American Public Opinion on Climate Change

Catherine Chen, Bo MacInnis, and Jon A. Krosnick

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C. Chen
Manship School of Mass Communication & Department of Political Science, Louisiana State University, Baton Rouge, LA, USA
e-mail: catherinechen@lsu.edu

B. MacInnis
Department of Communication, Stanford University, Stanford, CA, USA
e-mail: bmacinni@stanford.edu

J. A. Krosnick (✉)
Department of Communication, Department of Political Science, Department of Psychology, and the Doerr School of Sustainability, Stanford University, Stanford, CA, USA
e-mail: krosnick@stanford.edu

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Abstract

This chapter offers an in-depth account of American public opinion about global warming (GW). Surveys of nationally representative samples of American adults have indicated that from 1997 to 2024, large majorities of Americans held "green" opinions: GW has been happening and caused by human activities; if unchecked, GW will continue, be a serious threat, and merit government

attention. Large majorities of Americans have supported a wide range of mitigation policy approaches. In 2024, more than one in five Americans considered GW to be extremely important to them personally. Political candidates have attracted votes by taking green stances and have lost votes as the result of voicing skepticism. Green majorities have appeared consistently across the United States and on many aspects of climate change. Even majorities of Republicans have held green views. Thus, lack of substantial legislation mitigating future warming is unlikely to be attributable to the public not being "green enough."

Keywords

Public opinion · Climate change · Policymaking · Voting · Environmental psychology

Introduction

Recent decades have witnessed a growing body of natural science evidence suggesting that the earth has been warming over the last 100 years (NASA 2024; The United States Environmental Protection Agency 2024). And natural scientists have argued that such warming will have devastating effects on contemporary societies if efforts are not made to reduce future greenhouse gas emissions and to prepare for the likely effects of inevitable future warming. Consequently, many people have called for aggressive action by the US government, US businesses, and other organizations.

However, many observers have claimed that climate legislation at both the federal level and state levels has been inadequate. Both the Climate Stewardship and Innovation Act of 2007 and the American Clean Energy and Security Act of 2009 faced considerable opposition in the Senate. The Carbon Dividend Act of 2019 did not advance in Congress. And the Green New Deal of 2019 was a topic of significant political debate. Meanwhile, several democratic countries have enacted comprehensive climate legislation. For example, in Denmark, the Climate Act of 2020 set a target to reduce the country's greenhouse gas (GHG) emissions by 70% in 2030 compared to 1990 levels. In New Zealand, the Climate Change Response Amendment Act 2019 aimed to reduce net emissions of GHG to zero by 2050. In Canada, the Pan-Canadian Framework on Clean Growth and Climate Change made significant progress on pricing carbon pollution. Compared with these countries, it seems that the United States has lagged behind in its legislative efforts, despite being one of the world's largest economies and a significant contributor to global GHG emissions.

Why has green legislation been rare in the United States? One possible explanation is public opinion. In democratic societies, public opinion is thought to play a pivotal role in policymaking (Dahl 1989). The public's attention to an issue has the potential to elevate it to national prominence and might thereby impact the directions of new laws and regulations. Therefore, lack of legislation might be attributable to lack of public will to address GW.

This chapter addresses this possibility using data from a series of high-quality national surveys of random samples of American adults collected by the Political Psychology Research Group (PPRG) at Stanford University. The chapter explores numerous aspects of public opinion on the issue to yield a comprehensive picture.

We begin with a few remarks about the methodology used for the surveys. Then we explore fundamental questions such as the perceived existence of GW, the perceived role of human activity in causing warming, the perceived threat posed by GW, and perceptions of its effects. Next, we discuss public preferences regarding who should take action to mitigate warming and the priority of the issue for the nation as a whole and for individual survey respondents. We turn next to public opinion regarding various possible government policies that might be implemented to mitigate future warming, how the public assesses the likely economic side effects of such policies, and the public's willingness to pay the economic costs of emissions reduction. Next, we address Americans' views of natural scientists talking about GW, the extent of perceived consensus among scientists on GW, and the degree of trust placed in those scientists. Subsequently, we address how GW influences voting behavior and how opinions vary across the states in the United States. Finally, we examine the opinions of Democrats, Republicans, and Independents and the partisan gap.

Probability Sampling and the Quality of Surveys

Probability sampling is one of the cornerstones of high-quality survey methodology (Converse 1987). In probability sampling, every member of the population has a known, nonzero chance of being included in an intended sample of respondents. Probability sampling contrasts with non-probability sampling, where potential respondents are not selected randomly, and the probability of each individual in the population ending up in an intended sample is unknown. Non-probability sampling often leads to over- or underrepresentation of specific groups within the population, leading to less accurate measurements than are yielded by probability samples (MacInnis et al. 2018; Malhotra and Krosnick 2007; Yeager et al. 2011). All results reported in the current chapter are from surveys that employed probability sampling.

Specifically, surveys all involved Random Digit Dialing by human interviewers. When surveys were first conducted in the late 1990s, only landlines were called. In more recent years, interviewers called landlines and cell phones. When landlines have been called, one adult household member was chosen at random to be interviewed. Base weights adjusted the statistics for unequal numbers of phone lines that could reach a respondent and for more than one adult sharing a landline. Standard post-stratification was conducted to correct for unequal rates of participation among various demographic subgroups. Questions were carefully worded to be balanced and unbiased. Extensive methodological details are available here: https://climatepublicopinion.stanford.edu/.

Fundamentals

Perceived Existence of Warming, Future Warming, and Certainty

Exploring public opinion about GW begins by gauging how many Americans believe that the planet has been warming, what people think has been causing warming, and whether people believe it is a threat. If most people believe that warming has not been happening or is not a threat, then public support for government action to address the issue seems likely to be minimal. Thus, beliefs about the existence and degree of threat may be important determinants of policy preferences.

Since 1997, a large majority of Americans has believed that the world's temperature probably has been going up over the past 100 years. In 1997, 77% of Americans said so. This percentage rose and fell during the ensuing years, yet a remarkable and consistent majority held the belief that the world's temperature has been going up (Fig. 1).

According to some observers, the fossil fuel industry has attempted to reduce the certainty with which Americans believe that GW has been happening and to increase the certainty with which others believe that it has not been happening (Oreskes and Conway 2010). Psychological research shows that attitudes held with more certainty are more stable, change-resistant, and predictive of behavior (Petrocelli et al. 2007; Rucker and Petty 2004; Tormala and Petty 2002). Therefore, causing those changes in public certainty might be a way to prevent public action to mitigate climate change.

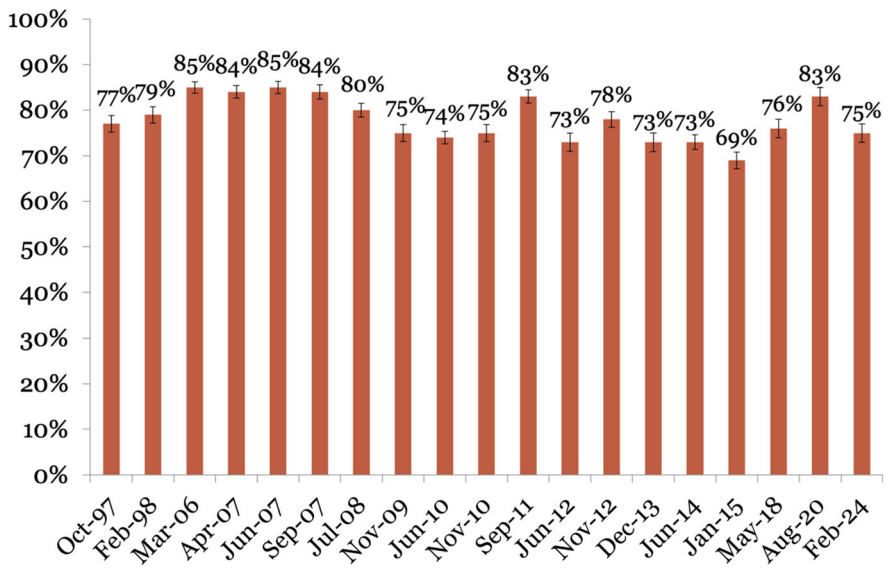

Fig. 1 Percent of Americans who believed that GW has probably been happening

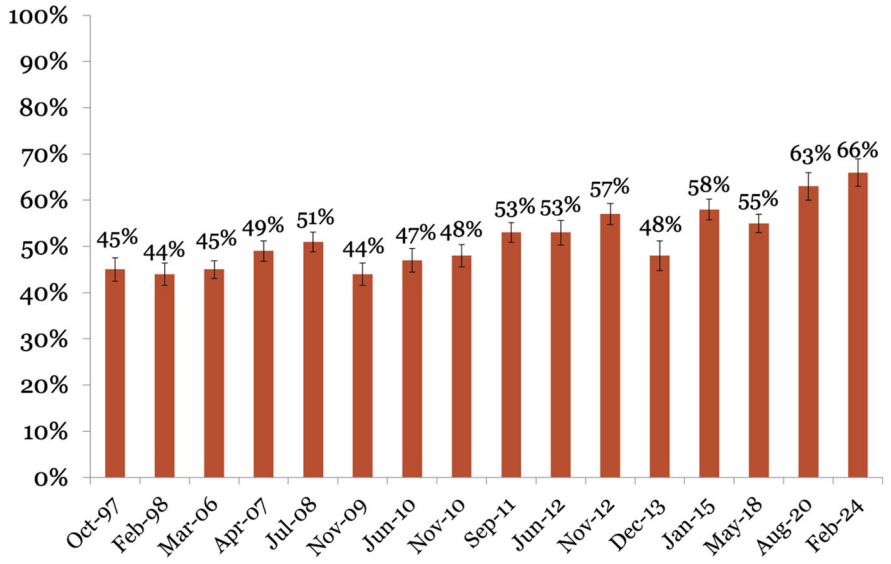

Fig. 2 Of the Americans who believed that the Earth's temperature has been going up, the percent who were extremely or very sure

However, the PPRG surveys suggest that any efforts to reduce or increase public certainty have not been successful. Indeed, among people who believed that the world's temperature has been going up, the proportion who were extremely or very sure began at 45% in October 1997 and rose to 66% in 2024 (Fig. 2). Among people who believed that the world's temperature has probably not been increasing, the percentage of Americans expressing high certainty between 1997 and 2015 was typically in the low 30 s, for example, 33% in 2018, and rose to 43% in 2020 but declined to 37% in 2024 (Fig. 3). Thus, as "believers" became more confident, skeptics did not.

Huge majorities of Americans have believed that the world's temperature will probably go up over the next 100 years if nothing is done to prevent it. The percentages were stable at approximately 75% from 2011 to 2024 (Fig. 4). The percentage that is extremely or very sure about future temperature increases rose from 45% in 1997 to 68% in 2024, suggesting a growing conviction in this belief (Fig. 5). Compared to people who thought the world's temperature will go up over the next 100 years, respondents who thought it will not go up manifested less certainty in this opinion; for example, only one-third were extremely or very sure that future temperature will not increase (Fig. 6).

Question Wording

All questions described above presented GW to respondents as "an increase in the world's average temperature." Some previous literature indicated that the use of the term "global warming" may have unintended consequences, especially among

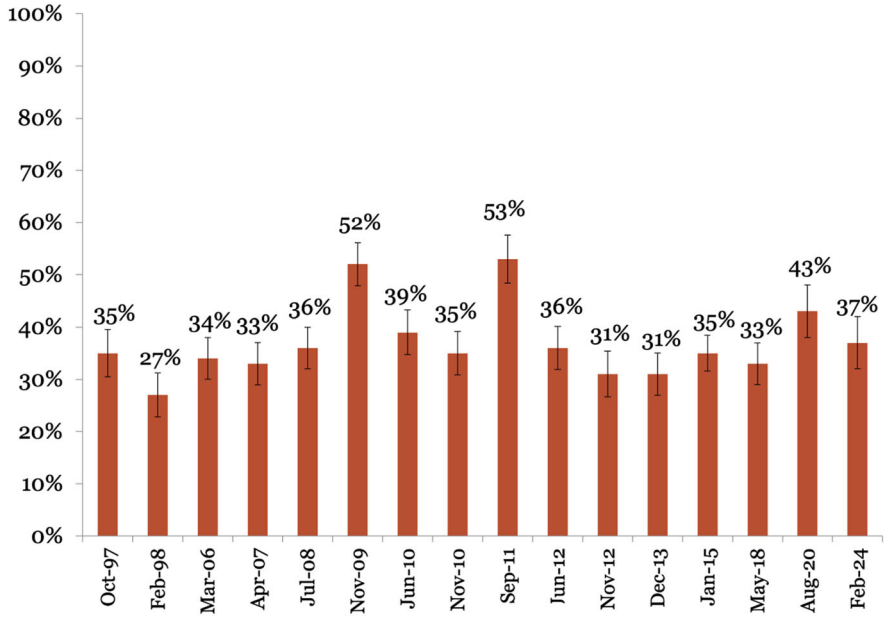

Fig. 3 Of the Americans who believed that the Earth's temperature has not been going up, the percent who were extremely or very sure

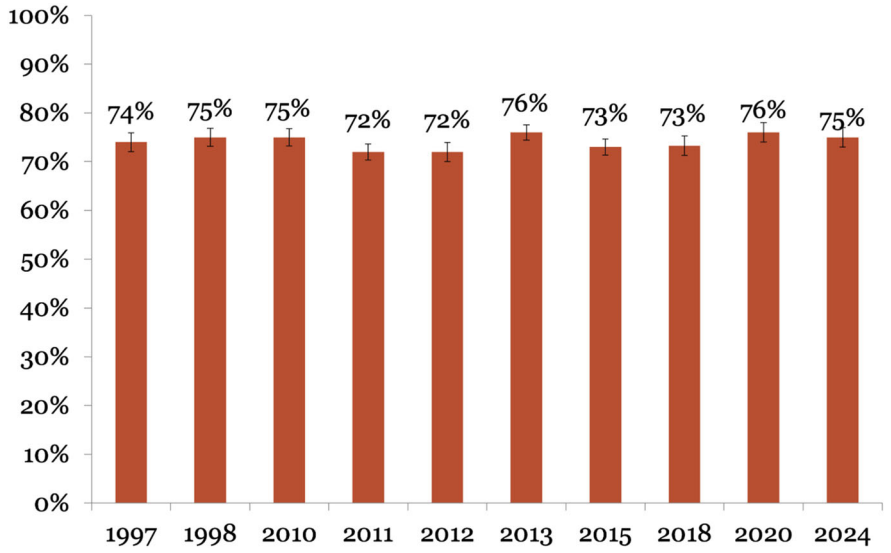

Fig. 4 Percent of Americans who thought the world's temperature will probably go up over the next 100 years

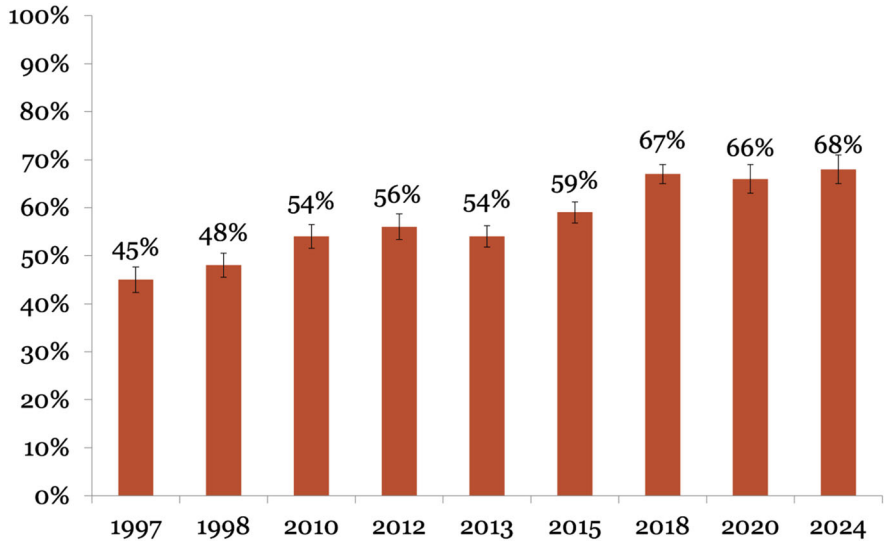

Fig. 5 Of those Americans who thought that the world's temperature will go up over the next 100 years, the percent who were extremely or very sure

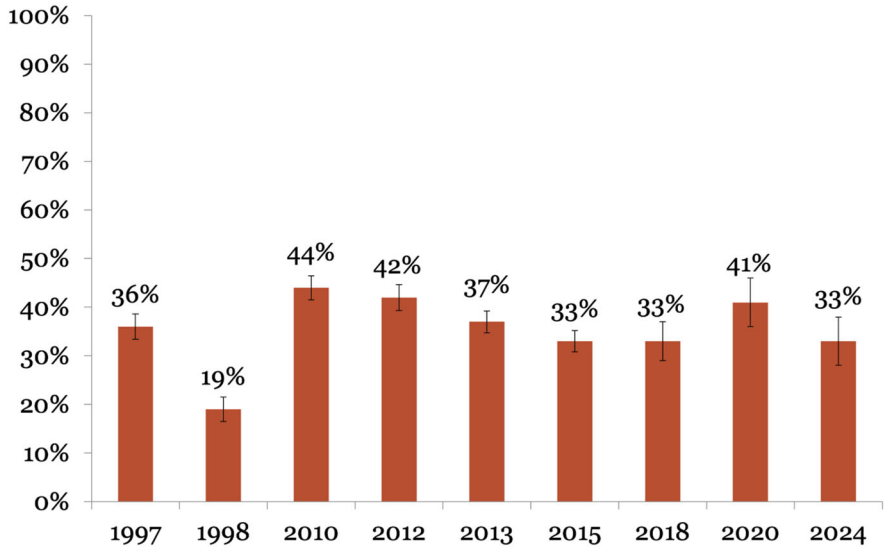

Fig. 6 Of those Americans who thought that the world's temperature will not go up over the next 100 years, the percent who were extremely or very sure

Republicans. In 2003, Republican strategist Frank Luntz advised the George W. Bush administration to talk in terms of "climate change" rather than "global warming" because the former was perceived to be less frightening. In his memorandum, Mr. Luntz wrote, "While global warming has catastrophic communications

attached to it, climate change sounds a more controllable and less emotional challenge" (Lee 2003).

Previous literature has provided mixed evidence regarding the question wording effect of "global warming." Some researchers found that Republicans were more likely to doubt the existence of "global warming" than to doubt the existence of "climate change," a pattern not observed among Democrats (Schuldt et al. 2011, 2017). Other researchers failed to find a higher rate of endorsement of "climate change" than "global warming" among Republicans (Benjamin et al. 2017). Still other researchers found that the nation as a whole and political Independents perceived "climate change" and "global warming" to be equally serious, and among Republicans, "climate change" was perceived to be more serious than "global warming" (Villar and Krosnick 2011). In another study, the term "global warming" evoked more public concern than "climate change", yet respondents reacted similarly to "global warming" and "climate change" in an image association task (Whitmarsh 2009). Thus, the available evidence does not provide strong and consistent support for Mr. Luntz's recommendation of a strategy to minimize the appearance of public concern about warming.

Perceptions of Threat

One way to explore perceptions of threat is to ask people whether they believe that an increase in the world's temperature over the past 100 years was good, bad, or neither good nor bad. As indicated in Fig. 7, a consistent majority of Americans held

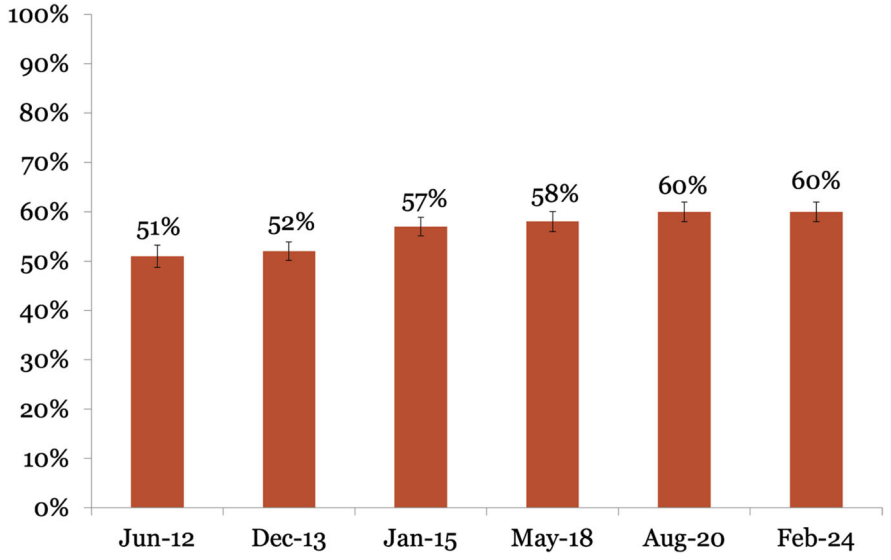

Fig. 7 Percent of Americans who thought that an increase in the world's temperature over the past 100 years was bad

negative attitudes toward GW. Most Americans thought that increased world temperature would be bad, and this majority has increased over the years from 51% in 2012 to 60% in 2024. Similarly, consistent majorities of Americans perceived future warming to be bad. The proportion of Americans who said that warming of five degrees Fahrenheit over the next 75 years would be bad ranged from a low of 58% in 1998 to a high of 70% in 200 and was 64% in 2024 (Fig. 8).

A huge majority of people believed that GW will be a very serious or somewhat serious problem for the United States in the future, dipping from 83% in 2006 to 73% in 2009 and registering 76% in 2024 (Fig. 9). And even larger majorities of people have believed that GW will be a very serious or somewhat serious problem for the world, dipping from 85% in 2006 to 76% in 2009 and increasing in the years that followed. 81% of Americans held this view in 2024 (Fig. 10).

Cause of Warming

People interpret problems in terms of their causes, and these interpretations play important roles in shaping reactions to undesirable conditions (Kelley and Michela 1980). According to the latest Intergovernmental Panel on Climate Change (IPCC) report (2023 AR6 Synthesis Report, p.42), "Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming." This suggests moral (i.e., humans "should" take actions) and practical (i.e., humans "can" take actions) responsibilities.

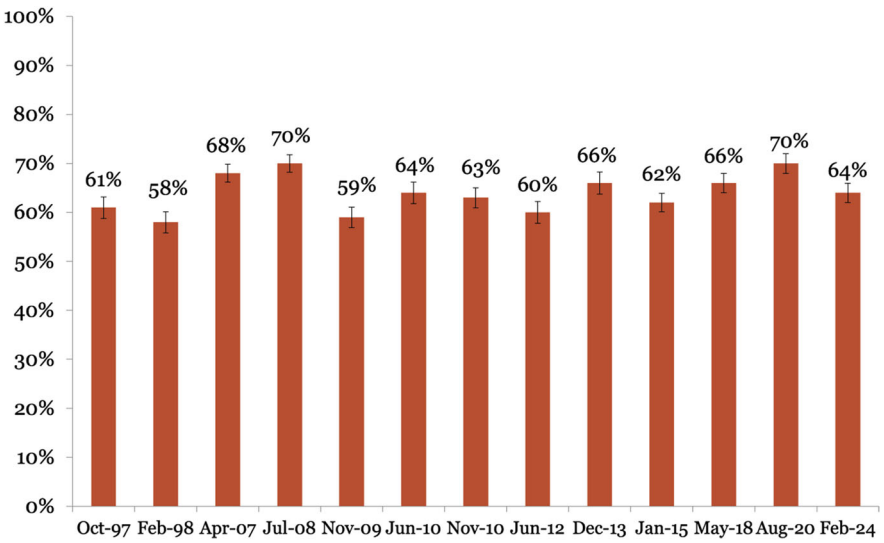

Fig. 8 Percent of Americans who believed that a 5-degree Fahrenheit rise in the 75 years would be bad

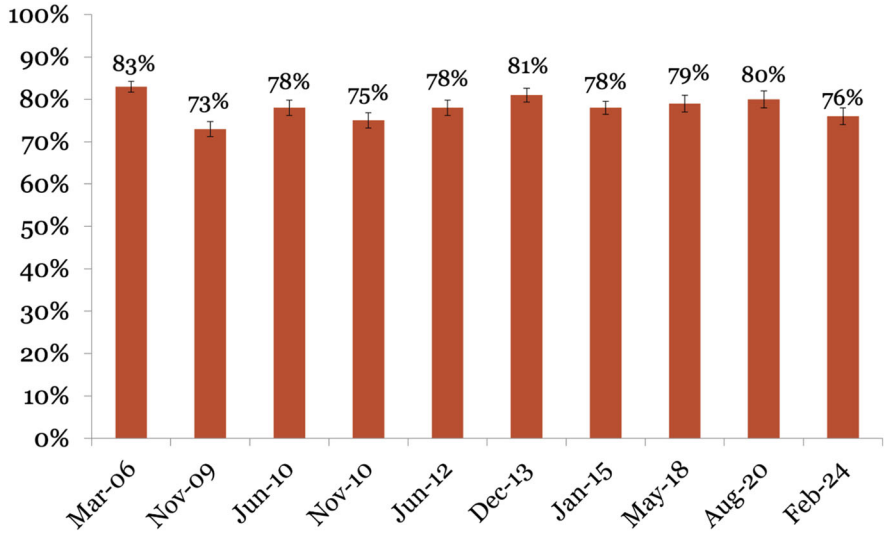

Fig. 9 Percent of Americans who believed that GW will be a very or somewhat serious problem for the United States

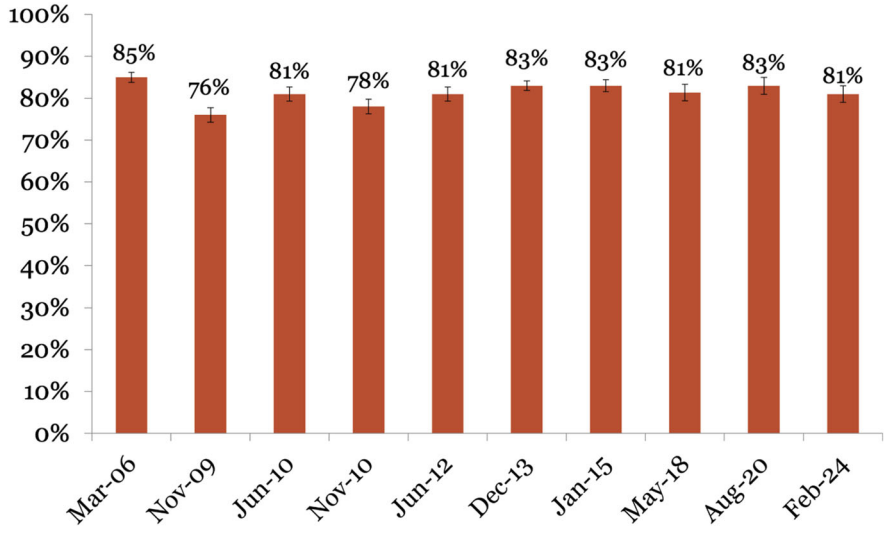

Fig. 10 Percent of Americans who believed that GW will be a very or somewhat serious problem for the world

Large to huge majorities, ranging from 70% in 2009 to a high of 83% in 2007 and 2024, have held the belief that human actions have at least partially contributed to a rise in the world's temperature over the past 100 years (Fig. 11). While there have been minor fluctuations, the data suggest a sustained belief of the role that human activity has played in causing GW.

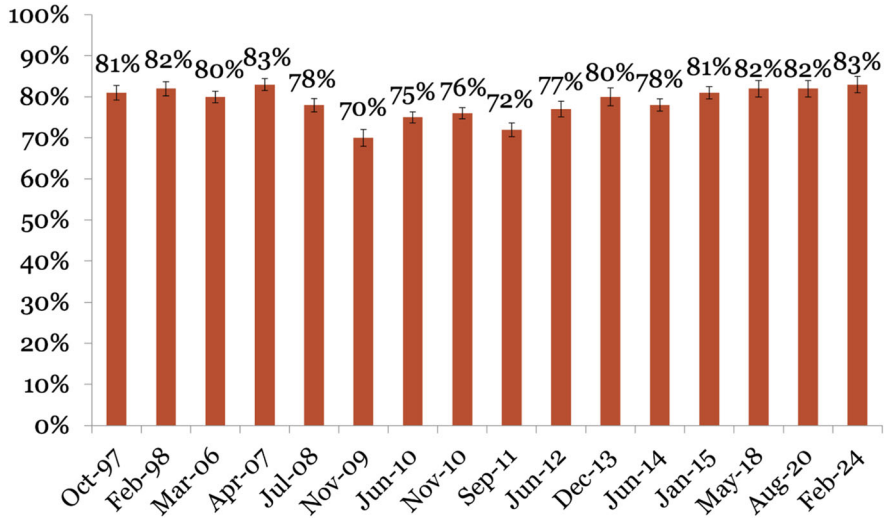

Fig. 11 Percent of Americans who believed that human action has been at least partly causing GW

Consequences of GW

According to many natural scientists, human-induced GHG emissions have increased the frequency and intensity of weather and climate extremes, including excessive precipitation, droughts, tropical cyclones, and wildfires (IPCC 2023). And Americans have noticed these weather and climate consequences, either in person or via media. The proportions of people saying so were 71% in 2013, 68% in 2015, 75% in 2020, and 73% in 2024. In December 2013, people who said they had seen consequences of GW were asked an open-ended question: "What effects of global warming have you seen?" The most common responses were natural disasters, changes in weather patterns, and effects on icebergs (Fig. 12).

In many surveys across the decades, majorities of Americans said they perceived weather patterns around the world to have been more unstable in the preceding 3 years, compared to earlier periods. The proportion of people perceiving instability was 70% in March 2006, dipped to 54% in 2009, and fluctuated around 60% for most of the following decade, ending at 66% in 2024 (Fig. 13).

The proportion of Americans who perceived global temperatures to be higher in the preceding 3 years, compared to earlier periods, has also been substantial and rising. The percentage was 56% in 2006, dipping to a low of 43% in 2009 and rising significantly to 62% by 2024 (Fig. 14). Compared with the perceived global patterns, fewer Americans thought that weather patterns in the county where they lived had been more unstable over the last 3 years. The percentages ranged from 39% to 48% between 2009 and 2020, with a slight decrease to 43% in the last recorded point (Fig. 15).

