

Question # 80 Page # 80

I'm going to read you some broad income categories. Please STOP me when I get to the one which includes the estimated annual income for your household for 1999.

Was it:

(If the R interrupts you with their income go ahead and enter the value.)

-Check List- (Number of items: 12 Min: 1 Max: 1)

31 $150,000 to less than $155,000
32 155 to less than 160,
33 160 to less than 165,
34 165 to less than 170,
35 170 to less than 175,
36 175 to less than 180,
37 180 to less than 185,
38 185 to less than 190,
39 190 to less than 195, or
40 195 to less than $200,000
-97 Dropout
-99 DK/NA

SKIPS from Q80
IF q80=0 SKIP TO: 82
IF else SKIP TO: 82

Question # 81 Page # 81

I'm going to read you some broad income categories. Please STOP me when I get to the one which includes the estimated annual income for your household for 1999.

Was it:

(If the R interrupts you with their income go ahead and enter the value.)

-Check List- (Number of items: 13 Min: 1 Max: 1)
41 $200,000 to less than $205,000
42 205 to less than 210,
43 210 to less than 215,
44 215 to less than 220,
45 220 to less than 225,
46 225 to less than 230,
47 230 to less than 235,
48 235 to less than 240,
49 240 to less than 245,
50 245 to less than $250,000, or
51 more than $250,000
-97 Dropout
-99 DK/NA

Question # 82 Page # 82

Thinking back to when I first contacted you, how would you describe your feelings about participating with us? Would you say that you were very reluctant, somewhat reluctant, slightly reluctant, or not at all reluctant to participate with our research?

-Check List- (Number of items: 6 Min: 1 Max: 1)
3 Very reluctant
2 Somewhat reluctant
1 Slightly reluctant, or
0 Not at all reluctant
-99 DK/NA
-97 Dropout

SKIPS from Q82
IF q82=-97 SKIP TO: 85

Question # 83 Page # 83

Your answers have been very helpful to our research. Would it be possible to call back in a few months to ask you some follow-up questions?

-Check List- (Number of items: 4 Min: 1 Max: 1)
1 Yes
0 No
-99 DK/NA
-97 Dropout

SKIPS from Q83
IF q83<1 SKIP TO: 85

In order to contact you at a later date, may I please have your first name?

[DK/NA = -99]
[Dropout = -97]

Question # 84 Page # 84
-Dbase- (Number of items: 2)
First name
«Text Variable»

[Please CONFIRM first name and spelling.]

Question # 85 Page # 85
Thank you, for taking the time to complete this interview.

Good bye.

Appendix B: Baseline Internet Survey

SECTION 100: INTRO DEMOS

[PROGRAMMER NOTE: DISPLAY 100-105 ON SAME SCREEN]

BASE: ALL RESPONDENTS
Q100 Are you…?

1 Male
2 Female

BASE: ALL RESPONDENTS
Q105 What is your year of birth? <I> *Please enter as a four-digit number, e.g., 1963.</I>*

[RANGE: 1900-1981]

☐☐☐☐

SECTION 200: CV RESEARCH QUESTIONS

BASE: ALL RESPONDENTS
Q200 We would like to ask about your attitudes regarding the environment.

Some people believe that pollution, population growth, resource depletion, and other man-made problems have put us on the brink of an environmental crisis that will make it impossible for humans to continue to survive as we have in the past. Others believe that these fears are overstated and that we are not in a serious environmental crisis.

On a scale from 0 to 10 where "0" means"No real environmental threat to civilization" and "10" means "Human civilization is on the brink of collapse due to environmental threats", what do you think about the current environmental situation?

[RANGE: 0-10]

|_|_|
[PROGRAMMER NOTE: DISPLAY Q205-Q210 ON SAME SCREEN]

BASE: ALL RESPONDENTS
Q205 Please indicate your level of agreement with the following statement.

Where tradeoffs must be made between environmental protection and property rights, the emphasis should be on protecting property rights.

1 Strongly agree
2 Agree

3 Disagree
4 Strongly disagree

BASE: ALL RESPONDENTS
Q210 As you may know, the issue of global climate change has been the subject of public discussion over the last few years.

On a scale from 0 to 10 where "0" means "No Attention" and "10"means "Close and constant attention", how much attention have you paid to the issue of global climate change?

[RANGE: 0-10]

|_|_|

[PROGRAMMER NOTE: DISPLAY 215-225 ON SAME SCREEN]

BASE: ALL RESPONDENTS
Q215 Think for a moment about your discussions with other people and what you see or read in the news. On a scale from 0 to 10 where "0"means "Not at all informed" and "10"means "Completely informed", how well informed do you think most Americans are about the issue of global climate change?

[RANGE: 0-10]

|_|_|

BASE: ALL RESPONDENTS
Q220 Using the same scale, how well informed do you consider yourself to be about the issue of global climate change?

[RANGE: 0-10]

|_|_|

BASE: ALL RESPONDENTS
Q225 In your personal experience, over the past few years have average temperatures where you live been …?

1 Rising
2 Falling
3 Staying about the same

[PROGRAMMER NOTE: DISPLAY Q230-235 ON SAME SCREEN]

BASE: ALL RESPONDENTS

Q230 Scientists who specialize in the study of the earth's climate have debated the possible effects of climate change. Do most scientists expect any of the following changes in the global climate to take place?

[ROTATE]	Yes	No	Not sure
Temperatures to rise?			
Ocean levels to drop?			
More frequent droughts?			
Fewer floods?			
More severe weather storms, like hurricanes and tornadoes?			

BASE: ALL RESPONDENTS

Q235 Many scientists have argued that average global temperatures have risen slightly and will continue to increase for many years as a result of human activities. To the best of your knowledge, do scientists believe any of the following cause global temperatures to rise?

[ROTATE]

	Yes	No	Not sure
Exhaust from cars and trucks?			
Radiation from nuclear power plants?			
Disposal of toxic chemicals in landfills?			
Coal powered electricity plants?			
Destruction of jungles and forests?			

[PROGRAMMER NOTE: DISPLAY Q240-Q245 ON SAME SCREEN

BASE: ALL RESPONDENTS

Q240 To the best of your knowledge, how much do scientists think the average global temperature will increase over the next 50 to 70 years? Is it…?

1 0-1 °F
2 2-5 °F
3 6-9 °F
4 10 °F or more
5 Not sure

BASE: ALL RESPONDENTS

Q245 Some climate scientists think that average global temperatures are rising because gasses from burning coal, oil, and other materials are released into the atmosphere. These gasses have been called "greenhouse gasses," because they are believed to trap heat in the earth's atmosphere like the glass does in a greenhouse.

In your opinion, do "greenhouse gasses" from burning coal, oil and other materials cause average global temperatures to rise?

1 Do
2 Do not

[PROGRAMMER NOTE: DISPLAY 250-260 ON SAME SCREEN]

BASE: ALL RESPONDENTS

Q250 On a scale from 0 to 10 where "0" means "Not at all certain" and "10" means "Completely certain", how certain are you that greenhouse gasses from burning coal, oil and other materials [INSERT RESPONSE FROM Q.245] cause average global temperatures to rise?

[RANGE: 0-10]

|_|_|

BASE: ALL RESPONDENTS

Q255 Using the same scale, how certain are climate scientists that "greenhouse gasses" from burning coal, oil and other materials cause global temperatures to rise?

[RANGE: 0-10]

|_|_|

BASE: ALL RESPONDENTS

**Q260 **On a scale from 0 to 10 where "0" means "Not at all important" and "10" means "Extremely important", how important is it that industrial nations reduce their production of "greenhouse gasses"?

[RANGE:0-10]

☐☐

BASE: ALL RESPONDENTS

Q600[PROGRAMMER NOTE: THIS IS THE RANDOM ASSIGNMENT OF ALL R'S TO GROUP 1 OR GROUP 2]

1	Group 1
2	Group 1
3	Group 1
4	Group 1
5	Group 1
6	Group 2
7	Group 2
8	Group 2
9	Group 2
10	Group 2

[PROGRAMMER NOTE: DISPLAY Q265-Q270 ON SAME PAGE]

BASE: GROUP 1 (MENTAL ACCOUNTS)RESPONDENTS (Q600/1-5)

Q265 Now think about your average monthly income and expenses. After you have paid all the necessary bills for such things as housing, transportation, groceries, insurance, debt and taxes, what<I><B> percentage</I></B> of your income is left over for optional use on things like recreation, savings, and giving for charity and other causes?

[RANGE; 0-99]

|_|_|

BASE: GROUP 1 (MENTAL ACCOUNTS)RESPONDENTS (Q600/1-5)
Q270 Now think about the portion of your total income available for optional uses. On average, what <I><B>percentage</I></B> of that amount do you use for contributions to environmental causes, such as donations for specific programs, or contributions and memberships to environmental advocacy groups?

Note: Please remember that we are not asking for money and that your answers will be kept completely confidential.

[PROGRAMMER: RESPONSE MUST = or be < RESPONSE TO Q265

|_|_|

BASE: ALL RESPONDENTS
Q275 Have you heard about the proposed international treaty called the Kyoto Protocol?

1 Yes
2 No

BASE: ALL RESPONDENTS
Q601 [PROGRAMMER NOTE: THIS IS THE RANDOM ASSIGNMENT OF R'S TO EITHER THE STANDARD OR ENHANCED MODE. ALL ENHANCED MODE R'S RECEIVE INFORMATION MENU ON ALL SUCCESSIVE SCREENS]

1	Standard Mode	[Jump to Q.285]
2	Standard Mode	[Jump to Q.285]
3	Standard Mode	[Jump to Q.285]
4	Standard Mode	[Jump to Q.285]
5	Standard Mode	[Jump to Q.285]
6	Enhanced Mode	[Ask Q.281]
7	Enhanced Mode	[Ask Q.281]
8	Enhanced Mode	[Ask Q.281]
9	Enhanced Mode	[Ask Q.281]
10	Enhanced Mode	[Ask Q.281]

BASE: GROUP 2 RESPONDENTS (Q601/6-10)
Q281 Now we would like your views on a particular environmental treaty, the Kyoto Protocol. The Kyoto Protocol is concerned with addressing the issue of possible human causes of global climate change.

Before proceeding to the questions on the Kyoto Protocol, you are invited to explore a brief information menu we have made available.

The items in the information menu are intended to provide brief and balanced summaries of research and informed opinion about global climate change and the Kyoto Protocol. Because the volume of information on these matters is enormous and growing rapidly, we sought to make the items in the information menu broadly representative and readily understood, rather than exhaustive.

Please feel free to visit as many pages as you wish as you proceed through the survey questions.

Click here to visit the information menu.

[PROGRAMMER NOTE; DISPLAY Q285-Q295 ON SAME PAGE]

BASE: ALL RESPONDENTS

Q285 Government officials in the U.S. are currently considering a proposed international treaty that concerns global climate change, called the Kyoto Protocol. In 1997 representatives from the U.S. and approximately 150 other nations developed and signed the Kyoto Protocol, which calls for reducing the production of "greenhouse gasses". The U.S. has negotiated similar treaties with other nations to try to deal with other environmental problems, such as acid rain and ozone depletion. On a scale from 0 to 10 where "0" means"Very bad idea" and "10"means"Very good idea", how do you view international treaties as a way to deal with environmental problems?

[RANGE: 0-10]

|_|_|

BASE: ALL RESPONDENTS

Q290 The U.S. currently produces about 36 percent of human-caused "greenhouse gasses". Until the Kyoto Protocol is ratified by a vote of two-thirds of the members of the U.S. Senate, the U.S. has no obligation to limit its "greenhouse gas" production. Since 1997, officials in the U.S. have been debating whether the U.S. Senate should ratify the treaty. Do you believe the U.S. Senate will at some point ratify the Kyoto Protocol?

