

1-2021

## **Convincing Conservatives: Private Sector Action Can Bolster Support for Climate Change Mitigation in the United States**

Michael P. Vandenberg

Ash Gillis

Kaitlin T. Raimi

Alex Maki

Ken Wallston

Follow this and additional works at: <https://scholarship.law.vanderbilt.edu/faculty-publications>



Part of the [Environmental Law Commons](#)

---



# Convincing conservatives: Private sector action can bolster support for climate change mitigation in the United States

Ash Gillis<sup>a,\*</sup>, Michael Vandenberg<sup>b</sup>, Kaitlin Raimi<sup>c</sup>, Alex Maki<sup>d</sup>, Ken Wallston<sup>e</sup>

<sup>a</sup> The Pennsylvania State University, Department of Psychology, United States

<sup>b</sup> Vanderbilt University, Law School, United States

<sup>c</sup> University of Michigan, Ford School of Public Policy, United States

<sup>d</sup> American Academy for the Advancement of Science, United States

<sup>e</sup> Vanderbilt University, School of Nursing, United States

## ARTICLE INFO

### Keywords:

Climate communications  
Private sector climate approaches  
Climate change policy  
Mitigation support  
Ideology  
Solution aversion

## ABSTRACT

Finding routes to inspire political conservatives' support for climate change mitigation is crucial in the United States. In an experiment with U.S. participants, we found that conservatives and moderates are more supportive of climate change mitigation when exposed to information about mitigation actions taken by the private sector. These results suggest that the private sector initiatives may be a way to bolster support for climate action across the U.S. political spectrum. We also tested for downstream spillover effects and found mixed results: Compared to reading about government regulations to mitigate climate change, reading about private sector climate actions led to both increased and decreased support for government-led further mitigation through two different pathways. We found an indirect positive spillover effect in which conservatives and moderates perceived private approaches to be feasible and effective, leading to more mitigation support. However, we also found an indirect negative spillover effect in which reading about private sector mitigation actions reduced concern about climate change among conservatives and moderates, thus decreasing their support for government policies to mitigate climate change. These indirect positive and negative spillover effects appear to cancel each other out. Additionally, when comparing the effect of reading about private sector action to reading specifically about a carbon tax (rather than other government regulations) there were no spillover effects. We explore the policy and behavioral implications of these findings.

## 1. Introduction

Human-caused climate change will likely lead to significant and harmful changes to the planet for the foreseeable future [1]. Policy experts have proposed a wide range of government responses to mitigate climate change, including new regulations, carbon taxes, the Green New Deal, and more ambitious provisions in international agreements [2]. Despite majority support for action on climate change in the United States [3], progress to date has been disappointing and the prospects for major new national and international efforts are limited [4]. Emissions reductions by the U.S. are important to achieve global mitigation goals, but roughly half of U.S. states are not taking major action to mitigate climate change [5]. Major federal legislation will require not only a supportive president, but also sixty votes in the Senate to overcome a filibuster, or 51 votes to replace the filibuster rule, and five votes on the

Supreme Court to overcome legal challenges. The deep polarization of the U.S. electorate [6], combined with the effects of the Electoral College and the fact that states with less than 20% of the U.S. population control a majority of votes in the Senate [7], suggest that simple majority support may be insufficient to adopt major new climate change mitigation measures [4]. Climate science acceptance and mitigation support from moderates and conservatives may be necessary [8].

Numerous collaborative efforts among social scientists have noted the importance of better understanding climate science acceptance and climate change mitigation support [9–12]. The last decade has seen significant increases in knowledge and concern about climate change among liberals and some moderates in the U.S., yet many people on the right side of the political spectrum still reject climate change science and policies [8]. Despite the importance of conservatives to climate change mitigation, less progress has been made in climate change

\* Corresponding author at: 514 Moore Building, Penn State University, University Park, PA 16802, United States.

E-mail address: [ajg54@psu.edu](mailto:ajg54@psu.edu) (A. Gillis).

<https://doi.org/10.1016/j.erss.2021.101947>

Received 11 May 2020; Received in revised form 10 January 2021; Accepted 15 January 2021

Available online 25 January 2021

2214-6296/© 2021 Elsevier Ltd. All rights reserved.

communications directed toward conservatives than toward liberals. Even less research has been generated on climate change communications toward political moderates, who make up about 40% of the U.S. population [13,14], and who may be more open to shifting their opinions [15,16].

Conservative opposition to climate change science and policies may be due to ideological distrust of the solutions to climate change, most of which involve the type of substantial governmental regulations that conservatives tend to oppose [17–19]. Research on climate change communications has generated insights on the effectiveness of moral framings [20,21], messages about protecting our homeland [22], and endorsements from religious figures [23] to change beliefs and attitudes about climate change. However, this research has focused on framing the climate change *problem* to shift attitudes or make government solutions more appealing in a context where much of the U.S. population has strong competing motivations to reject government *solutions* because of resistance to increasing the role of government.

New approaches to reach conservatives and moderates are needed, and developments in climate change governance suggest reasons for optimism. Although many people assume climate change policy must come from public government entities, there is a growing recognition that delays arising from the difficulty of adopting government policies will undermine the ability to achieve the 2C goal and 1.5C aspiration of the Paris Agreement [24]. An important development is the increased climate change mitigation efforts of private organizations [25–31] some of which are taking on the traditional governmental role of achieving significant reductions in carbon emissions [32,33]. As discussed in more detail below, numerous analyses of non-state and private actors have concluded that initiatives driven by and focused on these actors have reduced carbon emissions by billions of tons and have the potential for substantial additional reductions [2,4,25,28,29]. Conservatives and moderates in particular may support these climate change mitigation options more than government options and may view them as more feasible (more likely to be adopted) and effective (having a larger impact if they are adopted) than government actions to address climate change. Just as members of the public can show their support or opposition for government policies in a variety of ways (e.g., voting, writing representatives, signing petitions), they can also support (or oppose) private sector actions through a variety of forms (e.g., increased customer or employee loyalty, protests). Given the importance of determining new strategies to convince conservatives and moderates that an array of approaches can help begin to address climate change, in this study we explore factors linked to support of or opposition to public and private climate change mitigation efforts.

### 1.1. The technical case for private sector action

Private organizations have used a wide range of instruments to address climate change and other environmental issues [34], especially in sectors that are particularly difficult for governments to regulate (e.g., global aviation, households). For example, private sector environmental action has spurred organizations to procure renewable power [35], require suppliers to meet environmental standards [36], support nonprofit organizations to develop and implement new environmental standards [37], and even supply their employees with discounts for home energy technologies, such as home solar panels [38]. Although greenwashing is a concern, a complex set of drivers may motivate firms to make and achieve carbon reduction commitments. Evidence suggests that private sector action, including the actions of private households, has reduced global carbon emissions by hundreds of millions of metric tons [2] and could provide carbon emissions reductions of a billion tons or more per year over the next decade [2,30,39,40]. At a global level, supply chain initiatives alone have reduced global emissions by over 640 million metric tons of CO<sub>2</sub> equivalent (MMTCO<sub>2</sub>e) [41] an amount roughly equal to the annual emissions of a major emitting country such as Argentina. Some firms are so large that their firm-specific initiatives

with advocacy groups may result in major emissions reductions. For instance, Walmart recently worked with several environmental advocacy groups on “Project Gigaton,” an effort to reduce supply chain emissions by a billion tons of CO<sub>2</sub> equivalent emissions by 2030, an amount roughly equal to the total annual emissions of Germany or Japan [42].