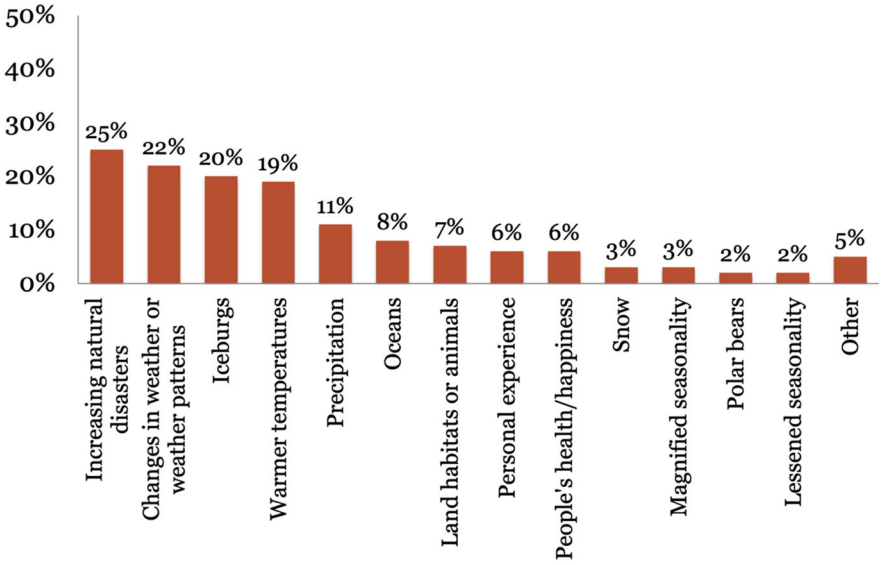

Fig. 12 Percent of Americans who said they have seen each type of effect of GW already (2013)

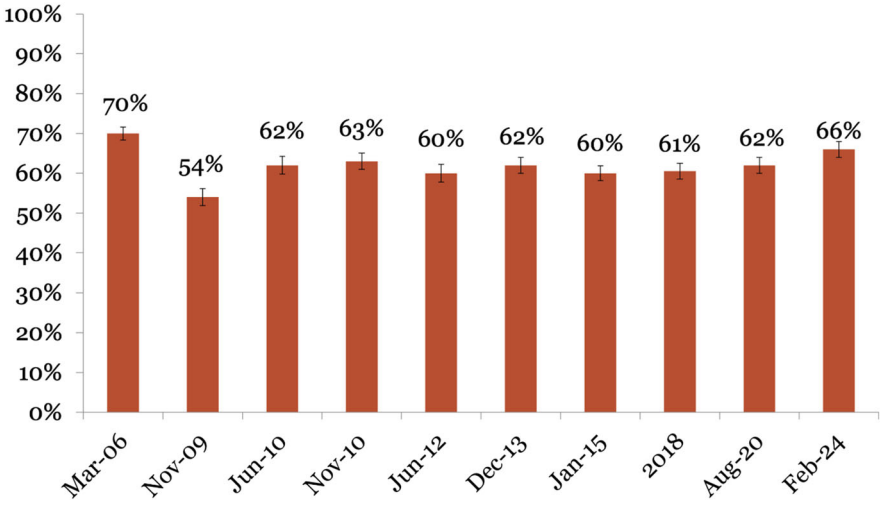

Fig. 13 Percent of Americans who thought that global weather patterns around the world have been more unstable over the last 3 years

A majority of Americans perceived that GW was causing more frequent droughts: 57% believed so in 2012, 60% in 2013, and 54% in 2015. In 2013, a substantial majority of 71% believed that if no preventive measures are taken, GW will cause more destructive storms. In the same year, a comparable majority of 73% thought that sea levels will rise due to GW without preventive action.

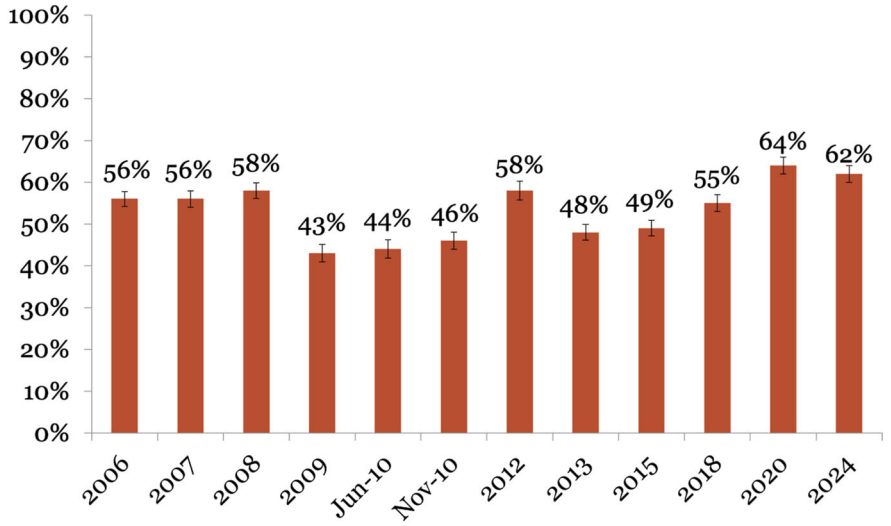

Fig. 14 Percent of Americans who thought that average world temperatures have been higher during the last 3 years

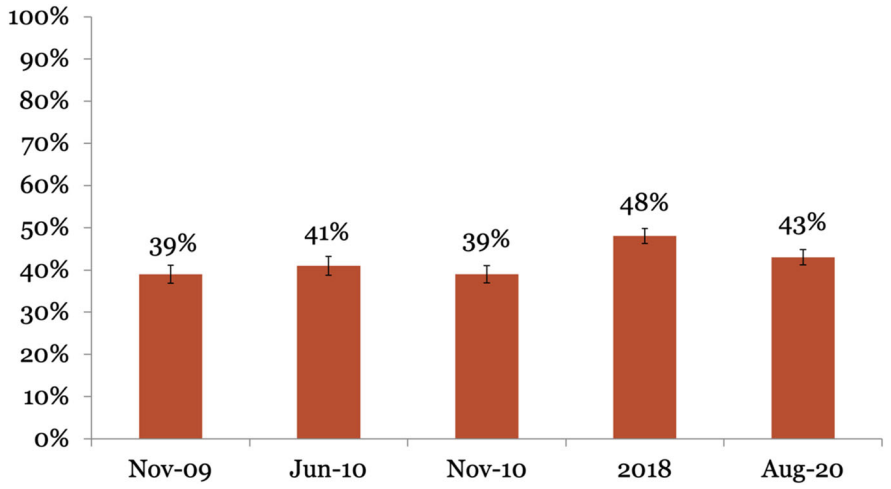

Fig. 15 Percent of Americans who thought that weather patterns in the county where they live have been more unstable over the last 3 years

Hurt or Help?

Between 1997 and 2024, majorities of Americans thought that GW will hurt them personally at least a moderate amount. This percentage peaked at 63% in 2010 and was 55% in 2024 (Fig. 16). Conversely, only 15% of Americans thought GW will

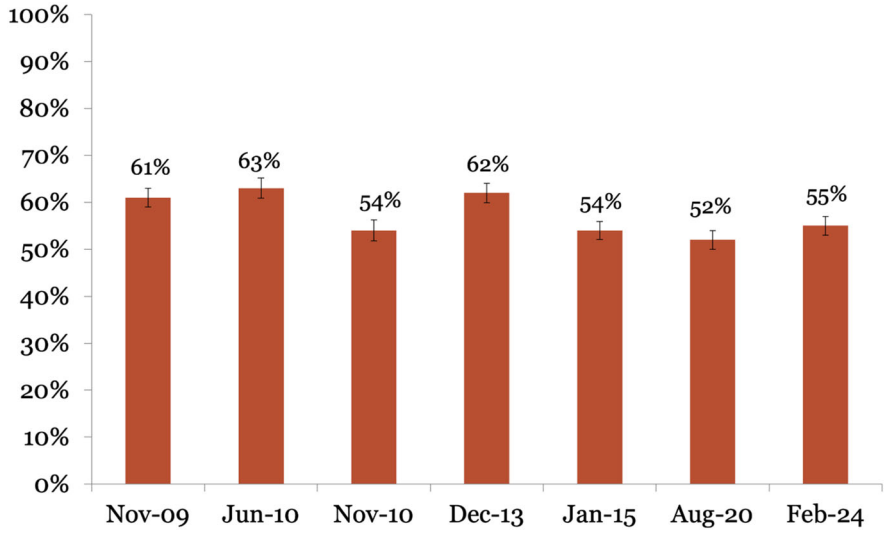

Fig. 16 Percent of Americans who thought that GW will hurt them personally by at least a moderate amount

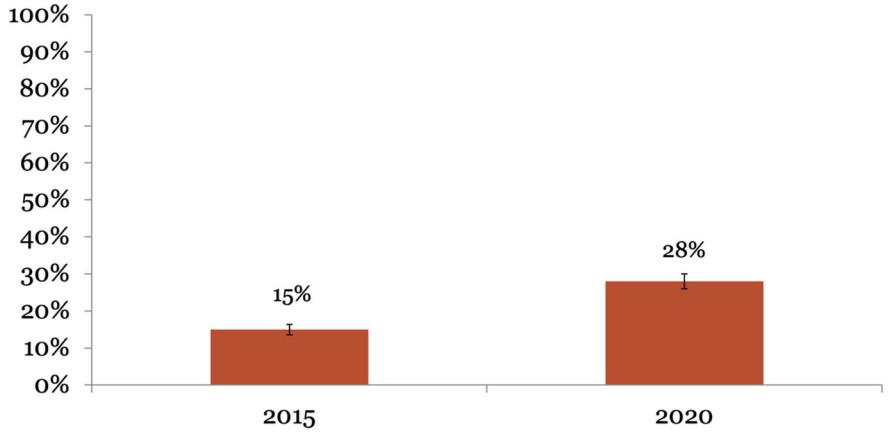

Fig. 17 Percent of Americans who thought that GW will help them personally by at least a moderate amount

help them personally at least a moderate amount, and that percentage increased but remained small at 28% in 2020 (Fig. 17).

Large majorities of Americans thought that GW will be harmful to future generations. In 2024, 77% said GW will hurt future generations at least a moderate amount. In 2010 and 2013, that number was as high as 80% (Fig. 18). The proportion

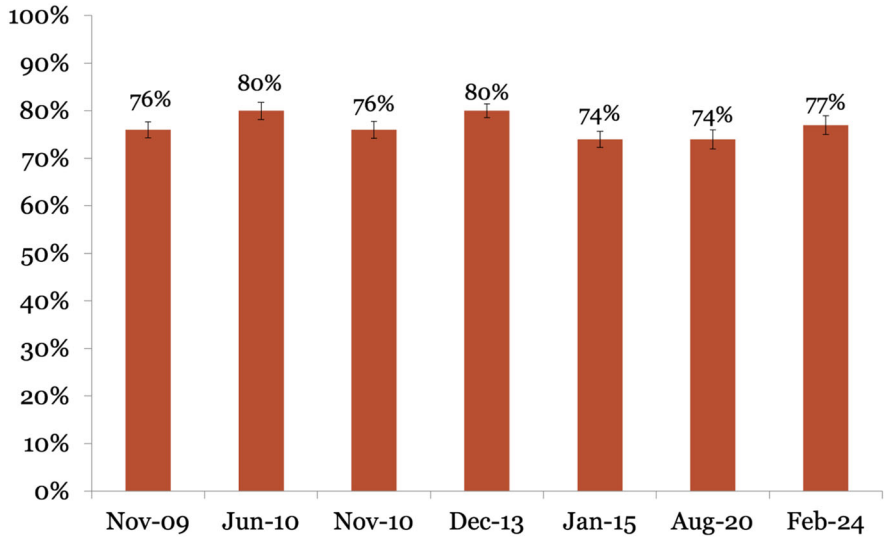

Fig. 18 Percent of Americans who thought that GW will hurt future generations by at least a moderate amount

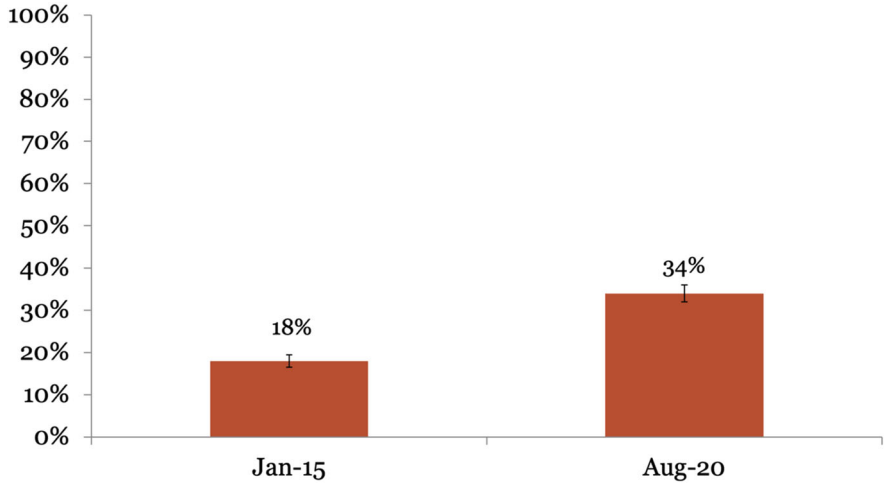

Fig. 19 Percent of Americans who thought that GW will help future generations by at least a moderate amount

of Americans who thought that GW will help future generations at least a moderate amount was 18% in 2015 and remained low though increased to 34% in 2020 (Fig. 19).

Preparing for Possible Consequences

In 2013, a huge majority of Americans preferred preparing for the impact of GW now (83%) rather than waiting to deal with those effects when they happen (16%). However, fewer people, around 50%, favored various specific policies for preparing:

- Improving building standards for coastal development (62%)
- Limiting new development in flood zones (51%)
- Building sand dunes as a means of coastal protection (49%)
- Curtailing rebuilding of damaged structures (47%)

Sand replenishment on eroded beaches, building seawalls to protect coastal structures, and purchasing beachfront properties to induce retreat were relatively unpopular, favored by only 33%, 33%, and 37%, respectively.

Who Should Act?

Given that large majorities of Americans have believed in the existence and threat of GW, we turn next to amelioration efforts, beginning with the question of who should take action to combat climate change.

The US Government

Approximately 80% of Americans have believed that the federal government should do at least a moderate amount to deal with GW (Fig. 20). This proportion reached an all-time high of 82% in 2020 and remained high at 78% in 2024. However, the public's perception of the government's actual performance differed from their desires. Starting in October 1997 at 55%, the belief that the government was taking adequate action peaked at 65% in 2010 and was 51% in 2024 (Fig. 21). Thus, many people believed that the federal government's actions on GW were insufficient. 67% of Americans in 2024 said that the US government should do more than it was doing then (Fig. 22).

Foreign Governments

Huge majorities of Americans have expressed the desire to see foreign governments take action against GW. Specifically, roughly 80% of Americans have believed that foreign governments should be doing at least a moderate amount, with an all-time high of 84% expressing that view in 2020, remained high at 80% in 2024 (Fig. 23). And in contrast, few Americans have believed that foreign governments were doing at least a moderate amount. This proportion was 27% in 1997 and 41% in 2024 (Fig. 24). In 2024, 70% of Americans believed that foreign governments should do more, almost identical to the all-time high of 72% in 1997 and 2020 (Fig. 25).

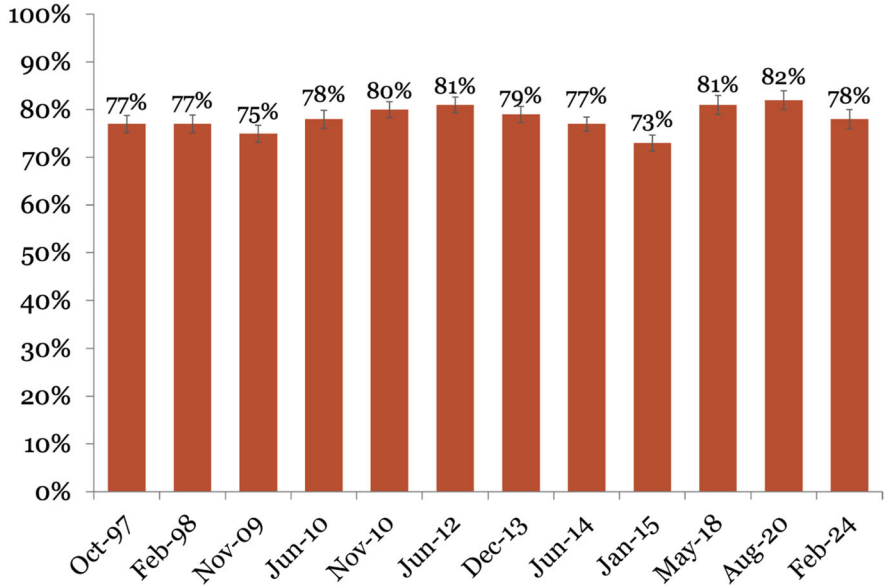

Fig. 20 Percent of Americans who believed that the US government should do at least a moderate amount to deal with GW

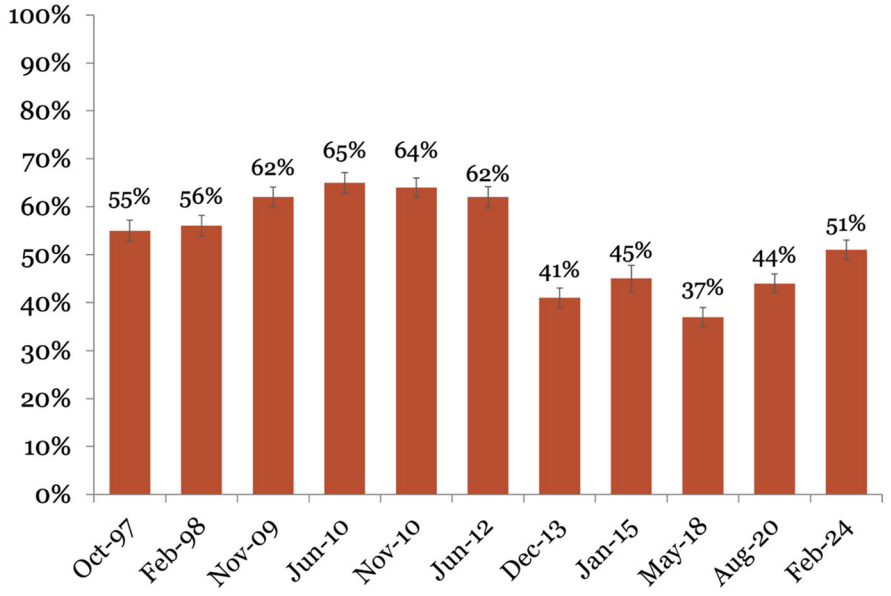

Fig. 21 Percent of Americans who believed that the US government was currently doing at least a moderate amount to deal with GW

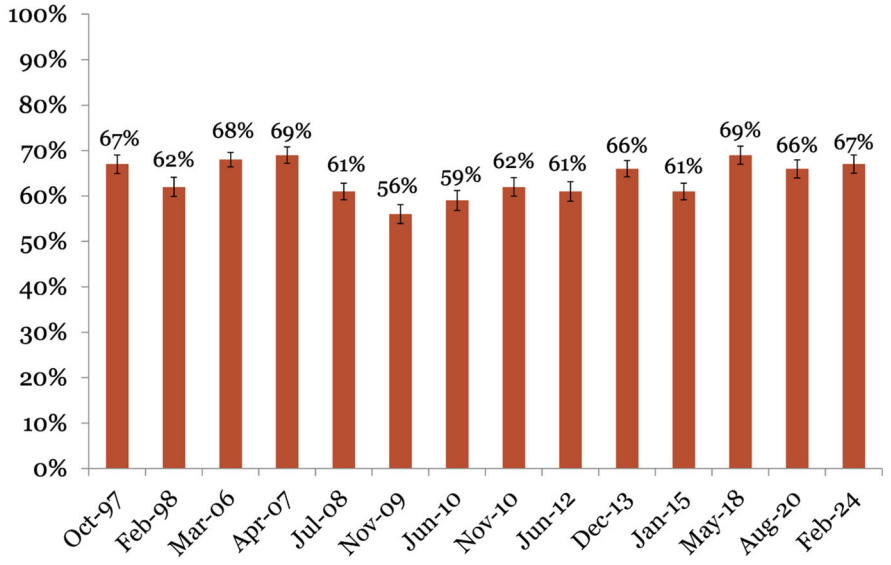

Fig. 22 Percent of Americans who believed that the US government should do more to deal with GW

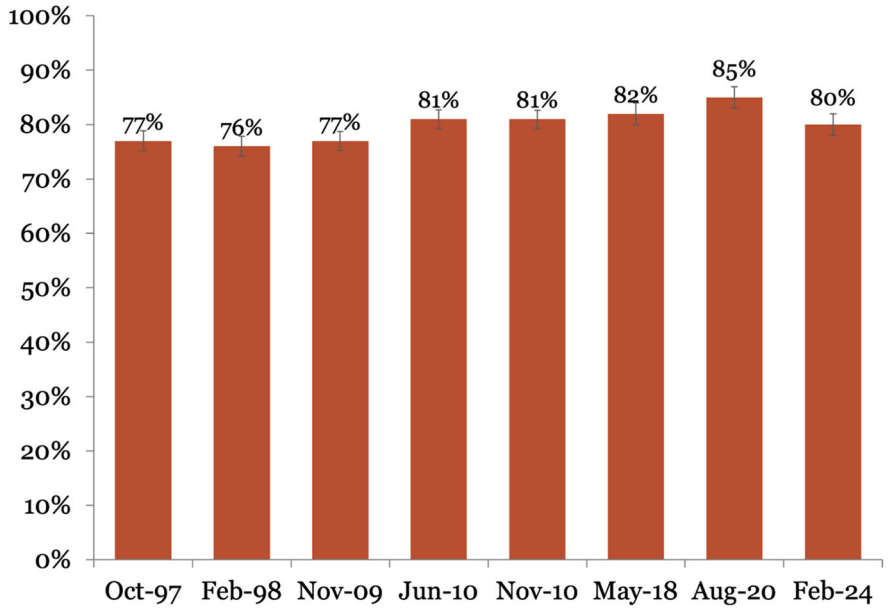

Fig. 23 Percent of Americans who believed that governments in other countries should do at least a moderate amount to deal with GW

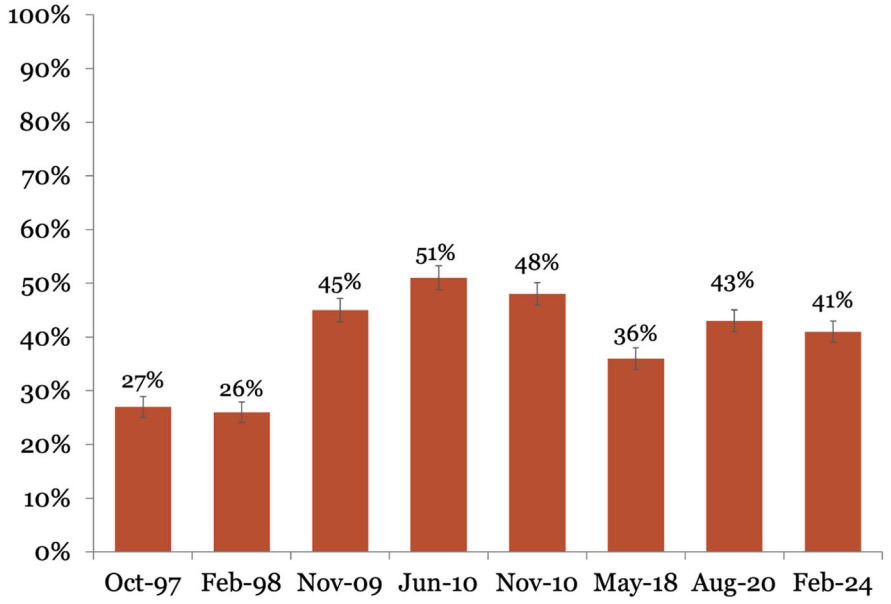

Fig. 24 Percent of Americans who believed that governments in other countries are currently doing at least a moderate amount to deal with GW

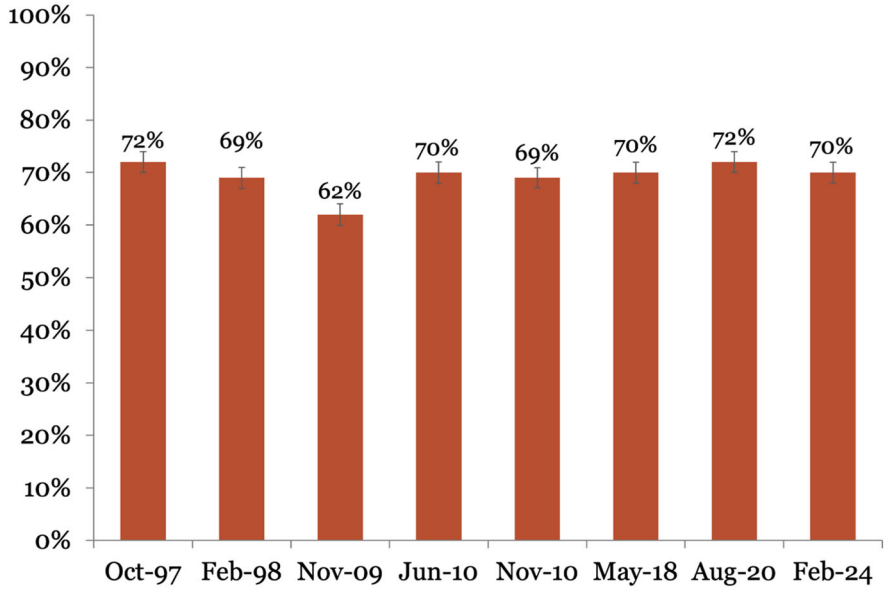

Fig. 25 Percent of Americans who believed that governments in other countries should do more to deal with GW

One might imagine that some Americans would be reluctant to support US economic compromises to deal with GW if other major emitting nations do not do so, because those countries might gain economic advantages in the global marketplace. But few Americans have thought that way. In 2015, 75% of Americans believed that the United States should take action even if other countries do less than the United States, up from 67% in 2008.

US Businesses

Large portions of Americans have wanted US businesses to take substantial steps to ameliorate GW. In 2024, the proportion wanting at least a moderate amount of effort was 78% (Fig. 26). And a substantial gap again appeared between public hopes and perceptions of actual business effort. The percentage of Americans who thought businesses were currently doing at least a moderate amount fluctuated between 35% and 51% (Fig. 27). From 1997 to 2024, approximately 70% of Americans wanted US businesses to be doing more, and 67% believed so in 2024 (Fig. 28).

The General Public

Some psychological theories suggest that people might defer action on GW to governments and businesses rather than engage personally. For instance, the classical *bystander effect* suggests that individuals are less likely to take action when they feel that the responsibility is shared among a larger group (Darley and Latane 1968). In the context of GW, people may perceive entities with greater resources

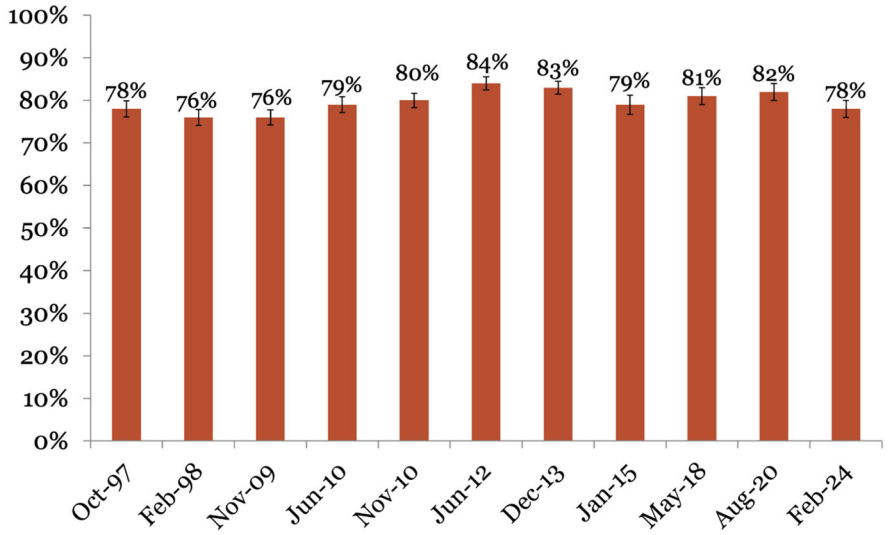

Fig. 26 Percent of Americans who believed that US businesses should do at least a moderate amount to deal with GW

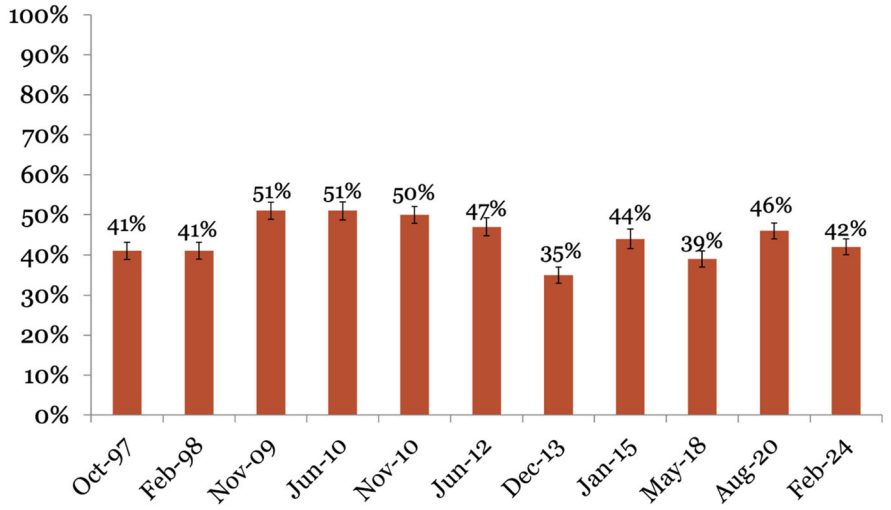

Fig. 27 Percent of Americans who believed that US businesses are currently doing at least a moderate amount to deal with GW

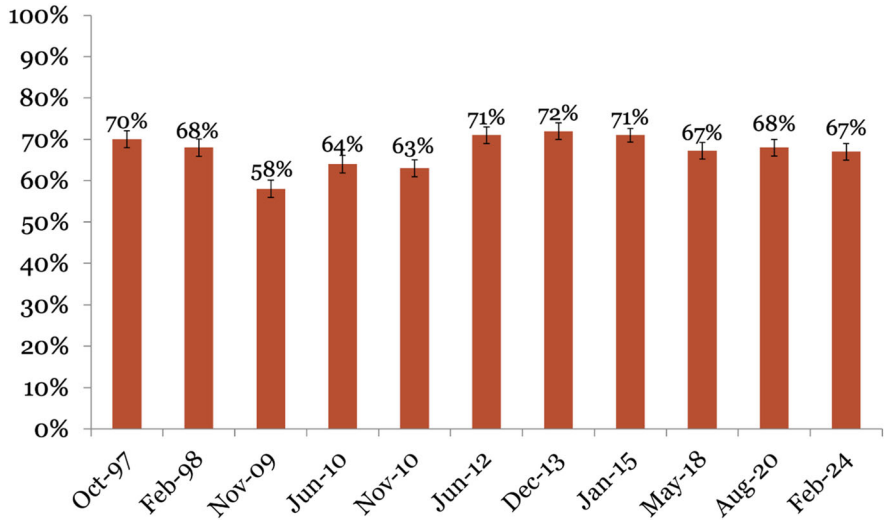

Fig. 28 Percent of Americans who believed that US businesses should do more to deal with GW

(e.g., governments and businesses) to be better positioned to address GW than individuals. Therefore, they may expect governments and businesses to lead the way in mitigating GW instead of themselves. The notion of *social loafing*, the tendency for individuals to invest less effort in performing a task when their contribution is buried among the efforts of a group, also suggests that individuals may expect governments and businesses to take action on GW so that they can free ride (Karau and Williams 1993; Kerr and Bruun 1983; Olson 1965).