1 Yes
2 No
3 Not sure

BASE: ALL RESPONDENTS

Q295 On a scale from 0 to 10 where "0" means "Not at all familiar" and "10" means "Completely familiar", how familiar are you with the provisions and requirements of the Kyoto Protocol?

[RANGE: 0-10]

|_|_|

SECTION 300: MORE CV RESEARCH QUESTIONS

BASE: ALL RESPONDENTS

Q300 Worldwide, the Kyoto Protocol calls for reducing annual “greenhouse gas” production to about 5% below the amount produced in 1990. The protocol would require 38 industrial nations, including the U.S., to promise to reduce their annual “greenhouse gas” production over the next 12 years.

To do this, exhaust from energy powerplants, vehicles and other sources will have to be reduced or treated to remove “greenhouse gasses”. Different countries would promise to reduce greenhouse gasses by different amounts, with Japan reducing by a slightly greater percentage than the U.S., and the European Union by slightly less. Developing countries, such as China, India, Mexico, Brazil, and Argentina, would not be required to reduce annual greenhouse gas production.

Overall, does this appear to be a fair way to reduce the production of greenhouse gasses? On a scale from 0 to 10 where “0” means "Completely unfair" and “10” means"Completely fair", how fair are the provisions of the Kyoto Protocol?

[RANGE: 0-10]

|_|_|

BASE: ALL RESPONDENTS

Q305 The Kyoto Protocol will require the U.S. to reduce annual “greenhouse gas” production below the levels produced in 1990. By the year 2010, that will mean reducing greenhouse gasses by one-third below the amount that the U.S. would otherwise be expected to produce. On a scale from 0 to 10, where “0” means "Certain the US <u>can not</u> meet the treaty requirements" and “10” means "Certain the U.S. <u>can</u> meet the treaty requirements", how certain is it that the U.S. can reduce “greenhouse gasses” as required by the Kyoto Protocol?

[RANGE: 0-10]

|_|_|

BASE: ALL RESPONDENTS

Q310 To meet the treaty requirements the U.S. would have to change the way it uses energy. Energy conservation and new technologies could help, and the treaty permits the U.S. to meet part of its obligations by helping reduce the amount of greenhouse gasses produced by other countries. Even with these changes, if the U.S. Senate ratifies the treaty, higher prices for energy and gasoline will result. The costs per household will vary, with greater costs being paid by households that use more gasoline, or that buy electricity from utilities that rely on coal or oil for electricity.

On a scale from 0 to 10 where “0” means "Not at all important" and “10” means"Extremely important", how important do you think it is that members of the U.S. Senate take into account the views of people in their districts before voting on the Kyoto Protocol?

[RANGE: 0-10}

|_|_|

[PROGRAMMER NOTE; DISPLAY Q315-Q320 ON SAME PAGE]

BASE: ALL RESPONDENTS

Q315 It is very difficult to predict the effects of the Kyoto Protocol on actual climate change. Estimates are that the treaty requirements would slow the increase in average global temperatures by 4 to 7 percent over the next century. This would lessen some of the predicted effects of global warming, such as rising sea levels, more extreme weather, and damage to plant and animal habitats and food production. It is currently very difficult to predict the size or location of these changes. Effects are expected to vary greatly by region of the world, and countries will differ greatly in their ability to adapt to the predicted changes.

Supporters of the Kyoto Protocol say that the predicted slowing of the rise in global temperatures is an important first step, and will buy time to take later steps to halt or adapt to global warming. Supporters also say that the Protocol will encourage other important benefits, like increased energy efficiency and reductions in pollution.

BASE: ALL RESPONDENTS

Q320 Opponents of the Kyoto Protocol say it requires us to move too fast, too soon, and that it will impose excessive costs on consumers and taxpayers in return for uncertain benefits. Other critics point out that the Protocol leaves out the major developing countries, which are expected to be major producers of "greenhouse gasses" in the future.

On a scale from 1 to 7 where "1" means "Very Poor" and "7" means "Excellent", what kind of job has the national news media done in fairly presenting all sides of this issue?

[RANGE: 1-7]

|_|_|

[PROGRAMMER NOTE; DISPLAY Q321-Q323 ON SAME PAGE]

BASE: ALL RESPONDENTS

Q321 [PROGRAMMER NOTE: THIS IS THE RANDOM ASSIGNMENT TO 1 OF 10 DIFFERENT DOLLAR AMOUNTS FOR USE IN LATER QUESTIONS]

1	6
2	12
3	25
4	75
5	150
6	225
7	300
8	500
9	700
10	900
11	1200
12	1800
13	2400

BASE: ALL RESPONDENTS

Q323 [PROGRAMMER NOTE: THIS IS THE RANDOM ASSIGNMENT OF ALL R'S TO EITHER THE BASIC OR MODIFIED GROUPS]

1 Basic Kyoto [Ask Q.325]
2 Modified Kyoto
3 Basic Kyoto [Ask Q.325]
4 Modified Kyoto
5 Basic Kyoto [Ask Q.325]
6 Modified Kyoto
7 Basic Kyoto [Ask Q.325]
8 Modified Kyoto
9 Basic Kyoto [Ask Q.325]
10 Modified Kyoto

BASE: BASIC KYOTO RESPONDENTS (Q323/1,3,5,7,9)

Q325 The U.S. Senate has not yet voted on whether to ratify the Kyoto Protocol. If the U.S. does not ratify the treaty, it is very unlikely that the Protocol can be successfully implemented.

Suppose that a national vote or referendum were held today in which U.S. residents could vote to advise their senators whether to support or oppose ratifying the Kyoto Protocol. If U.S. compliance with the treaty would cost your household [INSERT # FROM Q321] dollars per year in increased energy and gasoline prices, would you vote for or against having your senators support ratification of the Kyoto Protocol?

Keep in mind that the [INSERT # FROM Q321] dollars spent on increased energy and gasoline prices could not be spent on other things, such as other household expenses, charities, groceries or car payments.

1 For
2 Against

BASE: BASIC KYOTO RESPONDENTS (Q323/1,3,5,7,9)

Q.326 Once again, suppose that a national vote or referendum were held today in which US residents could vote to advise their Senators whether to support or oppose ratifying the Kyoto Protocol, and that the treaty would cost your household [INSERT # FROM Q321] dollars per year in increased energy and gasoline prices. On a scale from 0 to 100 where "0" means "Absolutely certain that you would vote against the Kyoto Protocol", and "100" means "Absolutely certain that you would vote for it", how certain are you that you would vote for the Kyoto Protocol?

[RANGE: 0-100]

|_|_|_|

BASE: BASIC KYOTO RESPONDENTS (Q323/1)

**Q330 **On a scale from 0 to 10 where “0” means"Certain that the Senate would <u>not</u> seriously consider the results of a national vote or referendum"

and “10” means"Certain that they <u>would</u> seriously consider the results, how certain is it that the Senate would give the results serious consideration in deciding how to vote on the Kyoto Protocol?

{RANGE: 0-10]

|_|_|

BASE: MODIFIED KYOTO RESPONDENTS (Q323/2)

Q335 The U.S. Senate has not yet voted on whether to ratify the Kyoto Protocol. If the U.S. does not ratify the treaty it is very unlikely that the Protocol can be successfully implemented.

An alternative to the Kyoto Protocol, which we will refer to as the Modified Kyoto Protocol, would make only one change in the agreement:

It would require that developing countries, such as China, India, Mexico, Brazil and Argentina, promise to restrict their future production of “greenhouse gasses” to no more than 5 percent above current levels.

BASE: MODIFIED KYOTO RESPONDENTS (Q.323/2)

Q336 Suppose that a national vote or referendum were held today in which U.S. residents could vote to advise their senators whether to support or oppose ratifying the Modified Kyoto Protocol. If U.S. compliance with the treaty would cost your household [INSERT # FROM Q.321] dollars per year in increased energy and gasoline prices, would you vote for or against having your senators support ratification of the Modified Kyoto Protocol?

Keep in mind that the [INSERT # FROM Q321] dollars spent on increased energy and gasoline prices could not be spent on other things, such as other household expenses, charities, groceries or car payments.

1 For
2 Against

BASE: MODIFIED KYOTO RESPONDENTS (Q323/2,4,6,8,10)

Q.338 Once again, suppose that a national vote or referendum were held today in which US residents could vote to advise their Senators whether to support or oppose ratifying the Modified Kyoto Protocol, and that the treaty would cost your household [INSERT # FROM Q321] dollars per year in increased energy and gasoline prices. On a scale from 0 to 100 where "0" means "Absolutely certain that you would vote against the Modified Kyoto Protocol", and "100" means "Absolutely certain that you would vote for it"how certain are you that you would vote for the Modified Kyoto Protocol?

|_|_|_|

BASE: MODIFIED KYOTO RESPONDENTS (Q323/2)

Q340 On a scale from 0 to 10 where “0” means"Certain that the Senate would <u>not</u> seriously consider the results of a national vote or referendum" and “10” means"Certain that they <u>would</u> seriously consider the results”,

how certain is it that the Senate would give the results serious consideration in deciding how to vote on the Kyoto Protocol?

[RANGE: 0-10]

|_|_|

BASE: ALL RESPONDENTS

Q345 In your view, would a national referendum be a good way for citizens to express their preferences regarding the Kyoto Protocol to the U.S. Senate?

1 Yes
2 No

BASE: ALL RESPONDENTS

Q350 Frequently, U.S. residents are asked about their willingness to pay in donations or higher prices to address environmental problems such as global climate change . The answers are often provided to government officials to assist in developing policies to address these problems.

Is this a good way for government officials to make policy choices about global climate change?

1 Yes
2 No
3 Not sure

BASE: ALL RESPONDENTS

Q355 Next you will see some of the arguments that are made against relying on residents' willingness to pay through donations or higher prices as a way to inform government decisions on issues like global climate change. On a scale from 0 to 10 where “0” means"Completely disagree" and “10” means"Completely agree", please indicate your level of agreement for each of the following arguments:

[PROGRAMMER NOTE: DISPLAY 360-365 ON SAME SCREEN]

BASE: ALL RESPONDENTS

Q360 "0" means "Completely Disagree" and "10" means "Completely Agree"

Residents from poor households can afford to pay less, so their views will have less weight than those from rich households.

{RANGE: 0-10]

|_|_|

BASE: ALL RESPONDENTS
Q365 Government officials should rely on scientific expertise about global climate change, not on the preferences of ordinary residents.

[RANGE: 0-10]

|_|_|

[PROGRAMMER NOTE: DISPLAY 370-380 ON SAME SCREEN]

BASE: ALL RESPONDENTS
Q370 "0" means "Completely Disagree" and "10" means "Completely Agree"</font

We all have a right to the preservation of a safe and stable global environment and should not have to depend on peoples' willingness to pay to get it.

[RANGE: 0-10]

|_|_|

BASE: ALL RESPONDENTS
Q375 I already pay far too much in taxes and contributions to consider paying more to address global climate change.

[RANGE: 0-10]

|_|_|

BASE: ALL RESPONDENTS
Q380 I don't trust most residents to have well informed views on environmental issues like global climate change.

[RANGE: 0-10]

|_|_|

BASE: ALL RESPONDENTS
Q385 Suppose that the Kyoto Protocol was ratified by the Senate and the U.S. worked with other industrialized countries to reduce “greenhouse gas” emissions. On a scale from 0 to 10, where “0” means"Certain that the Kyoto Protocol will have no effect on global warming" and “10” means"Certain it will reduce global warming", how likely is it that the treaty would reduce global warming?

[RANGE: 0-10]

|_|_|

PROGRAMMER NOTE: "TURN OFF" INFORMATION MENU FOR ENHANCED GROUP FROM Q.276/2

[PROGRAMMER NOTE: DISPLAY 390-395 ON SAME SCREEN]

BASE: ENHANCED RESPONDENTS (Q276/2)

Q390 We would appreciate your candid evaluation of the information menu links that are included with this survey. There are 27 information menu links included with the survey. About how many of these links did you review as you took the survey?