### 1.2. The psychological case for private sector action

Social psychological research on understanding and influencing public support for climate change mitigation suggests that messages emphasizing mitigation options that are consistent with political conservatism could bridge partisan gaps. The lens of motivated reasoning [43,44] explains conservative opposition to climate change mitigation as a process in which conservatives’ general opposition to large-scale governmental policies motivates a rejection of climate change solutions. This, in turn, can extend to rejection of climate change science because of an inherent conflict between the expected solutions to climate change (e.g., large-scale government action) and conservative values. This motivated reasoning process can be leveraged to increase acceptance of climate change science and support for climate change solutions among conservatives by framing the solutions to climate change as consistent with a conservative worldview [17,18,45].

For example, presenting public governance approaches to climate change as consistent with free market goals can be more effective at inducing conservatives to believe in human-caused climate change than a government regulation approach to climate change [17,45]. This suggests that people are more likely to downplay or doubt a social problem when they are opposed to the proposed policy solution and become more open to dealing with the problem when the solutions are consistent with their ideology. However, the types of climate change policies explored in previous research involved government legislation designed to leverage private sector action, so government remained in a central role [17]. For instance, a national carbon tax is a market-friendly solution, but it requires major government action in the form of federal legislation.

In contrast, private climate change governance focuses on the actions taken by private organizations (e.g., companies, civic, religious, and cultural organizations, and private hospitals and universities), with limited motivation from or requirement to adopt government laws, policies, and programs [25]. Environmental advocacy groups often attempt to organize private governance initiatives not as a substitute for government action, but as a means of compensating for or filling gaps in government mitigation measures. It seems likely that unambiguous private sector action will be particularly appealing to conservatives in contrast to public governance approaches. Emphasizing the role that the private sector can play in driving climate change mitigation may be a particularly effective way to elicit support from political conservatives.

In addition, although a significant body of work has examined the psychology of political conservatives and liberals [46], we know much less about another large proportion of voting-age people: political moderates. Nearly 40% of voting Americans express politically moderate views [13,14]. Yet, the attitudes and policy views of political moderates have not often been the subject of examination. Rather, much of what we know about political moderates comes from research on the political extremes, with moderates serving as a comparison group for testing hypotheses about the extremes [47].

The influences on the political attitudes of moderates are distinct from those on the extremes. Moderates tend to view political issues through a more complex lens than individuals toward the extremes [48]. Additionally, compared to those on the extremes, political moderates rely less on their affective responses to determine their political attitudes and more on their cognitive responses [16].

The ideological extremity hypothesis suggests that those on the political extremes are more cognitively rigid than moderates [15]. Although this hypothesis is often used to explain the reactions of the

political extremes, it says quite a bit about political moderates as well — that they are more flexible and more open to differing opinions [15,16,49,50]. Not only is the psychology of political moderates worth studying because they make up a significant proportion of the voting population but, as the ideological extremity hypothesis suggests, political moderates may also be more open to new ideas and more persuadable. As we might expect for a politically polarizing issue such as climate change [51], more than half of moderates believe climate change is happening and about half of moderates are worried about climate change [3]. Thus, this group not only includes many who do not accept the climate change science or support climate change mitigation, but also includes many who may be particularly open to learning about new approaches to climate change that appeal to a wide range of political ideologies.

### 1.3. A potential caveat

Despite the opportunity that private governance might offer for capturing conservative and moderate support for climate change action, there is also a potential downside – communication about private sector actions could undermine support for public actions. Although private sector action can make significant headway in reducing carbon emissions, it is not a panacea — major government responses and the associated policy support, activism, and individual behavior remain important for the foreseeable future. A potential concern arising from private sector action is a “crowding out” effect on support for government climate change mitigation. Some studies have found that introducing new behavior-based mitigation policies (nudges) can undermine support for government carbon taxes [52–54]. This process is similar to what researchers have described as a negative spillover effect — where the engagement of one type of climate change mitigation action (e.g., private sector action) leads to a decrease in another type of climate change mitigation action (e.g., government policy support) [55,56]. Similarly, technology-based approaches to climate change (such as geoengineering) can lead people (especially conservatives) to be less concerned about climate change and thus lead them to be less supportive of a wide range of government-based climate change mitigation policies [57–60]. Conservatives in particular may become even less supportive of further government-led climate change mitigation if they perceive climate change as less concerning after reading about private sector action, consistent with research on communications about novel climate change solutions such as geoengineering [57,58].

Two recent papers have demonstrated that private governance approaches to environmental regulation can affect citizen support for government-led initiatives. Malhotra et al. [61] tested the effects of reading about voluntary corporate actions on six different environmental topics, although none explicitly labelled as climate-related. They found that when programs are described as broadly adopted across an industry, these voluntary actions can erode support for similar actions by government. They did not test for political ideology as a moderator among a sample of the general public but found the effects were stronger among liberals in a sample of government officials. In contrast, Dana and Nadler [62] found that reading about private corporate efforts to improve food practices (e.g., caged chickens or antibiotics in meat) increased support for government actions in these arenas among conservative participants. It remains to be seen which of these patterns would be true for the climate change domain. Given that climate change is even more politically polarized in the U.S. than other environmental topics [63] we may expect political ideology to moderate these effects, although whether these differences would result in a net increase or decrease in support for government regulation is still unclear.

Findings about negative spillover effects are worrying, as none of these new approaches to mitigation are projected to be sufficient to address climate change in the absence of broader government action. A key question in addition to whether private action can garner more universal support is whether it will do so at the expense of support for

further actions, particularly those led by the government. If reading about private sector action increases support for private approaches at the expense of support for public approaches, the value of such strategies for climate change mitigation may be reduced. Indeed, to achieve climate change mitigation the goal should be to increase support for private governance approaches while maintaining or enhancing support for public governance approaches. Thus, there is clear value in examining whether reading about private sector approaches leads individuals, particularly political conservatives and moderates, to express less or more support for government climate change mitigation.

### 1.4. Current research

In this experiment, we explored whether people across the political spectrum support private sector action to reduce carbon emissions, even if they do not support government climate change policies. We also explored the processes that may lead to support for private sector action, including attitudes toward private sector action as well as judgments of its feasibility and effectiveness. Lastly, because both public and private action are needed in long-term solutions, we assessed whether support for private actions affects further support for carbon reductions (both in general and those carried out by governments). We tested two pathways by which this might occur. First, private action might undermine support for further carbon reduction via reduced concern about climate change. Second, private actions might increase support for further reductions by increasing the perceived feasibility and effectiveness of private sector actions. Belief in the feasibility and effectiveness of private sector action to mitigate climate change may act as a “foot-in-the-door” to bolster further support for carbon reduction [56]. In the absence of prior research directly testing political responses to private sector initiatives and the processes that lead to further increased and decreased support for government policy, we had three primary research questions:

1. To what extent do people across the political spectrum support or oppose private sector climate change mitigation?
2. Under what conditions does reading about private sector climate change initiatives increase support for reducing carbon emissions?
3. Under what conditions does reading about private sector climate change initiatives decrease support for further climate change mitigation?