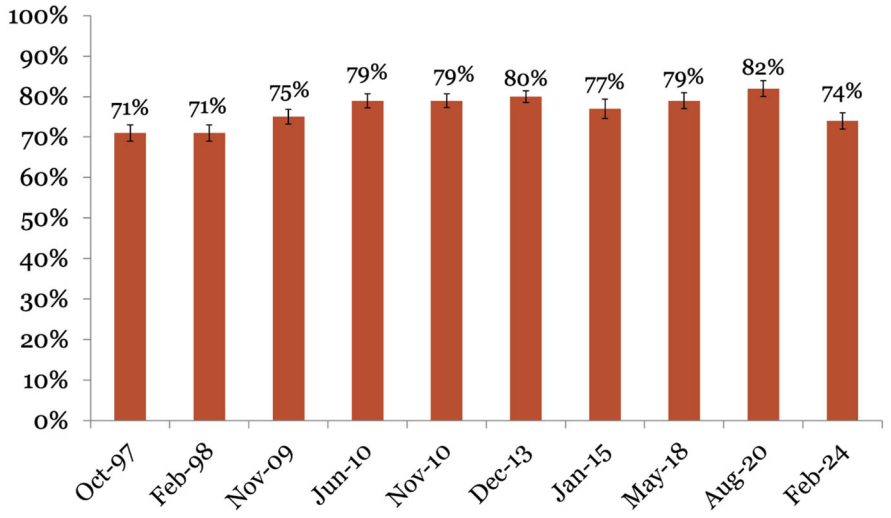

Fig. 29 Percent of Americans who believed that average people should do at least a moderate amount to deal with GW

Contradicting that hypothesis, Americans have expressed desire for no less effort from the general public than from governments and businesses. Large majorities of Americans have thought individuals should do at least a moderate amount to deal with GW. This percentage increased from 71% in 1997 to 82% in 2020 and remained high, though declined to 74% in 2024 (Fig. 29). And the percentage of Americans who believed that average people had been doing at least a moderate amount about GW has been relatively small, ranging from 26% in 1998 to 45% in 2010. In 2024, this proportion was 37% (Fig. 30). A considerable proportion of Americans, ranging from 62% to 74%, thought that members of the general public should do more than they were doing; 64% believed so in 2024 (Fig. 31).

Priority

Even if Americans want government to be taking action on GW, they might not prioritize the issue very highly, and this might allow government to focus its efforts on dealing with other problems facing the country. In the political science literature, people's priorities have been operationalized in two different ways: perceptions of national importance and judgments of personal importance. National importance refers to the significance that an issue has for the entire nation, viewed as a collective (Kingdon 1984). In contrast, personal importance refers to judgments people make about whether to attach tremendous personal significance to the issue. Whereas personal importance judgments of issues tend to be quite stable, national importance judgments vary considerably over time, reflecting changes in national circumstances

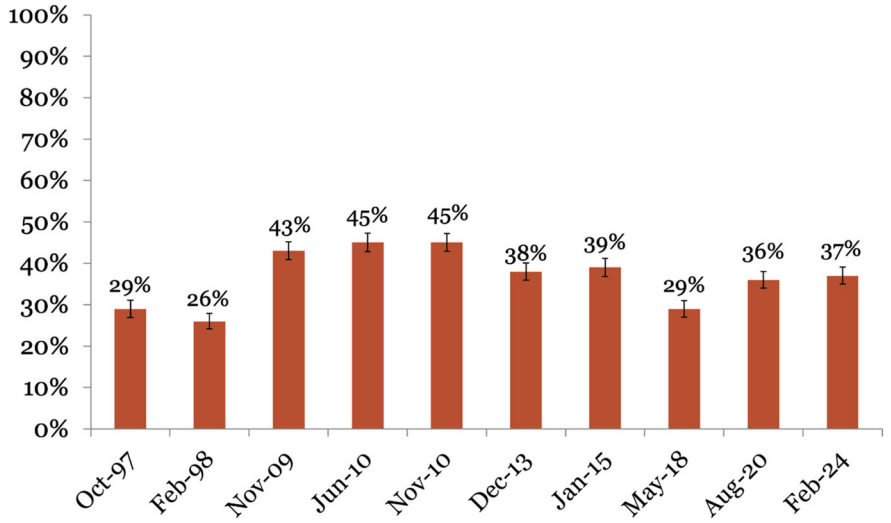

Fig. 30 Percentage of Americans who believed that average people have currently been doing at least a moderate amount about GW

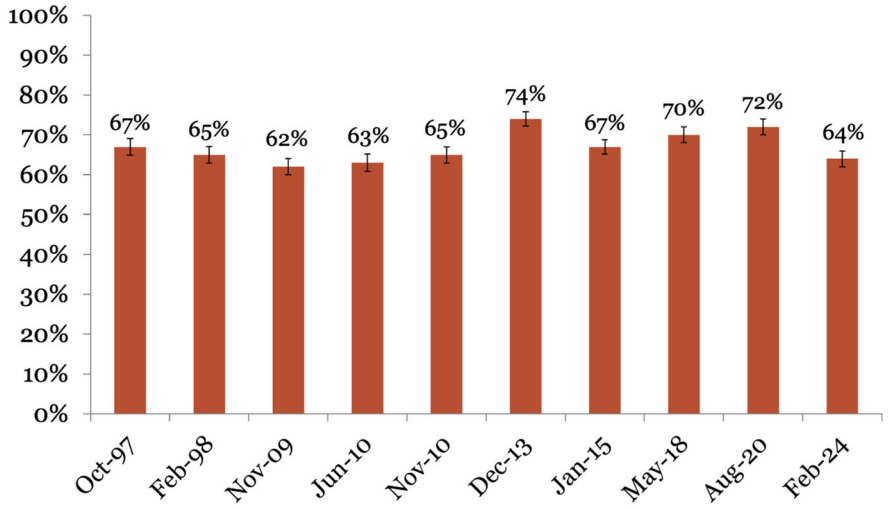

Fig. 31 Percent of Americans who believed that average people should do more to deal with GW

(Miller et al. 2016). And whereas a person may perceive an issue to be very important for the nation, he or she might attach little personal importance to it.

Likewise, a person might attach great personal importance to an issue that he or she recognizes is not especially important for the nation. Consistent with this reasoning, Miller et al. (2016) found that individuals' personal and national importance judgments regarding GW correlated only 0.42 ($p < 0.001$) with one another.

Personal importance was a significant instigator of policy preference expression, attitude expression, and behavior, where national importance was not. Nonetheless, politicians pay attention to issues to which many citizens attach great national importance, so such judgments are likely to be politically consequential, even if they do not inspire citizens to devote thinking and action to an issue.

National Importance

The most frequently used survey measure of national importance is the so-called "most important problem" (or MIP) question, developed by George Gallup in the 1930s (e.g., "What do you think is the most important problem facing this country today?") and variants of it (Yeager et al. 2011).

Few Americans have named GW as the most important problem the country faces. As shown in Fig. 32, only 3% of Americans named the environment as the nation's top problem in 2022 in a Gallup survey. Neither climate change nor the environment was among the three most often named as the country's MIP between 2001 and 2022 in Gallup surveys (Fig. 33). This kind of result was observed across a multitude of surveys that have asked this question (in more than 450 surveys) since

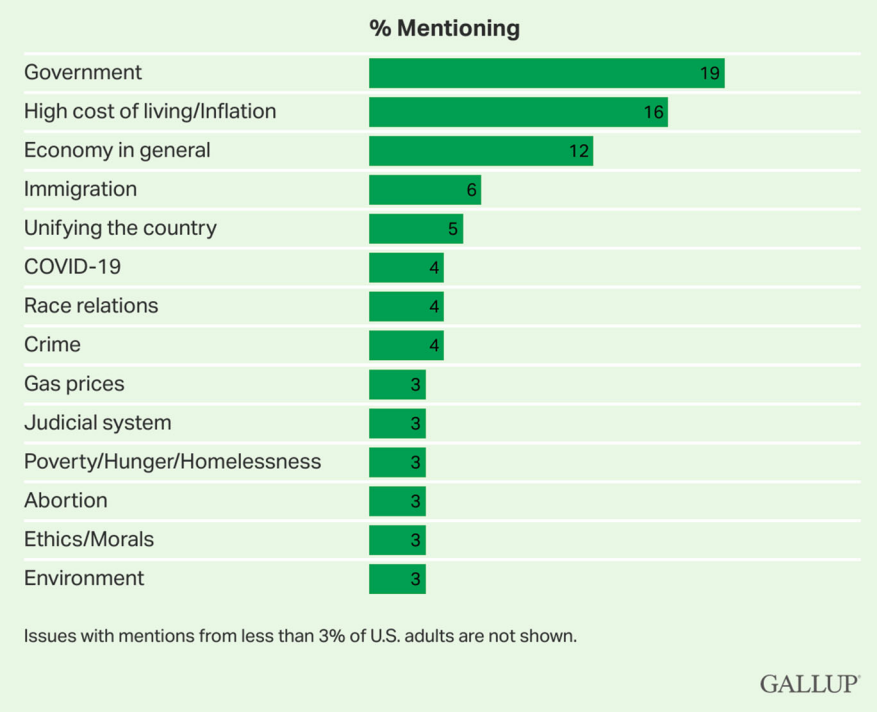

Fig. 32 Average MIP mentions in 2022

Year	Issue #1	%	Issue #2	%	Issue #3	%
2022	Government	19	Inflation	16	Economy	12
2021	Government	20	COVID-19	18	Immigration	8
2020	COVID-19	30	Government	24	Race Relations	8
2019	Government	27	Immigration	18	Race Relations	6
2018	Government	22	Immigration	14	Race Relations	7
2017	Government	20	Healthcare	10	Race Relations	8
2016	Economy	16	Government	13	Jobs	9
2015	Government	16	Economy	13	Jobs	8
2014	Government	18	Economy	17	Jobs	15
2013	Economy	22	Government	19	Jobs	17
2012	Economy	31	Jobs	25	Government	13
2011	Economy	30	Jobs	29	Federal Deficit	12
2010	Economy	29	Jobs	27	Healthcare	13
2009	Economy	40	Jobs	16	Healthcare	15
2008	Economy	39	Iraq	18	Gas Prices	10
2007	Iraq	33	Healthcare	10	Immigration	9
2006	Iraq	26	Immigration	10	Economy	9
2005	Iraq	22	Economy	11	Terrorism	8
2004	Iraq	22	Economy	19	Jobs	14
2003	Economy	27	Iraq	17	Jobs	12
2002	Terrorism	24	Economy	22	Iraq	9
2001	Economy	14	Terrorism	10	Education	9

GALLUP

Fig. 33 Top issues named MIP by US adults, 2001–2022

1950 (see Yeager et al. 2011). This sort of finding has been used as a basis to claim that Americans have not prioritized GW.

However, Yeager et al. (2011) pointed out that the traditional wording of the MIP question only partly characterizes public priorities. It asks each respondent for only one problem, and it asks about problems facing the country today, not problems that will face the country in the future. And when the time horizon looks forward, it's necessary to add a phrase such as "if nothing is done to address it" in order to prevent respondents from overlooking phenomena that they believe would be serious problems but will be ameliorated by human efforts. Lastly, focusing on only those problems that face the United States may be misleadingly narrow if Americans want their government to work on problems that will face other nations as well. Yeager et al. (2011) showed that when national samples of respondents were asked to identify the most serious problem that will face the world in the future if nothing is done to stop it, GW and the environment were the most frequently mentioned.

Do Americans Want Their Leaders to Prioritize GW?

In 2015, about half of Americans wanted politicians to attach substantial importance to GW: the percentages who thought GW should be extremely or very important to President Obama (53%), to congressional Democrats (52%), and to congressional Republicans (52%) were all just above 50%. 43% thought that President Obama should increase the importance that he accorded to the issue of GW, 46% said so about congressional Democrats, and 56% said so about congressional Republicans.

Personal Importance

For many policy issues that are the focus of federal legislation, a small group of people consider each problem to be of great personal importance. This group of people is called the "issue public" on the issue, and they identify themselves by saying that the issue is extremely important to them personally (Krosnick 1990). Issue public members follow the issue closely, think a lot about it, and form strong preferences about policy on the issue.

Personal importance appears to be the root of policy issue engagement for citizens: personal importance has much more impact than national importance on candidate choices, policy preference expression, and financial contributions to political lobbying organizations (Miller et al. 2016). Citizens for whom an issue is highly personally important are the ones most likely to write letters to the media and to representatives expressing their views on the issue, volunteer with organizations advocating to influence policy on the issue, and vote in line with their views on that issue.

Over the years, the GW issue public has hovered around 15% of the American adult population. In 1997, this percentage was 9%, and the percentage increased over the years up to a high point of 26% in 2020 and declined to 21% in 2024 (Fig. 34). An overwhelming majority of members of global warming "issue public" hold "green"

opinions on global warming. For example, among global warming issue public members, 94% believed that global warming has been happening in 2020, and 88% believed that in 2024; 92% of them believed that the government should do more than it was currently doing about global warming in 2020, and 87% believed that in 2024.

The global warming issue public of 21% in 2024 is among the largest issue publics documented in America (see Table 1). For example, according to data from the American National Election Studies 2008 Time Series Survey, 3 out of 12 examined

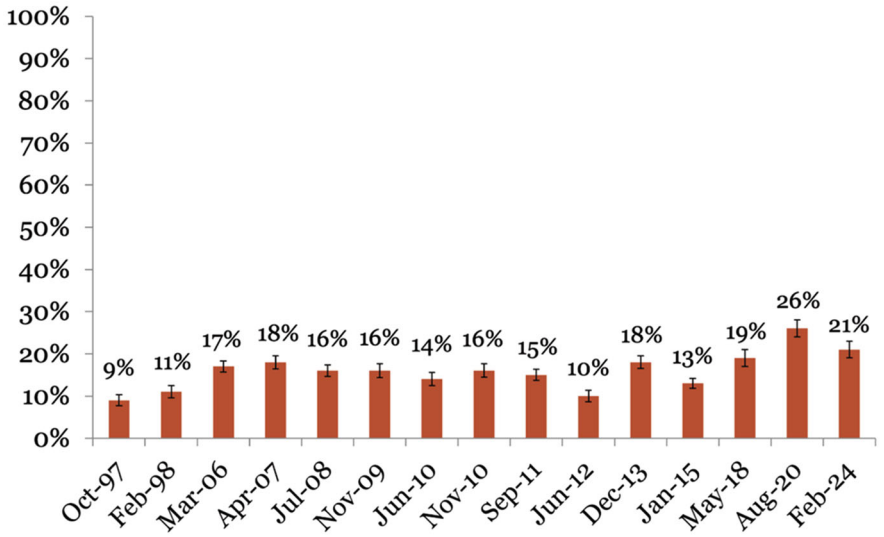

Fig. 34 Percent of Americans who said GW was extremely personally important

Table 1 Percent of American citizens to whom the issue was extremely personally important in 2008

Issue	Issue public size
National health insurance	27%
Women's role in running business and government	26%
Government pays for prescription drugs for seniors	21%
Cut government spending vs. government services	19%
Government guarantees a job for every American	18%
Should illegal immigrants be allowed to work temporarily	18%
Gun control	17%
Spending on the military	15%
Should illegal immigrants be given a path to citizenship	15%
Government regulation of emissions by power plants	15%
Government help to Black Americans	14%
Importance of protecting the environment vs. the economy	11%

Source: The American National Election Studies 2008 Time Series Study (ANES; www.electionstudies.org)

issues had an issue public of 21% or greater (Table 1). The largest issue public was 27%, focused on national health insurance, followed by 26% on women's role in running business and government, and 21% on the issue of whether the government should pay for prescription drugs for seniors. Other issue publics were documented in other American surveys, again reinforcing the conclusion that the current global warming issue public is relatively large (see, e.g., Krosnick et al. 1994).

Another way to assess a person's level of engagement with an issue is to measure their strength of opinion. The percentage of Americans with very or extremely strong opinions on GW has hovered at about 40–45% over the last 20 years. In 2010, 41% of respondents reported having very or extremely strong opinions, and this percentage increased to a peak of 54% in 2018 and was 48% in 2024 (Fig. 35).

Knowledge

Knowledge is important because it helps people to make political decisions wisely (e.g., Fishkin 2009). Political scientists have primarily measured knowledge in two ways. The first is to ask respondents to report how knowledgeable they believe they are on an issue, and the second is to quiz respondents about factual matters (Delli Carpini and Keeter 1996). Many of the data points described above might be considered to be quiz questions by some observers (e.g., has the earth been warming over the past 100 years?), and huge proportions of Americans gave what might be considered correct answers. But people's sense of their own levels of knowledge has increased, from 42% saying they knew a moderate amount or a lot about GW in 1997 to a peak of 75% in 2020 and the second highest of 73% in 2024 (Fig. 36).

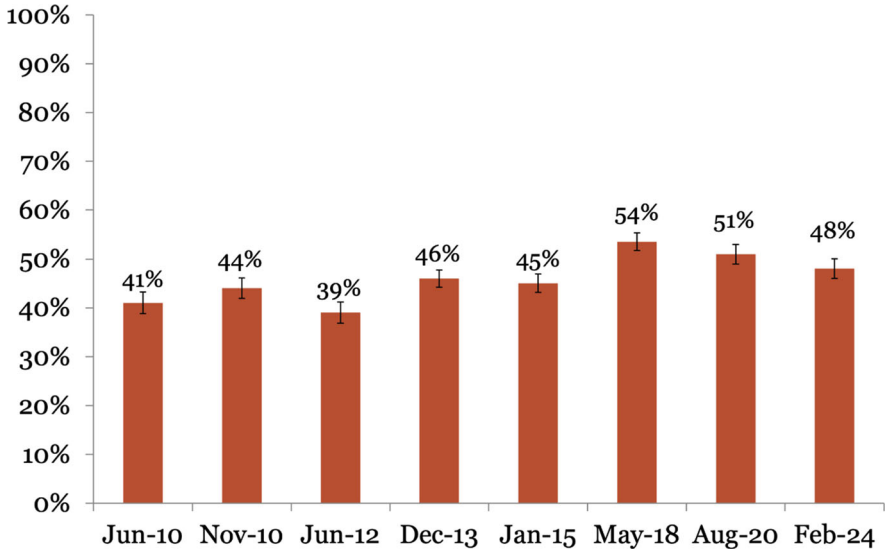

Fig. 35 Percentage of Americans with very or extremely strong opinions on GW

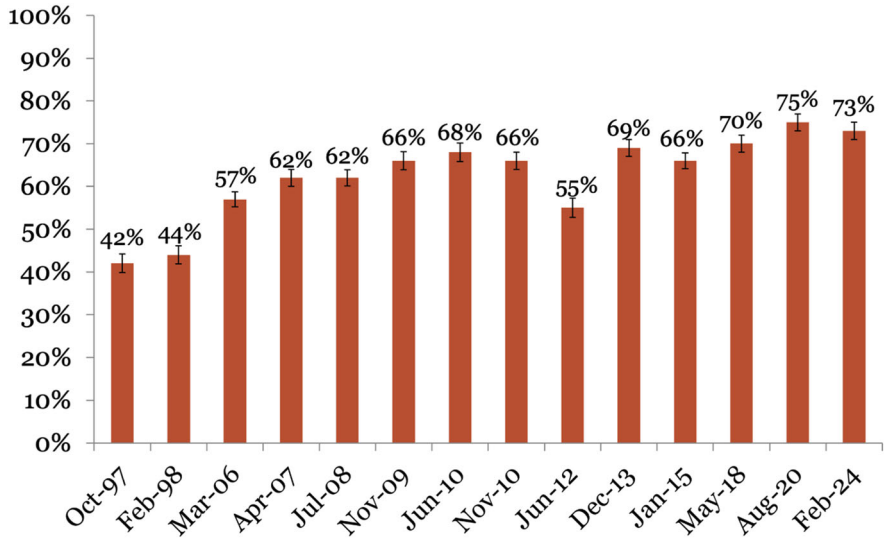

Fig. 36 Percent of Americans who said they knew at least a moderate amount of GW

Government Policy

We turn next to people's opinions about government policies that might be implemented to reduce greenhouse gas emissions in the future.

Paris Agreement

The Paris Agreement is an international treaty on climate change adopted by 196 countries at the UN Climate Change Conference (COP21) in Paris, France, in 2015. The Paris Agreement was the result of 25 years of negotiations, and its overarching goal is to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels" and pursue efforts "to limit the temperature increase to 1.5°C above pre-industrial levels." During Barack Obama's presidency, the United States pledged to curb emissions between 26% and 28% below 2005 levels by 2025, with a longer-term goal of an 80% reduction by 2050.

On June 1, 2017, President Trump announced the United States' withdrawal from the Paris Agreement because of "the unfair economic burden imposed on American workers, businesses, and taxpayers by U.S. pledges made under the Agreement" (The US Department of State Archive 2023). On January 1, 2021, President Biden brought the United States back into the Paris Agreement on his first day in office. And on January 20, 2025, President Trump again withdrew.

According to our survey in 2018, a majority of Americans (61%) did not support President Trump's decision to withdraw from the Paris Accord. Furthermore, 81%

said they supported the United States maintaining the commitment to try to cut greenhouse as production by about 25 percent from its 2005 levels.

Reduce Emissions

From 1997 to 2024, a large majority of Americans believed that the government should limit the amount of GHG that US businesses put out. The proportion ranged from a low of 72% in 2009 to a high of 81% in 2013 and was 74% in 2024 (Fig. 37). In 2020, 81% of respondents favored efforts by the federal government to lower US GHG emissions by 25% below 2005 levels by 2025. Two in three Americans—66%—favored the federal government lowering its own GHG emissions by 40% by 2025, relative to 2015.

The public has also favored policies to reduce emissions from power plants. From 2006 to 2024, about 75% of Americans wanted the US government to either require or give tax breaks to power plants to lower their GHG emissions. 86% of Americans supported the policy in 2006, and 76% did so in 2024 (Fig. 38). More than three-quarters of Americans (77%) favored the US government requiring power plants to reduce their GHG by 30% below 2005 levels by 2025.

Carbon taxes charged to companies have been favored by only slightly more than half of Americans. Specifically, requiring companies to pay a tax for every ton of GHG they emit was favored by 58% of Americans in 2009, by 61% in 2015, by 67% in 2018, and by 62% in 2020.

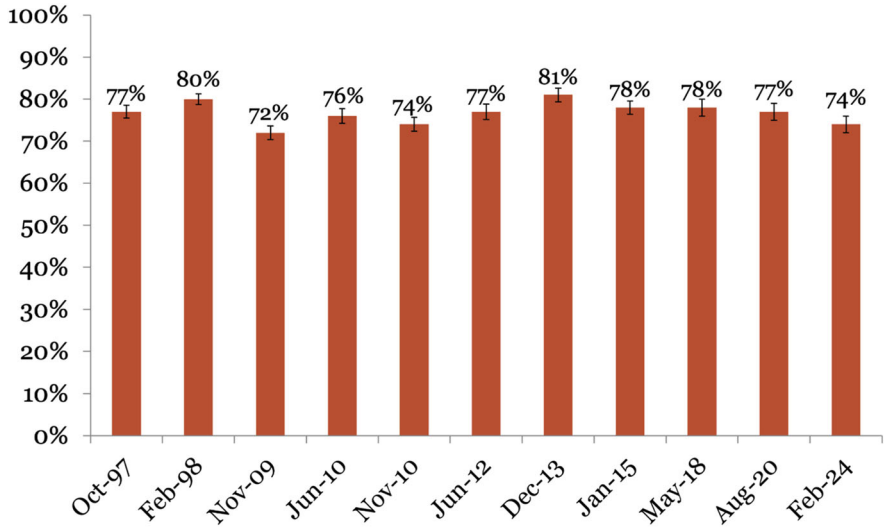

Fig. 37 Percent of Americans who believed that the government should limit the amount of GHG that US businesses put out

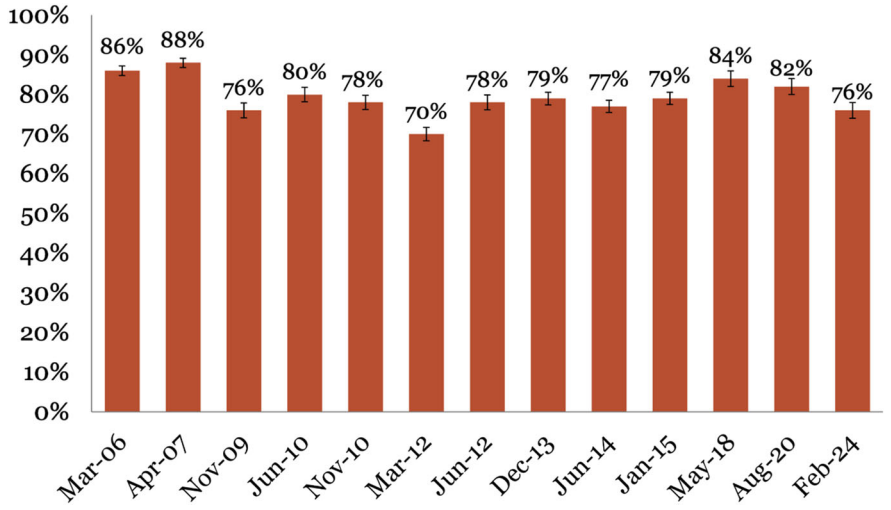

Fig. 38 Percent of Americans who wanted the US government to either require or give tax breaks to lower GHG emissions from power plants

58% of Americans favored the government charging an import tax on items brought to the United States from countries that do not control their emissions.

In 2020, respondents were asked different versions of a question about carbon taxes to compare a simple tax with a tax plus dividend that returned the revenue from the tax to all Americans. In comparison to the 62% who favored a carbon tax without a dividend, mentioning a dividend did not increase support notably. 58% of Americans favored a carbon tax with a $200 annual per-person dividend, 63% favored it with a $600 dividend, and 57% favored it with an $800 dividend. None of these were significantly different from the 62% in favor of carbon taxes with no dividend (Fig. 39).

According to economists, another strategy to reduce future warming is to tax emissions from imported fuels. In 2015, a sizable majority of Americans (67%) thought that the federal government should do so by taxing companies for every ton of GHG the companies emit from burning imported coal, natural gas, and oil, and that percentage rose to 78% in 2018.

Tax Breaks for Renewable Energy

Apart from taxing emissions (which one might think of as a stick), another possible strategy is to offer tax benefits in return for using cleaner forms of energy (a carrot). The percentage of Americans who believed that the US government should give energy-generating companies tax breaks to produce electricity from water, wind, and solar power was 87% in March 2006. That proportion peaked at 88% in 2009 and declined to 72% in 2024 (Fig. 40).

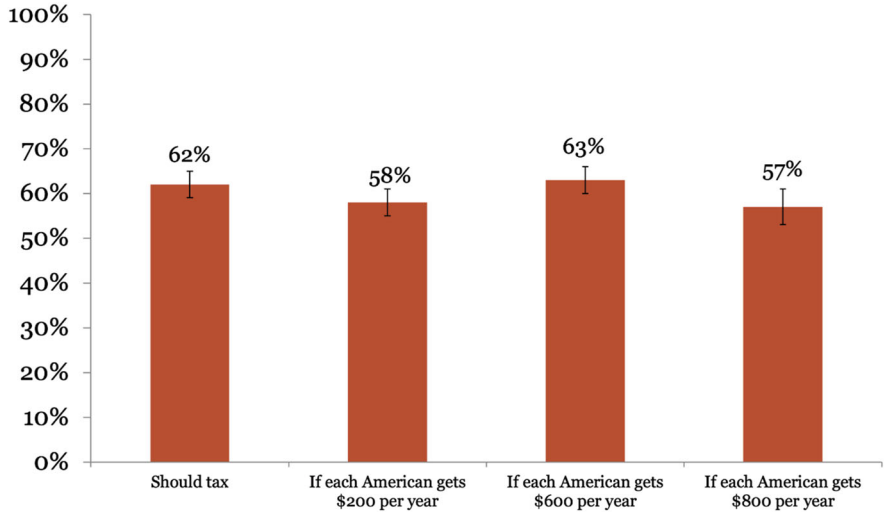

Fig. 39 Percent of Americans who thought the government should charge companies a tax for every ton of GHG they put out (2020)

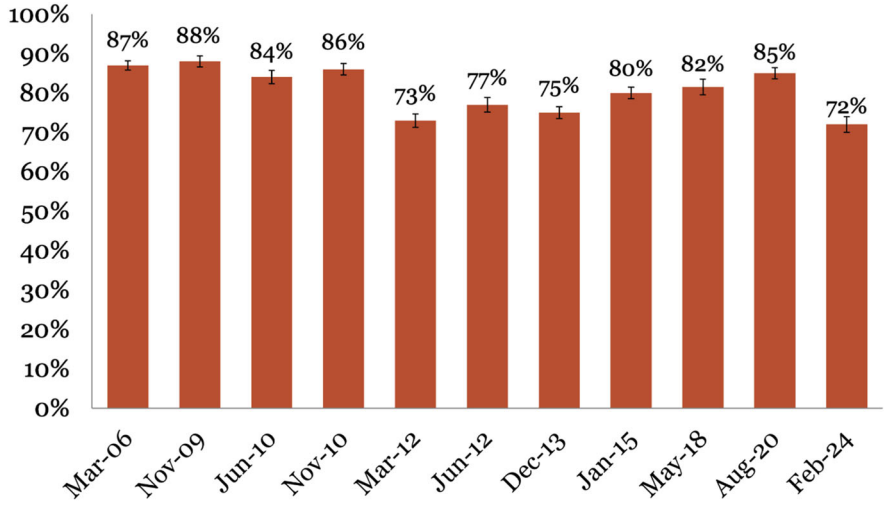

Fig. 40 Percent of Americans who supported the US government giving companies tax breaks to produce electricity from water, wind, and solar power

Fewer, but still a majority, said that they believed that the government should give tax breaks to energy-generating companies in exchange for reducing air pollution from burning coal. In 2009, 65% of Americans favored this policy, and 63% did so in 2024 (Fig. 41). In 2010, more than two-thirds of Americans wanted the government to require power companies to make at least 20% of their electricity from renewable sources such as water, wind, or solar power.