[RANGE: 0-27]

☐☐

BASE: ENHANCED RESPONDENTS (Q.276/2)

Q395 Overall, about how many minutes did you spend reading the information menu links?

[RANGE: 0-99]

|_|_|

SECTION 400: MORE CV RESEARCH QUESTIONS

[PROGRAMMER NOTE: DISPLAY 400-405 ON SAME SCREEN]

BASE: ENHANCED RESPONDENTS (Q276/2)

Q400 On a scale from 0 to 10, where “0” means "No use at all" and “10” means"Extremely useful", how useful were the links in informing you about the global climate change debate?

{RANGE: 0-10]

|_|_|

BASE: ENHANCED RESPONDENTS (Q276/2)

Q405 On a scale from 0 to 10 where "0" means "The information links were strongly biased against the argument that human activities are causing average global temperatures to rise", "5" means "The links were balanced and neutral" and "10" means "The information links were strongly biased in favor of the argument that human activities are causing average global temperatures to rise," how would you evaluate the information links?

[RANGE: 0-10]

|_|_|

BASE: ALL RESPONDENTS
Q410 As you know, the campaign for the 2000 Presidential election is currently underway. If the election were held today, and you could choose among the following candidates, for whom would you vote:

[DO NOT ROTATE]

1 George W. Bush
2 Al Gore
3 John McCain
4 Bill Bradley
5 Someone else
6 Would not vote

BASE: ALL RESPONDENTS
Q415 To the best of your knowledge, which of the current presidential candidates have taken the strongest position in favor of making international agreements to reduce the production of "greenhouse gasses"?

[DO NOT ROTATE]

1 George W. Bush
2 Al Gore
3 John McCain
4 Bill Bradley
5 Someone else

BASE: ALL RESPONDENTS
Q418 On average, how many times per week do you watch news on television?

{RANGE: 0-99]

|_|_|

BASE: ALL RESPONDENTS
Q420 With which political party do you identify?

1	Democratic party	[Ask Q.425]
2	Republican (GOP) party	[Ask Q.425]
3	Green party	[Ask Q.425]
4	Reform party	[Ask Q.425]
5	Other party	[Jump to Q.430]
6	No party affiliation	[Jump to Q.430]

BASE: IDENTIFIES WITH DEMOCRATIC ,REPUBLICAN, GREEN, REFORM PARTY (Q420/1-4)
Q425 To what extent do you identify with the [INSERT RESPONSE FROM Q.420]?

1 Completely
2 Somewhat
3 Slightly

BASE: ALL RESPONDENTS
Q430 On a scale of political ideology, individuals can be arranged from strongly liberal to strongly conservative.

Which of the following categories best describes your views?

1 Strongly liberal
2 Liberal
3 Slightly liberal
4 Middle of the road
5 Slightly conservative
6 Conservative
7 Strongly conservative

8 Decline to answer

[PROGRAMMER NOTE: DISPLAY Q435-440 ON SAME SCREEN]
BASE: ALL RESPONDENTS
Q435 Are you currently registered to vote?

1 Yes
2 No

BASE: ALL RESPONDENTS
Q440 Do you belong to any environmental groups or organizations?

1 Yes
2 No

SECTION 900: DEMOGRAPHICS

[PROGRAMMER NOTE: DISPLAY Q900-906 ON ONE SCREEN]

BASE: ALL RESPONDENTS
Q900 The next few questions ask for your demographic information.

[PROGRAMMER NOTE: PLACE THE FOLLOWING IN A BOX AS INDICATED; UNDO STANDARD BOLD FONT AND DISPLAY IN NORMAL TYPE]

Are you wondering <B> **why** </B> we ask these demographic questions? We collect this demographic and "webographic" information so that we can properly generalize survey results to the greater population. In addition, this information helps us ensure that we have sufficient diversity among our respondents. Individuals' data are summarized and individual answers will be kept strictly confidential. If you have additional questions or concerns about our collection of this information, you will have an opportunity to share them with us at the end of the survey.

BASE: ALL RESPONDENTS
Q909 In what country do you currently reside?
[DROP DOWN MENU WITH CHOICES LISTED—SEE STANDARD RESPONSES]

BASE: ALL RESPONDENTS

Q912 What type of Internet connection do you have for your home computer or other primary computer?

1 14.4k modem
2 28.8k modem
3 33.6k modem
4 56k modem
5 128k modem
6 Cable modem
7 T1 or T3 line
8 ISDN line
9 ADSL/DSL
10 Other
98 Not sure

[PROGRAMMER NOTE: DISPLAY Q913-Q914 ON SAME SCREEN]

BASE: ALL RESPONDENTS

Q913 Do you have regular access to a computer at your residence?

1 Yes
2 No

BASE: ALL RESPONDENTS

Q914 Do you have regular access to a computer outside of your home, such as at work or school?

1 Yes
2 No

[PROGRAMMER NOTE: DISPLAY 915-916 ON SAME SCREEN]

BASE: ALL RESPONDENTS

Q-915 Approximately how often do you log on to the Internet?

1 Every day
2 Several times a week
3 About once a week
4 Several times a month
5 Less than once a month

BASE: ALL RESPONDENTS

Q916 Do you use the Internet for… Please check all that apply.

[MULTIPLE RESPONSE]

1 Making purchases
2 Gathering information
3 None of the above

BASE: ALL RESPONDENTS

Q917 In the last 6 months, about how many surveys have you completed for the Harris Poll Online?

|_|_|

BASE: ALL RESPONDENTS

Q918 How many different residential phone lines do you have in your household? By this we mean phone with separate numbers, but do not include business lines or cellular phones.

|_|_|

[PROGRAMMER: DISPLAY Q935 TO Q941 ON ONE SCREEN]

BASE: ALL RESPONDENTS

Q935 What is your marital status?

1 Married
2 Single
3 Divorced
4 Separated
5 Widowed
6 Living with partner

BASE: ALL RESPONDENTS

Q938 Including you, how many adults (age 18 or over) live in this household?

[RANGE: 1-20]

|_|_|

BASE: ALL RESPONDENTS

Q941 How many children under the age of 18 live in this household?

[RANGE: 0-15]

|_|_|

IF 0 AT Q941, JUMP TO Q946. OTHERS ASK Q943

BASE: HAS CHILDREN UNDER 18 (Q941=1-15)

Q943 What best describes their age(s)? <I>*Please check all that apply.* </I>

[MULTIPLE RESPONSE]

1 Under 6
2 6-12
3 13-17

[PROGRAMMER NOTE: DISPLAY Q946 THROUGH Q949 ON ONE SCREEN]

BASE: U.S. RESPONDENTS (Q909/U.S.)
Q946 What is the highest level of education you have completed or the highest degree you have received?

1 Less than high school
2 Completed some high school
3 High school graduate or equivalent (e.g. GED)
4 Completed some college, but no degree
5 College graduate (e.g., B.A., A.B., B.S.)
6 Completed some graduate school, but no degree
7 Completed graduate school (e.g., M.S., M.D., Ph.D.)

BASE: U.S. RESPONDENTS (Q909/U.S.)
Q949 What is your employment status?

1 Employed full-time
2 Employed part-time
3 Self Employed
4 Not employed, but looking for work
5 Not employed and not looking for work
6 Retired
7 Disabled
8 Student
9 Homemaker

BASE: ALL RESPONDENTS
Q950 Which of the following groups includes your estimated household income for 1998?

1 Less than $50,000 [Ask Q.951]
2 $50,000-$99,999 [Jump to Q.952]
3 $100,000 or more [Jump to Q.953]
4 Decline to answer [Jump to Q960]

BASE: LESS THAN $50,000 INCOME (Q.950/1)
Q951 Please select the choice below that best describes your 1998 estimated household income.

1 Less than $5,000 [Jump to Q960]

2	$5,000 to $9,999	[Jump to Q960]
3	$10,000 to $14,999	[Jump to Q960]
4	$15,000 to $19,999	[Jump to Q960]
5	$20,000 to $24,999	[Jump to Q960]
6	$25,000 to $29,999	[Jump to Q960]
7	$30,000 to $34,999	[Jump to Q960]
8	$35,000 to $39,999	[Jump to Q960]
9	$40,000 to $44,999	[Jump to Q960]
10	$45,000 to $49,999	[Jump to Q960]
99	Decline to answer	[Jump to Q960]

BASE: $50-$99,999 INCOME (Q950/2)

Q952 Please select the choice below that best describes your 1998 estimated household income.

1	$50,000 to $54,999	[Jump to Q960]
2	$55,000 to $59,999	[Jump to Q960]
3	$60,000 to $64,999	[Jump to Q960]
4	$65,000 to $69,999	[Jump to Q960]
5	$70,000 to $74,999	[Jump to Q960]
6	$75,000 to $79,999	[Jump to Q960]
7	$80,000 to $84,999	[Jump to Q960]
8	$85,000 to $89,999	[Jump to Q960]
9	$90,000 to $94,999	[Jump to Q960]
10	$95,000 to $99,999	[Jump to Q960]
99	Decline to answer	[Jump to Q960]

BASE: $100,000 OR MORE INCOME (Q950/3)

Q953 Was your income…?

1	Less than $150,000	[Ask Q954]
2	$150,000-$199,999	[Jump to Q955]
3	$200,000 or more	[Jump to Q956]
99	Decline to answer	[Jump to Q960]

BASE: LESS THAN $150,000 INCOME (Q953/1)

Q954 Please select the choice below that best describes your 1998 estimated household income.

1	$100,000 to $104,999	[Jump to Q960]
2	$105,000 to $109,999	[Jump to Q960]
3	$110,000 to $114,999	[Jump to Q960]
4	$115,000 to $119,999	[Jump to Q960]
5	$120,000 to $124,999	[Jump to Q960]
6	$125,000 to $129,999	[Jump to Q960]
7	$130,000 to $134,999	[Jump to Q960]

8 $135,000 to $139,999 [Jump to Q960]
9 $140,000 to $144,999 [Jump to Q960]
10 $145,000 to $149,999 [Jump to Q960]
11 Decline to answer [Jump to Q960]

BASE: $150-199,999 INCOME (Q953/2)

Q955 Please select the choice below that best describes your 1998 estimated household income.

1 $150,000 to $154,999 [Jump to Q960]
2 $155,000 to $159,999 [Jump to Q960]
3 $160,000 to $164,999 [Jump to Q960]
4 $165,000 to $169,999 [Jump to Q960]
5 $170,000 to $174,999 [Jump to Q960]
6 $175,000 to $179,999 [Jump to Q960]
7 $180,000 to $184,999 [Jump to Q960]
8 $185,000 to $189,999 [Jump to Q960]
9 $190,000 to $194,999 [Jump to Q960]
10 $195,000 to $199,999 [Jump to Q960]
11 Decline to answer [Jump to Q960]

BASE: $200,000 OR MORE INCOME (Q953/3)

Q956 Please select the choice below that best describes your 1998 estimated household income.

1 $200,000 to $204,999 [Jump to Q960]
2 $205,000 to $209,999 [Jump to Q960]
3 $210,000 to $214,999 [Jump to Q960]
4 $215,000 to $219,999 [Jump to Q960]
5 $220,000 to $224,999 [Jump to Q960]
6 $225,000 to $229,999 [Jump to Q960]
7 $230,000 to $234,999 [Jump to Q960]
8 $235,000 to $239,999 [Jump to Q960]
9 $240,000 to $244,999 [Jump to Q960]
10 $245,000 to $249,999 [Jump to Q960]
11 Decline to answer [Jump to Q960]

[PROGRAMMER NOTE: DISPLAY Q960 AND Q963 ON ONE SCREEN]

BASE: U.S. RESPONDENTS (Q909/U.S.)

Q960 In what state or territory do you currently reside?