## 2. Method

### 2.1. Participants

Participants were 1225 U.S. adults recruited via Amazon’s Mechanical Turk [MTurk; see 64 for details regarding the value of MTurk as a sampling platform]. Ninety-seven participants were removed from the dataset for failing the attention check; analyses were with the remaining sample ( $N = 1128$ ; 53.1% Female, 44.9% Male, 1.80% Missing;  $M_{\text{age}} = 35.92$ ,  $SD_{\text{age}} = 11.58$ ). This sample was less ethnically and racially diverse than U.S. census averages [64]; individuals could select multiple identities, with 82.0% self-identified as White/Caucasian, 9.7% as Black/African-American, 8.9% as Hispanic or Latino, 7.0% as Asian, 2.3% as American Indian or Alaska Native, and 2.2% as Other. Median education was a bachelor’s degree (higher than U.S. Census averages) and median income was \$50,000–\$74,999 [comparable to U.S. Census averages; 65–67]. Political ideology was normally distributed with a slightly more liberal than average skew (5-point scale from  $-2$ , “very conservative” to  $+2$ , “very liberal”:  $M = 0.32$ ,  $SD = 1.02$ ).

### 2.2. Procedure and measures

Participants completed the survey using Qualtrics survey software [68]. We first defined three climate change approaches for participants

(private sector climate action, government regulations, and a government-instituted carbon tax), and participants completed baseline measures of their support for each of these three approaches, as well as their general support for reducing carbon emissions, provided in random order. Participants were then randomly assigned to read one of three newspaper articles (see Appendix A for full text of the articles). All three articles mentioned addressing climate change and reducing carbon emissions, but differed in the approach advocated: government regulations, a government-adopted carbon price, or private sector action (see experimental conditions section below). We then again defined the three approaches for participants and measured participants' support for each approach, and their general support for reducing carbon emissions (i.e., the same measures used in the baseline), followed by measures of their beliefs about the effectiveness of private sector action, the feasibility of private sector action, concern about climate change, belief that carbon emissions should be reduced, and support for government policies to mitigate climate change. Then, participants reported their demographic information, including their political ideology. Full text of measures is included in Appendix A.

### 2.2.1. Experimental conditions.

In the private sector action condition, participants read about the efforts of private organizations to address climate change and reduce carbon emissions, and why these efforts can play a major role in climate change mitigation. In the regulations condition, participants read that public governance regulations should, and have been, targeting reductions in carbon emissions, such as reducing emissions from power plants, factories, and motor vehicles, and accelerating the permitting of renewable energy on public lands. In the carbon tax condition, participants read about a government carbon tax that would reduce carbon emissions, with both revenue-neutral and revenue-positive variants of a carbon tax discussed, and brief discussion of use of this approach in Canada.

### 2.2.2. Support for private sector action, government regulation, and a carbon tax.

Participants responded to a question about support for each type of action both before and after the manipulation that asked, "How strongly do you support [X] to reduce carbon emissions?" with responses ranging from -3 (*completely oppose*) to +3 (*completely support*). Participants responded to these statements for all three focal approaches (i.e., private sector action, government regulation, and a carbon tax).

### 2.2.3. General support for reducing carbon emissions.

Participants responded to a statement about the need for carbon emission reductions both before and after the manipulation. The statement read "Carbon emissions should be reduced" with responses ranging from -3 (*completely disagree*) to +3 (*completely agree*).

### 2.2.4. Beliefs about private sector action.

Participants responded to two measures of their beliefs about the feasibility and effectiveness of private sector action after the manipulation. The question regarding feasibility read, "How feasible is private sector action to reduce carbon emissions?" with responses ranging from -3 (*completely infeasible*) to +3 (*completely feasible*). The item regarding effectiveness read, "Private sector action would go a long way toward reducing carbon emissions" with responses ranging from -3 (*completely disagree*) to +3 (*completely agree*).

### 2.2.5. Climate change concern

Participants responded to a question about their concern about climate change by answering the question, "How personally worried are you about the effects of climate change?" with responses ranging from 0 (*not at all worried*) to 5 (*very worried*).

### 2.2.6. Support for government policies to mitigate climate change

Participants indicated their level of support for 12 individual government policies (see Appendix A) on a scale of -3 (*completely do not support*) to +3 (*completely support*). Participants were also given the opportunity to select "NA" if they did not know about the policy, and these responses were excluded from the analyses. Items were partially adapted from a previous study [57] and partially created for this study. These items combined to form a reliable scale (Cronbach's  $\alpha = 0.94$ ) and the mean of these items was used as a composite score indicating support for government policies.

### 2.2.7. Demographics and political ideology.

Finally, participants reported their age, gender, race, income, and level of education. Participants also indicated their political ideology on a scale of -2 (very conservative) to +2 (very liberal). For all analyses political ideology was categorized such that conservatives were those who answered -2 or -1 ( $N = 237$ ), moderates answered 0 ( $N = 376$ ), and liberals answered 1 or 2 ( $N = 502$ ).

## 3. Results

### 3.1. To what extent do people across the political spectrum support or oppose private sector climate change mitigation?

#### 3.1.1. Conservatives and moderates are more supportive of private sector action than public sector action

The first known direct test of support for private sector action found that conservatives and moderates are more supportive of private sector action than government action. Paired *t*-tests among conservatives and moderates compared support of private versus public sector initiatives to mitigate climate change. Results showed that at baseline (i.e., before experimental manipulation) conservatives' support for private sector action ( $M = 1.33$ ) was significantly greater than government regulations ( $M = 0.15$ ),  $t(2\ 3\ 3) = 9.97$ ,  $p < .001$ ,  $M_D = 1.18$ , 95% CI [0.95, 1.41] or a government carbon tax ( $M = -0.15$ ),  $t(2\ 3\ 3) = 11.32$ ,  $p < .001$ ,  $M_D = 1.48$ , 95% CI [1.22, 1.73]. Similarly, paired *t*-tests among moderates compared support for private versus public sector initiatives to mitigate climate change. Results showed that at baseline moderates were slightly more supportive of private sector action ( $M = 1.73$ ) than government regulations ( $M = 1.31$ ),  $t(3\ 7\ 3) = 5.56$ ,  $p < .001$ ,  $M_D = 0.42$ , 95% CI [0.27, 0.57] or a government carbon tax ( $M = 0.86$ ),  $t(3\ 7\ 4) = 9.69$ ,  $p < .001$ ,  $M_D = 0.86$ , 95% CI [0.69, 1.04].

#### 3.1.2. Liberals are more supportive of government regulations than private sector action and a carbon tax

Results from paired *t*-tests showed that at baseline liberals were slightly more supportive of government regulations ( $M = 2.17$ ) than private sector initiatives ( $M = 2.01$ ),  $t(4\ 9\ 7) = -3.13$ ,  $p = .002$ ,  $M_D = -0.16$ , 95% CI [-0.26, -0.06], but more supportive of private sector initiatives than a government carbon tax ( $M = 1.80$ ),  $t(4\ 9\ 5) = 3.18$ ,  $p = .002$ ,  $M_D = 0.20$ , 95% CI [0.08, 0.33]. These results show that although liberals are more supportive of private sector action than some government actions (i.e., a carbon tax) in the same way that moderates and conservatives are, they do prefer government regulations to private action. Note, however, that liberals were still more supportive of private sector initiatives than conservatives were, ( $M_D = 0.68$ ,  $p < .001$ , 95% CI [0.43, 0.94]).

### 3.2. Under what conditions does reading about private sector climate change initiatives increase support for reducing carbon emissions?

#### 3.2.1. Reading about private sector actions to mitigate climate change (vs. Reading about government policies) increases general support for reducing carbon emissions

We examined whether general support for reducing carbon emissions changed from the baseline measure to the measure following the

experimental manipulation, and whether these changes differed by treatment condition.