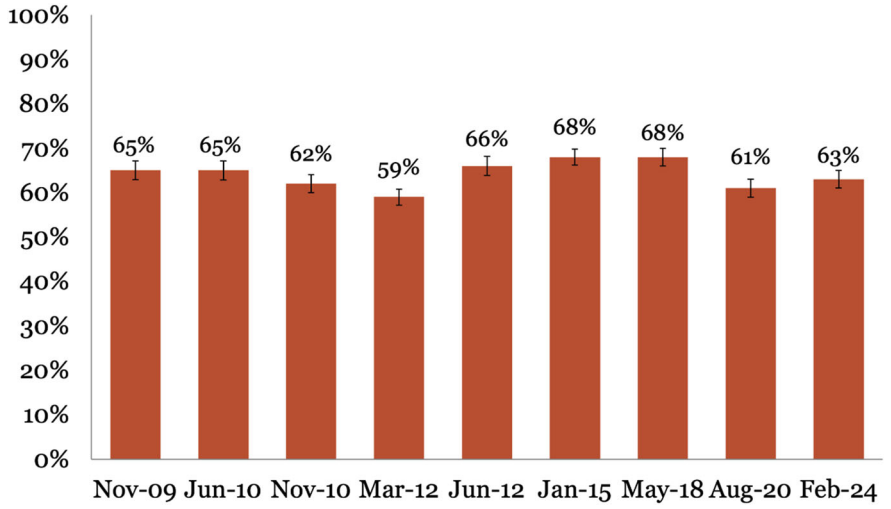

Fig. 41 Percent of Americans who wanted the US government to give companies tax breaks to reduce air pollution from burning coal

In 2013, 73% of Americans favored the government giving tax breaks to companies to make electricity from sunlight, wind, and water, with a slight majority supporting tax breaks for natural gas companies as well. A sizable 68% of Americans wanted the government to pay part of the cost for people to put solar panels on their homes.

Public support for government tax incentives for nuclear power was lower than that for other forms of energy despite the fact that nuclear power emits no greenhouse gases. Support was 41% in 2006, peaked at 54% in 2009, and was 47% in 2020 (Fig. 42).

Cap and Trade

"Cap and trade" is a system in which the government issues permits limiting GHG emissions. Companies that do not use all their permits can sell them to other companies. Companies that need more permits can buy them, or these companies can pay the money necessary to reduce the amount of GHG that they put out. This is intended to incentivize companies to reduce their GHG emissions in the most cost-effective manners possible. When asked about implementing this type of policy and when told that economists believe that it will lead to cost-efficient GHG emissions reduction, majorities of Americans said they favored the policy—59% in 2013 and 52% in 2015.

When presented to respondents as a "cap and dividend" policy, where the revenue generated by selling permits to companies is returned to all Americans in the form of a dividend, support rose: 65% of respondents favored this policy in 2013, 62% favored it in 2015, 61% favored it in 2020, and 51% favored it in 2024.

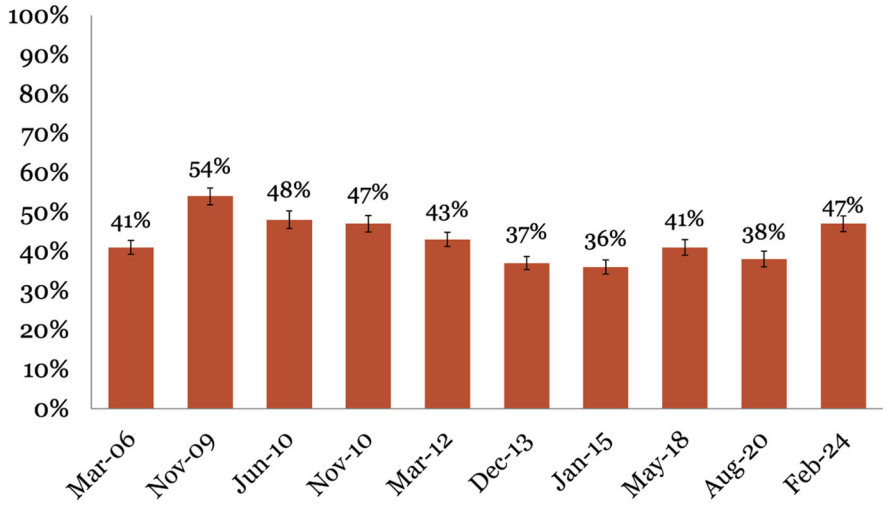

Fig. 42 Percent of Americans who supported the US government giving companies tax breaks to build nuclear power plants

When asked in 2010 about cap and trade, half of the respondents were told that cap and trade had successfully reduced acid rain, 74% favored cap and trade after being educated in that manner, compared to 65% among respondents who were not thusly educated (difference: $p < 0.001$).

In 2013, when one group of respondents was told that "economists say this system is likely to cause companies to figure out the cheapest way to reduce greenhouse gas emissions," 48% of Americans favored cap and trade. When another group was told that "this will cause companies to figure out the cheapest way to reduce greenhouse gas emissions," 59% of Americans favored this policy ($p < 0.001$).

In 2008, 56% of respondents favored cap and trade when told it would add $10 to their monthly electric bill, whereas 47% favored it when told that it would add $25 to their monthly electric bill. Thus, opinions were responsive to the economic cost.

Manufacturing Standards

In 2008, a huge majority, 78%, favored increasing the strictness of government fuel efficiency standards for cars. In 2018, 56% of Americans favored the federal government requiring that cars and light trucks manufactured after 2025 get an average of 55 miles per gallon. In 2020, 64% favored the government requiring that all new cars and trucks made in the United States after 2025 get at least 55 miles per gallon, as laid out by the Corporate Average Fuel Economy (CAFE) standards under the Obama Administration.

The percentage of Americans who believed that the US government should either require or give tax breaks to incentivize construction of more energy-efficient cars was 84% in 2006, 85% in 2007, and 62% in 2024 (Fig. 43). Likewise, public support for the government requiring or giving tax breaks for constructing more energy-efficient buildings was about 80% before 2011, approximately 75% till 2020, and declined to 69% in 2024 (Fig. 44). And public support for the government requiring or giving tax breaks for building more energy-efficient appliances was about 80% before 2011, approximately 72% till 2020, and declined to 68% in 2024 (Fig. 45). Less popular was the government requiring or giving tax breaks for constructing all-electric vehicles: 64% in 2009 and 60% in 2020 and 46% in 2024 (Fig. 46).

Consumer Consumption Taxes

Increasing sales taxes to cause people to use less gasoline or electricity has rationales in economic theory, but the public has been especially unfavorable about those policies, which guarantee increased government revenue and guarantee no emissions reduction. The percentage of Americans who believed that the US government should increase taxes on gasoline was 31% in 2006, generally below 40% in ensuing years, peaked at 43% in 2020, and then declined to 28% in 2024 (Fig. 47). Similarly, increasing taxes on electricity consumption to cause people to use less was favored by only 19% in 2006, peaked at 28% in 2020, and declined to a low of 15% in 2024 (Fig. 48).

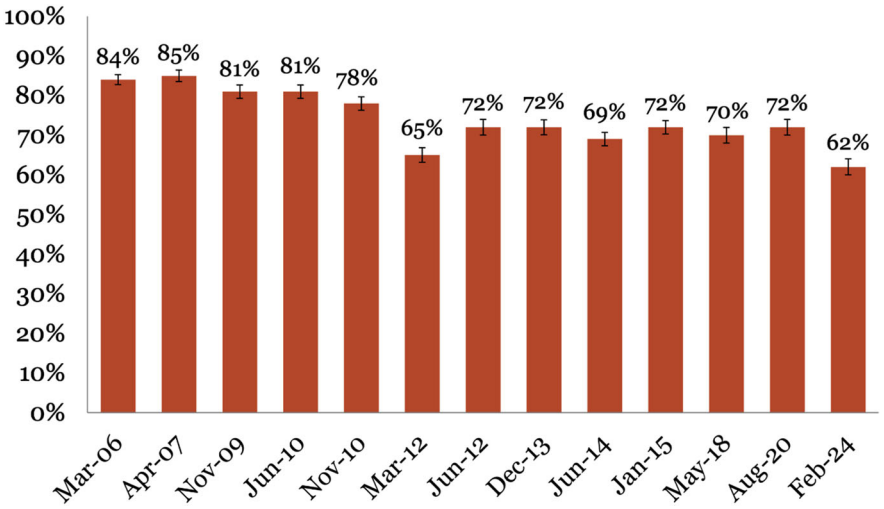

Fig. 43 Percent of Americans who believed that the US government should either require or give tax breaks to construct more energy-efficient cars

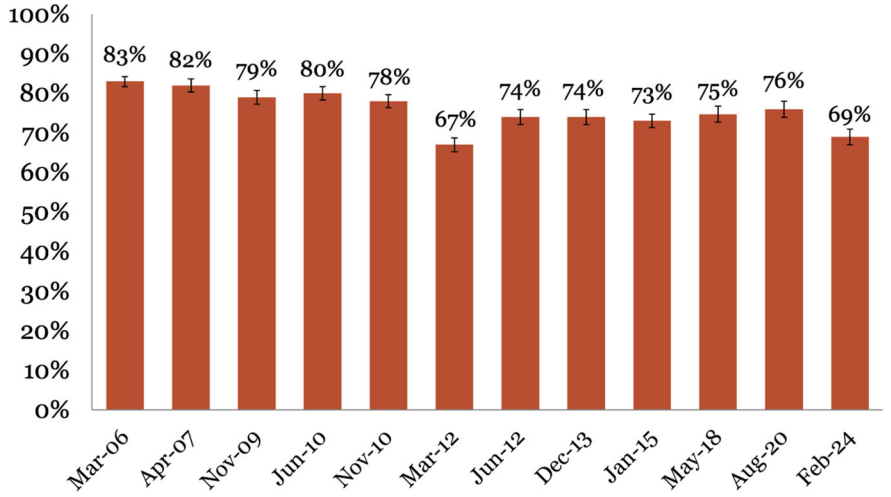

Fig. 44 Percent of Americans who believed that the US government should require or give tax breaks to build more energy-efficient buildings

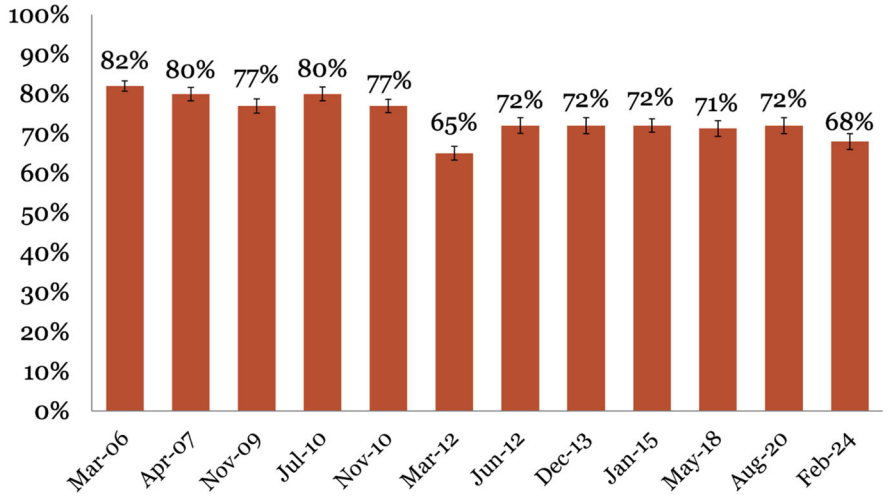

Fig. 45 Percent of Americans who believed that the US government should require or give tax breaks to manufacture more energy-efficient appliances

Green Stimulus During the COVID-19 Pandemic

In 2020, when asked whether the government should spend money to create jobs and new technologies to reduce future warming, 66% of Americans favored this. 59% said the government should spend money to pay for planting trees to absorb GHG, and 61% wanted the government to spend money by investing in developing new, more efficient energy generation methods. Majorities of Americans wanted money

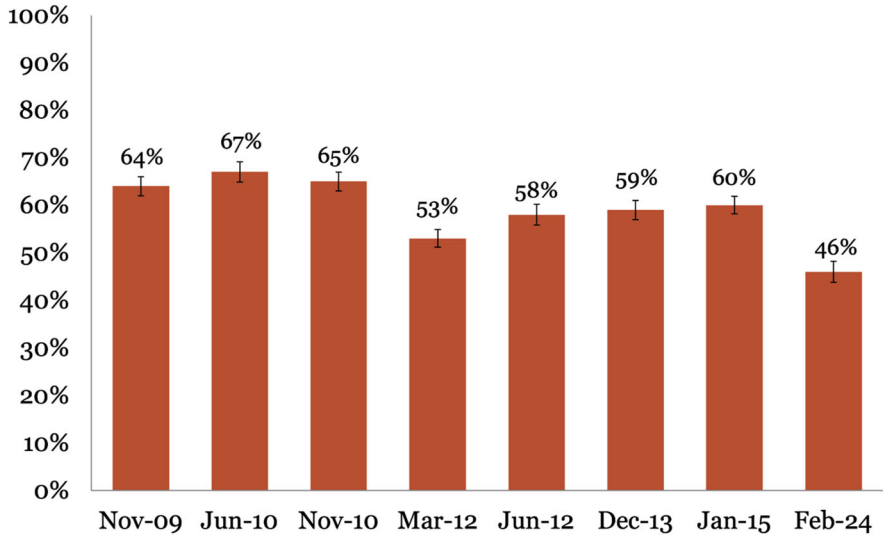

Fig. 46 Percent of Americans who believed that the US government should require or give tax breaks to construct all-electric vehicles

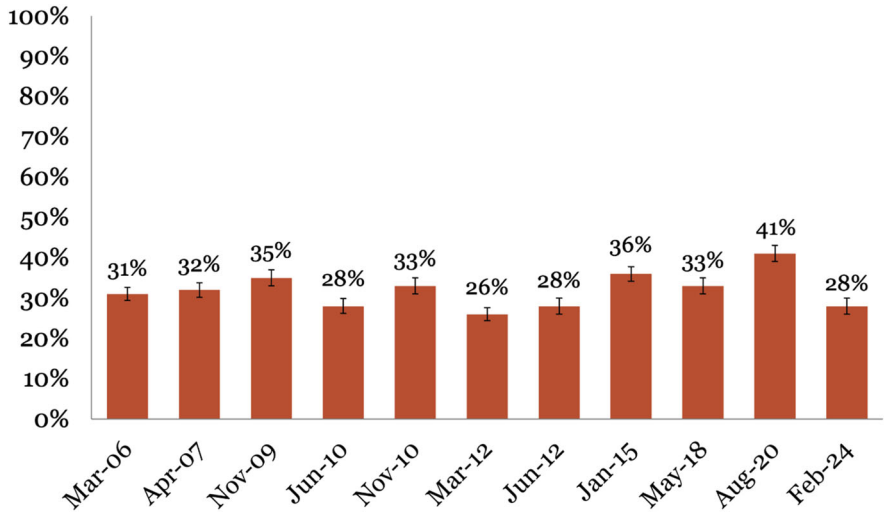

Fig. 47 Percent of Americans who believed that the US government should increase taxes on gasoline to cause people to use less

to help companies make smaller, longer-lasting batteries (56%), strengthen oil and gas pipelines to reduce leaking and pollution (54%), and install charging equipment in parking lots to be used by electric cars and trucks (51%). However, less than half (45%) of Americans favored government spending money to encourage making

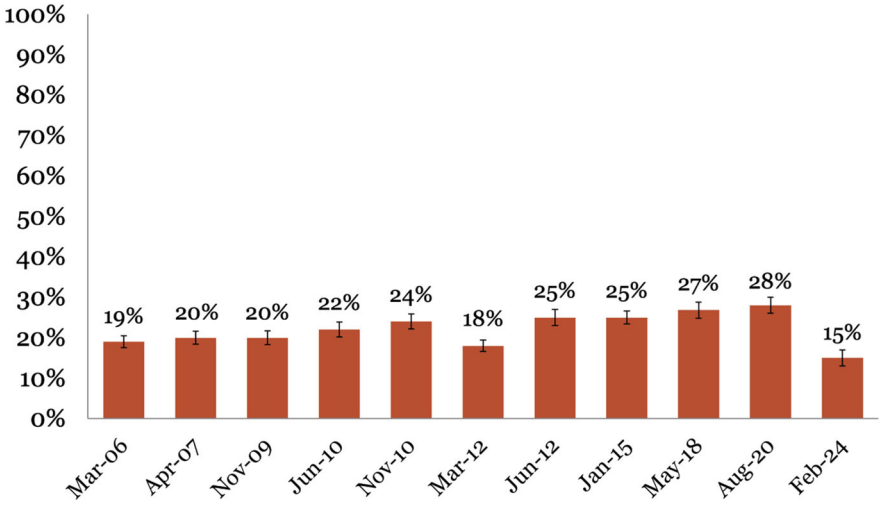

Fig. 48 Percent of Americans who believed that the US government should increase taxes on electricity to cause people to use less

more cars and trucks that run entirely on electricity. This is another instance in which the public seems less favorable toward all-electric cars than other strategies, and this can be viewed as sensible when recognizing that most electricity is still made by burning fossil fuels these days, so all-electric cars do not necessarily reduce emissions unless charged by solar panels.

Summary: Mitigation Policies

Overall, there is substantial public support in the United States for a variety of mitigation strategies, including reducing emissions from power plants and implementing carbon taxes, with public approval varying slightly depending on policy specifics. Public support for tax breaks for clean energy production and cap and trade policies was also considerable. Majorities of Americans supported using government money for developing technologies to reduce future warming and other GW-reducing policies. The only policies favored by few people involve consumer taxes on gasoline and electricity that do not guarantee reductions in consumption or in GHG emissions.

Economic Side Effects

Opinions about emissions-reduction policies might be influenced by perceptions of unintended side effects of those policies on the economy. Indeed, during the last two decades, skeptics have often proclaimed that we could not afford to take steps to

reduce GW because such efforts would damage the economy. Next, we explore the extent to which these arguments have taken hold in the public and might therefore be inhibiting support for policies. We shall see that relatively few Americans have accepted these viewpoints.

Impact on Jobs and the Economy

Only a minority of Americans has believed that GW mitigation efforts would negatively affect the economy generally. Between 2009 and 2020, about one-quarter of respondents believed that government actions on GW will hurt the US economy, and that percent remained low but increased to 36% in 2024 (Fig. 49). On the flip side, pluralities have said that such government action will help the economy: around 50% since 2009 and 44% in 2020 (Fig. 50).

Even as unemployment climbed to 9.8% in November 2010, people did not become more likely to see potential government action on GW as causing problems for job availability. Many more people believed that action on GW would increase the number of jobs in the country (48%) than believed the opposite (18%) (Figs. 51 and 52). In 2024, 35% of Americans thought that taking action on GW would increase the number of jobs in the United States, compared with only 27% who believed amelioration efforts would decrease the number of jobs.

When respondents were asked about their states of residence in 2010, 45% believed that mitigation actions would cause there to be more jobs in their state, and 48% thought such efforts would help their state economy. In 2024, these numbers were 32% and 39%, respectively (Figs. 53 and 54).

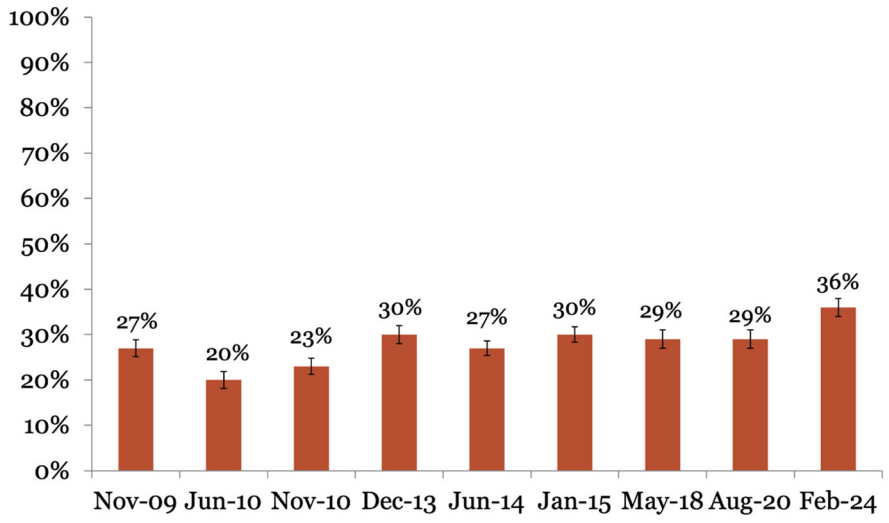

Fig. 49 Percent of Americans who believed that the US government taking action on GW would hurt the US economy

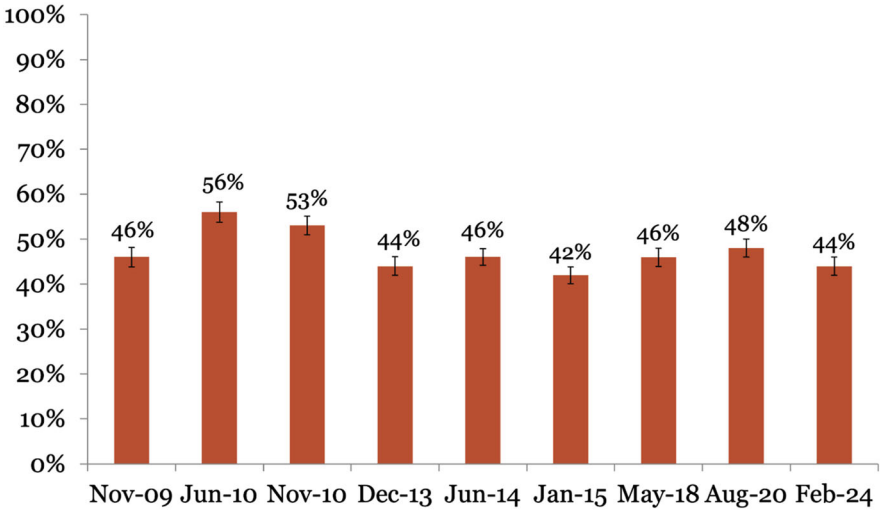

Fig. 50 Percent of Americans who believed that the US government taking action on GW would help the US economy

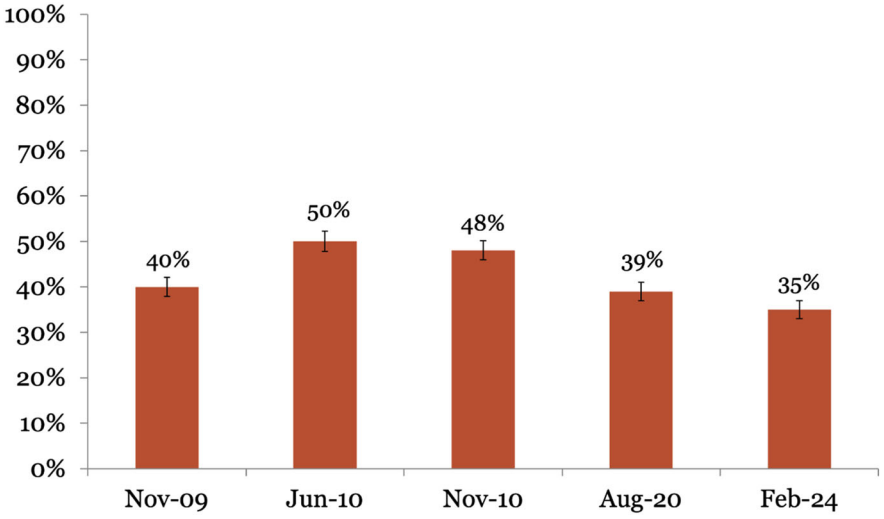

Fig. 51 Percent of Americans who believed that the government taking action on GW would increase the number of jobs in the country

Impact on Personal Finances

Starting in 2020, respondents were asked about how government action on GW might affect them personally, in terms of their personal wealth and their prospects for having a good-paying job. In 2020, 20% of Americans believed that taking

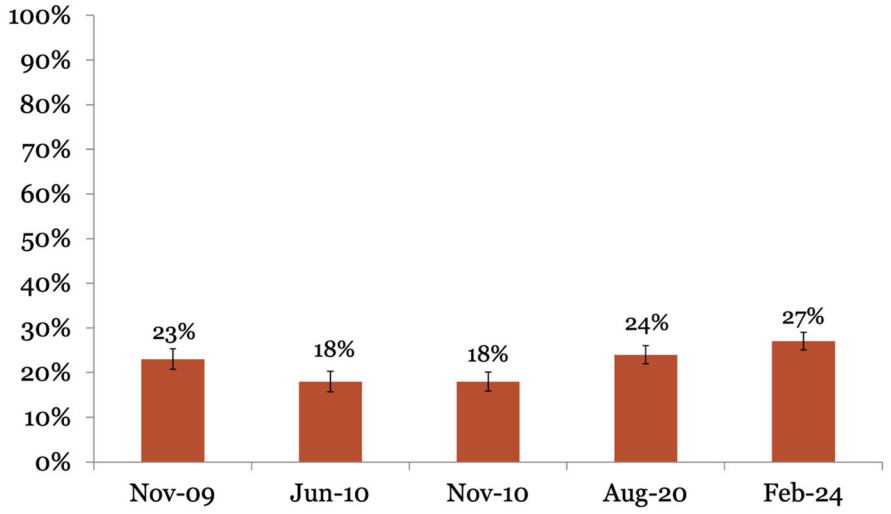

Fig. 52 Percent of Americans who believed that the government taking action on GW would decrease the number of jobs in the country

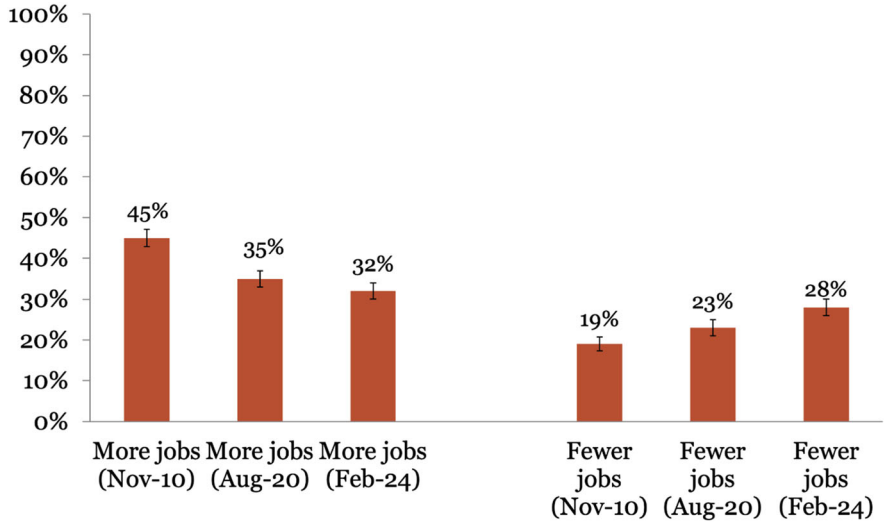

Fig. 53 Percent of Americans who believed that the government taking action on GW would affect the number of jobs in their state

action on GW would result in them having less money, compared to 11% who believed that such efforts would cause them to have more money. These numbers were 36% and 8%, respectively, in 2024. Likewise, in 2020, few Americans felt that the government taking action on GW would increase the likelihood that they would be able to find a good-paying job (16%) or would decrease that likelihood

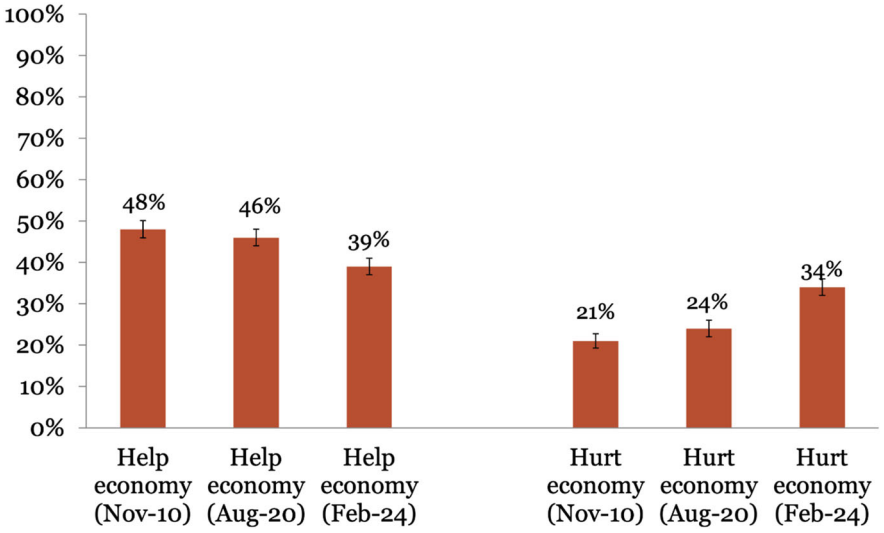

Fig. 54 Percent of Americans who believed that the government taking action on GW will affect the economy in their state

(12%). In 2024, these numbers were both 17%. Thus, few people thought that government mitigation efforts would have an impact on their economic fortunes one way or another.

Willingness to Pay

According to most experts, retooling the economy to significantly reduce GHG emissions will cost money, and those costs are likely to be passed along to consumers. It is therefore of interest to know how much the public is willing to pay for this purpose. "Willingness to pay" (WTP) is a foundational concept in economics that represents the maximum amount an individual is prepared to spend for a good or service, indicating the value they place on it. In public economics, WTP is crucial for cost-benefit analysis. It can be used to assess whether the benefits of a public good outweigh the costs of generating it. Next, we describe studies conducted between 2010 and 2015 investigating how much Americans are willing to pay for GW mitigating policies.