[DROP DOWN MENU WITH CHOICES LISTED—SEE STANDARD RESPONSES]

BASE: U.S. RESPONDENTS (Q909/U.S.)
Q963 What is your zip code? <I> *Please enter only the first five digits.* </I>

[PROGRAMMER NOTE: ALLOW ONLY 5 DIGIT, NUMERIC CODE]

|__|__|__|__|__|

[PROGRAMMER NOTE: DISPLAY Q966 AND Q969 ON ONE SCREEN]

BASE: CANADIAN RESPONDENTS (Q909/CANADA)
Q966 In what province or territory do you currently reside?
[DROP DOWN MENU WITH CHOICES LISTED—SEE STANDARD RESPONSES]

BASE: CANADIAN RESPONDENTS (Q909/CANADA)
Q969 What is your postal code?

[PROGRAMMER NOTE: ALLOW 10 DIGIT, ALPHA NUMERIC CODE]

|__|__|__|__|__|__|__|__|__|__|

BASE: NON-U.S./CANADIAN RESPONDENTS (Q909/NOT U.S., NOT CANADA)
Q972 What is your postal or zip code?

[PROGRAMMER NOTE: ALLOW 10 DIGIT, ALPHA NUMERIC CODE]

|__|__|__|__|__|__|__|__|__|__|

[PROGRAMMER NOTE: DISPLAY Q975 AND Q978 ON ONE SCREEN]

BASE: U.S. RESPONDENTS (Q909/U.S.)
Q975 Are you of Hispanic origin, such as Mexican American, Latin American, Puerto Rican, or Cuban?

1 Yes, of Hispanic origin
2 No, not of Hispanic origin
99 Decline to answer

BASE: U.S. RESPONDENTS (Q909/U.S.)
Q978 Do you consider yourself…?

1	White	JUMP TO Q985
2	Black	JUMP TO Q985
3	African American	JUMP TO Q985
4	Asian or Pacific Islander	JUMP TO Q985
5	Native American or Alaskan native	JUMP TO Q985
6	Mixed racial background	JUMP TO Q980
7	Other race [SPECIFY AT Q979]	ASK Q979
99	Decline to answer	JUMP TO Q985

BASE: OTHER RACE (Q978/7)

Q979 Please specify what race you consider yourself.

[TEXT BOX]

BASE: MIXED RACIAL BACKGROUND RESPONDENTS (Q978/6)

Q980 You indicated that you consider yourself of a mixed racial background. With which of the following racial groups do you most closely identify? <I> *Please select all that apply.* </I>

[MULTIPLE RESPONSE]

1 White
2 Black
3 African American
4 Asian or Pacific Islander
5 Native American or Alaskan native
6 Other race
99 Decline to answer

Appendix C: Information Menu Pages

The following pages are intended to provide a balanced presentation of research and informed opinion about global warming and the Kyoto Protocol. As the literature dealing with global warming is diverse and growing rapidly, the material is broadly representative rather than comprehensive. Please feel free to visit as many pages as you like before moving on to the next survey question.

Global Warming Theory
- Basic "Greenhouse" Mechanism
  - Greenhouse Gases
  - Carbon Dioxide Changes
- Feedback Mechanisms
  - Feedbacks Related to Carbon Dioxide and Methane
  - Feedbacks Related to Water Vapor, Clouds, and Ice Cover
  - Feedbacks Related to Ocean Currents
- Aerosol Offsets
- Temperature Predictions under Current Policy

Evidence of Global Warming
- Ground-Based Measurements
- Atmospheric Measurements

Consequences of Global Warming
- Sea Level Changes
- Ecological Effects
- Agricultural Effects
- Health Effects
- Weather Extremes

Alternative Theories and Explanations for Apparent Warming
- Solar Cycles
- Measurement Issues
- Modeling Limitations

Kyoto Protocol on Climate Change
- Background
- Country Commitments
- Flexibility Mechanisms
- Predicted Impacts under Full Implementation

Ratification Status, Political Views, and Public Opinion
- Ratification Status
- Views in Opposition to Ratification of the Kyoto Protocol
- Views in Favor of Ratification of the Kyoto Protocol
- Selected Reports from Public Opinion Surveys

Basic "Greenhouse" Mechanism

The sun warms the Earth with radiant energy. For the average surface temperature of the Earth to remain constant, the total radiant energy emitted back into space from the top of the atmosphere must balance the total radiant energy entering the atmosphere. If more solar energy reaches Earth than is being radiated back into space, then the temperature of the Earth must rise to increase the amount of radiation that it emits. Some components of the atmosphere, called "greenhouse gases," absorb energy so there is a greater difference in temperature between the surface of the Earth and the upper surface of the atmosphere than there would be in their absence. In order for radiant energy emitted into space from the top of the atmosphere to balance the incoming solar radiation, the temperature of the Earth's surface must rise with the addition of greenhouse gases. This warming effect, similar to that caused by the glass of a greenhouse, is called the *greenhouse effect*.

Approximately 99 percent of the Earth's atmosphere is made up of the gases nitrogen (78 percent) and oxygen (21 percent). If the atmosphere consisted of *only* these two gases, then the average surface temperature of the Earth would be much colder than it actually is – about 21 degrees Fahrenheit (minus 6 degrees Centigrade). But the Earth's atmosphere contains a number of greenhouse gases, including carbon dioxide, water vapor, methane, oxides of nitrogen, halocarbons, and ozone. By decreasing the amount of energy emitted from the Earth into space, the presence of these greenhouse gases raises the average surface temperature of the Earth to about 59 degrees Fahrenheit (15 degrees Centigrade). This temperature difference attributed to the presence of greenhouse gases is referred to as the *natural greenhouse effect*.

Human activities, primarily the burning of fossil fuels and deforestation, are increasing the quantities of greenhouse gases in the atmosphere. If current trends continue, then in about fifty years the concentration of carbon dioxide in the atmosphere will reach a level twice as high as it was just prior to the industrial revolution. In the absence of any other changes to the Earth's atmosphere or surface, this doubling of carbon dioxide concentration would require the average temperature of the Earth's surface to rise by about 2.2 degrees Fahrenheit (1.2 degrees Centigrade). Assessments of changes likely to occur with this increase, referred to as *feedbacks*, have led a many of climatologists to predict that the increase in the average temperature of the Earth's surface will be between 1.8 and 6.3 degrees Fahrenheit (1.0 and 3.5 degrees Centigrade). The temperature increase resulting from human activity is sometimes referred to as the *enhanced greenhouse effect*.

Primary source:

John Houghton, ***Global Warming: The Complete Briefing*** 2nd ed. (New York: Cambridge University Press, 1997).

Greenhouse Gases

Greenhouse gases contribute to higher global temperatures by trapping infrared radiation emitted from the Earth and lower atmosphere. The major greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, oxides of nitrogen, halocarbons, and ozone. In discussions of global warming, most attention is focused on those greenhouse gases that are long-lived and well-mixed in the atmosphere. Although water vapor is a powerful greenhouse gas, it is neither long-lived nor well-mixed. Ozone is long-lived, but not well mixed. The relative importance of the greenhouse gases is measured by how much their increases caused by human activity contribute to *radiative forcing*, the net watts per square meter that must be radiated at the top of the lower atmosphere (troposphere) to maintain an energy balance.

The following table summarizes the major categories of long-lived greenhouse gases:

Major Long-Lived and Well-Mixed Greenhouse Gases

	Major Sources	Concentrations Current [Pre-industrial] (parts per million by volume)	Contribution to Radiative Forcing as Percent of Total Contribution of Long-Lived and Well-Mixed Greenhouse Gases
Carbon Dioxide	Respiration, decomposition of organic matter, fossil fuel burning, deforestation and land-use changes, cement production	360 [280]	64
Methane	Wetlands and bogs, rice paddies, cattle, termites, landfills, fossil fuel production, biomass burning	1.8 [0.7]	19
Oxides of Nitrogen	Microbes in soil and ocean, burning of timber and fossil fuels, fertilizers	.0312 [.0275]	6
Halocarbons	Chlorofluorocarbons used in refrigerants, air conditioners, solvents, and aerosol spray cans; insulation and fire extinguishers	.001 [.000]	6-10

Carbon dioxide has a central focus in consideration of global warming for two reasons. First, it accounts for a majority of the radiative forcing associated with the long-lived greenhouse gases. Second, its concentration in the atmosphere is continuing to increase.

Primary source:

Atmospheric Radiation Program, U.S. Department of Energy

Carbon Dioxide Changes

The concentration of carbon dioxide in the atmosphere has increased substantially since the beginning of the Industrial Revolution. Studies of air bubbles trapped in ice cores gathered in Antarctica suggest that the current concentrations of carbon dioxide have not been witnessed for 120,000 years. For several thousand years prior to 1750, the concentration of carbon dioxide remained within about 10 parts per million (ppm) of 280 ppm. Since 1750, the concentration of carbon dioxide has risen to its current level of about 360 ppm, an increase of almost 30 percent.

Since 1959, accurate measurements of carbon dioxide concentration have been made at Mauna Loa Mountain in Hawaii. A line fitted to the monthly mean averages shows a rise in carbon dioxide concentration from about 315 ppm in 1959 to about 363 ppm in 1997, an increase of over 15 percent.

Currently, the concentration of carbon dioxide appears to be increasing on average at the rate of about 1.6 ppm per year. If this rate were to continue, then the concentration of carbon dioxide would reach 560 ppm, or twice its pre-Industrial Revolution level, in about 60 years. Simultaneous increases in other greenhouse gases, however, mean that the Earth will have experienced the equivalent of the radiative forcing of a doubling of carbon dioxide by 2030. This doubling of the radiative-forcing equivalent of the carbon dioxide concentration forms the basis for most models of global climate change.

A number of factors make the prediction of carbon dioxide concentration over the next century uncertain. Predicting the amount of carbon dioxide introduced into the atmosphere by human activity, primarily through the burning of fossil fuels and land-use changes, requires assumptions about population growth, economic growth, and changes in energy efficiency. Predicting changes in the natural processes that move carbon among the atmosphere, oceans, and land biota also require numerous assumptions. Consequently, while it is quite certain that carbon dioxide concentrations have increased substantially in modern times, and that they are continuing to increase, predictions of concentrations over longer periods of time are much less certain.

Primary Sources:

Atmospheric Radiation Program, U.S. Department of Energy

John Houghton, ***Global Warming: The Complete Briefing*** 2nd ed. (New York: Cambridge University Press, 1997).

Feedback Mechanisms

The theory and evidence linking increasing concentrations of greenhouse gases to at least some global warming are quite strong. Predicting the actual increase in global warming, however, requires scientists to take account of a number of complicated processes that enhance or moderate the radiative forcing of the greenhouse gases. Assumptions about these processes, referred to as *feedback mechanisms*, account for much of the variation in predictions of global warming.

One set of important feedback mechanisms are related to biological processes in the ocean and the land biosphere. These include the effects of temperature on plankton populations, respiration, forest ecosystems, and decay in wetlands (all *positive* feedbacks that are likely to enhance the effects of greenhouse gases), as well as the effects of increased carbon dioxide concentration on plant growth (a *negative* feedback likely to dampen the effects of greenhouse gases).

A second set of important feedback mechanisms operate through changes in the composition and distribution of water globally. Increases in water vapor in the atmosphere enhance the greenhouse effect, while changes in cloud patterns can either enhance or dampen it. Additionally, increases in the accumulation of ice and snow effect the absorption of radiant energy, generally damping the greenhouse effect.

A third set of important feedback mechanisms operate through the circulation of water in the oceans. Both ocean currents that move water near the surface, as well as circulation between the warmer surface and colder deep waters influence how global climates respond to the green house effect.

Primary source:

John Houghton, ***Global Warming: The Complete Briefing*** 2nd ed. (New York: Cambridge University Press, 1997).