A repeated measures analysis of variance (ANOVA) testing differences between baseline and post-manipulation support for reducing carbon emissions by treatment condition showed that, though general support for reducing carbon emissions reductions increased from baseline,  $F(1, 1113) = 8.08, p = .005$ , this increase did not differ between conditions,  $F(2, 1113) = 0.75, p = .473$ . However, paired t-tests showed that, compared to their baseline, participants who read about private sector action significantly increased their support for reducing carbon emissions ( $t(3\ 6\ 9) = 2.14, p = .033; M_{pre} = 2.17, SD_{pre} = 1.31, M_{post} = 2.25, SD_{post} = 1.24$ ). Reading about government regulations ( $t(3\ 7\ 9) = 0.83, p = .406; M_{pre} = 2.20, SD_{pre} = 1.24, M_{post} = 2.22, SD_{post} = 1.24$ ) or a carbon tax ( $t(3\ 6\ 8) = 1.77, p = .077; M_{pre} = 2.20, SD_{pre} = 1.32, M_{post} = 2.27, SD_{post} = 1.25$ ) did not lead to changes in support for reducing carbon emissions. These results provide some supportive evidence that reading about private sector action increases people's support for reducing carbon emissions.

### 3.2.2. The increased support for reducing carbon emissions among people who read about private sector action is stronger for political conservatives and moderates than liberals

Results from a two-way (political ideology  $\times$  experimental condition) repeated measures ANOVA showed that the increase of support for reducing carbon emissions from baseline across experimental conditions differed by political ideology,  $F(4, 1097) = 2.89, p = .021$ . Simple effects tests verified that, within the private sector condition, conservatives had a significant increase in their support for reducing carbon emissions ( $t(85) = -2.90, p = .005; M_{pre} = 1.35, M_{post} = 1.59$ ) as did moderates ( $t(1\ 2\ 0) = -2.48, p = .015; M_{pre} = 2.03, M_{post} = 2.19$ ) but not liberals ( $t(1\ 5\ 6) = 1.29, p = .119; M_{pre} = 2.70, M_{post} = 2.63$ ). Fig. 1 depicts these effects.

### 3.2.3. Among conservatives and moderates (but not liberals), strengthened belief of the feasibility and effectiveness of private sector action mediates the effect of reading about private sector initiatives on increased support for further climate change mitigation

We next examined moderated mediation models testing whether reading about the different climate change approaches affected support for reducing carbon emissions by way of differences in beliefs that private sector action is effective and feasible (treated each as mediators in the same model), and whether political ideology moderated these effects (see Fig. 2). We ran one model with general support for reducing carbon emissions as the dependent variable and one model with our composite measure of government climate change mitigation policy support as the dependent variable to examine whether patterns for general support for carbon mitigation hold for support for specific government policies.

To conduct the moderated mediation analysis, we used the PROCESS macro for SPSS [69] with 10,000 bootstrapping iterations for PROCESS Model 92 (Fig. 2). This model allowed ideology to moderate all of the links among condition, mediators, and support for carbon mitigation. Because we hypothesized that feasibility is a prerequisite for the effectiveness of private sector action (a policy must be adopted before it can have results), we also chose this model because it allowed us to test serial mediation (i.e., to test whether the private sector condition increases perceived feasibility, which increases perceived effectiveness, and explains an increase in support for climate change mitigation). The condition variables were dummy coded (the government regulation condition was used as the referent; the carbon tax condition was used as a covariate)<sup>1</sup>. The total (unmediated) effect was determined by the interaction between the private sector vs government regulation condition and political ideology, controlling for the private sector vs carbon

tax condition [70]. Table 1 contains the means of the measures used in this analysis for each condition by political ideology. Table 2 contains a summary of results from the moderated mediation. Table B.1 in Appendix B provides correlations among all mediators and outcome variables.

3.2.3.1. *Effects on general support for reducing carbon emissions.* Results showed a significant indirect effect: reading about private sector action increased support for reducing carbon emissions among conservatives and moderates by increasing their belief in the feasibility of private sector action, which in turn increased their belief in the effectiveness of private sector action (Table 2). No such effect emerged for liberals. Consistent with this serial mediation, we found that reading about private sector action increased belief in the feasibility of private sector action,  $b = 0.31, t(1094) = 2.88, p = .004, 95\% \text{ CI } [0.10, 0.52]$ , and that feasibility was strongly associated with increased belief in the effectiveness of private sector action,  $b = 0.66, t(1092) = 28.53, p < .001, 95\% \text{ CI } [0.62, 0.71]$ , which was associated with stronger support for reducing carbon emissions,  $b = 0.26, t(1090) = 7.75, p < .001, 95\% \text{ CI } [0.19, 0.33]$ . Neither the direct effects nor the total (unmediated) effect was statistically significant.

3.2.3.2. *Effects on support for government policies.* We tested whether this same effect extended to increased support for government policies to mitigate climate change. Using an identical model but with mean policy support across 12 policies as the dependent variable, we found the same pattern — a significant indirect effect of reading about private sector action on increased support for government policies for conservatives and moderates through an increased belief in the feasibility of private sector action, which increased belief in the effectiveness of private sector action (Table 2). Consistent with this serial mediation, we found that reading about private sector action increased belief in the feasibility of private sector action,  $b = 0.31, t(1096) = 2.92, p = .004, 95\% \text{ CI } [0.10, 0.52]$ , and that feasibility was strongly associated with increased belief in the effectiveness of private sector action,  $b = 0.66, t(1094) = 28.62, p < .001, 95\% \text{ CI } [0.62, 0.71]$ , which was associated with stronger support for government climate change policies,  $b = 0.28, t(1092) = 9.35, p < .001, 95\% \text{ CI } [0.22, 0.34]$ . As with the model of support for general carbon emissions, no direct effects were statistically significant. We concluded that an increased belief in the feasibility of private sector action from reading about private sector action also increased the belief in the effectiveness of private sector action and led to increased support for government policies among conservatives and moderates. As with the mediation of effects on support for general carbon reductions, the total (unmediated) effect was not significant.

### 3.3. Under what conditions does reading about private sector climate change initiatives decrease support for further climate change mitigation?

#### 3.3.1. Among conservatives and moderates (but not liberals), reduced concern about climate change mediates the effect of reading about private sector action on reduced support for further climate change mitigation

We used mediation models identical to the previous model but with one mediator (climate change concern) instead of two (PROCESS Model 59). Two models tested whether reading about private sector action reduced support for generally reducing carbon emissions and government climate change policies, respectively, by way of reducing concern about climate change, and whether political ideology moderated these effects (Fig. 3). The condition variables were dummy coded identically to the previous mediational analysis and the total (unmediated) effect was also calculated in the same manner as the previous analysis [70]. Table 1 contains the means of the measures used in this analysis for each condition by political ideology. Table 3 contains a summary of results from the moderated mediation.

<sup>1</sup> Mediation models comparing the private sector condition to the carbon tax condition are in Appendix B and produce the same pattern.