Background

By the end of the 2000s, a variety of attempts were made to pass legislation to reduce GHG emissions at the federal and state levels in the United States. For example, in 2009, the US House of Representatives passed the American Clean Energy and

Security Act (ACES). However, the bill did not advance to the US Senate and therefore did not become law. Under the ACES, domestic GHG emissions would have been reduced primarily through a national cap and trade system. Key targets in the ACES were a 17% reduction in GHG emissions (below 2005 levels) by 2020 and an 80% reduction by 2050.

Likewise, in 2010, the American Power Act (APA) was introduced to the US Senate as a draft bill. Under the APA, domestic GHG emissions would have been reduced primarily through a national cap and trade system. Key targets in the APA were a 17% reduction in GHG emissions by 2020 and an 83% reduction by 2050. The US Senate did not vote on the APA, so it, too, did not become law.

Substantial economic costs of achieving the GHG emission reduction targets were often said to be the primary reason that the ACES and the APA failed to be passed by the Senate. The Congressional Budget Office (CBO) estimated that the ACES would cost the average American household $175 per year (in 2010 dollars) (CBO 2009). The Environmental Protection Agency (EPA) estimated that the ACES would cost the average American household between $74 and $117 per year (in 2010 dollars) and that the APA would cost the average American household between $79 and $146 per year (in 2010 dollars).

Were Americans willing to bear the costs of reaching these GHG emission targets? We turn to survey evidence on this question next.

Study 1: A National Survey in January 2015

Study 1 gauged Americans' willingness to pay for the cost of a national program to reduce GHG emissions by 85% by the year 2050. The cost of the program was described as being incurred by American households through higher market prices of goods and services. Each survey respondent was randomly assigned to be asked about one of three possible annual costs to them: $100, $150, or $190 during the first year of the program, increasing slightly each year throughout the duration of the program.

As expected, the percentage of respondents who voted in favor of the program was highest, 47%, when the price was lowest ($100). The percentages who voted in favor at $150 and $190 were lower: 40% and 42%, respectively.

The lower bound of average willingness to pay per household (Turnbull 1976) across all respondents was $85 in 2015 dollars. Because $85 is a lower bound estimate, the true mean willingness to pay may have been higher, even considerably so.

Study 2: A National Survey in 2013

Study 2 employed the same study design as Study 1, with one difference. For about half of the respondents selected randomly, the cost of the program to them in 2050

was stated explicitly, but this number was not stated for the other half of the respondents.

49% of these respondents voted in favor of the program when the price was $100, 56% did so when the price was $150, and 54% did so when the price was $190. The lower bound average willingness to pay per household across all respondents who did not hear the cost in 2050 was $108 in 2013 dollars.

The other half of the respondents were asked the question mentioning not only the cost in 2013 but also the cost in 2050. 46% of these respondents voted for the program when the price was $100, 45% did so when the price was $150, and 32% did so when the price was $190. The lower bound average willingness to pay per household across all respondents who did hear the cost in 2050 was $81 in 2013 dollars.

Study 3: A National Survey in 2010

In Study 3, each respondent was asked one or two questions about their willingness to pay at various prices (higher or lower) based on their answers to a question about an initial price. This is called a double-bounded dichotomous choice methodology (Hanemann et al. 1991).

A randomly selected one-third of the respondents were asked a series of questions that started with the lowest bid, $75. 59% of the respondents voted for this law at that cost $75, and these respondents then voted on the program at $150. Respondents who voted in favor of $150 were subsequently asked how they would vote on the program at a cost of $250.

Another one-third of the respondents were asked a series of questions that started with the middle bid, $150. 58% of the respondents voted for this law at an annual price of $150, and the respondents who voted for it at that price were then voted on the program at a cost of $250. The respondents who did not vote for the law at $150 were asked how they would vote at a cost of $75.

The last third of the respondents were asked a series of questions that started with the highest bid, $250. 50% of the respondents voted for this law at an annual price of $250. Respondents who did not vote for this law with an annual cost of $250 were asked how they would vote at a cost of $150, and respondents who voted against the program at $150 were asked to vote at a price of $75.

Putting all the data together, 59% of people voted for the law at a price of $75, 58% voted for it at a price of $150, and 50% voted for it at a price of $250. A lower bound estimate of average willingness to pay per household across all respondents, based on responses to the first questions they were asked, was $163 in 2015 dollars.

Based on responses to all questions, 66% of respondents voted for the policy when the price was $75, 53% voted for it at $150, and 41% voted for it at $250. A lower bound estimate of average willingness to pay per household across all respondents based on all questions was $138 in 2015 dollars.

National Surveys in April 2015

Study 4 implemented a similar design with more prices spreading across a wider range: $25, $75, $125, $225, and $350.

As expected, the percentage of respondents who voted for the program was the highest, 47%, when the price was lowest, $25. Support declined as the price increased: 44% at a price of $75 and 42% and 41% when the price was $125 and $225, respectively. Support reached the lowest level of 37% when the price was the highest, $350. The lower bound estimate of average willingness to pay per household across all respondents was $141 in 2015 dollars.

Summary

Throughout all studies, about half of Americans were willing to pay for a policy to reduce GHG emissions at the stated prices. If respondents had been asked about lower prices, most likely, more people would have been willing to pay, which would have documented more willingness to pay. And if respondents had been asked about higher prices, this would most likely have revealed additional willingness to pay. And if more intermediate prices had been asked about, this too would most likely have revealed more willingness to pay. So it seems reasonable to conclude that the nation has collectively been willing to pay the cost of greenhouse gas reduction proposed in the legislation described above.

Consumer Choices

According to the US Energy Information Administration, transportation emits more GHG than any other sector in the United States, attributable to transportation's near-complete dependence on fossil fuels. Therefore, emissions can be dramatically reduced by widespread adoption of EVs if the electricity is made from renewable sources (which is not yet the case). Perhaps partly for this reason, manufacturing and sales of EVs have been increasing in recent years. Still, thus far, such sales represent a small share of consumer automobile purchases in the United States. In 2020, only 34% of Americans had driven or knew someone who had driven an EV. And only 40% of Americans said that they would even consider buying an all-electric car in the future.

This reluctance can be explained by a variety of factors. In 2020, 46% of Americans believed that finding places to charge EVs was extremely or very difficult. Just 71% of Americans believed that driving an EV helps the environment a moderate amount or more, with just under 30% saying it will help "a great deal" (29%). This is again reasonable in light of the fact that most electricity is currently made from fossil fuels. Only 63% of Americans said that EV batteries are slightly likely or not likely at all to catch on fire. 29% believed that maintaining EVs is more costly than maintaining gasoline-powered cars. And 22% of Americans believed that

driving EVs was more costly than driving typical gas-powered cars. 15% believed that the value of EVs depreciated more quickly than gas-powered cars. 25% believed that EVs have worse acceleration than gas-powered cars (25%). And 65% believed that very few mechanics or none were capable of repairing EVs.

Scientists

In 2002, Republican strategist Frank Luntz advised President George W. Bush: "Voters believe that there is no consensus about global warming in the scientific community. Should the public come to believe that the scientific issues are settled, their views about global warming will change accordingly" (Lee 2003). Thus, Mr. Luntz proposed that perceptions of scientific consensus might influence public opinion and policy discussions on climate change. Specifically, he proposed that when the public perceives much disagreement among scientists, the public may conclude that the scientific community's opinions are not yet resolved and are therefore not informative.

The Gateway Belief Model (GBM) is a proposal of how perceived scientific agreement might influence people's opinions about climate change. The GBM suggests that a change in the public's perception of the scientific consensus on an issue acts as a "gateway" to changes in the numbers of people who think climate change has been happening, who believe it is human-caused, and who worry about the issue (van der Linden et al. 2015; van der Linden 2021).

Growing numbers of Americans have expressed the belief that a majority of natural scientists believe GW has been happening. For example, in 2010, 58% of Americans thought so, and in 2024, this proportion was 68% (Fig. 55). Furthermore, in 2012, two-thirds of Americans believed that among the scientists who believed GW had been happening, a majority attributed the warming mostly to human activity, up from 57% of respondents who held that perception of scientists in 2010.

Some studies have offered empirical support for the GBM. For example, Ding et al. (2011) reported an effect of perceived scientific agreement on support for climate change mitigation policies that the investigators said was mediated by people's certainty about whether GW was happening. Likewise, van der Linden et al. (2015) reported that messages asserting scientific agreement caused changes in people's beliefs and worry about climate change, which in turn increased support for public action.

However, other research disconfirmed the GBM. For example, Kahan (2015) showed that an experiment initially claimed to support the GBM actually showed that perceptions of scientific consensus did not shape people's opinions. Other studies also found that messaging about consensus among scientists did not affect climate change-related beliefs (e.g., Dixon et al. 2017), and still others found that consensus messaging backfired (i.e., decreased acceptance of human-caused GW) among strong supporters of unregulated free markets (e.g., Cook and Lewandowsky 2016).

Adding to this latter body of evidence is the fact that even though perceptions of scientific consensus on GW have been rising in recent years, we have seen no

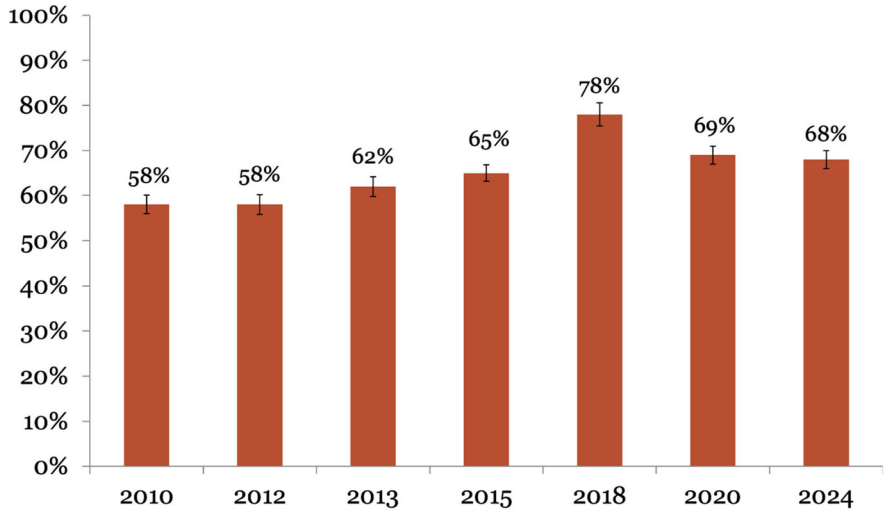

Fig. 55 Percent of Americans who believed that more than 50% of climate scientists believe that GW has been happening

corresponding rises in the proportions of Americans who acknowledged the existence and threat of GW or who favored emissions-reduction policies.

Trust in Scientists

One might imagine that perceptions of the opinions of scientists would only be consequential among Americans who trust climate scientists to be accurate and unbiased. Therefore, understanding the distribution and dynamics of trust in such scientists is important.

Americans' trust in scientists talking about the environment was quite stable between 2006 and 2024. A majority of Americans reported at least a moderate amount of trust in what scientists say about the environment (Fig. 56).

Two 2009 Controversies

People who are skeptical about GW have cited two 2009 controversies to question the credibility of scientists who contributed to IPCC reports: the so-called "Climategate" controversy (McKie 2019) and errors found in the fourth IPCC assessment report (IPCC 2012).

Climategate involved a hack into the computer system of the Climate Research Unit of the University of East Anglia: more than 1000 emails and many other documents were made public. Some observers alleged that the leak showed climate scientists conspiring to manipulate data for the IPCC's reports. Several investigations, including by the US Environmental Protection Agency (2017), found no

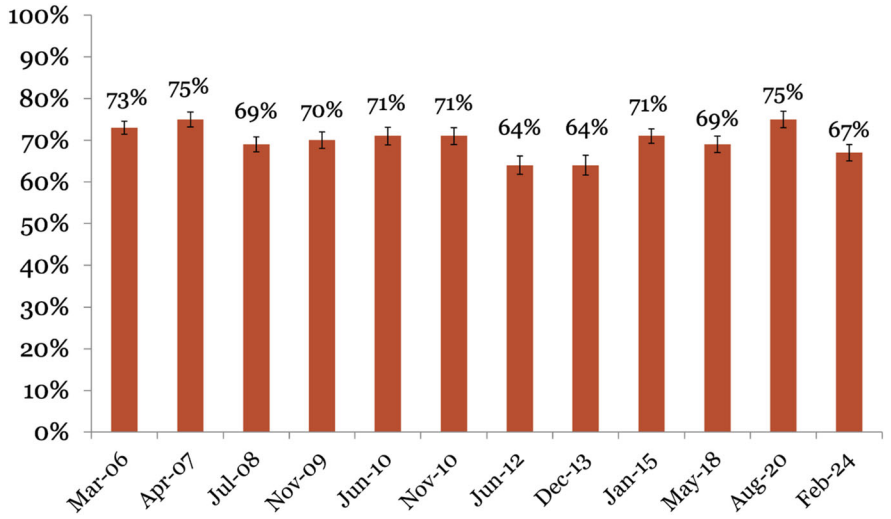

Fig. 56 Percent of Americans who trusted what scientists said about the environment at least a moderate amount

substantiation for those claims and concluded that the materials did not undermine the IPCC's findings.

In December 2009, accounts of errors in the fourth assessment report of the IPCC emerged. For example, the report mistakenly projected the date for Himalayan glacial melting to be 2035 instead of 2050 (The United States Environmental Protection Agency 2010).

A June 2010 national survey assessed whether the public knew the details of these events and whether people believed that the events had impacted public confidence in scientists. About one-third of Americans remembered hearing or reading something about Climategate, yet 71% of those people didn't remember any details about the emails. One in four remembered hearing or reading something about mistakes in the IPCC report, yet 81% said they didn't recall any details. Only a small portion of Americans said Climategate showed that climate scientists should not be trusted (9%) or stated that IPCC reports should not be trusted (13%). These figures suggest very low upper limits on the potential impact of these events on public opinion. Furthermore, there was no notable lasting drop in the number of Americans who expressed "green" opinions on climate change after these events occurred. If they had any impact on the public, that impact was quite short-lived.

Motives of Scientists

Skeptics have questioned the motives of natural scientists who draw conclusions about climate change. If natural scientists claim that GW will lead to dire consequences, are they simply in on a hoax to garner more research funding? Or if

scientists report findings challenging the notion of GW, are those researchers simply doing so due to the influence of fossil fuel industries?

In June 2012, Americans were far from unanimous regarding the motivations underlying scientists' expressed conclusions about GW. When scientists said that GW had been happening and was due to human activity, just over half of the nation believed that those conclusions are based on scientific evidence, whereas 35% thought that scientists reached those conclusions for economic or political reasons. Likewise, 44% of Americans thought that scientists who expressed skeptical views of the existence and threat of climate change based their opinions on scientific evidence, whereas 49% thought that their motivation was economic or political. Thus, Americans thought that skeptical scientists were more likely to have sub-optimal motivations than scientists who believe in the existence and threat of GW.

Uncertainty

In his memo to President George W. Bush, Frank Luntz recommended that President Bush should "continue to make the lack of scientific certainty a primary issue in the debate" (Lee 2003). Perhaps Luntz presumed that as long as people are uncertain, they will not feel the need to implement GHG emissions reduction policies (see, e.g., Oreskes and Conway 2010).

Scientific uncertainty is inherent in scientific inquiry. Lessons learned from scientific inquiry are provisional, because humans are always bounded by the knowledge they possess. Science is also self-correcting: as new evidence emerges, scientific understanding evolves, sometimes overturning previous beliefs or revealing the limits of current knowledge.

Howe et al. (2019) found that natural scientists acknowledging uncertainty (in the form of confidence intervals for predictions) increased trust in those scientists and public acceptance of their messages. However, this impact occurred only if researchers did not acknowledge irreducible uncertainty, which is uncertainty due either to intrinsically random and uncontrollable natural phenomena or to the limits of human knowledge. This research suggests the value of educating the public about the nature of scientific inquiry, where some uncertainties can be reduced through further research, whereas others are inherent to the phenomena being studied and unavoidable. Improving public understanding of these different types of uncertainty could potentially increase people's comfort with irreducible uncertainties over time.

Howe et al. (2019) showed that acknowledging scientific uncertainty is not a sign of weakness and is instead a sign of appropriate humility and a driving force calling for continued investigation and refinement of human understanding. The open acknowledgment of uncertainty among scientists fosters a culture of debate and skepticism that is essential for the advancement of knowledge. Moreover, the presence of uncertainty in science is a reminder that many aspects of the natural world are complex and may never be completely understood. Recognizing this inherent uncertainty encourages scientists to remain cautious in their conclusions, transparent in their methodology, and open to alternative interpretations, ensuring that science remains a dynamic and evolving pursuit of truth.

GW and Voting

Voters consider a wide range of factors when evaluating candidates, including:

- Party identification
- The performance of the incumbent
- The health of the nation
- Interests of social groups
- Perceptions of candidates' personalities
- Emotions evoked by candidates
- Policies favored and opposed by candidates

When a citizen is passionate about a particular policy issue, he or she is especially likely to use the issue when deciding for whom to vote. Philip Converse (1964) proposed that the small group of citizens passionate about any particular issue is that issue's "issue public" (see also section "Personal Importance") (Converse 2006). The US electorate contains a gun-control issue public, an abortion issue public, and other small groups focused on their own prioritized policy topics.

As mentioned in section "Personal Importance", roughly 21% of Americans were in the GW issue public in 2024. This number increased over most of the prior years and was the second highest in the past decades in 2024.

Most issue publics are divided equally between people on either side of the issue. This balance makes it difficult for politicians to gain broad support by talking about those subjects. If a candidate takes a position on one side, he or she will alienate about as many people as he or she will attract.

The GW issue public is unusual in this regard, because it is overwhelmingly one-sided. The vast majority of issue public members believe that GW has been happening, that it is human caused, that it is a threat, and that it requires government action. A tiny minority of this issue public takes a skeptical view.

Do views on GW influence voting decisions of issue public members as theory suggests they should? Eight studies conducted over seven years answer this question with a resounding "yes."

Key findings are:

- Candidates attract more votes by stating a belief in GW and its human causes, and they hurt their electoral chances by voicing opposite positions. Such expressions are most likely to attract votes from Democrats and Independents.
- Taking a skeptical position about GW hurts a candidate among Democratic and Independent voters and does not attract votes from Republicans.

The current chapter uses the terms "green" and "not-green" to label people's sets of beliefs about GW. A "green" position means believing that GW has been happening, is human caused, is threatening, and requires government action. A "not-green" position means believing that GW has not been happening, is not human-caused, is not threatening, and does not merit government action.

Next, we report the findings of eight studies conducted by PPRG between 2008 and 2015 investigating the campaign and voting strategies concerning GW. Detailed findings and methodologies of these studies were reported by MacInnis and Krosnick (2016).

The 2008 White House Election

A survey in late 2008 and 2009 looked into whether the GW issue affected the presidential election in which Barack Obama competed against John McCain in 2008.

Among the GW issue public, 86% believed that it was occurring and was human-caused, was threatening, and required government action. Thus, one would expect that the issue would enhance the chances of victory by a candidate who took a green position and would reduce votes received by skeptical candidates.

Sixty percent of voters in the issue public thought that Mr. Obama endorsed the green view more than did Mr. McCain. As a result, Mr. Obama gained an electoral advantage because the vast majority of high-importance respondents were on the green side of the issue.

The 2012 White House Election

In June 2012, a nationally representative sample of American adults reported their presidential voting intentions and their opinions on GW. We sought to learn whether candidates' GW views were a consideration for the electorate and whether a voter's own opinions on the subject influenced how he or she voted. Issue public members were more likely than others to support candidates whom they perceived to share their own views on the subject. A majority of these people said they would vote for Mr. Obama over Mr. Romney. Thus, GW did matter in that presidential election.

The 2010 Congressional Midterm Elections

Another study analyzed the 2010 campaign and government websites of candidates in 430 House and Senate races to determine which candidates took green positions, which took not green positions, and which were silent or mixed on GW. Election results were predicted by the candidates' expressed GW opinions. The results indicated that candidates who took green positions were more likely than candidates who did not.

The 2012 Presidential Election

In 2011, a nationally representative sample of American adults was interviewed to explore whether respondents' candidate preferences in the 2012 presidential election were predictable using their views of GW.

The survey proposed a series of hypothetical matchups between Democrat Barack Obama and each of various Republicans: Mitt Romney, Ron Paul, Rick Perry, Jon Huntsman, and Michele Bachmann. Respondents stated their candidate preferences in each of the hypothetical races. Respondents who said they believed in human-caused GW were more likely to favor Mr. Obama in these matchups. More generally, respondents were more likely to vote for the candidate whose views on GW most closely matched their own.

Hypothetical Candidates in 2015

A 2015 survey asked a nationally representative sample of American adults about the impact that a statement about climate change made by a hypothetical political candidate would have on the respondent's likelihood of voting for the candidate. After hearing the candidate make a "green" statement, 66% of respondents said that that would make them more likely to vote for the candidate. After hearing the candidate express skepticism about climate change, 67% of respondents said that that would make them less likely to vote for the candidate. And after hearing the candidate say that he/she is not a scientist and doesn't have an opinion about climate change, 44% of respondents said that that would make them less likely to vote for the candidate, and only 27% of respondents said that that would make them more likely to vote for the candidate.

Hypothetical Candidates in 2010

A 2010 survey asked a nationally representative sample of adults how likely they were to vote for Senate candidates based on the candidates' GW policy stances. Each respondent was randomly assigned to hear a hypothetical candidate express a "green" position or a "non-green" position on GW or no statement of GW, and then respondents reported their likelihood of voting for the candidate. The hypothetical candidate taking a green position significantly increased respondents' reported likelihood of voting for the candidate (by 12 percentage points), and taking a not-green position significantly lowered the respondent's likelihood of voting for the candidate (by 17 percentage points).

2010 Hypothetical Candidates in Florida, Maine, and Massachusetts

In 2010, in surveys conducted in Florida, Maine, and Massachusetts, respondents were again told about a hypothetical political candidate and heard the candidate make either no statement about climate change (and instead made statements about other issues) or heard the candidate make statements about other issues plus expressing a green position on climate change. Hearing the candidate make the green statement increased respondents' likelihood of voting for the candidate by

24 percentage points, 7 percentage points, and 10 percentage points in Florida, Maine, and Massachusetts, respectively.

2012 Barack Obama vs. Mitt Romney

In 2012, a non-probability sample of people who volunteered to complete online surveys for money were asked to evaluate President Barack Obama and his challenger, Governor Romney, after watching videos of the candidates making comments about GW. Watching Mr. Obama express a green opinion on climate change increased the favorability of respondents' evaluations of him. And respondents who watched Mr. Obama express a green position evaluated Mr. Romney more favorably when he did so as well than when he did not.

Opinions in the States

Because US Senators are responsible for and to their constituents, understanding public opinion on GW in each state separately is potentially useful to them. This section presents maps showing state-level public opinion for 20 survey questions as of 2020. Two additional maps show state opinions as of 2015—the most recent year in which those two questions were asked. In some maps, some states have no percentage because too few survey respondents in that state were asked the question to permit reliable estimation.

The maps were created by concatenating all past surveys that asked each question and then statistically modeling the impact of change in opinions over time and of the impact of methodological factors in measurement.

Fundamentals

This section first focuses on the following seven fundamental opinions on a state-by-state basis:

- Whether GW has been happening
- Whether warming will continue in the future
- Whether past warming has been caused by humans
- Whether warming will be a serious problem for the United States
- Whether warming will be a serious problem for the world
- Whether 5 degrees of warming in 75 years will be bad
- Whether the US government should do more to address GW

Across all seven fundamental opinions, majorities of the residents in all analyzed states held green opinions—that warming has been happening, that it is attributable

to human activities, and that it poses a threat to the welfare of the United States and the world. More than 70% of the residents of all states believed that warming has occurred. In a majority of the states, proportion believing in the existence of warming was greater than 80%. The largest majority was in Massachusetts (88%), and the smallest was in Utah (71%) (Fig. 57).

Similarly, large majorities in all states believed that the world's temperature will rise in the future if nothing is done to address it. The New England states of Rhode Island (86%) and Vermont (85%) had the largest majorities, and Idaho and Utah (both 61%) had the smallest. In only six states, fewer than 70% of residents believed that future warming would happen, and no states manifested majorities smaller than 60% (Fig. 58).

There was also widespread agreement that warming has been caused by human activity. The fraction of people expressing this opinion was never below 70% in any state. Utah had the smallest majority (71%), and Rhode Island and New Hampshire had the largest (91%). In general, greater levels of skepticism about people's role in causing GW appeared in the South and certain Midwestern and Western states (Fig. 59).

Majorities in all states believed that GW will be a serious problem for both the United States and the world if nothing is done to address it. Idaho had the smallest majorities holding these beliefs (60% and 62%, respectively), and Rhode Island led the Northeastern states with the largest majorities (94% and 92%, respectively) (Figs. 60 and 61).

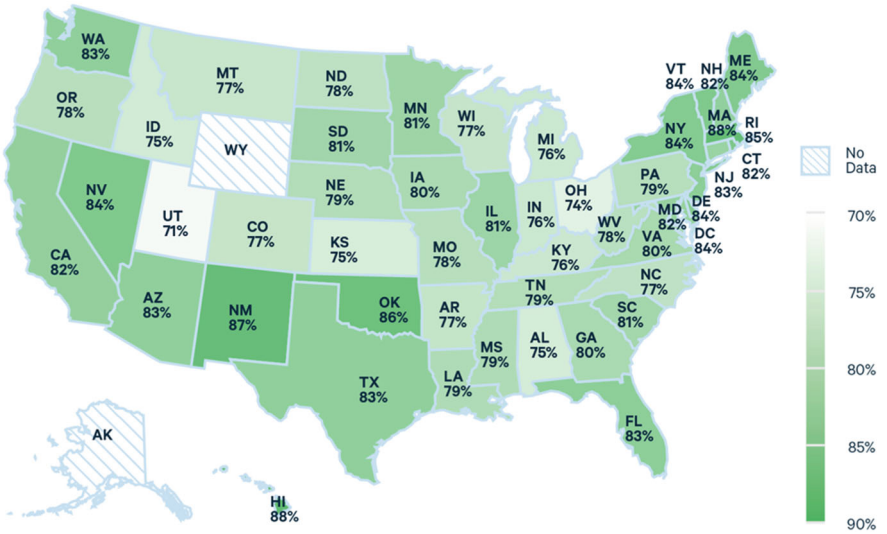

Fig. 57 Percent of residents who believed that GW has been happening by state

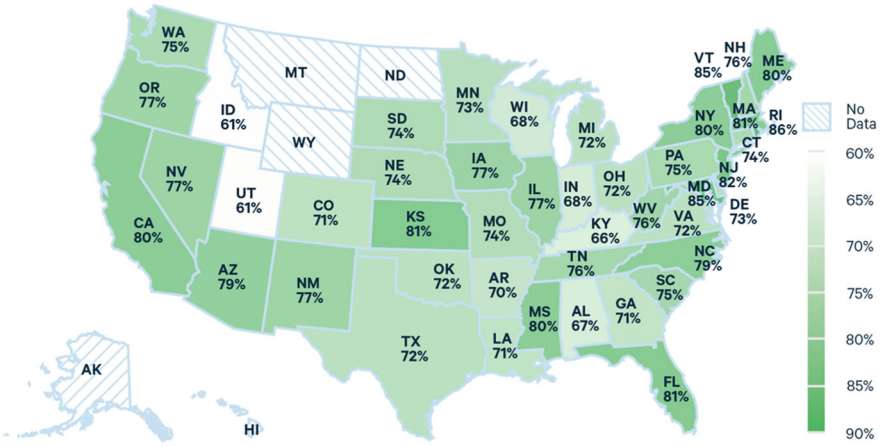

Fig. 58 Percent of residents who believed that the world's temperature will rise in the future if nothing is done to address it by state

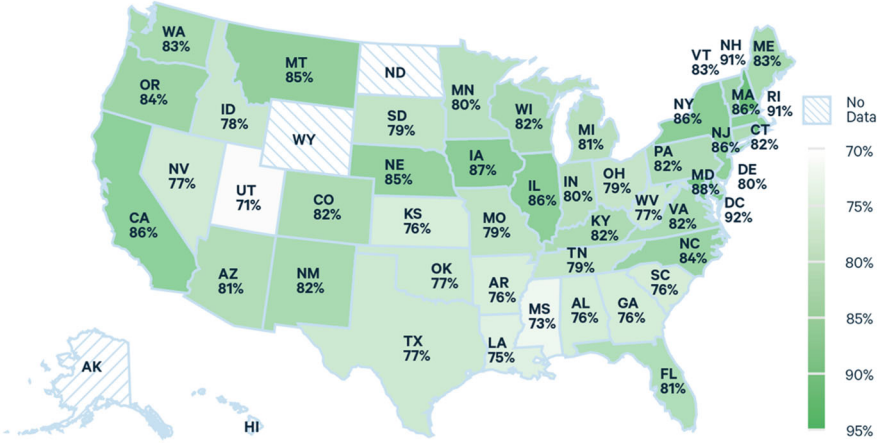

Fig. 59 Percent of residents who believed that warming has been caused by human activity by state

Likewise, majorities of all states believed that 5 degrees Fahrenheit of warming over the next 75 years will be bad. The smallest majorities appeared in Idaho (58%) and Utah (55%), and most states were in the 60–80% range. Large majorities appeared in the Northeastern states, but the largest majorities appeared in South Dakota (80%) and New Mexico (77%) (Fig. 62).