Feedbacks Related to Carbon Dioxide and Methane

Scientists have identified a number of biological process that can either enhance (provide positive feedback) or moderate (provide negative feedback) the greenhouse effect:

Plankton multiplier (positive feedback) – Plankton are very small plants (phytoplankton) and animals (zooplankton) that live near the surface of the ocean. The phytoplankton undergo an explosion of growth, or bloom, in the spring when nutrients brought near the surface by colder water in the winter combine with increasing sunlight. This growth removes carbon dioxide from the atmosphere. Warmer global temperatures, however, reduce the winter mixing of nutrient rich cold waters with warmer surface waters, which reduces the phytoplankton bloom. Consequently, warmer temperatures reduce the carbon locked up in the oceans, and thus contribute to higher concentrations of carbon dioxide in the atmosphere, which in turn can enhance the greenhouse effect.

Carbon dioxide fertilization (negative feedback) – Plants absorb carbon dioxide from the atmosphere during photosynthesis. Higher concentrations of carbon dioxide accelerate the growth process by acting as a fertilizer. Consequently, more carbon is locked up in plants, which reduces concentrations of carbon dioxide in the atmosphere, which in turn moderates the greenhouse effect.

Increased respiration (positive feedback) – Plants and animals combine oxygen with food to create energy, water vapor, and carbon dioxide. Higher temperatures increase the amount of respiration, most notably for microbes in the soil. Consequently, warmer temperatures increase concentrations of carbon dioxide, which in turn enhances the greenhouse effect.

Stress on forests (positive feedback) – Trees absorb carbon dioxide from the atmosphere and sequester it as carbon in wood. Forests, which cover about 30 percent of the land area of the Earth, play an important role in regulating the concentration of carbon dioxide in the atmosphere. Global warming changes the ranges of various tree species. As trees grow relatively slowly, these changes put stress on forests that is likely to reduce the net amount of carbon dioxide they absorb until their species adjust to their new ranges. Consequently, by stressing forests, warmer temperatures contribute to higher concentrations of carbon dioxide, which in turn enhances the greenhouse effect.

Methane release from wetlands (positive feedback) – About 20 percent of methane emissions into the atmosphere come from microbes in natural wetlands. Global warming increases microbial activity. Consequently, warmer temperatures increase the natural emission of methane, which in turn enhances the greenhouse effect.

Primary source:

J.T. Houghton et al., editors, ***Climate Change 1995: The Science of Climate Change*** (New York: Cambridge University Press, 1996).

Feedbacks Related to Water Vapor, Clouds, and Ice Cover

Scientists have identified a number of ways that changes in the distribution and phase (liquid, vapor, or solid) of the Earth's water can either enhance (provide positive feedback) or moderate (provide negative feedback) the greenhouse effect:

Increased water vapor (positive feedback) – Higher atmospheric temperatures increase evaporation from the oceans and wet land surfaces. The increased evaporation results in higher concentrations of water vapor in the atmosphere. Water vapor is itself one of the most important greenhouse gases. Consequently, higher temperatures result in higher concentrations of this greenhouse gas, thus enhancing the greenhouse effect. The magnitude of the effect, however, depends upon the extent to which water vapor reaches the troposphere, an as yet unresolved scientific question.

Changes in cloud patterns (positive or negative feedback) – Increases in atmospheric water vapor resulting from higher temperatures affect cloud formation. Although changes in precipitation complicate the process, the higher concentrations of water vapor are likely to increase cloud cover. Clouds affect global temperatures in two ways. First, clouds contribute to cooling by reflecting radiation back into space. Second, clouds contribute to warming by holding heat within the atmosphere. Which effect dominates depends on the height of the cloud and its optical properties. Generally, the cooling effect dominates for lower clouds, while the warming effect dominates for higher clouds. Consequently, the net effect of increased cloud cover could either enhance or moderate the greenhouse effect.

Changes in ice and snow cover (positive feedback) – The fraction of light reflected (albedo) by ice and snow is greater than that reflected by vegetation. Land covered by ice or snow, or water covered by ice, thus contribute to cooling by reflecting more sunlight back into space. Possible reductions in the sizes and integrity of ice sheets caused by global warming, especially those in polar regions that remain in place during summer months when sunlight is strongest, may enhance global warming. Increases in water vapor and clouds accompanying global warming are expected to increase precipitation at higher Northern Hemisphere latitudes. To the extent that this precipitation falls during winter months as snow, there would be a net increase in snow and ice cover that would moderate global warming. Most scientists currently see the combined effects of increasing temperature and precipitation on ice and snow cover as enhancing the greenhouse effect.

Primary sources:

John Houghton, ***Global Warming: The Complete Briefing*** 2nd ed. (New York: Cambridge University Press, 1997).

Fred Pearce, "Greenhouse Wars," ***New Scientist***, No. 2091, 19 July 1997.

Feedbacks Related to Ocean Currents

The oceans, which cover approximately 70 percent of the surface of the Earth, play a fundamental role in the determination of climate. Oceans have much greater thermal inertia than the atmosphere – the top three meters of the oceans have greater heat capacity than the entire atmosphere so that ocean temperatures change much more slowly than atmospheric temperatures. Ocean currents transfer large amounts of heat from warmer to cooler regions. As ocean currents depend on salinity and temperature differences (thermohaline circulation) and wind stress on ocean surfaces (wind driven circulation), changes in global temperatures, precipitation, and wind patterns can create feedbacks by affecting ocean currents.

The density of water increases as it gets colder and more saline (salty). In the North Atlantic and areas of the Antarctica seas, cold surface waters increase in salinity as ice forms. This dense water sinks toward the bottom of the ocean and then spreads toward warmer equatorial waters. To balance these deep flows of cold water, warmer surface waters from equatorial regions flow toward the poles. The melting of ocean ice and greater precipitation at higher latitudes caused by global warming would reduce thermohaline circulation by reducing the salinity of polar waters. Reductions in circulation would result in warmer but more variable ocean surface temperatures. Consequently, reductions in thermohaline circulation are likely to enhance the greenhouse effect.

Changes in wind patterns can affect ocean currents by altering mechanical, thermal, and evaporative processes at the interface between the atmosphere and water surface. These effects are potentially very large. Unfortunately, scientific knowledge is currently insufficient to assess whether these interactions are likely to enhance or moderate the greenhouse effect.

Primary source:

J.T. Houghton et al., editors, ***Climate Change 1995: The Science of Climate Change*** (New York: Cambridge University Press, 1996).

Aerosol Offsets

Both natural processes and human activity result in the suspension of small particles of matter in the atmosphere. Wind lifts particles from land, especially in arid regions, and from ocean spray. Forest fires and volcanoes also produce large influxes of particles over short periods. The burning of biomass, especially in the use of fire to clear forests for agriculture, and the burning of fossil fuels in energy production increase the concentration of particles in the atmosphere. Especially important to climate change are sulfate particles, which result from chemical reactions in the atmosphere involving sulfur dioxide given off in the burning of coal and petroleum. These particles, which are often referred to as *aerosols*, offset the radiative forcing of greenhouse gases and thereby contribute to global cooling.

Aerosols tend to offset the radiative forcing of greenhouse gases in two ways. First, aerosols both absorb solar energy and reflect it back into space. Second, large concentrations of aerosols can contribute to clouds with smaller droplets, increasing their reflectivity. Consequently, predictions of global warming must take account of changes in aerosols.

Aerosols are generally poorly mixed globally and usually short-lived – they tend to remain in the regions in which they are formed. As concentrations of aerosols tend to be higher in the more populous and industrial Northern Hemisphere, they exert a stronger cooling effect in the Northern Hemisphere than in the Southern Hemisphere. Major volcanic eruptions can inject large quantities of particles sufficiently high into the atmosphere to produce global cooling over a period of several years. For example, the Mount Pinatubo eruption in 1991 appears to have lowered global average temperatures by about .45 degrees Fahrenheit (.25 degrees Centigrade) for the following two years.

Predictions of global warming require scientists to take account of the aerosol offset.

Primary source:

John Houghton, ***Global Warming: The Complete Briefing*** 2nd ed. (New York: Cambridge University Press, 1997).

Temperature Predictions under Current Policy

In 1988 the World Meteorological Organization and the United Nations Environment Program established the Intergovernmental Panel on Climate Change (IPCC) to assess available scientific evidence on climate change, interpret its implications for society, and formulate possible response strategies. In 1995 the IPCC predicted that an increase in radiative forcing equivalent to a doubling of the pre-Industrial concentration of carbon dioxide occurring in the middle of the next century would result in an increase in global mean surface temperature in 2100 of between 1.8 and 6.3 degrees Fahrenheit (1.0 and 3.5 degrees Centigrade) above the 1990 level of 59 degrees Fahrenheit (15 degrees Centigrade).

The following quote from the 1995 report of the IPCC elaborates on this prediction:

"For the mid-range IPCC emission scenario, IS92a, assuming the 'best estimate' value of climate sensitivity and including the effects of future increases in aerosol, models project an increase in global mean surface air temperature relative to 1990 of about 2EC by 2100. This estimate is approximately one third lower than the 'best estimate' in 1990. This is due primarily to lower emission scenarios (particularly for CO_2 and CFCs), the inclusion of the cooling effect of sulphate aerosols, and improvements in treatment of the carbon cycle. Combining the lowest IPCC emission scenario (IS92c) with a 'low' value of climate sensitivity and including the effects of future changes in aerosol concentrations leads to a projected increase of about 1EC by 2100. The corresponding projection for the highest IPCC scenario (IS92e) combined with a 'high' value of climate sensitivity gives a warming of about 3.5EC. In all cases the average rate of warming would probably be greater than any seen in the last 10,000 years, but the actual annual to decadal changes would include considerable natural variability. Regional temperature changes could differ substantially from the global mean value. Because of thermal inertia of the oceans, only 50-90% of the eventual equilibrium temperature change would have been realized by 2100 and temperature would continue to increase beyond 2100, even if concentrations of greenhouse gases were stabilised by that time." ***Climate Change 1995: The Science of Climate Change*** (p. 5-6).

Several points are worth noting. First, the IPCC as a broadly representative scientific group probably provides a balanced assessment of the current state of climate science, though a number of scientists view its conclusions as too pessimistic. Second, the range of temperature increase should be interpreted as very probably, rather than certainly, including the actual increase that will be realized. That is, there is perhaps about one chance in ten that the actual value will fall outside this range. Third, as more is learned and climate models are refined, the "best" estimate as well as the range of temperature increase are likely to change. Indeed, their has been a trend toward lower predictions and tighter ranges as climate models have been improved.

Primary source:

J.T. Houghton et al., editors, ***Climate Change 1995: The Science of Climate Change*** (New York: Cambridge University Press, 1996).

Ground-based Evidence of Global Warming

In order to find a warming trend in the average global temperature, it is necessary to collect appropriate data covering many locations over an extended period of time. A primary source of data is ground-based measurements made over both land and sea. Weather stations making consistent observations for the last 130 years provide land-based measurements. Nearly 60 million naval observations, which have been made for the most part by merchant marine vessels, provide sea-based measurements for roughly the same period of time. These data are organized by placing their locations into squares of one degree latitude and one degree longitude. The mean global temperature is calculated by first averaging the values within each square, and then averaging the results over the squares.

Scientists must use less direct methods to estimate temperatures over longer periods of time. These sources include tree rings, records of lake levels, locations of glacier advance and retreat, pollen distributions, and, most importantly, ice cores. From these proxies, the temperature can be estimated, though with less precision as one goes further back in time. A recent study focusing on the past six centuries has shown that, while temperature appeared to vary primarily with changes in solar radiation and volcanic eruptions for the first 400 years, over the past century the dominant factor affecting temperature variations appears to be increases in levels of greenhouse gases.