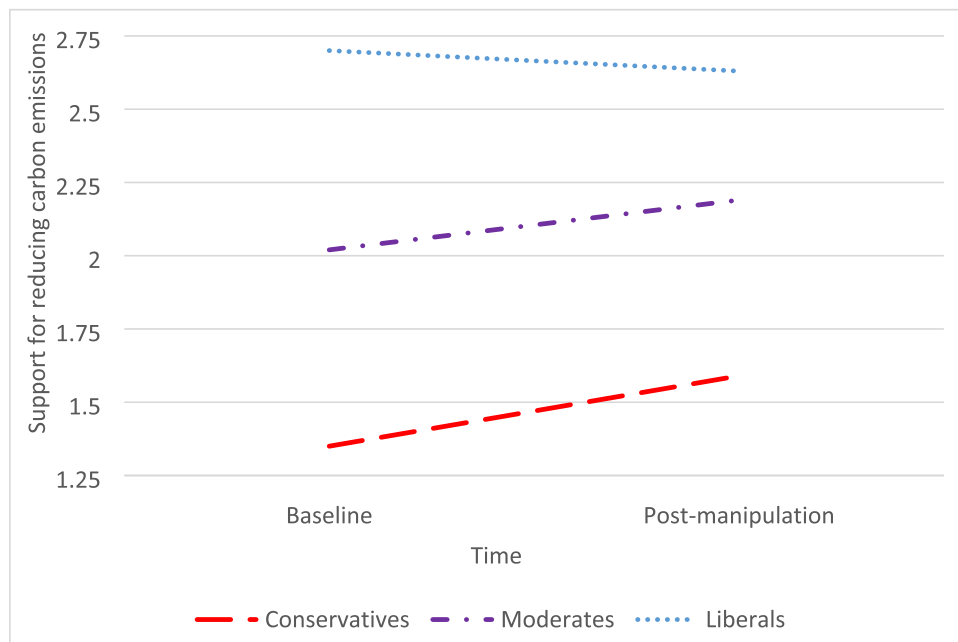


Fig. 1. Effect of private sector condition on support for reducing carbon emissions by political ideology. Note: Means between baseline and post-manipulation were significantly different for conservatives and moderates at  $p < .05$ .

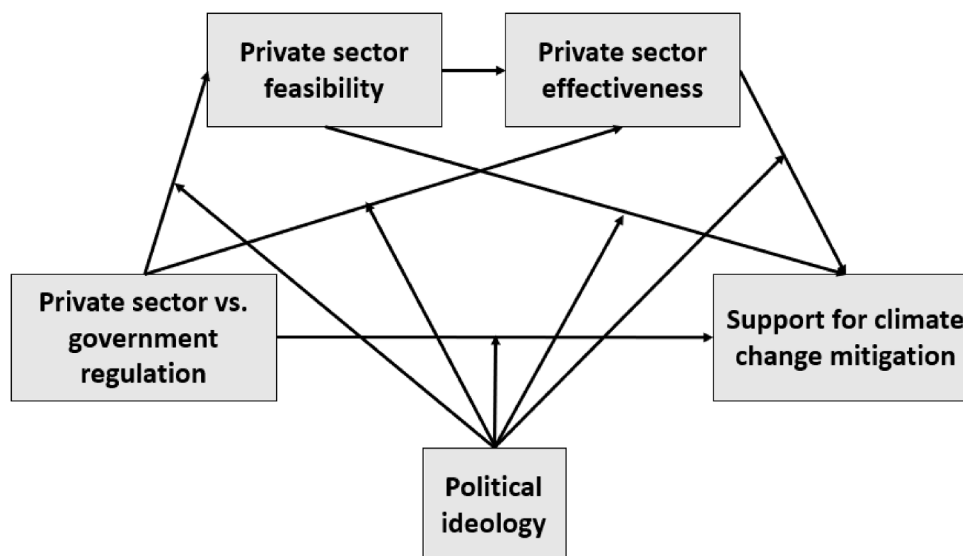


Fig. 2. Mediation model for process to increase support for climate change mitigation.

3.3.1.1. *Effects on general support for reducing carbon emissions.* There was a significant indirect effect of reading about private sector action on support for reducing carbon emissions through concern about climate change (Table 3). For conservatives and moderates (but not liberals), reading about private sector action reduced their climate change concern, undermining support for reducing carbon emissions. We also found a significant direct effect of reading about private sector action on support for reducing carbon emissions such that conservatives and moderates were significantly more supportive of reducing carbon emissions in the private sector action condition (when controlling for the climate change concern mediator). When looking at the direct ( $b_{con} = 0.31, SE = 0.12; b_{mod} = 0.15, SE = 0.08$ ) and indirect ( $b_{con} = -0.20, SE = 0.12; b_{mod} = -0.08, SE = 0.05$ ) effects together, we see that the overall effect of reading about private sector action on general support for reducing carbon emissions is net-positive, leading to more (rather than

less) support. The two effects appear to cancel out, as the total (unmediated) effect was not significantly different from zero.

3.3.1.2. *Effects on support for government policy.* The same pattern for the indirect effect held for support of government policies: reading about private sector action to mitigate climate change reduced support for public policies among conservatives and moderates by reducing concern about climate change (Table 3). Unlike the effect on support for reducing carbon emissions, we found no significant direct effect of reading about private sector action on support for public policies. These results provide supportive evidence that private sector action can decrease support for government-led further climate change mitigation among conservatives and moderates insofar as private sector action reduces their perception of climate change concern. As with the mediation of effects on support for general carbon reductions, the total

**Table 1**  
Means and standard errors of key measures across conditions by political ideology.

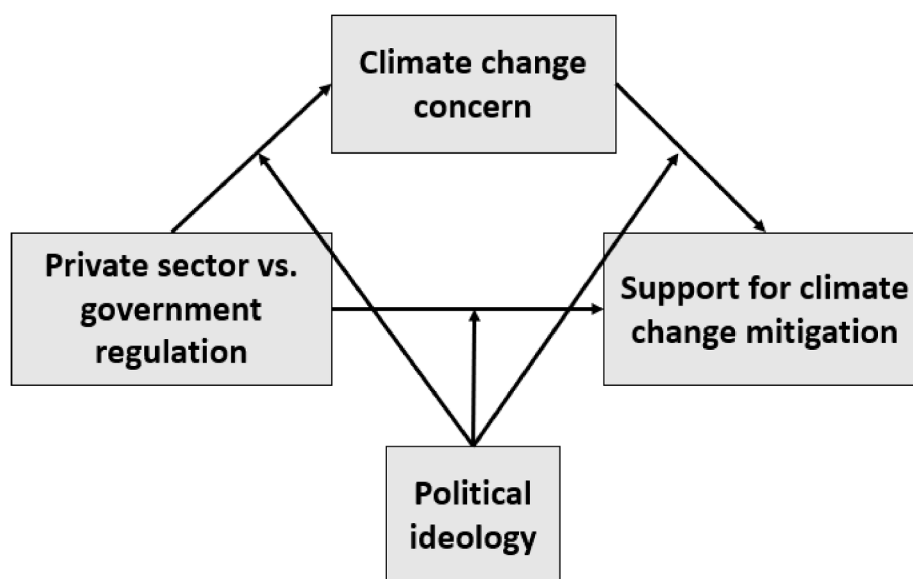
	Baseline	Dependent variables		Mediators		
	General support for reducing carbon emissions	General support for reducing carbon emissions	Support for government policies	Climate change concern	Feasibility of private sector action	Effectiveness of private sector action
<b>Private sector condition</b>						
Conservatives (N = 86)	1.35 (0.18)	1.59 (0.13)	0.58 (0.12)	1.50 (0.11)	1.56 (0.15)	1.59 (0.15)
Moderates (N = 123)	2.03 (0.12)	2.19 (0.11)	1.22 (0.10)	2.07 (0.10)	1.46 (0.13)	1.57 (0.13)
Liberals (N = 159)	2.70 (0.06)	2.63 (0.09)	1.83 (0.09)	2.74 (0.09)	1.49 (0.11)	1.76 (0.11)
<b>Government regulation condition</b>						
Conservatives (N = 77)	1.33 (0.18)	1.35 (0.13)	0.55 (0.12)	1.70 (0.12)	0.94 (0.16)	1.05 (0.16)
Moderates (N = 134)	2.19 (0.09)	2.18 (0.10)	1.29 (0.09)	2.26 (0.09)	1.13 (0.12)	1.30 (0.12)
Liberals (N = 167)	2.65 (0.07)	2.67 (0.09)	1.91 (0.08)	2.74 (0.08)	1.43 (0.11)	1.66 (0.11)
<b>Carbon tax condition</b>						
Conservatives (N = 74)	1.46 (0.20)	1.44 (0.13)	0.46 (0.13)	1.55 (0.13)	1.06 (0.17)	0.82 (0.16)
Moderates (N = 119)	2.05 (0.12)	2.23 (0.11)	1.11 (0.08)	2.15 (0.10)	1.21 (0.13)	1.42 (0.13)
Liberals (N = 176)	2.59 (0.08)	2.63 (0.09)	1.90 (0.08)	2.60 (0.08)	1.13 (0.11)	1.38 (0.10)

**Table 2**  
Conditional direct and indirect effects of reading about private sector action on climate change mitigation support by political ideology via perceived feasibility and effectiveness as serial mediators.