Sizable majorities of all states wanted the US government to do more to combat climate change. The smallest majorities appeared in western states such as Idaho (53%), Utah (54%), and Nevada (60%), whereas the largest majorities

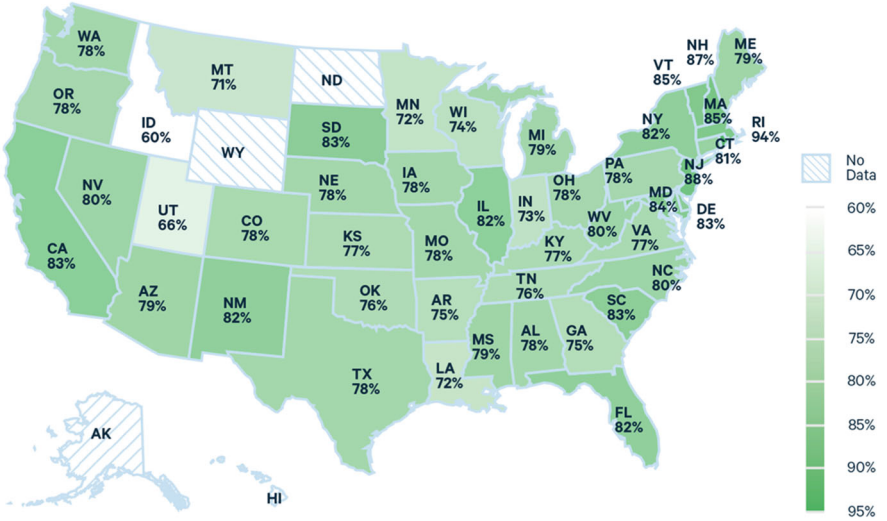

Fig. 60 Percent of residents who believed that GW would be a serious problem for the United States by state

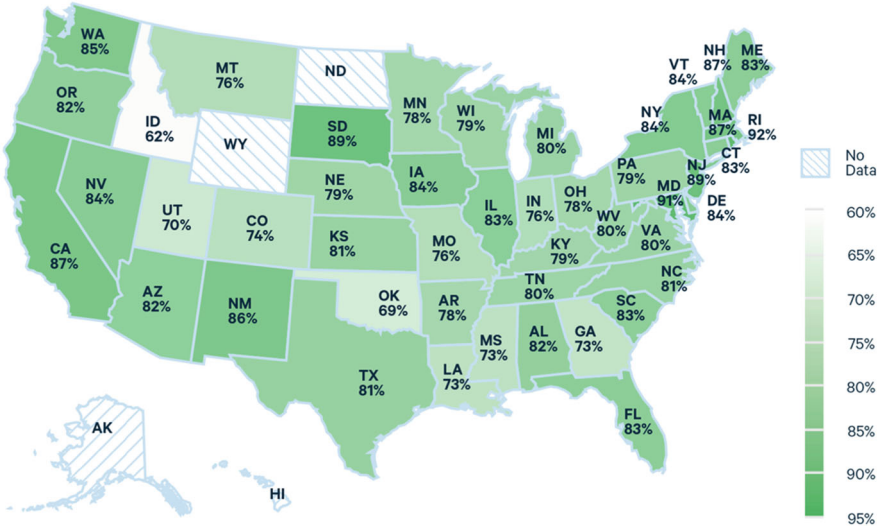

Fig. 61 Percent of residents who believed that GW will be a serious problem for the world by state

were in northeastern states such as Rhode Island (82%) and New Jersey (77%) (Fig. 63).

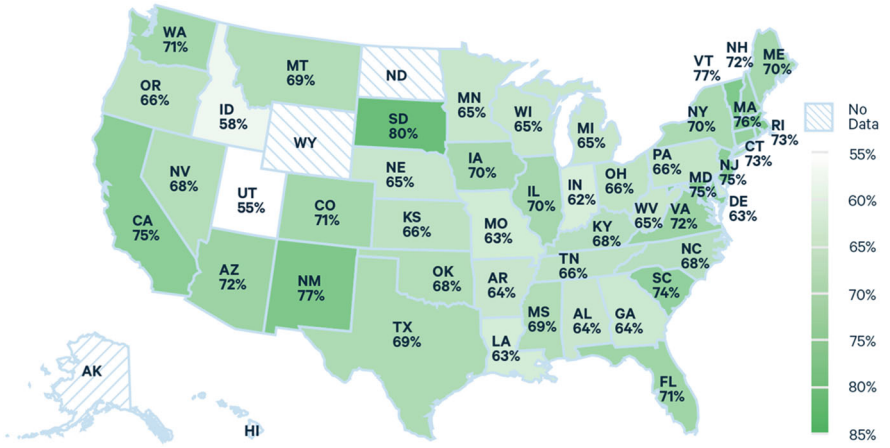

Fig. 62 Percent of residents who believed that 5 degrees of warming over the next 75 years will be bad by state

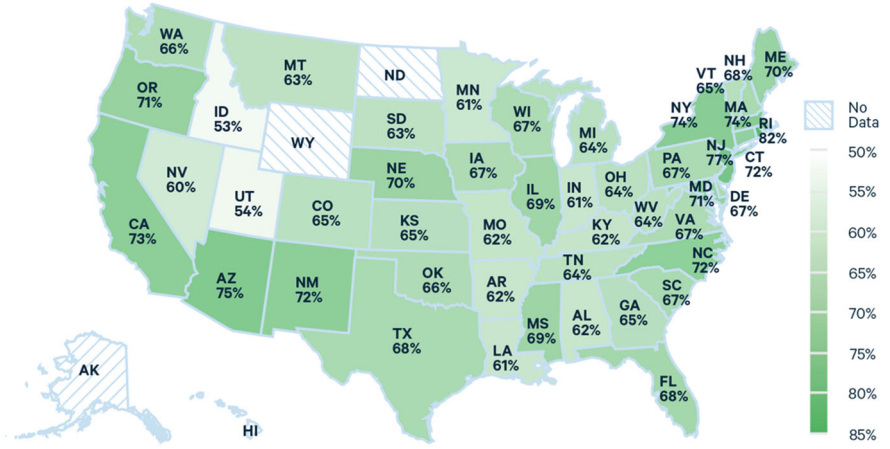

Fig. 63 Percent of residents who believed that the US government should do more than it is now to combat climate change by state

Public Engagement

The size of the GW issue public varied across the states. The largest issue public was in Rhode Island (33%), and the smallest was in South Dakota (9%). Some states in the western portion of the country, such as California (31%), Arizona (31%), and New Mexico (31%), also manifested high levels of passion on the issue (Fig. 64).

At least 60% of the residents of all states reported having at least a moderate amount of knowledge about GW, except South Dakota, where 53% reported at least a moderate amount of knowledge about GW. Majorities of 80% or more existed in seven states, led by Vermont (85%) (Fig. 65).

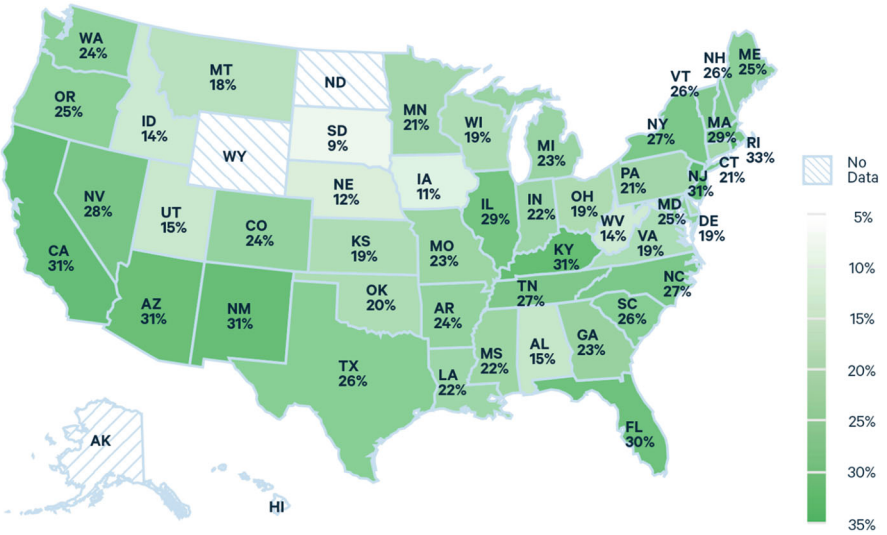

Fig. 64 Percent of residents for whom GW was extremely important personally by state

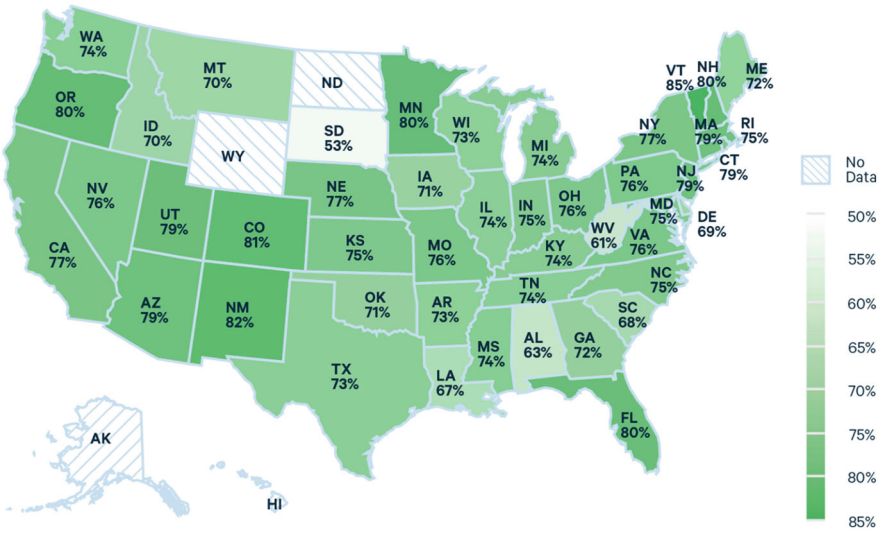

Fig. 65 Percent of residents who said that they are at least moderately knowledgeable about GW by state

Policy Preferences

Large majorities across all states (as of 2015) did not see international cooperation as a prerequisite for American action on GW. Majorities that ranged from 63% in Indiana and Mississippi to 91% in New Hampshire favored US action regardless of what other countries do to reduce their emissions (Fig. 66).

Huge majorities of over 70% in every state favored restriction on businesses' GHG emissions. These majorities ranged from a low of 71% in Mississippi to a high of 92% in Rhode Island (Fig. 67). Majorities in all states also favored the government limiting power plant emissions. Support for government action to do so was no less than 68% in Utah, and support was as high as 92% in Rhode Island (Fig. 68).

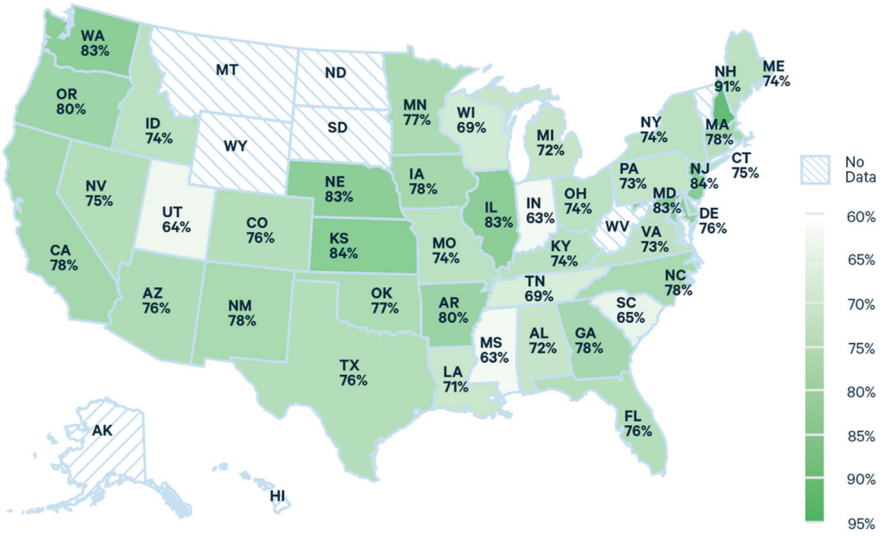

Fig. 66 Percent of residents who believed the US should take action regardless of what other countries do by state

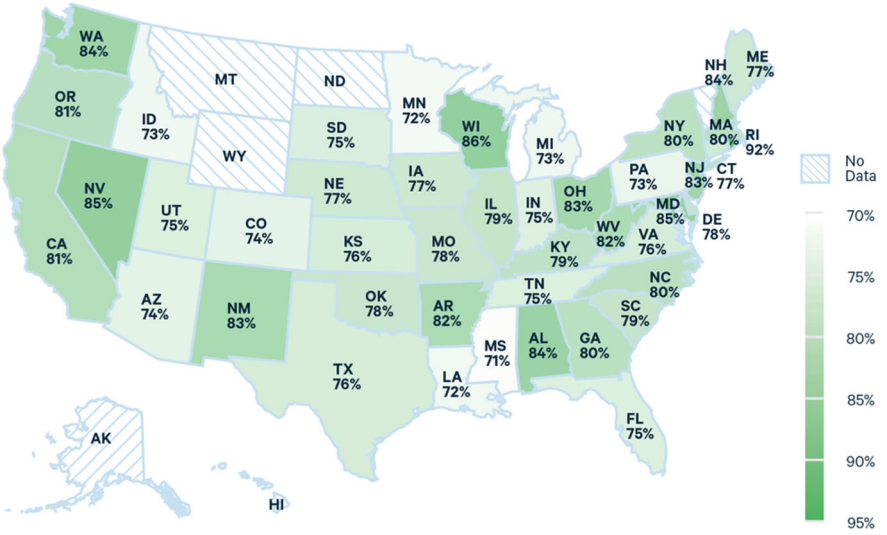

Fig. 67 Percent of residents who favored restrictions on businesses' GHG emissions by state

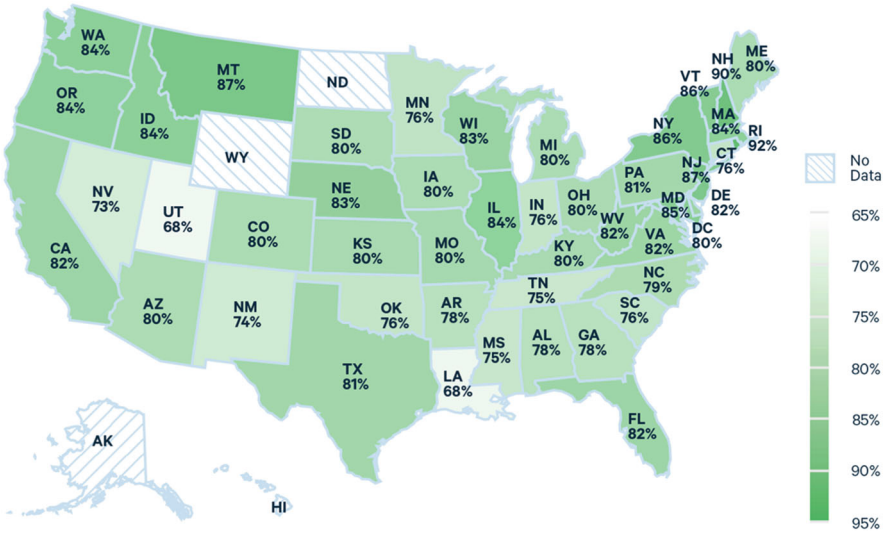

Fig. 68 Percent of residents who supported restrictions on GHG emissions by power plants by state

Majorities of most states favored a cap-and-trade system in which the government would sell permits to companies limiting the amount of GHG they can put out, while also allowing companies that emit more to purchase permits from companies that emit less. Relatively few were supportive of this in Western states, including Idaho (39%), Nevada (47%), and Utah (48%). The program was much more popular in the mid-Atlantic and northeast regions. However, the highest levels of support were found in Washington (72%) and Nebraska (70%) (Fig. 69).

Regulations, Tax Incentives, and Taxes

Large majorities across the states supported increasing fuel efficiency standards for cars. More than 60% of respondents in every state favored raising them. Support ranged from 60% in Oklahoma to 79% in Washington, New Jersey, and Rhode Island (Fig. 70).

In 2015, government encouragement of manufacturing of all-electric cars was supported by majorities in all but four states. Support ranged from 43% in Alabama to 69% in Washington and New Hampshire (Fig. 71).

Government encouraging or requiring more energy-efficient appliances drew majority support in all states surveyed, with majorities ranging from 52% in Idaho to the upper 70s in northeastern states such as New Hampshire (78%), New York (78%), and New Jersey (77%) (Fig. 72). Support for increasing the energy efficiency of buildings was similar: supportive majorities ranged from the low 60s in western and southern states like Idaho (62%), Mississippi (64%), Utah (65%), and Arkansas (66%), to the low 80s in states like West Virginia (84%) and Maryland (83%) (Fig. 73).

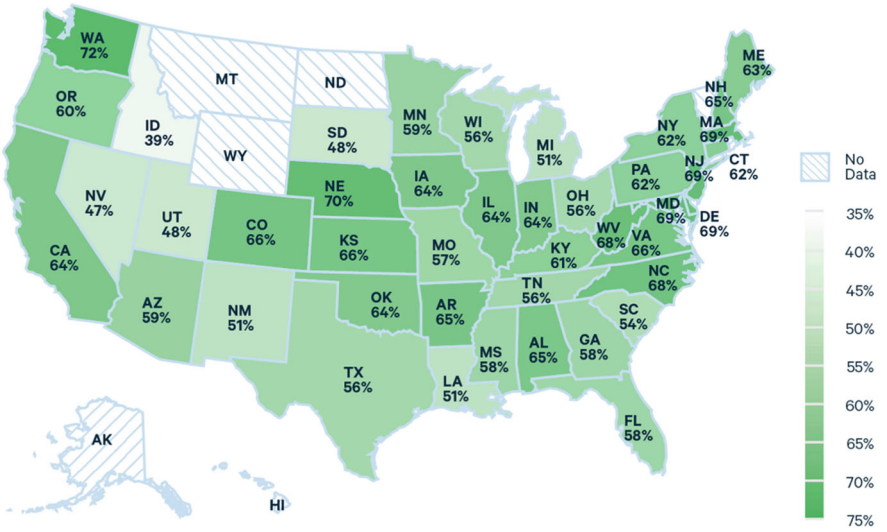

Fig. 69 Percent of residents who favored cap and trade by state

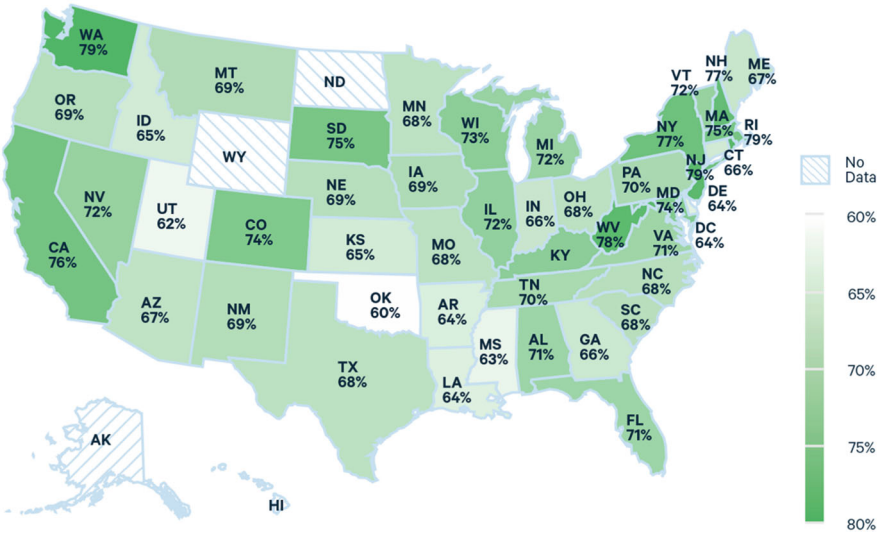

Fig. 70 Percent of residents who favored raising fuel economy standards by state

Majorities of all states favored tax breaks for utilities producing electricity from renewable sources. Even in Mississippi, the state with the lowest level of support, 71% of individuals favored these types of tax breaks, and that proportion went as high as 91% in Montana (Fig. 74). Majorities in every state also favored tax incentives to encourage the adoption of cleaner coal technologies. The majorities were largest in coal-producing states like West Virginia (79%) and Kentucky (73%) and smallest in

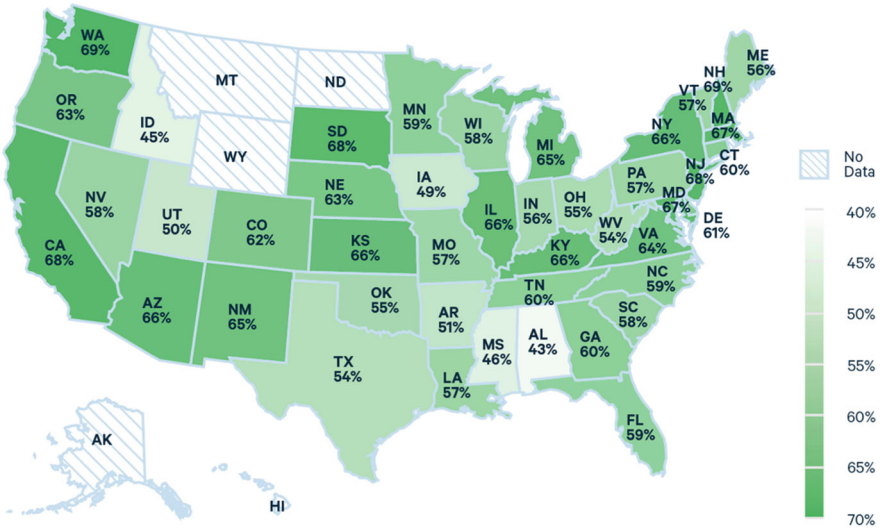

Fig. 71 Percent of residents who favored government encouragement for the manufacturing of all-electric vehicles by state

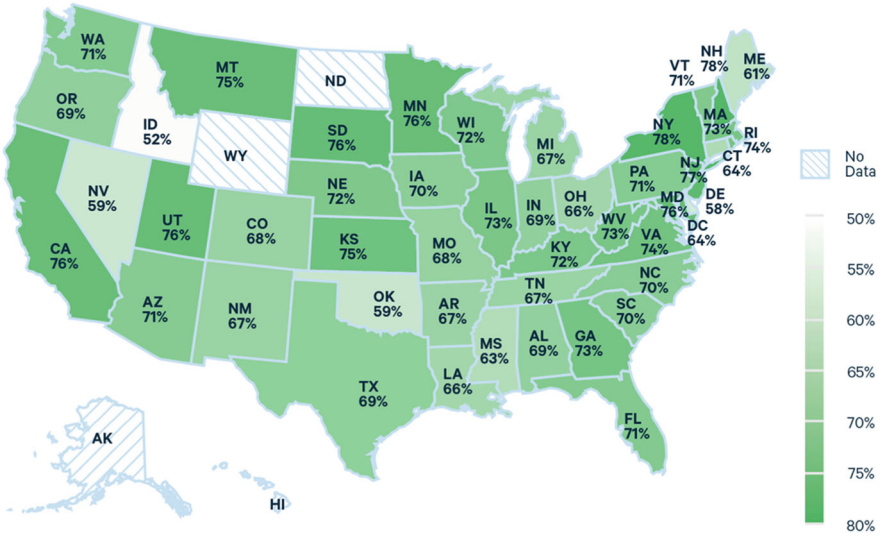

Fig. 72 Percent of residents who believed the government should encourage or require more energy-efficient appliances by state

the states of Nevada (53%) and Vermont (54%). This pattern is consistent with the notion that coal-producing state residents liked to preserve their local industries by reducing the deleterious impact of those industries on the environment (Fig. 75).

Providing tax breaks to encourage the construction of more nuclear power plants is a relatively unpopular policy. A minority of respondents in all states except Idaho

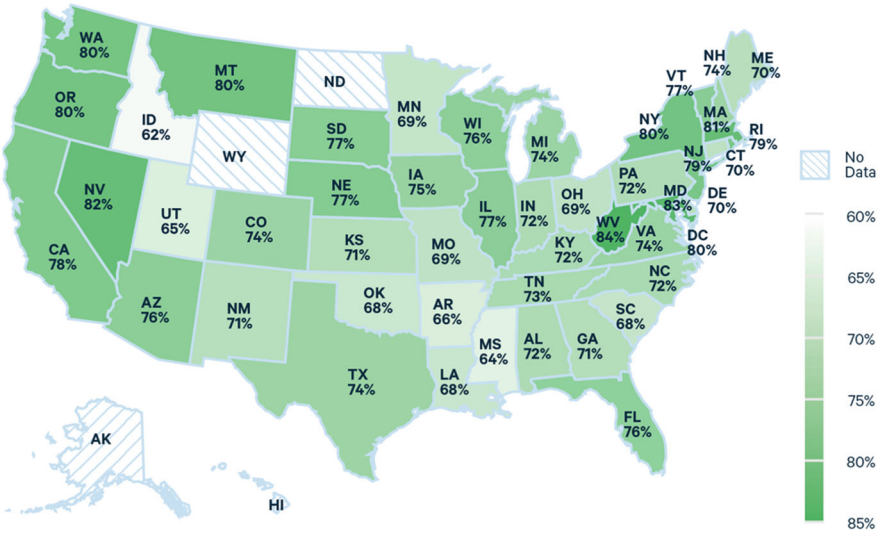

Fig. 73 Percent of residents who believed the government should encourage or require more energy-efficient buildings by state

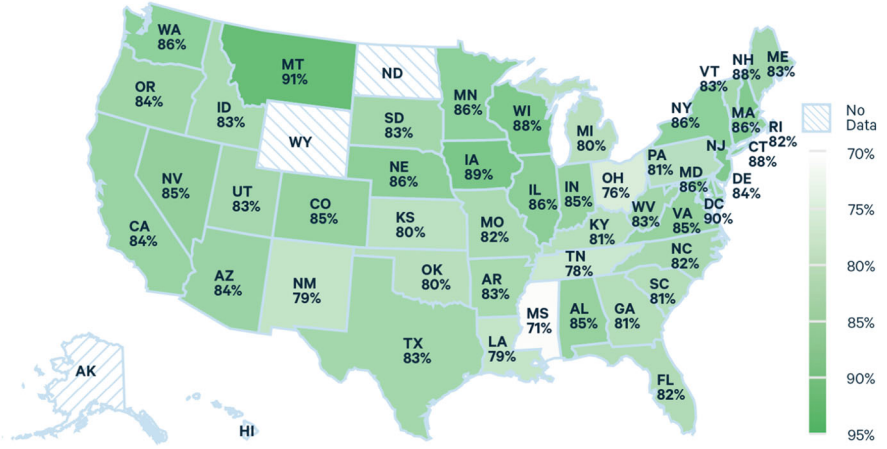

Fig. 74 Percent of residents who favored tax breaks for utilities producing electricity from renewable sources by state

(51%) and South Carolina (54%) favored such tax breaks. Opposition to nuclear power tax breaks was greatest in states in the northeast and northwest. Residents of Rhode Island manifested the lowest levels of support for tax breaks for building nuclear power plants (20%), followed by Oregon (28%), Washington (29%), Maine (30%), and Iowa (30%) (Fig. 76).

The least popular policies are those that involve consumer tax increases intended to manipulate people's consumption behavior with no stated use of the raised

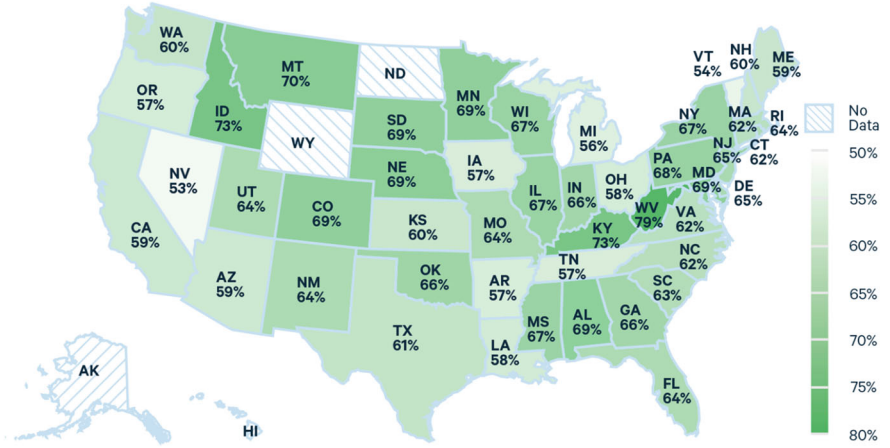

Fig. 75 Percent of residents who supported tax incentives to encourage the adoption of cleaner coal technologies by state

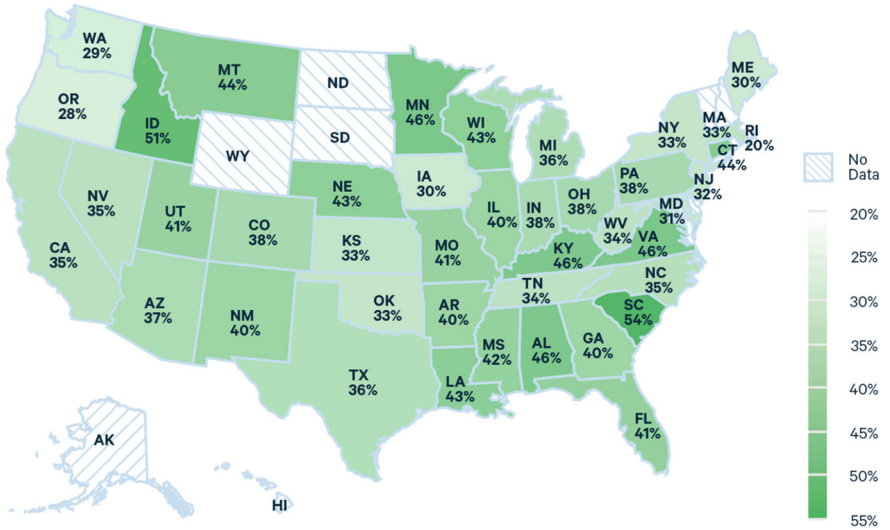

Fig. 76 Percent of residents who favored giving tax breaks for building nuclear power plants by state

revenue. In no state did the majority of individuals favor increasing consumption taxes on electricity to cause people to use less of it, with support ranging from as low as 14% in New Hampshire to 37% in Colorado (Fig. 77). Similarly, most people opposed increasing taxes on gasoline. The minorities favoring this policy were especially small in rural states and southern states, including Idaho (24%), Alabama (26%), South Carolina (26%), and Kansas (26%). Bare majorities in favor appeared in some western states like Colorado (57%) and Nevada (55%) (Fig. 78).