Since 1860, there has been an increase in the average global temperature of between 0.54 and 1.08 degrees Fahrenheit (0.3 and 0.6 degrees Centigrade). In the second half of the century, the warming has been far greater in the nighttime than the daytime. Another recent study has shown that the average minimum (nighttime) temperature has increased 0.335 degrees Fahrenheit (0.186 degrees Centigrade) per decade. Over the same period, of 1950 to 1993, the globally averaged maximum (daytime) temperature increased by only 0.158 degrees Fahrenheit (0.088 degrees Centigrade) per decade. This trend would seem to support the skeptics' argument that the temperature change is related to the urban heat island phenomenon—as cities expand horizontally and vertically, they become a cavity of heat and prevent it from escaping at night. But when the study excluded the weather stations near large urban centers (approximately 1,300 out of a total of 5,400), the results changed by only 10 percent, suggesting that the warming trend is not due to the urban heat island phenomenon.

Primary Sources:

Michael Mann, et al, "Global-Scale Temperature Patterns and Climate Forcing over the Past Six Centuries," ***Nature,*** No. 392, 23 April 1998, 779-787.

Richard Monastersky, "Global Warming Lurks Principally at Night," ***Science News***, No. 153, 19 July 1997.

Atmospheric Evidence of Global Warming

While reliable ground-based measurements of temperature have existed for more than a century, the same is not true of atmospheric measurements. Dependable observations from weather balloons only go back to 1958, while global measurements via satellites did not begin until 1979 with the Microwave Sounding Unit (MSU) project. The MSU project estimates temperature from radiation emitted at a specific frequency by oxygen molecules. A debate has ensued over initial results showing that the part of the atmosphere approximately 2.2 miles (3.5 kilometers) above the surface, known as the lower troposphere, has cooled by 0.09 degrees Fahrenheit (0.05 degrees Centigrade) per decade. Over the same time period, the weather balloons show a cooling trend of only 0.036 degrees Fahrenheit (0.02 degrees Centigrade) per decade.

Scientists agree that as altitude increases, the temperature decreases. This decrease is not large enough to explain the difference in results between weather balloon and MSU project measurements. Further, the fact that the temperature of the middle troposphere is measured to be warmer than the lower troposphere appears to be an inconsistency in the data. Critics argue that the initial results did not take into account the orbital decay of the satellites, which lowers their altitude by nearly three-quarters of a mile (1.2 kilometers) a year. Taking orbital decay into consideration, the data indicate a warming trend of about 0.126 degrees Fahrenheit (0.07 degrees Centigrade) per decade.

The short length of time of the MSU project raises another concern about satellite data. Data from weather balloons demonstrates sensitivity to the period of observation. >From 1979 to 1996 the trend reported is a cooling one of 0.036 degrees Fahrenheit (0.02 degrees Centigrade) per decade. However, if the record is extended back to 1958, a warming trend of 0.288 degrees Fahrenheit (0.16 degrees Centigrade) per decade appears. Most likely, the recent results are skewed by the warm El Nino of 1982-83 in the beginning of the study, and the cooling at the end of the study that resulted from the eruption of Mount Pinatubo in 1991. Statistically removing these anomalies suggests a warming trend for the 1979 to 1996 period of approximately 0.18 degrees Fahrenheit (0.10 degrees Centigrade) per decade.

Primary Sources:

John Houghton, ***Global Warming: The Complete Briefing*** 2nd ed. (New York: Cambridge University Press, 1997).

Richard Kerr, "Among Global Thermometers, Warming Still Wins Out," ***Science***, No. 281, 25 September 1998, 1948-1949.

Frank Wentz and Matthias Schabel, "Effects of Orbital Decay on Satellite-Derived Lower-Tropospheric Temperature Trends," ***Nature***, Vol. 394, 13 August 1998, 661-664.

Sea-Level Effects

Predicting the consequences of global warming for the sea level involves considerable uncertainty. It is quite likely that the sea level will rise by between 5.9 to 39.4 inches (15 to 100 centimeters) by the year 2100, a wide range around the commonly reported prediction of an increase of 19.7 inches (50 centimeters) by the year 2100.

There are two major factors contributing to increases in sea level: thermal expansion of the oceans and the melting of glaciers and ice caps. Thermal expansion of the oceans is likely to account for somewhat more than one-half of the increase sea level, and the melting of glaciers outside the polar regions and in Greenland is likely to account for the rest. These factors will be offset to some extent by increased evaporation of water into the atmosphere, and increased deposits of snow at the poles and higher elevations.

While the expected contribution from Antarctica is almost negligible, there are scenarios in which its effect could create a sea-level rise of between 13.1 and 19.7 *feet* (four and six meters). This is dependent on the stability of the Western Antarctic Ice Sheet (WAIS) in a warmer climate. The WAIS contains 3.8 million cubic kilometers of ice, which began to form at least nine million years ago. It contains ice that is both grounded onto the continent and floating on water. Only the former would effect the rise of sea level if the WAIS melted or collapsed, since the latter has already displaced an equal amount of water. The probability for such an occurrence is currently considered to be very small. The most likely scenario of collapse would be a gradual melting, over a period of 500 to 700 years. This would cause a rise in sea level of 23.6 to 47.2 inches (60 to 120 centimeters) per century during the process.

Primary sources:

John Houghton, ***Global Warming: The Complete Briefing*** 2nd ed. (New York: Cambridge University Press, 1997).

Michael Oppenheimer, "Global Warming and the Stability of the West Antarctic Ice Sheet," ***Nature,*** Vol. 393, 28 May 1998, 325-331.

Ecological Effects

Rapid global warming would damage the Earth's natural ecosystems. Almost 90 percent of land surface is uncultivated, and includes large areas of forests and grasslands. A small change of temperature, as little as 1.8 degrees Fahrenheit (1.0 degree Centigrade), could devastate areas of forest. Forests will replenish themselves with new species, but this process can take several decades. The global warming accompanying a doubling of carbon dioxide concentration could affect 65 percent of the boreal forests in the Northern Hemisphere. Changes in plant species would in turn affect animal populations, perhaps leading to the extinction of some species with localized ranges.

Higher concentrations of carbon dioxide and nitrous oxide would also have noticeable effects on areas of grassland. While both gases would have a "fertilization" effect, they would favor the growth of invasive species over more native species. This would lead to an increase in the amount of carbon withdrawn from the atmosphere through photosynthesis. The amount sequestered, however, may level off due to a decline in biodiversity in certain regions. Grasslands could also see the invasion of shrubs. This has recently occurred in Texas, where mesquite shrubs have replaced the native prairie grasses. This has caused an increase in soil erosion, a shift in wildlife species, and a decrease in the amount of land available for grazing livestock.

Increased evaporation due to higher temperatures may contribute to the expansion of deserts into currently arid grasslands. Changing patterns of rainfall may also alter the current boundaries of deserts and wetlands. Coastal wetlands, especially important to many fisheries and bird populations, would be vulnerable to increases in sea level. The more rapid are these changes, the more stress placed on existing species within the currently established ecosystems.

Primary sources:

John Houghton, ***Global Warming: The Complete Briefing*** 2nd ed. (New York: Cambridge University Press, 1997).

Jocelyn Kaiser, "Green Grass, Cool Climate?" ***Science***, Vol. 274, 6 December 1996, 1610-1611.

Kathryn B. Stelljes, et al. "Preparing Agriculture for a Changing World," ***Agricultural Research***, Vol. 45, 1997, 4-15.

Agricultural Effects

The global warming associated with a doubling of carbon dioxide in the atmosphere will have mixed effects on agricultural output in the United States and around the world. The largest positive effect is carbon dioxide "fertilization." Higher concentrations of carbon dioxide increase plant growth by stimulating photosynthesis, which allows carbon to be absorbed at a higher rate. Another positive effect is related to the distribution of temperature changes. As most of the temperature increase is predicted to occur in the higher northern latitudes rather than in the tropics, the growing season in the former will be longer and produce greater crop yields. One negative effect is greater evaporation of moisture from soil during summer months, which increases the risk of drought. Another negative effect is greater precipitation in higher Northern latitudes, which could cause an increase in soil erosion, and the leaching of agricultural chemicals. Overall, these effects are likely to result in almost no change in the world's output of food, but they will generally favor developed over developing countries.

The impact of global warming on agriculture is likely to be negative for the developing countries of the world. Food impact studies generally focus on grains (wheat, rice, and corn) because they account for over half of the calorie consumption in the world. Some scientists predict that under the most likely global warming scenarios, by the year 2100, food production could decrease in developing countries by between 9 and 11 percent, though vigorous adjustments by farmers, such as planting entirely different crops and using more efficient irrigation techniques, could reduce this loss to between 6 and 8 percent. Other analysts view these predictions as too pessimistic, and see improving infrastructure and human capital development as more pressing problems.

The developed countries of Europe and North America will most likely see an increase in their grain production. By simply taking into account the carbon dioxide "fertilization" effect, grain production will at worst decrease by 4 percent, and could increase as much as 11 percent. By including the ability of farmers to adapt to the changing circumstances, it is estimated that grain production will increase somewhere between 4 and 14 percent. With respect to the United States, there will likely be an increase in agricultural production, mainly in the northern sections of the Great Lakes and Great Plains regions. Warmer areas in the southern sections of the United States, however, will probably see a reduction in their crop yields.

Primary sources:

Richard M. Adams, et al., **Agriculture & Global Climate Change** (Arlington, Virginia: Pew Center on Global Climate Change, 1999).

J. T. Houghton, et al., editors, ***Climate Change 1995: Contribution of Working Group II*** (New York: Cambridge University Press, 1996).

Health Effects

There is a great debate over what health effects, if any, will result from the predicted global warming of between 1.8 and 6.3 degrees Fahrenheit (1.0 and 3.5 degrees Centigrade). Some scientists argue that the temperature increase will cause a spread of tropical diseases into the mid-latitude regions, including the United States. These epidemics will be caused by increased mosquito populations that carry diseases such as malaria, yellow fever, dengue fever, and viral encephalitis. Currently, about 45 percent of the Earth's population lives in regions where the potential for these epidemics exist. The increase in temperature over the next half century is expected to increase this threat to approximately 60 percent of the population. Warmer ocean temperatures may cause an increase in sea-borne plankton, which carry the pathogens necessary for cholera. Scientists cite the 1991 outbreak of cholera in Peru, which accompanied the warm El Nino of that year, as evidence of increased risk of cholera epidemic.

Skeptics argue that such apocalyptic predictions have little basis and are quite simplistic. They assert that epidemics would not result from the shift in climate, but from a breakdown in the public health infrastructure. Sanitation systems, clean water, and window screens allow places at or near the tropics, such as Singapore, Hong Kong, and Hawaii, to be basically free of malaria, while surrounding areas are being ravaged by these diseases. Similarly, an outbreak of dengue fever in 1995 affected 2,000 residents of Reynosa, Mexico, while across the Rio Grande in Texas, only seven cases of the disease were confirmed. The argument that warmer climate will lead to greater mosquito populations is also problematic. For example, there are over 20 different species of mosquitoes that can carry the malaria virus in the Amazon basin. Each of these species reacts differently to climate and precipitation changes. It could easily be possible that some regions could experience decreases in malaria-carrying mosquito population from global warming.

Primary sources:

John Houghton, ***Global Warming: The Complete Briefing 2nd ed.*** (New York: CambridgeUniversity Press, 1997).

Gary Taubes, "Apocalypse Not," ***Science***, Vol. 278, 7 November 1997, 1004-1006.

Thomas Moore, "Health and Amenity Effects of Global Warming," **Economic Inquiry**, Vol. 36, no. 3, 1998, 471-488.

Weather Extremes

Scientific knowledge currently provides only a weak basis for predicting the implications of climate change for weather patterns. The consequences of global warming for weather patterns appear to fall into two categories: broad generalizations related to higher global mean temperatures and speculations about localized phenomena.

Higher global mean temperatures are expected to lead to increases in the number of extremely warm days and a decrease in the occurrence of extremely cold days. As warmer temperatures generally increase evaporation and precipitation, global warming would likely be accompanied by increases in precipitation. The evaporation itself, however, may intensify the severity of droughts.