	Effects on general support for reducing carbon emissions					
	Direct Effect			Indirect Effect		
Political ideology	Coefficient	SE	95% CI	Coefficient	Boot SE	95% CI
Conservative	-0.13	0.14	[-0.40, 0.13]	0.14	0.06	[0.03, 0.27]
Moderate	-0.08	0.08	[-0.24, 0.08]	0.05	0.02	[0.02, 0.10]
Liberal	-0.03	0.11	[-0.23, 0.18]	0.01	0.01	[-0.01, 0.03]
Total (Unmediated) Effect: $b = -0.12, SE = 0.11, 95\% CI [-0.34, 0.10]$						
	Effects on support for public policy to mitigate climate change					
	Direct Effect			Indirect Effect		
Political ideology	Coefficient	SE	95% CI	Coefficient	Boot SE	95% CI
Conservative	-0.17	0.13	[-0.42, 0.08]	0.14	0.06	[0.04, 0.27]
Moderate	-0.14	0.08	[-0.29, 0.01]	0.06	0.02	[0.02, 0.10]
Liberal	-0.12	0.10	[-0.31, 0.08]	0.01	0.02	[-0.02, 0.05]
Total (Unmediated) Effect: $b = -0.04, SE = 0.10, 95\% CI [-0.25, 0.16]$						

Note: Reference group = government regulation condition;

Total (Unmediated) Effect = Private sector condition (vs. government regulation) X political ideology, controlling for private sector condition vs carbon tax condition.



**Fig. 3.** Mediational model for process to decrease support for climate change mitigation.



**Table 3**

Conditional direct and indirect effects of reading about private sector action on climate change mitigation support by political ideology via concern about climate change.

		Effects on general support for reducing carbon emissions					
		Direct Effect			Indirect Effect		
Political ideology		Coefficient	SE	95% CI	Coefficient	boot SE	95% CI
Conservative		0.31	0.12	[0.07, 0.55]	-0.20	0.12	[-0.43, -0.03]
Moderate		0.15	0.08	[0.01, 0.30]	-0.08	0.05	[-0.18, -0.01]
Liberal		-0.01	0.10	[-0.20, 0.18]	-0.01	0.03	[-0.08, 0.05]
Total (Unmediated) Effect:		$b = -0.12, SE = 0.11, 95\% CI [-0.34, 0.10]$					
		Effects on support for public policy to mitigate climate change					
		Direct Effect			Indirect Effect		
Political ideology		Coefficient	SE	95% CI	Coefficient	boot SE	95% CI
Conservative		0.15	0.11	[-0.03, 0.41]	-0.17	0.10	[-0.36, -0.04]
Moderate		0.05	0.07	[-0.08, 0.18]	-0.08	0.04	[-0.17, -0.01]
Liberal		-0.09	0.09	[-0.26, 0.08]	-0.01	0.04	[-0.10, 0.07]
Total (Unmediated) Effect:		$b = -0.04, SE = 0.10, 95\% CI [-0.25, 0.16]$					

Note: Reference group = government regulation condition.

Total (Unmediated) Effect = Private sector condition (vs. government regulation) X political ideology, controlling for private sector condition vs carbon tax condition.

(unmediated) effect was not significant.

Notably, however, an identical mediation test using the carbon tax condition (rather than the government regulation condition) as the referent condition found no indirect effects on either general carbon reduction support or on support for the 12 government policies (Appendix B). This suggests that reading about private action reduces support for further action via reduced climate change concern only when compared to reading about government regulations but not when compared to a carbon tax. Thus, any seemingly detrimental effects of private sector initiatives may depend on those initiatives being compared to specific types of government actions.

#### 4. Discussion

With continuing government gridlock on major climate change legislation at the U.S. federal level and in many states, an increased emphasis on private sector action to mitigate climate change may be a promising route. Not only are private organizations making meaningful strides toward carbon emission reduction goals [2,25,30], but our findings suggest widespread support of private sector action among political conservatives, moderates, and liberals in the U.S. Indeed, an important way of framing messages about climate change and public policy may be to emphasize private sector approaches if the goal is to engage a broader group of Americans in supporting climate change mitigation.

Furthermore, using an experimental design, we found that reading about private sector climate action indirectly increased support for reducing carbon emissions and for climate change government policies. These effects were particularly strong among political moderates and conservatives. We found that this increase in support for carbon reduction and public policies was explained by an increased belief in the effectiveness of private sector action in mitigating climate change. However, we also found evidence that private sector climate change action can reduce support for public sector climate change mitigation among conservatives and moderates by reducing concern about climate change. These indirect effects worked to cancel each other out: the total unmediated effect was not significant. Therefore, we emphasize caution in developing communications about private sector action to mitigate climate change to maximize perceptions of feasibility and effectiveness while avoiding reduced concern about climate change.

##### 4.1. Evaluating implications of private sector action

Our research suggests that communications about specific types of climate change actors and actions may increase support for carbon emissions reduction among political conservatives and moderates. A

focus on private sector climate change action may lead to new climate change mitigation strategies, both through the advocacy of private non-profit and for-profit organizations and through the efforts of the general public to pressure private organizations into adopting more environmentally-friendly approaches [e.g., 71,72]. Indeed, evidence suggests that just as people and organizations can lobby the government to adopt environmental policies, people and organizations can lobby private organizations to change their environmental practices [73]. Based on the present results, such private sector actions have the potential to lead many people to advocate for further actions to mitigate climate change.

The present work provides evidence of processes that contribute to increased and decreased climate change policy support, both of which have significant implications for climate change communication. Reading about private sector action led to support for reducing carbon emissions when people perceived it to be feasible and effective at mitigating climate change. As such, perceived feasibility and effectiveness of private sector action plays a key role in persuading people to support climate change mitigation, especially for conservatives and moderates. Additionally, we found that inducing support for private sector action can also lead to decreased support for public governance approaches by reducing concern about climate change. This finding is consistent with evidence suggesting that reading about technology-based forms of climate change mitigation specifically may decrease support for other mitigation policies through the same mechanism of reduced concern about climate change [57,58]. Importantly, however, this pattern only emerged when reading about private sector action was compared to reading about government regulations, not when private actions were compared to reading about a carbon tax, suggesting that more is at play than simple distinctions between private vs. public policies. Because a wide range of actions are needed to mitigate climate change, researchers and practitioners may find discussions of private sector approaches helpful for bridging political divides but should be cautious about tempering concern about climate change.

##### 4.2. Future research and policy directions

Results from the present study are only the beginning of a deeper understanding of the public implications of private sector action to mitigate climate change. Researchers should continue to test potential processes that lead to climate change policy support, including evaluating not only information about the climate problem, but also information about potential public and private solutions. Future research should also evaluate the relative strengths of these processes to locate the key factors that drive support for various approaches.