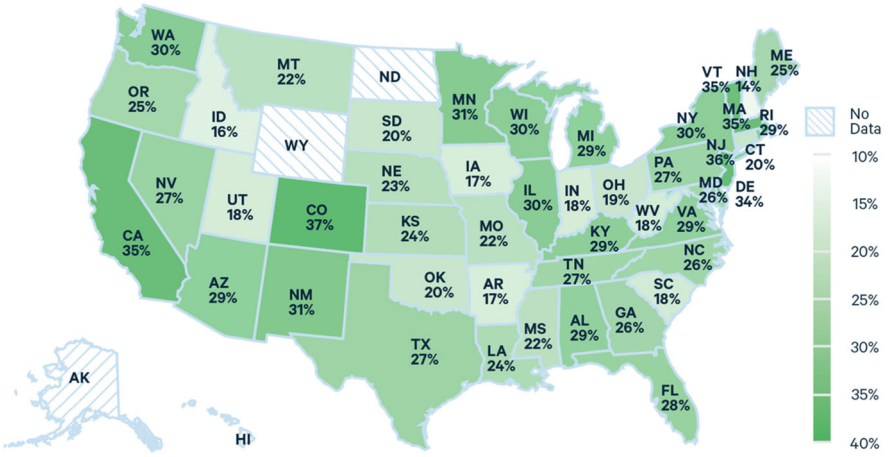

Fig. 77 Percent of residents who favored increasing consumption taxes on electricity to cause people to use less of it by state

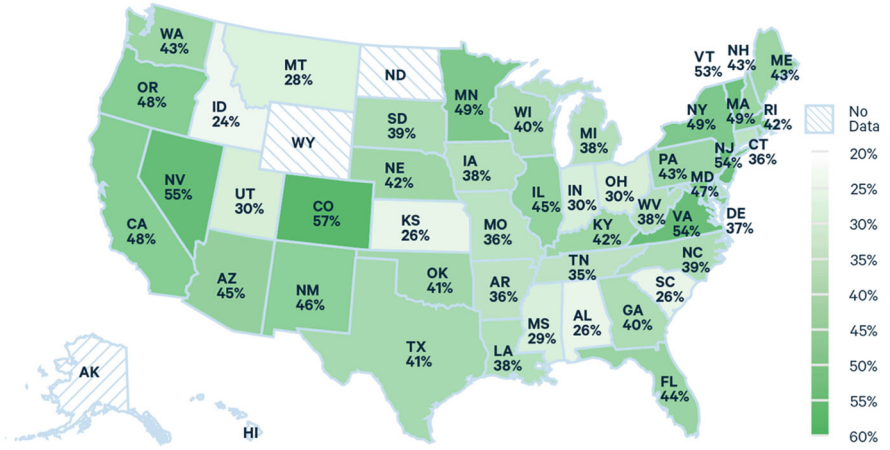

Fig. 78 Percent of residents who favored increasing consumption taxes on gasoline to cause people to use less of it by state

Partisan Division

On many policy issues, Democrats and Republicans differ sharply from each other. When PPRG's survey series began in 1997, just before Bill Clinton and Al Gore hosted the White House Conference on Climate Change, the partisan gap on many aspects of GW was small. Over the years since then, the partisan gap has grown.

Party Identification

According to PPRG surveys, the proportions of self-identified Democrats and Republicans were relatively stable from 1997 to 2024 (Fig. 79). There was a slight increase in the proportion of Independents accompanied by smaller decreases in the proportions of Republicans and Democrats over the past quarter of a century.

This chapter uses two ways to calculate the partisan gap in GW-related opinions, and they yielded similar conclusions. First, we used data on whether GW has been happening and whether it has been caused at least partly by human activity. Using this method, the partisan gap was only 8 percentage points on average in 1997 and 1998. It increased to 30 percentage points in 2011, stabilized between 23 and 28 percentage points from 2012 to 2020, and then peaked to 35% in 2024 (Fig. 80).

The second method used 7 questions asked in 11 surveys: (1) whether GW has been happening; (2) whether, if warming has been happening, it was caused at least partly by human activity; (3) whether government policy should reduce GHG emissions by power plants; (4) whether fuel efficiency standards for automobiles should be strengthened; (5) whether the energy efficiency of buildings should be increased; (6) whether the energy efficiency of appliances should be increased; and (7) whether scientists studying the environment are trustworthy. Using those measures, the partisan gap was 9 and 11 percentage points on average in 1997 and 1998, grew to 15 to 31 percentage points during 2007–2013, and stabilized between 21 and 27 percentage points in 2015–2020. In 2024, the gap reached the all-time high of 38 percentage points (Fig. 81).

Both methods showed an increase in the partisan gap, and the greatest increase in the partisan gap was found between 2020 and 2024.

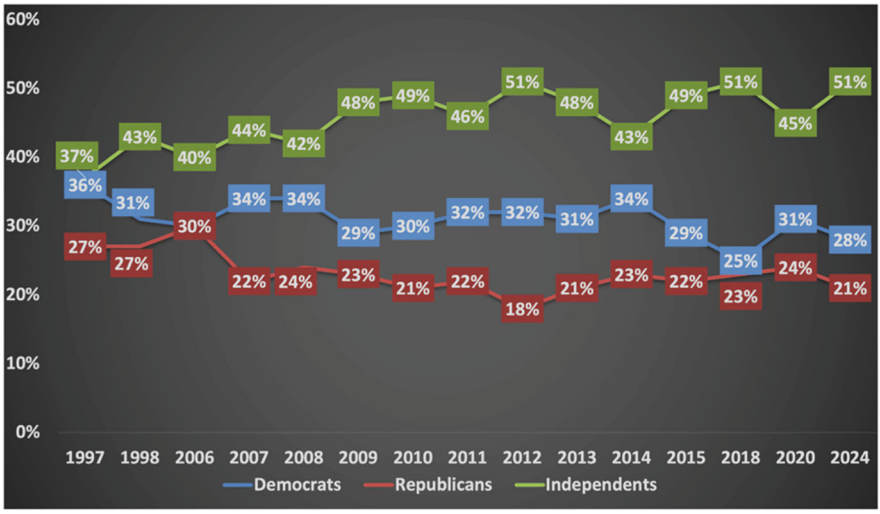

Fig. 79 Proportions of self-identified Democrats, Republicans, and Independents from 1997 to 2024

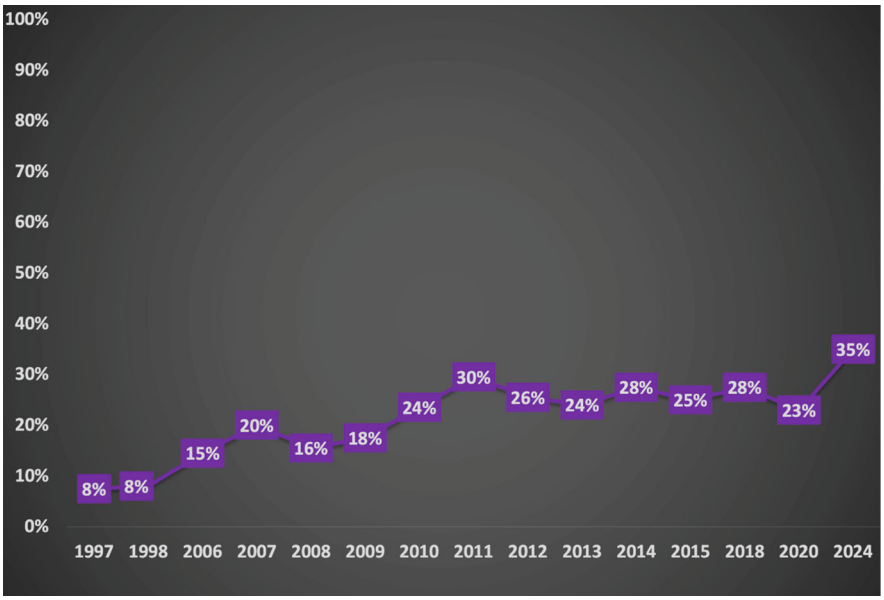

Fig. 80 Partisan gap in GW-related opinions measured by whether GW has been happening and whether it has been caused at least partly by human activity

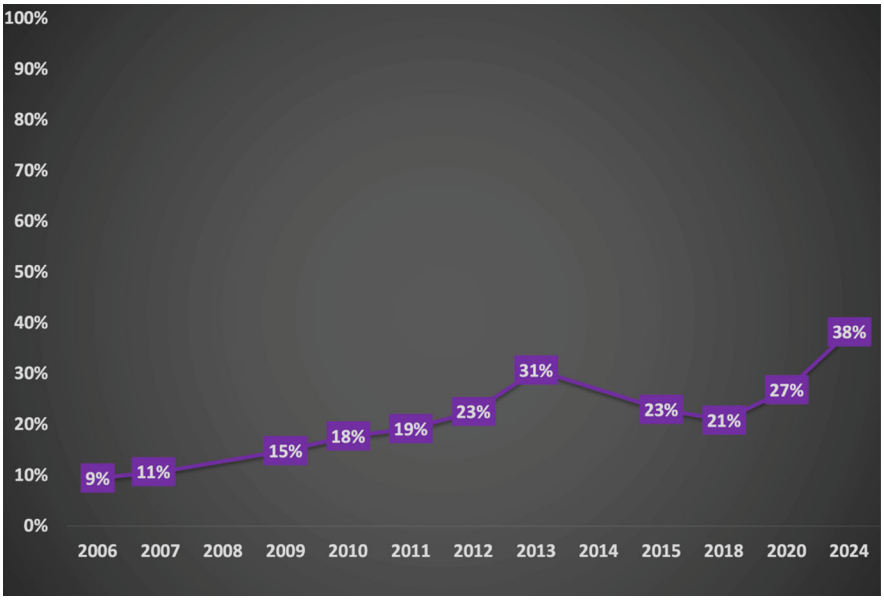

Fig. 81 Partisan gap in GW-related opinions measured by seven questions

Fundamentals

Since 1997, majorities of Democrats, Republicans, and Independents have believed that the earth has probably been warming over the last 100 years. In 2024, 88% of Democrats, 65% of Independents, and 43% of Republicans believed that GW has been happening. The partisan gap grew from 9 percentage points in 1997 to 24 percentage points in 2020 and 45 percentage points in 2024 (Fig. 82). But the gap has not grown steadily over those years. 2010 marked a point of notable growth from 15 percentage points the year before to 28 percentage points. There was a notable increase in the gap from 2020 to 2024.

Since 1997, majorities of Democrats, Republicans, and Independents have believed that, if the world's temperature has increased over the past 100 years, that warming has been caused at least partly by humans. In 2024, 92% of Democrats reported believing that increases in global temperature were caused mostly or partly by human activities. Independents and Republicans also manifested high levels in 2024: 84% of Independents, and 67% of Republicans believed that GW was attributable to human activities (Fig. 83).

Over time, the proportions of Democrats and Independents who believed that the world's temperature will probably go up in the next 100 years generally increased, with some fluctuations. By 2024, a high of 95% of Democrats and 74% of Independents held this belief. In contrast, Republican belief peaked in 1997 at 68% but then showed a notable decline, reaching 50% in 2015 and 48% in 2024 (Fig. 84).

Similarly, there was a slight decrease in the proportion of Republicans who believed that a 5-degree Fahrenheit temperature increase would be bad. A majority of Democrats and Independents consistently perceived so, while the proportion of

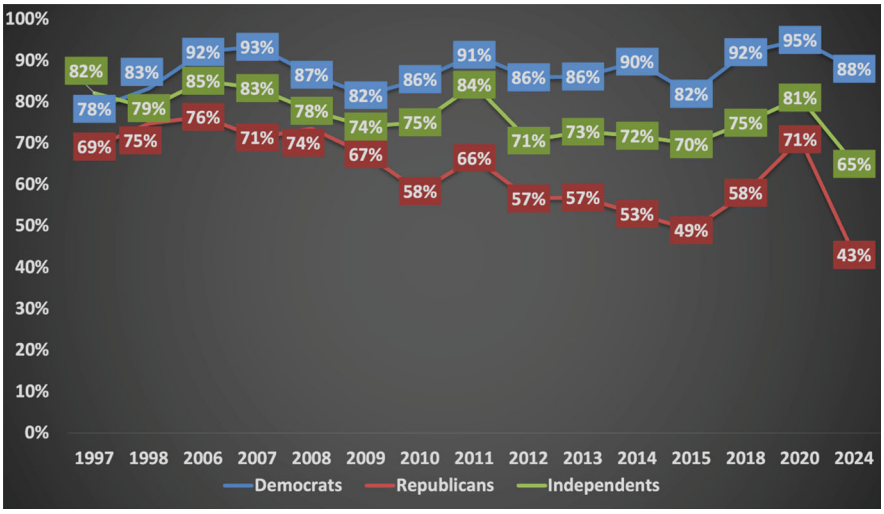

Fig. 82 Percentages of Democrats, Republicans, and Independents who believed that the earth has probably been warming over the last 100 years

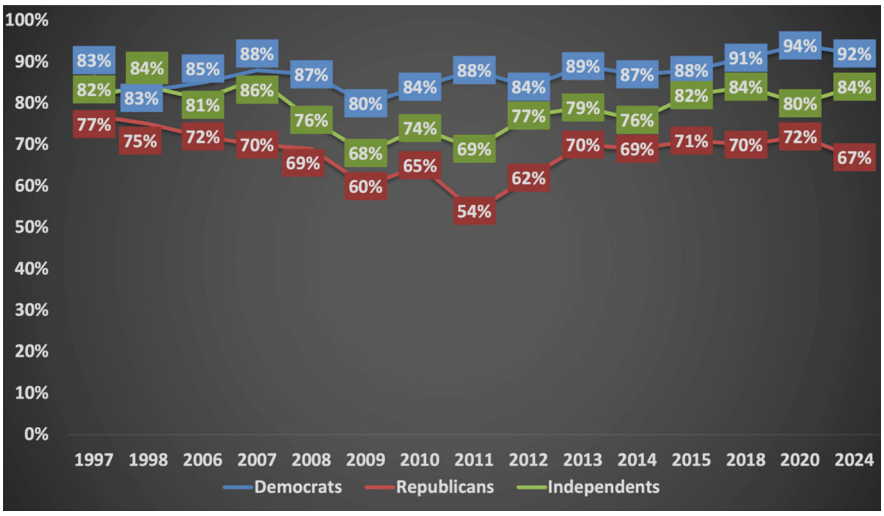

Fig. 83 Percentages of Democrats, Republicans, and Independents who believed that, if the world's temperature has increased over the past 100 years, that warming has been caused at least partly by humans

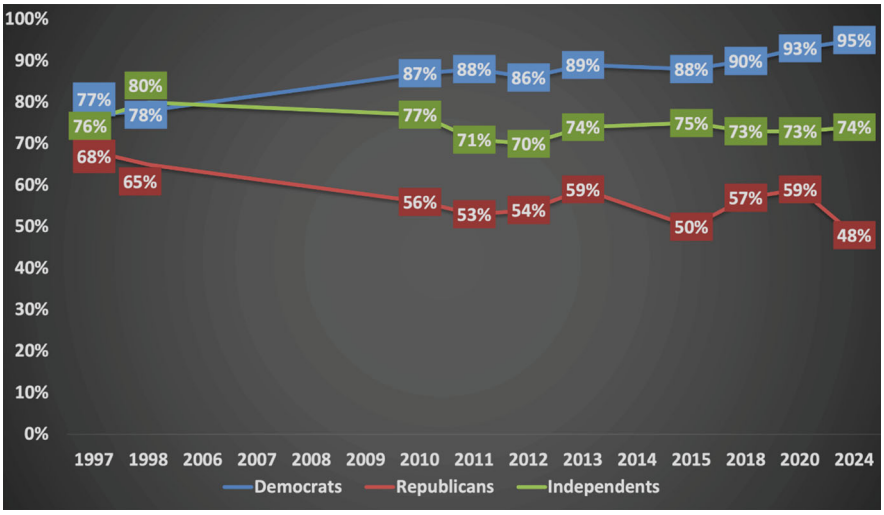

Fig. 84 Percentages of Democrats, Republicans, and Independents who believed that the world's temperature will probably go up in the next 100 years

Republicans hovered around 50%. The partisan gap in 2024 was the biggest observed since 1997 at 38 percentage points (Fig. 85).

Majorities of Democrats, Republicans, and Independents consistently believed that GW will be a very or somewhat serious problem for the United States in the future. In 2024, nearly all Democrats surveyed (96%) reported that GW would be a

serious problem for the United States, while 55% of Republicans and 73% of Independents believed so. While a slight majority of Republicans believed it would be a very or somewhat serious problem for the United States, the near-unanimous Democratic response to this question created a record partisan gap of 41 percentage points in 2024 (Fig. 86). Likewise, majorities of Democrats,

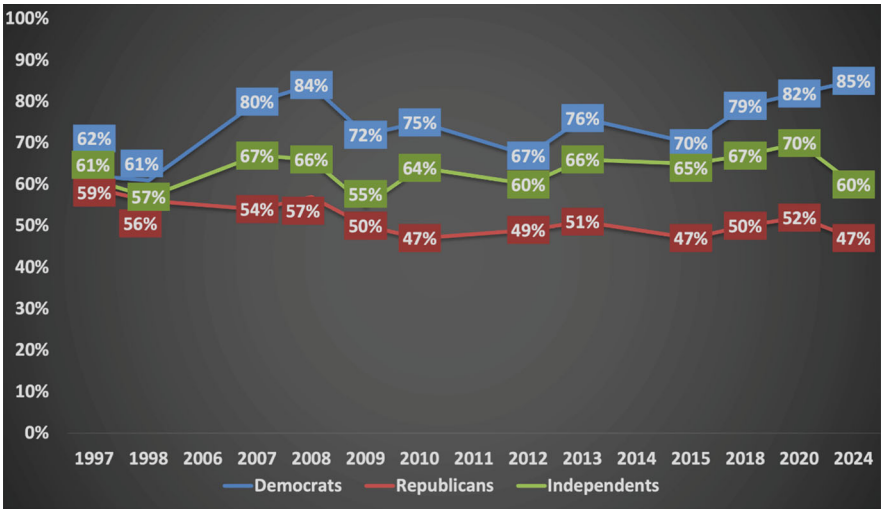

Fig. 85 Percent of Democrats, Republicans, and Independents who believed that a 5-degree Fahrenheit of warming would be bad

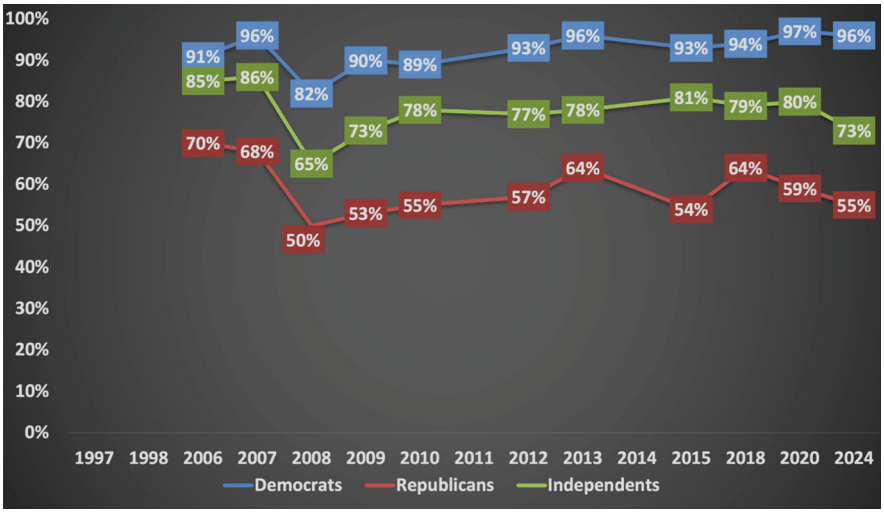

Fig. 86 Percent of Democrats, Republicans, and Independents who believed that GW will be a very or somewhat serious problem for the US

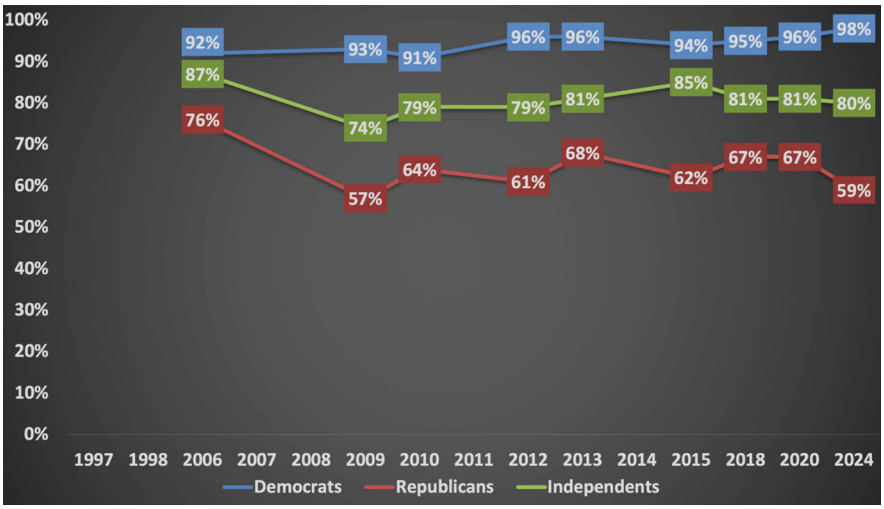

Fig. 87 Percent of Democrats, Republicans, and Independents who believed that GW will be a very or somewhat serious problem for the world

Republicans, and Independents have consistently believed that GW will be a very or somewhat serious problem for the world in the future. In 2024, 98% of Democrats, 59% of Republicans, and 80% of Independents shared this view. The partisan gap was 39 percentage points in 2024, a notable increase from 2020 (29%) (Fig. 87).

Action

Since 1997, majorities of Democrats and Independents consistently believed that the federal government should do more about GW. In 2024, 85% of Democrats and 65% of Independents favored more federal action. Minorities of Republicans favored increased government action (45% in 2024). The partisan gap was 40 percentage points in 2024, a notable decrease from 2020 (55%) (Fig. 88).

Since 1997, majorities of Democrats, Republicans, and Independents have believed that governments in other countries should do more about GW. In 2024, 83% of Democrats, 55% of Republicans, and 69% of Independents believed this, with a partisan gap of 28 percentage points, a slight decline from 2020 (33%) (Fig. 89).

Over the years, the percentage of Democrats who believed that US businesses should do more about GW has increased, reaching a peak of 90% in 2020 and remained high at 88% in 2024. For Republicans, the percent peaked at 59% in 1998, followed by a decline, and then leveling off at 42% in 2020 and 43% in 2024. The partisan gap was 45 percentage points in 2024 (Fig. 90).

Since 1997, majorities of Democrats and Independents have believed that average people should also do more about GW. In 2024, 83% of Democrats and 63% of Independents held this opinion. Smaller, though still substantial, proportions of

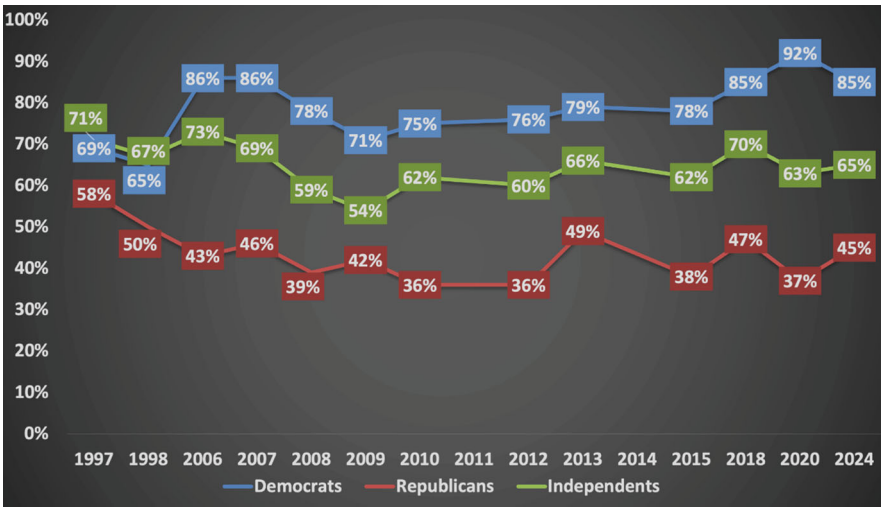

Fig. 88 Percent of Democrats, Republicans, and Independents who believed that the federal government should do more about GW

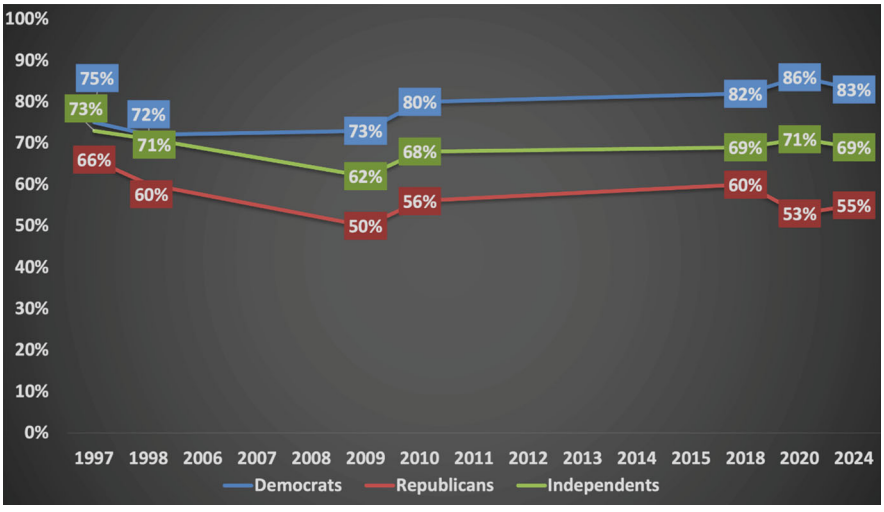

Fig. 89 Percent of Democrats, Republicans, and Independents who believed that governments in other countries should do more about GW

Republicans also favored increased individual action, with all-time highs of 60% in 1997 and 1998 and an all-time low of 41% in 2024. The partisan gap was 42 percentage points in 2024, with no change from 2020 (Fig. 91).

Majorities of Democrats and Independents consistently believed that the federal government should limit the amount of GHG that businesses emit. In 2024, 90% of

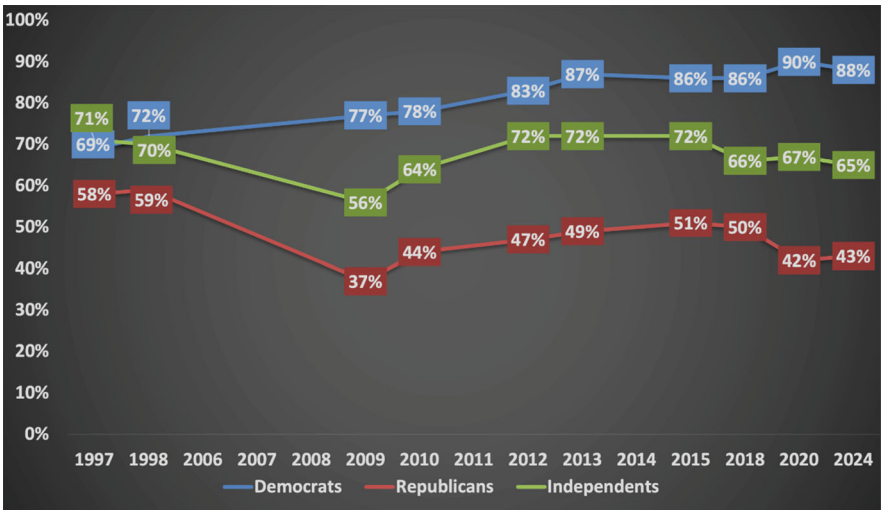

Fig. 90 Percent of Democrats, Republicans, and Independents who believed that US businesses should do more about GW

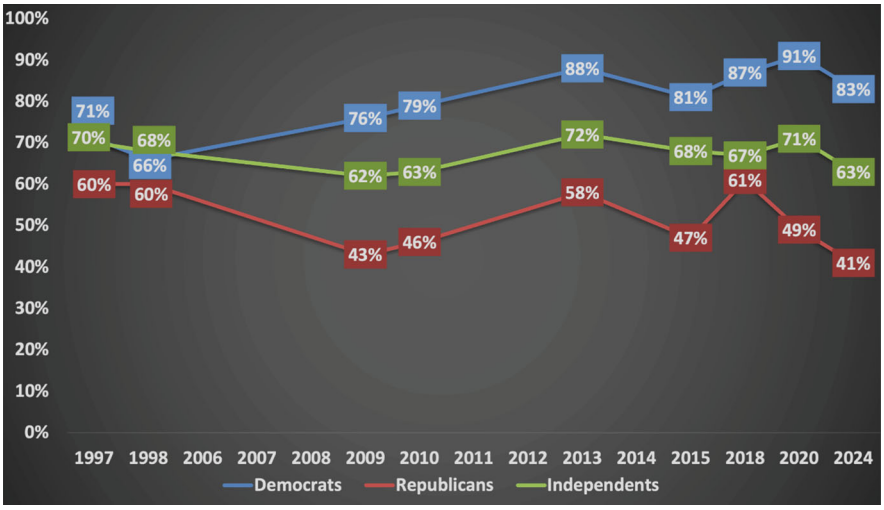

Fig. 91 Percent of Democrats, Republicans, and Independents believing that average people should do more about GW

Democrats, 47% of Republicans, and 76% of Independents favored this policy option, with a partisan gap of 43 percentage points, a slight increase from 2020 (39%) (Fig. 92).

Majorities of Democrats, Republicans, and Independents believed that the federal government should take action to deal with GW even if other major industrial countries do not. In 2015, 87% of Democrats 58% of Republicans, and 76% of Independents took this stance, with a partisan gap of 29 percentage points in 2015, about the same as in 2008 and after (Fig. 93).