Predictions of the consequences of global warming for the frequency and intensity of storms are less well grounded. Some models suggest that warmer ocean temperatures will make tropical storms more intense; predictions of an increase in their frequency are less well grounded. While it is plausible that global warming could increase the intensity and frequency of mid-latitude storms, including small-scale storms such as thunderstorms and squall lines, these predictions are largely speculative.

Primary sources:

J.T. Houghton et al., editors, ***Climate Change 1995: The Science of Climate Change*** (New York: Cambridge University Press, 1996).

J.D. Mahlman, "Uncertainties in Projections of Human-Caused Climate Warming," ***Science***, Vol. 278, 21 November 1997, 1416-1417.

Alternative Theory: Solar Cycles

Greenhouse gases are not the only sources of climate forcing. An argument has been made that changes in solar radiation cause global mean temperature fluctuations. The sun does not give off a constant amount of energy. Rather, it goes through cycles of varying energy output. The magnetic field of the sun varies on average over an eleven-year cycle that can be seen in the number of sunspots and faculae (bright spots) that the sun produces. In addition, solar activity follows a longer cycle known as the Gleissberg period, which lasts for 80 to 90 years. Finally, the sun sometimes enters periods in which it produces no sunspots. Such a situation occurred from 1645 to 1715, a period referred to as the Maunder Minimum.

These changes can have a great impact on the climate of the Earth. The coldest period of the Little Ice Age (1450-1850) corresponds to the period of the Maunder Minimum. Scientists estimate that a 0.2 percent increase in the solar output would have the same effect on the average global temperature as a doubling of the level of carbon dioxide in the atmosphere. One study claims that between 50 and 100 percent of the increase in temperature over the last 350 years may be due to an increase in solar irradiance. Solar activity can also help explain the decrease in average temperature from 1945 to 1970, something that cannot be explained by greenhouse theory.

Recently, scientists have identified chemical processes in the stratosphere that could amplify the effect of solar cycle changes. Changes in concentrations of ozone in the upper stratosphere may serve as a source of positive feedback on climate change induced by changes in the solar cycle irradiance.

Primary sources:

E..W. Cliver, V. Boriakoff, and J. Feynman, "Solar Variability and Climate Change: Geomagnetic AA Index and Global Surface Temperature," ***Geophysical Research Letters***, Vol. 25, 1998, 1035-1038.

E. Friis-Christensen, and K. Lassen, "Length of the Solar Cycle: An Indicator of Solar Activity Closely Associated with Climate," **Science**, Vol. 254, 1 November 1991, 698-700.

Deborah Scherrer, "Global Warming: Does it Exist?" (http://solar-center.stanford.edu/sun-on-earth/glob-warm.html).

Drew Shindell, David Rind, Nambeth Balachandran, Judith Lean, Patrick Lonergan, "Solar Cycle Variability, Ozone, and Climate," ***Science***, Vol. 284, 9 April 1999, 305-308.

Measurement Issues

Those skeptical of global warming point to major flaws in the temperature data that have been used to show a warming trend. They note that the measurements are not really global. When thermometers were first considered dependable, around 1860, they were used over only about 10 percent of the globe. This coverage increased to a high point of 40 percent in the 1960s, but has declined in recent years to less than 20 percent. Skeptics also note inconsistencies with some of the land-based thermometers, such as a small region warming while the surrounding area and atmosphere above it are cooling. Consequently, some have argued that the data from the Microwave Sounding Unit (MSU) project are more accurate because the variation in temperature they show is smooth and plausible. While ground based measurements have recorded a 0.27 degree Fahrenheit (0.15 degree Centigrade) per decade warming trend from 1979 to 1997, the scientists in charge of the MSU satellites have estimated that the area of the lower atmosphere approximately 2.2 miles (3.5 kilometers) above the surface has cooled by 0.018 degrees Fahrenheit (0.01 degrees Centigrade) per decade. Correcting the MSU data for orbital decay of satellites results in a warming trend of 0.126 degrees Fahrenheit (0.07 degrees Centigrade) per decade, while data collected from weather balloons shows a cooling trend of 0.036 degrees Fahrenheit (0.02 degrees Centigrade) per decade.

One explanation for the difference between atmospheric and ground-based measurements is the urban heat island phenomenon. The vertical walls of the city trap heat, which make the city warmer, especially at nighttime. Airports also experience this, with the paved runways and air traffic causing an increase in temperature. Excluding this effect brings the ground-based warming trend of 1979-1997 down to 0.099 degrees Fahrenheit (0.055 degrees Centigrade) per decade. Another explanation for the higher temperature estimates made by the ground-based thermometers is the "changing skyline hypothesis," which asserts that the growth of trees or new building around a thermometer can increase the temperature it measures by trapping reflected radiation around it and decreasing the wind velocity over it. If an additional 1 percent of the sky around the thermometer is blocked, then the temperature will increase by 0.36 degrees Fahrenheit (0.2 degrees Centigrade).

Primary source:

Douglas V. Hoyt, "Greenhouse Warming: Fact, Hypothesis, or Myth?" (http://www.erols.com/dhoyt1/index.html).

Fred Pearce, "Greenhouse Wars," ***New Scientist***, No. 2091, 19 July 1997.

Modeling Limitations

Scientists base their predictions of global warming on complex models of physical processes they believe to be important in the determination of climate. Models consist of equations requiring the conservation of energy, mass, and momentum in the interaction of the atmosphere, oceans, and land surfaces at geographic points separated by between 200 and 400 kilometers. The climate models, which must be implemented through large-scale computer simulations, are typically calibrated to produce current climate patterns. The calibrated models are then allowed to reach new equilibria under various assumptions about changes in the concentrations of greenhouse gases.

Criticisms of the models include:

Granularity – Current models provide a very course, or granular, geographic representation. Equations representing the various physical processes are solved at specific points representing large and sometimes diverse areas of the Earth's surface. This granularity limits the accuracy of predictions of regional mean temperature changes in climate. The representation of smaller, and therefore less diverse geographic regions, requires improvements in computer technology.

Flux adjustments – The current energy and momentum relationships at specific geographic points are not known with certainty. Consequently, even if all of the relevant physical processes were accurately represented, models would not necessarily reproduce observed climate patterns. Modelers typically adjust the assumed initial conditions through so-called flux adjustments so that the models reproduce current climate patterns as a basis for comparison with greenhouse scenarios. There are concerns that the flux adjustments are correcting for problems with the representations of physical processes as well as initial conditions.

Treatment of clouds – Most climate models do not provide detailed models of clouds, which in some circumstances enhance, and in other circumstances moderate, the greenhouse effect. The treatment of clouds remains a major source of uncertainty in model predictions.

Coupling of oceans with atmosphere – Although models are becoming more sophisticated in how they represent the coupling of oceans with the atmosphere, they still treat heat transfer relatively crudely. A special problem arises with respect to sea ice, which has important implications for reflectivity and salinity.

Primary source:

J.T. Houghton et al., editors, ***Climate Change 1995: The Science of Climate Change*** (New York: Cambridge University Press, 1996).

Background

Currently 179 nations have ratified the 1992 United Nations Framework Conference on Climate Change (UNFCCC). Under UNFCCC conferences have been held aimed at achieving an international agreement on reductions of greenhouse gas emissions. The 1995 conference held in Berlin established the principle of binding restrictions on greenhouse gas emissions. The 1996 conference held in Geneva prepared analyses of the likely elements of an agreement on restrictions. The third conference, held in Kyoto, Japan in December 1997, set out a protocol for emission limitations and commitments to reductions.

The Kyoto Protocol imposes quantitative limits on greenhouse gas emissions for 38 developed countries. It comes into force ninety days after it has been ratified by not less than 55 parties to the UNFCCC, including ratification by countries accounting for 55 percent of carbon dioxide emissions in 1990 from 34 developed countries. The United States alone accounts for 36 percent of the carbon dioxide emissions from these countries. The next highest percentages are contributed by the Russian Federation (17.4 percent), Japan (8 percent), Germany (7.4 percent), and the United Kingdom (4.3 percent).

The Kyoto Protocol set emission limits on a basket of six greenhouse gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and suflur hexafluoride. The baselines for measuring emission reductions are emissions in 1990 for the first three of these gases and emissions in 1990 or 1995 for the last three. The Protocol calls for aggregate reductions of 5 percent in carbon dioxide equivalent emissions from the 38 countries subject to quantitative commitments as averaged over the five-year period from 2008 to 2012. Countries are expected to demonstrate progress toward achieving their commitments by 2005.

Countries can satisfy their commitments in several ways. First, they can reduce emissions of the six greenhouse gases. Second, they can receive credit for changes in land use and forestry that remove carbon from the atmosphere. Third, they can earn credit for investments in less developed countries that reduce carbon dioxide emissions. Finally, countries that have not achieved their commitments can trade credits with countries that have.

So far 84 countries have signed the Kyoto Protocol, and ten countries have formally ratified it.

Source:

United Nations Framework Convention on Climate Change, Report of the Conference of the Parties on its Third Session, Held at Kyoto from 1 to 11 December 1997. (at http://www.unfccc.de).

Country Commitments

The following Annex lists commitments for 38 countries and the European Union under the Kyoto Protocol:

Annex B
Party Quantified emission limitation or reduction commitment

(percentage of base year or period)

Australia 108
Austria 92
Belgium 92
Bulgaria* 92
Canada 94
Croatia* 95
Czech Republic* 92
Denmark 92
Estonia* 92
European Community 92
Finland 92
France 92
Germany 92
Greece 92
Hungary* 94
Iceland 110
Ireland 92
Italy 92
Japan 94
Latvia* 92
Liechtenstein 92
Lithuania* 92
Luxembourg 92
Monaco 92
Netherlands 92
New Zealand 100
Norway 101
Poland* 94
Portugal 92
Romania* 92
Russian Federation* 100
Slovakia* 92
Slovenia* 92
Spain 92
Sweden 92
Switzerland 92
Ukraine* 100
United Kingdom of Great Britain and Northern Ireland 92
United States of America 93

* Countries that are undergoing the process of transition to a market economy.

The United States commitment is 93 percent of 1990 emissions. Australia, Iceland, and Norway have commitment levels higher than their 1990 emissions, while New Zealand, Russian Federation, and Ukraine have commitment levels equal to their 1990 emissions. Most European Union countries have commitment levels at 92 percent of their 1990 emissions.

Source:

United Nations Framework Convention on Climate Change, Report of the Conference of the Parties on its Third Session, Held at Kyoto from 1 to 11 December 1997. (at http://www.unfccc.de).

Flexibility Mechanisms

The Kyoto Protocol includes *flexibility mechanisms* to be used by countries as instruments for achieving identified emissions targets. Specific implementation rules have *not* yet been agreed upon, and thus questions remain concerning their effectiveness.

Emission Trading: The governments of industrialized countries can issue "greenhouse gas emission permits" to the private sector that equal the target set by the Kyoto Protocol. Once initially allocated, the permits can then be freely bought and sold by domestic firms – it is unresolved whether firms may trade across borders. The fundamental idea behind emission trading is that any environmental target can be achieved at lower total cost to society if those responsible for achieving the target can exploit gains from trade. Specifically, those with incremental costs of abatement higher that the permit price can buy permits from those with incremental costs of abatement lower than the permit price.

Joint Implementation (JI)/Clean Development Mechanism (CDM): JI permits one country to get credit for implementing a project to reduce emissions in another. It is limited to the industrialized countries, which enter into bilateral agreements to complete projects to mitigate greenhouse gases. The CDM allows collaborative projects to reduce emissions or sequester carbon in developing countries. Industrialized countries may count certified emission reductions toward their quantified emissions reduction commitments. A special administrative fee must also be paid by the industrialized countries, a small portion of which goes to the poorest of countries to help them adapt to climate change.