The present results suggest that exploring nuances between types of

political conservatives and types of public and private climate actions may be valuable in future research. For example, Republican legislators in some states (e.g., Maryland, Massachusetts, and Vermont) have supported clean energy legislation, particularly where the influence of fossil fuel industries is less [74]. This suggests that some conservatives or Republicans may express greater support for certain public climate change governance approaches, or even hybrid public-private partnerships [e.g., the republicEn or Green Tea movements; 75]. Also, some types of private sector actions may be more appealing to conservatives than others, and future research could explore which types of private sector actions to propose to conservatives.

It is also worth stating that relying on private sector action to help reach carbon emission reduction goals may have its own weaknesses as a climate change mitigation approach. For example, experimental research suggests that endorsement of free market ideology can lead to lower concern about corporate injustice or environmental shortcomings, particularly for corporations that are perceived to be part of one's in-group [76]. This may suggest that to the extent that reading about private sector action elicits endorsement of free market ideology, some people may become less likely to evaluate how much private climate change governance is taking place. Additionally, as our own results indicated, to the extent that private sector action reduces concern about climate change, it may undermine government climate change policy support. We suggest framing messages about private sector action more as a piece of a very large puzzle, or as "silver buckshot," rather than as a silver bullet, a framing technique that has been found to lessen such crowding out effects in other domains [53,58].

Our results also indicate that the perceived effectiveness and feasibility of private sector actions are important to emphasize. Efforts by private advocacy groups or other organizations to increase transparency and to improve the monitoring of climate change mitigation actions by corporations and other private organizations (e.g., colleges and universities, religious organizations) may be one strategy to increase the likelihood that private climate change governance approaches will be effective. This is consistent with theory on unilateral regulatory over-compliance [77] in which private sector action may signal to governments that climate change mitigation strategies are low cost, which triggers further government action. Another option is to induce organizations to make public commitments when adopting private climate change governance approaches and goals and to combine those commitments with mechanisms for transparency and accountability regarding the achievement of those commitments [29,78].

#### 4.3. Limitations

Data were gathered from a convenience sample of online participants through Amazon Mechanical Turk, which may limit the generalizability of the findings. Researchers have recently documented poor data quality in MTurk samples likely due to server farms and "bots". The data in the present study were collected in 2016 prior to the 2018 "bot scare". Nevertheless, our findings are bound to the circumstances under which data were collected and may not generalize broadly. However, our use of a controlled experimental design provides some confidence in the quality of the data and veracity the findings, as the experimental process provides an ideal circumstance under which to study the basic psychological processes that follow exposure to information about private sector initiatives.

Our experimental manipulations lacked ecological validity in that the articles did not appear like real newspaper articles in their layout and design — the articles were presented as a page of text alike to a word document. However, the fact that our manipulations lacked this "real-world" feel and yet we still found effects on support for climate change mitigation suggests a rather robust effect of reading about private sector initiatives.

Our measure of general support for reducing carbon emissions included some level of ambiguity, and participants may have had

varying interpretations that affected the results. For example, our finding showing an increase in support for carbon reduction among those in the private sector condition but not in the government conditions could be explained by the experimental condition priming participants in the private sector conditions to think of support for private sector actions to reduce carbon emissions rather than general support for reducing carbon emissions. It would be more difficult to conclude then that reading of private sector action leads to further support of reducing carbon emissions. However, because we observed increased support for not just general emission reductions but also specifically government-led policies by those in the private sector condition we have confidence that private sector action can further climate change mitigation support.

We also note that our results did not demonstrate a large effect of the private sector condition on support for reducing carbon emissions (see Appendix B). Rather, we observed an increase in support for reducing carbon emissions within the private sector condition, especially for conservatives and moderates, relative to participants' baseline. Even so, the observed increase in support for reducing carbon emissions was small.

#### 4.4. Conclusion

In the deeply polarized political atmosphere, it is vitally important that researchers assess new ways to elicit support for climate change mitigation. One promising new avenue involves not shifting the description or framing of the problem, but shifting the actor who will respond to the problem and the type of action, such as focusing on the potential contribution of private sector action [25]. Indeed, in the Fourth National Climate Assessment released by the U.S. government, the authors argued that to properly address climate change, governments must work alongside the private sector to make meaningful strides in the reduction of carbon emissions [79], and the implementation process for the Paris Agreement also incorporates an explicit role for private sector action [80,81]. The present experimental results suggest that people are open to private sector action as an approach to mitigating climate change, including political conservatives in the U.S. who are often skeptical of public governance policies. Conservative and moderate support may be ultimately necessary for the U.S. to adopt and implement federal climate change mitigation legislation, so understanding the role of reading about private sector action in addressing conservatives' climate change mitigation support may be an important piece of the U.S., and ultimately global, response to climate change. However, this comes with an important caveat: if private sector action reduces climate change concern, it may undermine support for public climate change governance policies. Research should continue to explore the contribution that private initiatives can make to climate change mitigation and how to generate support for private sector action while maintaining or increasing support for public sector action.

#### Funding

Funding for this research was provided by Vanderbilt University Law School's Climate Change Research Network.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Acknowledgements

We would like to acknowledge the work and dedication of our dear friend, colleague, mentor, and co-author Ken Wallston, Ph.D., who passed away prior to this article's publication.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.erss.2021.101947>.