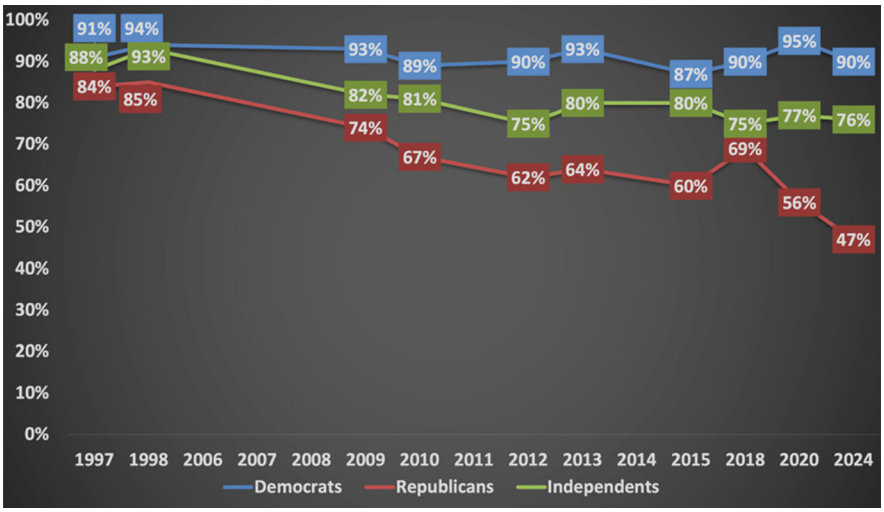

Fig. 92 Percent of Democrats, Republicans, and Independents who believed that the federal government should regulate the GHG emissions of businesses

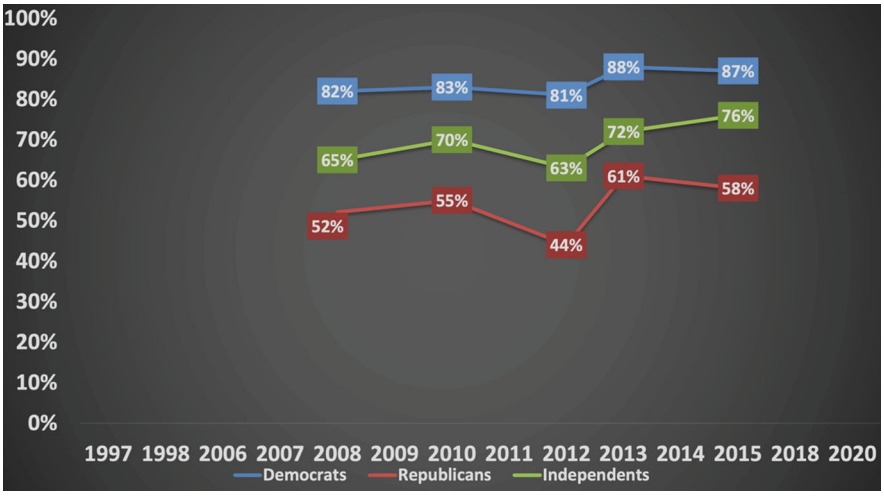

Fig. 93 Percentages of Democrats, Republicans, and Independents who believed that the federal government should take action to deal with GW even if other major industrial countries did not

Specific Policies

Majorities of Democrats, Republicans, and Independents consistently favored federal government efforts to cause more electricity to be generated using water, wind, and solar power. In 2024, 86% of Democrats, 54% of Republicans, and 72% of Independents favored this policy, yielding a partisan gap of 32 percentage points, a notable increase from 2020 (18%) (Fig. 94).

Majorities of Democrats, Republicans, and Independents consistently favored federal government efforts to lower the amount of GHG produced by power plants. In 2024, 90% of Democrats, 61% of Republicans, and 74% of Independents supported this policy, with a partisan gap of 29 percentage points, a slight increase from 2020 (25%) (Fig. 95).

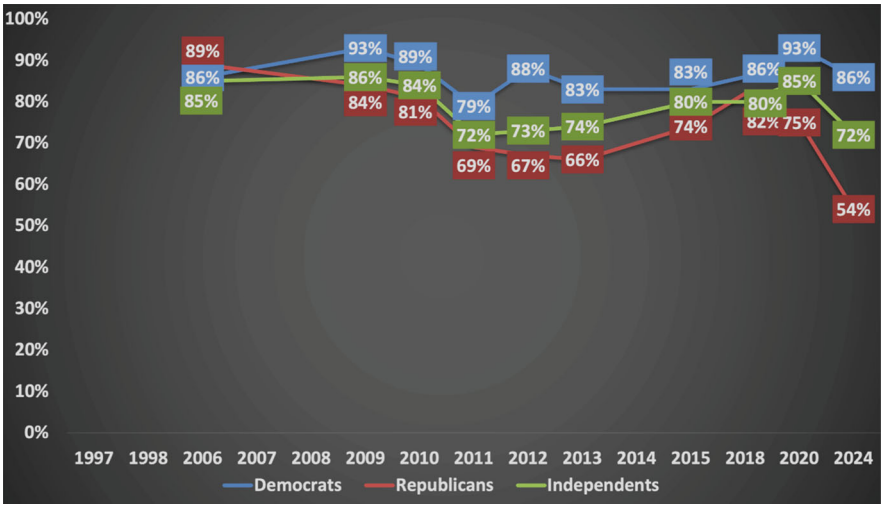

Fig. 94 Percentages of Democrats, Republicans, and Independents who favored federal government efforts to cause more electricity to be generated using water, wind, and solar power

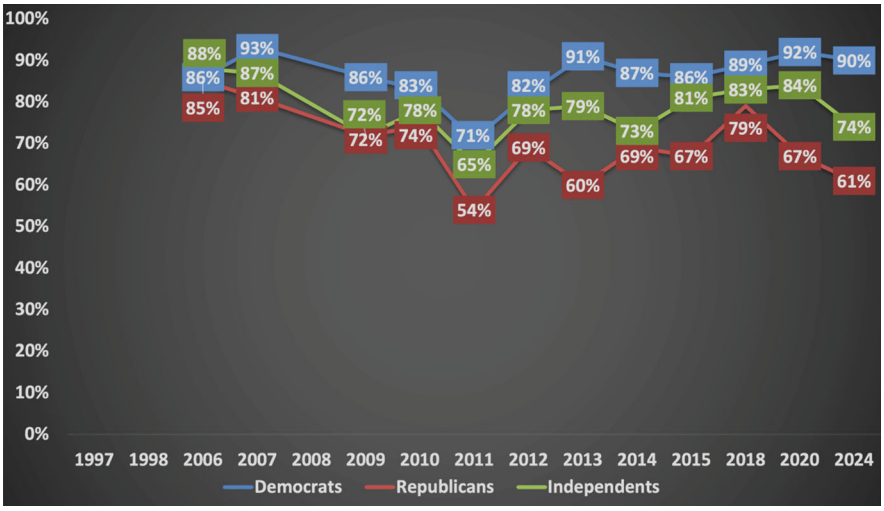

Fig. 95 Percentages of Democrats, Republicans, and Independents who favored federal government efforts to lower the amount of GHG produced by power plants

Majorities of Democrats and Independents consistently favored federal government efforts to cause improvement in the fuel efficiency of cars. In 2024, 80% of Democrats, 41% of Republicans, and 62% of Independents supported this policy option, with a partisan gap of 39 percentage points, a slight increase from 2020 (36%) (Fig. 96).

Majorities of Democrats and Independents consistently favored federal government efforts to improve the energy efficiency of new buildings. In 2024, 88% of Democrats, 40% of Republicans, and 69% of Independents favored this policy option, with a partisan gap of 48 percentage points, a large increase from 2020 (21%) (Fig. 97).

Majorities of Democrats and Independents consistently favored federal government efforts to cause appliances to become more energy efficient. In 2024, 85% of Democrats, 48% of Republicans, and 68% of Independents favored this policy, with a partisan gap of 37 percentage points, an increase from 2020 (31%) (Fig. 98).

Majorities of Democrats consistently favored federal government efforts to cause more cars to be built running completely on electricity. In 2024, 70% of Democrats and 47% of Independents favored this policy, while 16% of Republicans did. The partisan gap was 54 percentage points in 2024, a marked increase from 2015 (23%) (Fig. 99).

Majorities of Democrats, Republicans, and Independents consistently favored federal government efforts to encourage reducing air pollution from burning coal. In 2024, this was most popular among Independents (66%), less popular among Democrats (62%), and less popular still (57%) among Republicans. The partisan gap was 5 percentage points (Fig. 100).

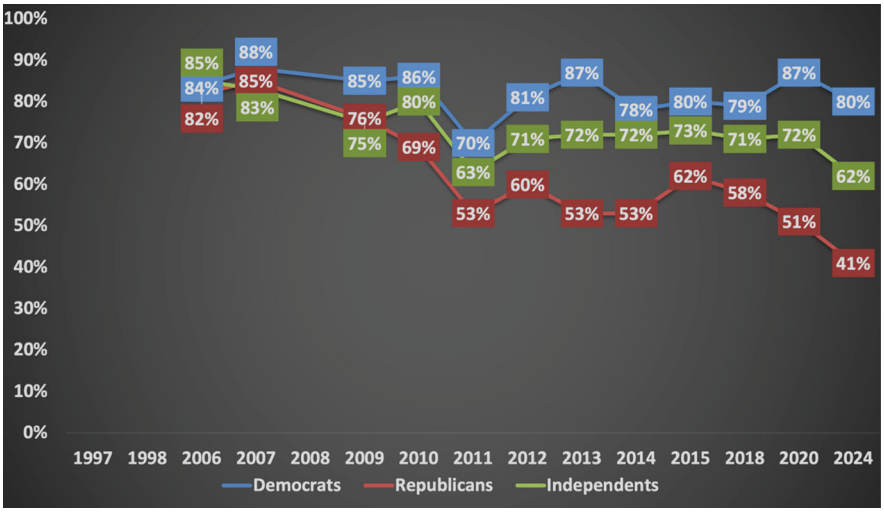

Fig. 96 Percentages of Democrats, Republicans, and Independents who favored federal government efforts to cause improvement in fuel efficiency of cars

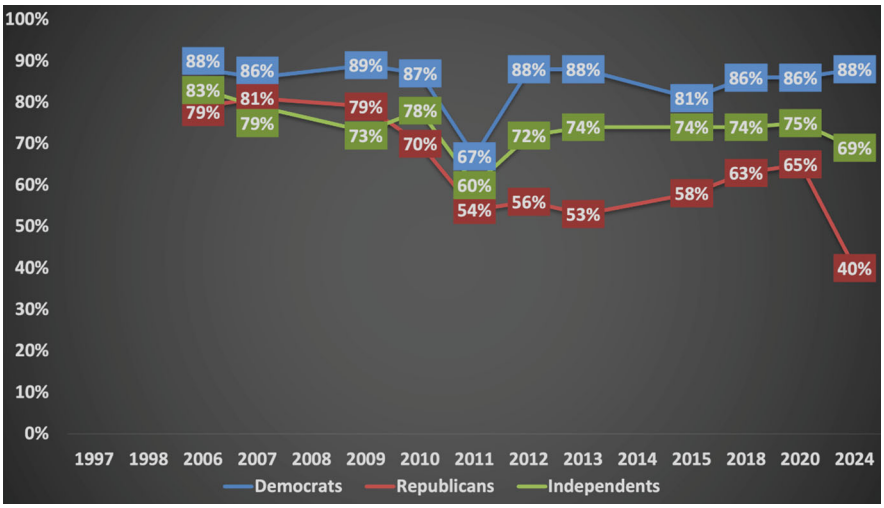

Fig. 97 Percentages of Democrats, Republicans, and Independents who favored federal government efforts to improve the energy efficiency of new buildings

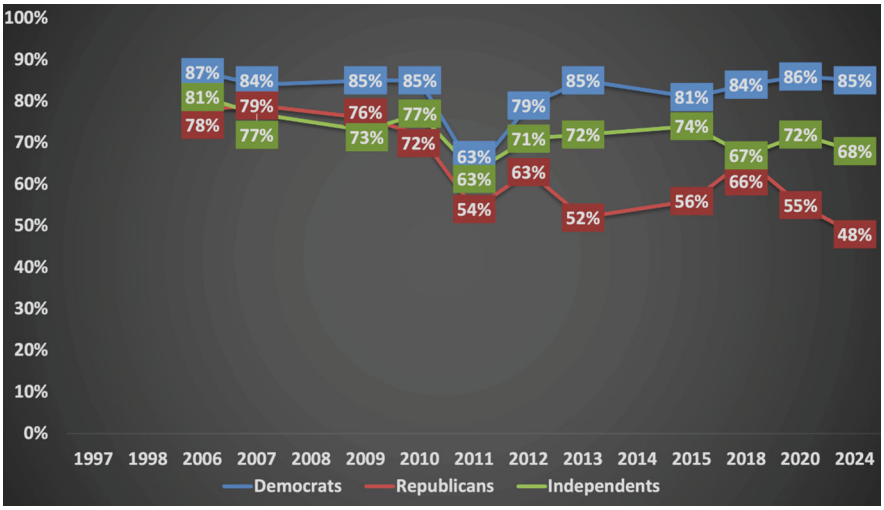

Fig. 98 Percentages of Democrats, Republicans, and Independents who favored federal government efforts to cause appliances to become more energy efficient

Republicans have almost always favored the federal government giving tax breaks to build nuclear power plants more than Democrats and Independents. In 2024, 38% of Democrats, 55% of Republicans, and 48% of Independents favored this policy, with a reverse partisan gap of 17 percentage points, a notable increase from 2020 (the reverse partisan gap was 8%) (Fig. 101).

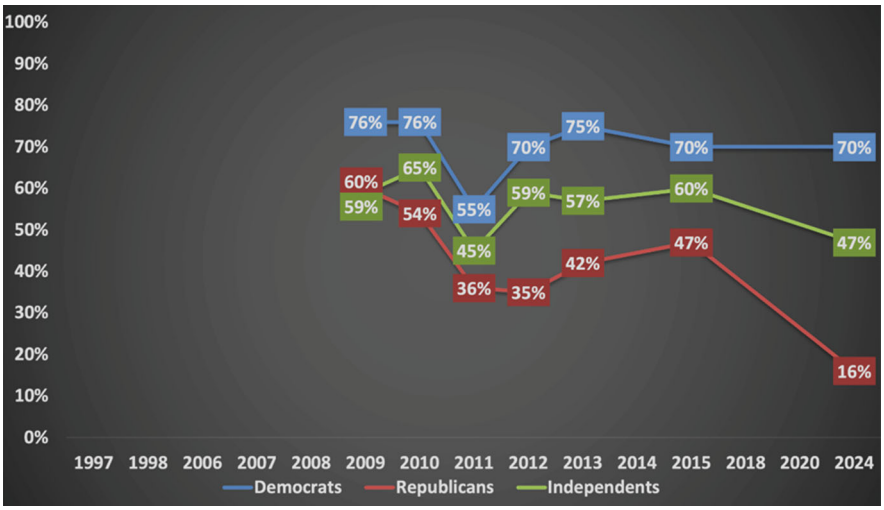

Fig. 99 Percentages of Democrats, Republicans, and Independents who favored federal government efforts to cause more cars to be built running completely on electricity

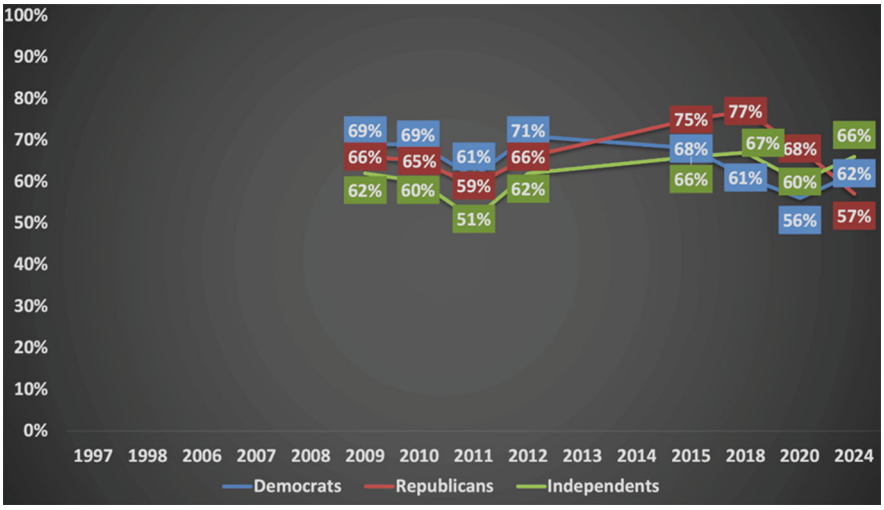

Fig. 100 Percent of Democrats, Republicans, and Independents who believed that the federal government should give tax breaks to companies that burn coal to make electricity if they use new methods to reduce air pollution

An increase in federal taxes on gasoline to cause people to use less of it has almost never received majority support in any group. Increased gasoline taxes reached and surpassed 50% among Democrats in 2015 and 2018, then gained significant traction in 2020, reaching a peak at 68%, and declined to 50% in 2024. The partisan gap in

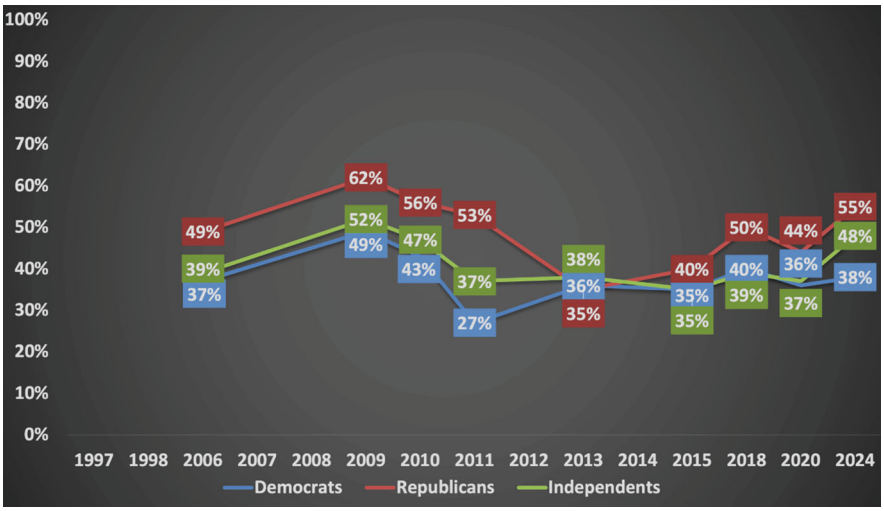

Fig. 101 Percent of Democrats, Republicans, and Independents who favored the federal government giving tax breaks to build nuclear power plants

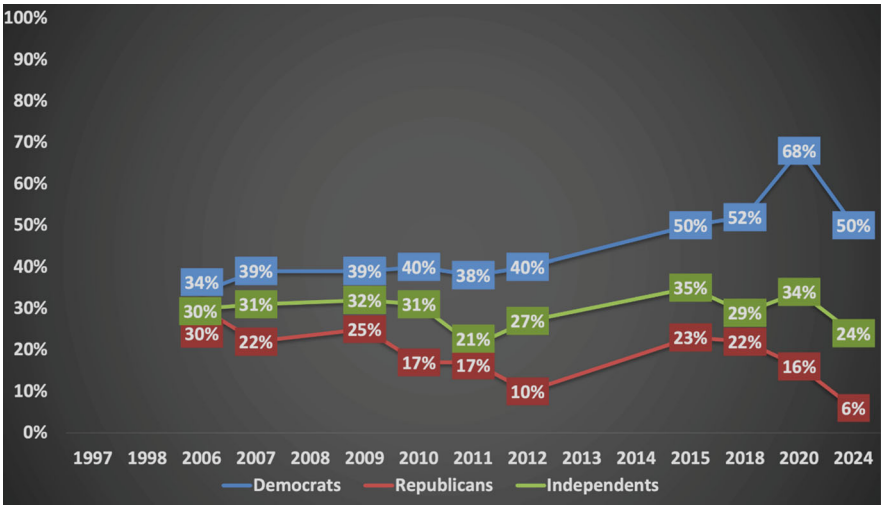

Fig. 102 Percent of Democrats, Republicans, and Independents who favored federal taxes on gasoline to cause people to use less of it

2024 was 44 percentage points, a decline from the all-time high in 2020 (52%) (Fig. 102). Similarly, people did not favor increases in federal taxes on electricity. In 2024, increased electricity taxes were supported by only 27% of Democrats, 3% of Republicans, and 13% of Independents, with a partisan gap of 24 percentage points, a decline from the all-time high in 2020 (30%) (Fig. 103).

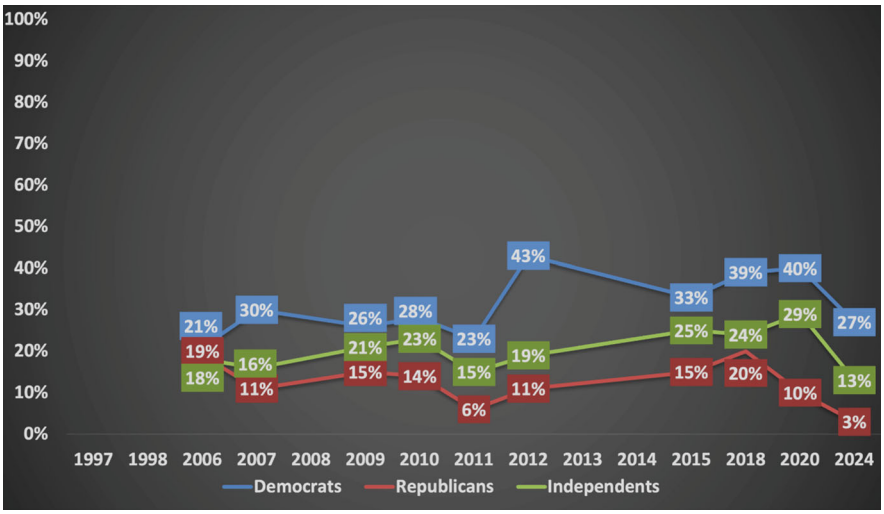

Fig. 103 Percent of Democrats, Republicans, and Independents who favored federal taxes on electricity to cause people to use less of it

Engagement

In 1997, the proportion of people in the GW issue public (for whom the issue is extremely personally important) was typical across all groups, with Democrats at 10%, Republicans at 8%, and Independents at 7%. Over the years, the proportion of Democrats who considered GW extremely important rose steadily, peaking at 46% in 2020, and was 37% in 2024. Among Republicans, there was a slight increase until 2009, reaching 12%, followed by a decline to 5% in 2024. Independents' concern peaked at 22% in 2020 and was 18% in 2024. In 2024, the partisan gap was 32 percentage points, a notable decline from 2020 (41%) (Fig. 104).

In 1997, approximately 44% of Democrats, 39% of Republicans, and 41% of Independents said they were at least moderately knowledgeable about GW. Over the years, all groups showed an upward trend in their perceived knowledge. By 2024, the proportion of Democrats who felt knowledgeable increased to 81%, Republicans to 65%, and Independents to 71%. The partisan gap was 16 percentage points in 2024, the same as in 2020 (Fig. 105).

In 1997, 81% of Democrats, 65% of Republicans, and 71% of Independents trusted scientists' statements about the environment to a significant degree. Republicans' trust in scientists declined from 2007 to 2013, reaching a low point of 46% in 2013. Afterward, Republicans' trust slightly increased to 59% in 2020, with a notable decline to 43% in 2024. Democrats' trust fluctuated slightly but showed an overall increase, reaching 88% in 2020 and 2024. Independents' trust decreased until 2010 and then increased to 75% by 2020, with a notable decline to 65% in 2024. The partisan gap was 45 percentage points in 2024, a marked increase from 2020 (29%) (Fig. 106).

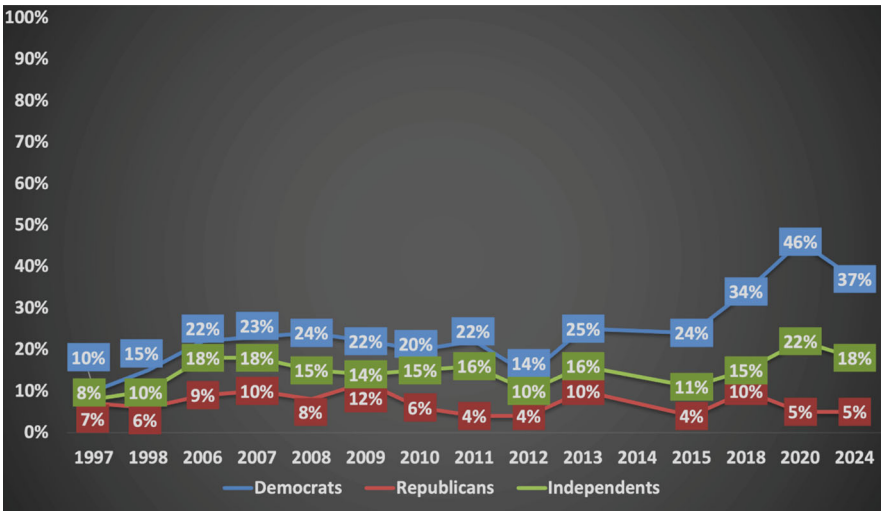

Fig. 104 Percent of Democrats, Republicans, and Independents who thought GW was extremely important to them personally

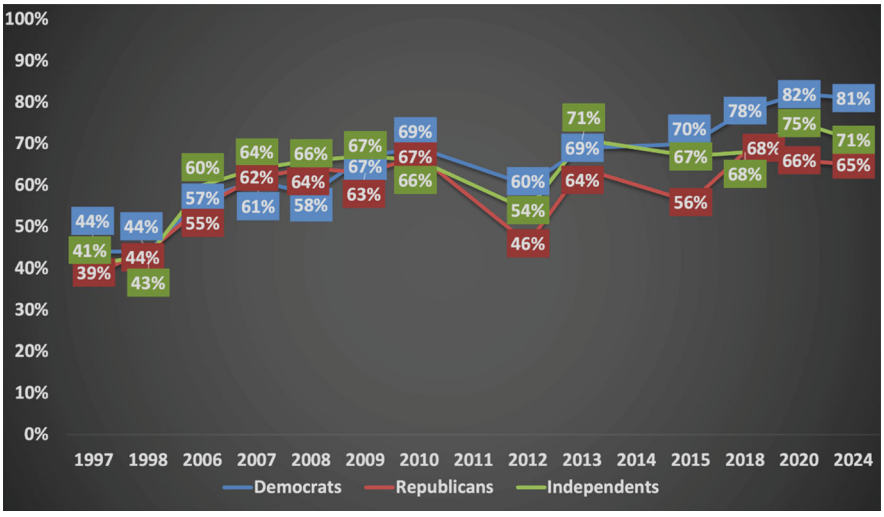

Fig. 105 Percent of Democrats, Republicans, and Independents who thought they knew a lot or a moderate amount about GW

Summary

For many measures, partisan gaps increased between 1997 and 2024, particularly from 2020 to 2024. While majorities across all parties believed that GW was happening and human-caused, the proportion of endorsers was larger among Democrats than among Republicans. Opinions on the perceived seriousness of GW and the role of the United States in taking action also show similar divides.

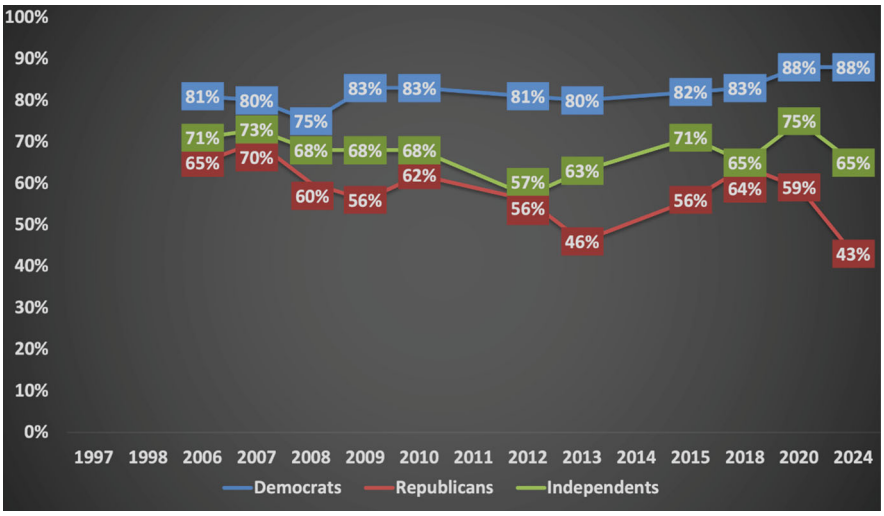

Fig. 106 Percent of Democrats, Republicans, and Independents who trusted things scientists say about the environment completely, a lot, or a moderate amount

Support of various GW mitigation policies was higher among Democrats and Independents, including reducing GHG emissions and improving energy efficiency. Republicans showed more support for coal pollution reduction and favored tax breaks for nuclear power plants more. Increased engagement and knowledge about GW appeared among all groups, with Democrats showing the highest levels.

These patterns have significant implications for policymaking and voting. Although Republicans are "less green" on average than Democrats, in many aspects, even a majority of Republicans held "green" opinions (e.g., endorsing the existence of GW and the human cause of it). Thus, there is bipartisan support on certain aspects of this issue. The challenge for policymakers will be to identify and build upon these areas of agreement to create resilient and effective legislation.

In the context of voting, candidates who can bridge the partisan divide and appeal to the "green" consensus across party lines may have a strategic advantage. They could galvanize a broad coalition of voters by focusing on widely supported initiatives, such as innovation in clean energy technology.

Conclusion

The responsiveness of government to citizens' policy preferences is a central tenet of some theories of democracy, and PPRG's research is inspired partly by theories arguing that a government's effectiveness depends on its leaders' having an accurate understanding of what the populace wants them to do. Elected officials frequently receive information from lobbying groups, direct communications from constituents (through phone calls, emails, and letters), protests and demonstrations, and meetings

and hearings held in their districts, but these forms of communication may convey the opinions of only small and select parts of the population.

If done well, scientific surveys have the potential to provide governments with insight into the entire population's views and can give voice to people who don't otherwise share their views with government. Survey research is therefore a potentially valuable tool for helping government officials understand the general public's opinions and wishes.

During the last 70 years of serious survey research, the American public has been roughly equally divided on many important and controversial issues of public policy. But GW is unusual: as seen in this chapter, since 1997, strikingly large majorities of Americans have agreed about whether GW has been happening, whether it is a threat, whether it merits government attention, what policy approaches should be implemented, and what policy approaches should be avoided. Public opinion on GW has also been relatively stable, a conclusion consistent with Page and Shapiro's landmark book, *The Rational Public* (2010). A majority of Americans are green on many aspects of the discussion, and this "green-ness" persisted across party lines: a majority of Republicans favored many ameliorative policies (e.g., use of clean energy, improvement of energy efficiency), albeit less unanimous than Democrats.

The beginning of the chapter raised some questions on the policymaking level: Why has American policymaking rarely included aggressive greenhouse gas emissions reduction efforts that are popular with the public? The rarity of such policies seems not to be because the public isn't "green enough." As the data indicate, a significant portion of the population across parties has acknowledged the reality of global warming and the role of human activities in causing it. Furthermore, majorities within all political partisan groups, to varying degrees, have supported actions to mitigate climate change, such as reducing greenhouse gas emissions and improving energy efficiency.

Although the majority of Americans have believed that something should be done about climate change—whether it be by the federal government, world leaders, businesses, or individuals—the details of how that something should be done have proven to be points of continued political contention. We hope that this chapter may help move policymakers forward in taking signals from the public about desired futures.

Competing Interest Declaration The author(s) has no competing interests to declare that are relevant to the content of this manuscript.

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