Multi-country Bubbles: The Protocol allows countries (e.g., the European Union) to act jointly to achieve emissions reduction commitments. A group of nations can form a multi-country "bubble" in which the group has an overall target to reach, and each nation has its own commitment to the rest of the group.

Carbon Sinks: Countries may meet their emissions reductions through land and forestry practices that remove carbon emissions from the atmosphere. Creating such "sinks" may provide a low-cost option for many countries in meeting emissions reduction commitments. Permitted practices under the Protocol are based on afforestation, reforestation, and deforestation since 1990, measured as verifiable changes in carbon stocks in each commitment period.

Primary sources:

J. Shogren,"Benefits & Costs of Kyoto," Manuscript, University of Wyoming, 1999.

M. Toman and J. Shogren, "Climate Change Policy," in P. Portney and R. Stavins, eds., ***Public Policies for Environmental Protection***, 2nd edition, (Washington, D.C.: Resources for the Future, forthcoming).

Predicted Impacts under Full Implementation

In order to predict the impacts of full implementation of the Kyoto Protocol for global warming, analysts must compare predictions of greenhouse gas levels under current policy with those expected to result from the limits imposed by the protocol. These predictions require assumptions about population growth, changes in per capita energy consumption, and changes in land use for all major countries. Models describing how emissions translate into changes in atmospheric concentrations, and how changes in atmospheric concentrations translate into changes in global mean temperatures provide the basis for assessing impacts. Although scientists are just beginning to apply this complex methodology to the Kyoto Protocol, it appears that the direct effect of the Protocol on temperature is likely to be modest, *reducing the increase in temperature in the year 2100 by between 4 and 7 percent*.

Countries without quantitative commitments under the Protocol currently account for about 35 percent of carbon dioxide emissions. Although these developing countries have much lower per capita emissions than developed countries, they will account for most of the world's future population growth. With full implementation of the Protocol, they are likely to account for 43 percent of carbon dioxide emissions by 2010. Consequently, compared to current policy, the full implementation of the Kyoto agreement would only reduce the atmospheric concentration of carbon dioxide in 2010 by about 0.4 percent. As carbon dioxide has a long residence time in the atmosphere, however, if countries with quantitative commitments maintained them in subsequent decades, then the Protocol would result in more substantial reductions of atmospheric carbon dioxide concentrations over the next century.

A researcher at the National Center for Atmospheric Research provides the first published estimates of the impact of the Kyoto Protocol on global mean temperature. The assumption that countries subject to quantitative commitments maintain emission levels at approximately their target levels for the rest of the next century leads to a predicted 4 to 7 percent reduction in the increase in global mean temperature by the year 2100. Assuming instead that countries subject to quantitative commitments continue to reduce their emissions by 1 percent per year after reaching their targets, leads to a predicted 14 percent reduction in the increase in global mean temperature by the year 2100.

Primary sources:

Bert Bolin, "The Kyoto Negotiations on Climate Change: A Science Perspective," **Science**, Vol. 279, 16 January 1998, 330-331.

T.M.L. Wigley, "The Kyoto Protocol: CO_2, CH_4 and Climate Implications," **Geophysical Research Letters**, Vol. 25, 1998, 2285-2288.

Ratification Status

Statement by Vice President Gore on the United States' signing of the Kyoto Protocol, **November 12, 1998**:

"U.S. leadership was instrumental in achieving a strong and realistic agreement in Kyoto - one that couples ambitious environmental targets with flexible market mechanisms to meet those goals at the lowest possible cost… Signing the Protocol, while an important step forward, imposes no obligations on the United States. The Protocol becomes binding only with the advice and consent of the U.S. Senate. We will not submit the Protocol for ratification without the meaningful participation of key developing countries in efforts to address climate change."

Proposed Senate Bill 547:

Short Title: Credit for Voluntary Reduction Act. *Purpose*: The purpose of this Act is to encourage voluntary actions to mitigate potential environmental impacts of greenhouse gas emissions by authorizing the President to enter into binding agreements under which entities operating in the United States will receive credit, usable in any future domestic program that requires mitigation of greenhouse gas emissions, for voluntary mitigation action before the end of the credit period.

Proposed Senate Bill 882:

Short Title: Energy and Climate Policy Act of 1999. *Purpose*: To strengthen provisions of the Energy Policy Act of 1992 and the Federal Nonnuclear Energy Research and Development Act of 1974 to further promote voluntary efforts to reduce or avoid greenhouse gas emissions and improve energy efficiency; focus Department of Energy efforts in this area; and authorize and undertake a long-term research, development, and demonstration program to develop new and enhance existing technologies that reduce or avoid anthropogenic emissions of greenhouse gases; develop new technologies that could remove and sequester greenhouse gases from emissions streams; and develop new technologies and practices to remove and sequester greenhouse gases from the atmosphere.

Proposed House Resolution 2221:

Official Title as Introduced: A bill to prohibit the use of Federal funds to implement the Kyoto Protocol to the United Nations Framework Convention on Climate Change until the U. S Senate gives its advice and consent to ratification of the Kyoto Protocol, and to clarify the authority of Federal agencies with respect to the regulation of emissions of carbon dioxide.

Selected Views in Opposition to Ratification of the Kyoto Protocol

Cato Institute

"The United Nations Framework Convention on Climate Change and the subsequent Kyoto Protocol to that convention represent the largest potential surrender of national sovereignty ever faced by the United States. The treaty and the protocol are based on a naive interpretation of immature science. The economic costs of the treaty and protocol are enormous. And even if all the world's nations met their commitments to the Kyoto Protocol, there would be no discernible effect on the globe's climate." (*Cato Handbook fir Congress*)

Heritage Foundation

"The Senate has not yet ratified the Kyoto Protocol because of the greater restrictions it would place on America's economy, industries, and families. To protect Americans from an immediate decline in their standard of living and from an increase in the cost of food, goods, and services, Congress should: (1) Reaffirm and enhance the principle outlined in Senate Resolution 98, (2) Prohibit bureaucratic implementation of the unratified Kyoto Protocol (appropriation committees should remove any budget request that seeks to implement the terms of the Kyoto Protocol without Senate ratification of the treaty), (3) Hold the Administration accountable by conducting public hearings on the scientific basis for the theory of global warming, as well as the economic and political repercussions of implementing the Kyoto Protocol without clear scientific consensus."

"Until it can be proved that global warming in fact occurs and is caused directly by human activity, the United States should not ratify any environmental treaty carrying such drastic consequences." *("The Department of Energy's Report on the Impact of Kyoto: More Bad News for Americans," Alexander F. Annet, The Heritage Foundation Backgrounder, October 23, 1998.)*

George C. Marshall Institute

"One of the most troubling aspects of the Kyoto climate change protocol is the way in which it impacts our national security …"

"The accord, which was signed last December, requires that fuel used in unilateral military operations, and other defense related actions, be counted against the U.S. national limit on greenhouse gas emissions …"

"The military should be granted a complete exemption from the Kyoto Protocol before it is given serious consideration by the U.S. Senate." *(Kyoto and National Security, George C. Marshall Institute Newsletter, Spring 1998)*

Selected Views in Favor of Ratification of the Kyoto Protocol

Pew Center

"We accept the views of most scientists that enough is known about the science and environmental impacts of climate change for us to take actions to address its consequences. Businesses can and should take concrete steps now in the U.S. and abroad to assess opportunities for emission reductions, establish and meet emission reduction objectives, and invest in new, more efficient products, practices and technologies. The Kyoto agreement represents a first step in the international process, but more must be done to implement the market-based mechanisms that were adopted in principle in Kyoto and to more fully involve the rest of the world in the solution." *(Pew Center on Global Climate Change-Business Environment Leadership Council Joint Statement)*

Sierra Club

"The first baby step toward curbing global warming does not halt the threat of rising sea levels, spreading diseases, floods, and species extinction. Global warming still places our children's future at risk…"

"By signing this treaty, the nations of the world have soundly rejected the polluters' claims that global warming doesn't exist and that no action is necessary. Any remaining doubt that the planet must end our business-as-usual reliance on polluting fossil fuels has been cast away…Now it's time for the U.S. to firm our resolve and work to leave a healthy atmosphere for future generations of Americans." *(Sierra Club on Global Warming Treaty: Not Far Enough or Fast Enough/Statement of Sierra Club President Adam Werbach, December 10, 1997)*

Natural Resources Defense Council

"…The Kyoto Protocol represents a landmark event in the effort to protect the planet from global warming…"

"A few wrinkles still need to be ironed out of the landmark global warming agreement."

"Environmentalist's evaluation of whether the Kyoto Protocol will succeed in curbing global warming, and whether the U.S. and other industrialized countries will succeed in meeting the agreement, is based on four key criteria: (1) Real Reductions ... (2) No Loopholes ... (3) Realistic Expectations for Developing Countries ... (4) Early Action ... But technologies and strategies developed to meet the goals of the Protocol can be put in place sooner, and environmentalists hope to leverage the Kyoto agreement into concrete, and immediate, action to reduce U.S. emissions." *(Worldview, Global warming: The Kyoto Protocol)*

Selected Reports from Public Opinion Surveys

Pew Research Center

In a survey conducted in November 1997, before the December Kyoto Conference, results showed that "fewer people are greatly concerned about the greenhouse effect now than in Gallup polls taken in 1989 and 1990. Only a quarter of the public today says they (sic) worry a great deal about global warming or the greenhouse effect—down from 30 percent in a 1990 Gallup survey … Support for dealing with global warming through international efforts is linked more to personal environmentalism than to increased fears about the global environment … The poll finds that those who worry about global warming are more attentive to news about the policy debate surrounding it than those with less concern …"

"Americans say the United Sates should join other nations in setting global standards rather than establishing its own standards by 55 percent to 42 percent; 70 percent said that all countries, rich or poor, should now share equally in global clean-up efforts; 19 percent believed that poorer countries should be allowed to do less." *(Americans Support Action on Global Warming, a survey of American Public Opinion on Environmental Issues conducted by the Pew Research Center for the People and the Press. The nationwide phone survey interviewed a cross-section of 1,200 respondents in November, 1997.*)

Resources for the Future and the Ohio Survey Research Unit

In a survey conducted from December 1997 to February 1998, just after the Kyoto Protocol: "79 percent of people said global warming had been occurring; 75 percent said they thought it would occur in the future if nothing was done to stop it; 58 percent said it would be bad for people; 57 percent said the U.S. government should do a great deal or quite a bit to combat global warming; 79 percent said they believed reducing air pollution would reduce global warming; 91 percent said the U.S. government should limit air pollution by U.S. businesses; 80 percent said the U.S. should require air pollution reductions from countries to which it gives foreign aid." *(American Opinion on Global Warming, a survey commissioned by Resources for the Future and conducted by Ohio State University Survey Research Unit (SRU). The SRU interviewed a representative national cross-section of 725 adults. Published in Resources, issue 133, 1998)*

The Gallup Poll Organization

"According to a survey conducted in October and November of 1997, Americans consider fossil fuel emissions, particularly automobile exhaust, to be major causes of global warming. They do not favor the United States taking steps to reduce emissions if those steps would incur high economic costs… By a 58 percent to 32 percent margin, Americans are opposed to the United States signing a global warming treaty which would hold the U.S. to stricter energy standards than other large nations of the world…"

"… 64 percent to 76 percent believe that global warming will have harmful effects within the next twenty five years on human health, agricultural production, and the survival of many plant and animal species. Large majorities also believe that global warming is caused by emissions from a variety of sources, including cars, and coal and oil burning plants…Only 41 percent think global warming is occurring now, down from 60 percent in a 1992 poll. Although 65 percent of Americans think global warming will pose a "serious threat" to their children or to the next generation, only 25 percent think it will pose a serious personal threat within their own lifetimes; 69 percent say it will not." (*Public Concerned, Not Alarmed About Global Warming, a survey conducted by the Gallup Poll Organization. Results based on three telephone surveys, each including a randomly selected national sample of approximately 1000 adults.)*