## References

- [1] J. Hansen, M. Sato, P. Hearty, R. Ruedy, M. Kelley, V. Masson-Delmotte, I. Velicogna, Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observations that 2° C global warming is highly dangerous, *Atmos. Chem. Phys. Discuss.* 15 (14) (2015).
- [2] United Nations Environment Programme (UNEP). (2019). Emissions Gap Report 2019 (p. 108). <https://wedocs.unep.org/bitstream/handle/20.500.11822/30797/EGR2019.pdf>.
- [3] M.T. Ballew, A. Leiserowitz, C. Roser-Renouf, S.A. Rosenthal, J.E. Kotcher, J. R. Marlon, E.W. Maibach, Climate change in the american mind: data, tools, and trends, *Environ. Sci. Policy Sustain. Dev.* 61 (3) (2019) 4–18.
- [4] J.M. Gilligan, M.P. Vandenbergh, Private climate governance, *Energy Res. Soc. Sci.* 60 (2020), 101400, <https://doi.org/10.1016/j.erss.2019.101400>.
- [5] Abramczyk, Marshall, Martha Campbell, Aman Chitkara, Mia Diawara, Aileen Lerch, and James Newcomb. Positive Disruption: Limiting Global Temperature Rise to Well Below 2 C°. Rocky Mountain Institute, 2017. [http://www.rmi.org/insights/reports/positive\\_disruption\\_limiting\\_global\\_temperature\\_rise](http://www.rmi.org/insights/reports/positive_disruption_limiting_global_temperature_rise).
- [6] Dunlap, R. E., McCright, A. M., & Yarosh, J. H. (2016). The Political Divide on Climate Change: Partisan Polarization Widens in the U.S. Environment: Science and Policy for Sustainable Development, 58(5), 4–23. <https://doi.org/10.1080/00139157.2016.1208995>.
- [7] F.E. Lee, B.I. Oppenheimer, *Sizing Up the Senate: The Unequal Consequences of Equal Representation*, University of Chicago Press, 1999.
- [8] Leiserowitz, A., Maibach, E., Rosenthal, S., Kotcher, J., Bergquist, P., Gustafson, A., Ballew, M., & Goldberg, M. (2019). *Politics & Global Warming*, November 2019. Yale University and George Mason University. New Haven, CT: Yale Program on Climate Change Communication.
- [9] S. Clayton, P. Devine-Wright, P.C. Stern, L. Whitmarsh, A. Carrico, L. Steg, J. Swim, M. Bonne, Psychological research and global climate change, *Nat. Clim. Change* 5 (2015) 640–646.
- [10] S. Clayton, P. Devine-Wright, J. Swim, M. Bonne, L. Steg, L. Whitmarsh, A. Carrico, Expanding the role for psychology in addressing environmental challenges, *Am. Psychol.* 71 (3) (2016) 199–215.
- [11] J.K. Swim, P.C. Stern, T.J. Doherty, S. Clayton, J.P. Reser, E.U. Weber, R. Gifford, et al., Psychology's contributions to understanding and addressing global climate change, *Am. Psychol.* 66 (4) (2011) 241–250, <https://doi.org/10.1037/a0023220>.
- [12] Weber, E. & Stern, P. Public Understanding of Climate Change in the United States, 66 *Am. Psychologist* 315 (2011).
- [13] Gallup (2018). Conservative Lead in U.S. Ideology is Down to Single Digits. <https://news.gallup.com/poll/225074/conservative-lead-ideology-down-single-digits.aspx>.
- [14] Pew Research Center (2014) Political Polarization in the American Public. <https://www.people-press.org/2014/06/12/section-1-growing-ideological-consistency/>.
- [15] J. Greenberg, E. Jonas, Psychological motives and political orientation—The left, the right, and the rigid: comment on Jost et al. (2003), *Psychological Bulletin* 129 (3) (2003) 376–382, <https://doi.org/10.1037/0033-2909.129.3.376>.
- [16] L. Zmigrod, P.J. Rentfrow, S. Zmigrod, T.W. Robbins, Cognitive flexibility and religious disbelief, *Psychol. Res.* 83 (8) (2019) 1749–1759.
- [17] T.H. Campbell, A.C. Kay, Solution aversion: on the relation between ideology and motivated disbelief, *J. Pers. Soc. Psychol.* 107 (5) (2014) 809.
- [18] D.M. Kahan, H. Jenkins-Smith, T. Tarantola, C.L. Silva, D. Braman, Geoengineering and climate change polarization: testing a two-channel model of science communication, *Ann. Am. Acad. Polit. Soc. Sci.* 658 (1) (2015) 192–222.
- [19] R.P. de Leon, S. Wingrove, A.C. Kay, Scientific skepticism and inequality: Political and ideological roots, *J. Exp. Soc. Psychol.* 91 (2020), 104045.
- [20] A.W. Severson, E.A. Coleman, Moral frames and climate change policy attitudes, *Soc. Sci. Quart.* 96 (5) (2015) 1277–1290.
- [21] M. Feinberg, R. Willer, The moral roots of environmental attitudes, *Psychol. Sci.* 24 (1) (2013) 56–62.
- [22] C. Wolsko, H. Ariceaga, J. Seiden, Red, white, and blue enough to be green: Effects of moral framing on climate change attitudes and conservation behaviors, *J. Exp. Soc. Psychol.* 65 (2016) 7–19.
- [23] J.P. Schuldt, A.R. Pearson, R. Romero-Canyas, D. Larson-Konar, Brief exposure to Pope Francis heightens moral beliefs about climate change, *Clim. Change* 141 (2) (2017) 167–177.
- [24] L. Goulder, Timing is everything: how economists can better address the urgency of stronger climate policy, *Rev. Environ. Econ. Policy* (2020) 1–15, <https://doi.org/10.1093/reep/rez014>.
- [25] Vandenbergh, M. P., & Gilligan, J. M. (2017). *Beyond Politics: The Private Governance Response to Climate Change*. Cambridge, United Kingdom ; New York, NY: Cambridge University Press.
- [26] J.F. Green, *Rethinking Private Authority: Agents and Entrepreneurs in Global Environmental Governance*, Princeton University Press, 2013.
- [27] S.E. Light, E.W. Orts, Parallels in public and private environmental governance, *Mich. J. Envtl. & Admin. L.* 5 (2015) 1.
- [28] D. Cole, Advantages of a polycentric approach to climate change policy, *Nat. Clim. Change* 5 (2015) 114–118.
- [29] Hsu, et al., A research roadmap for quantifying non-state and subnational climate mitigation action, *Nat. Clim. Change* 9 (1) (2019) 11–17, <https://doi.org/10.1038/s41558-018-0338-z>.
- [30] Hultman, et al. “Accelerating America’s Pledge: Going All-In to Build a Prosperous, Low-Carbon Economy for the United States.” (Bloomberg Philanthropies with University of Maryland Center for Global Sustainability Rocky Mountain Institution, and World Resources Institute 2019.
- [31] L.G. Leonard, Under the radar: a coherent system of climate governance, driven by business, *Environ. Law Reporter* 50 (2020) 10547–10572.
- [32] Vandenbergh, M. P. (2013). Private environmental governance. *Cornell L. Rev.*, 99, 129.
- [33] P.C. Stern, K.B. Janda, M.A. Brown, L. Steg, E.L. Vine, L. Lutzenhiser, Opportunities for reducing fossil fuel consumption by households and organizations, *Nat. Energy* 1 (2016), <https://doi.org/10.1038/nenergy.2016.43> article number 16043.
- [34] M. Starik, A.A. Marcus, Introduction to the special research forum on the management of organizations in the natural environment: a field emerging from multiple paths, with many challenges ahead, *Acad. Manage. J.* 43 (4) (2000) 539–547.
- [35] Renewable Energy Buyers Alliance (2020) REBA Deal Tracker. <https://rebuyers.org/deal-tracker/>.
- [36] Vandenbergh, M. P. (2006). The new Wal-Mart effect: The role of private contacting in global governance. *UCLA L. Rev.*, 54, 913.
- [37] Meidinger, E. E. (2001). Environmental certification programs and US environmental law: Closer than you may think. *Envtl. L. Rep. News & Analysis*, 31, 10162.
- [38] Maki, A., McKinney, E., Cohen, Gilligan, J., & Vandenbergh, M. (2018) Employee Energy Benefits: What Are They and What Effect Might They Have on Pro-environmental Behavior and Employee Morale? *Energy Efficiency* (2018) at <https://link.springer.com/article/10.1007/s12053-018-9721-x>.
- [39] J. Gilligan, M. Vandenbergh, A framework for assessing the impact of private climate governance, *Energy Res. Soc. Sci.* 60 (2020), 101400.
- [40] M.A. Delmas, M. Fischlein, O.I. Asensio, Information strategies and energy conservation behavior: a meta-analysis of experimental studies from 1975 to 2012, *Energy Policy* 61 (2013) 729–739.
- [41] Carbon Trust. (2019). Cascading Commitments: Driving Ambitious Action through Supply Chain Engagement. CDP Worldwide. [https://6fefcb86e61af1b2fc4-c70d8ead6ced550b4d987d7c03fcd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/004/072/original/CDP\\_Supply\\_Chain\\_Report\\_2019.pdf?1550490556](https://6fefcb86e61af1b2fc4-c70d8ead6ced550b4d987d7c03fcd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/004/072/original/CDP_Supply_Chain_Report_2019.pdf?1550490556).
- [42] Project Gigaton (2017) Walmart Sustainability Hub <https://www.walmart.com/sustainabilityhub.com/project-gigaton>.
- [43] P.S. Hart, E.C. Nisbet, Boomerang effects in science communication: How motivated reasoning and identity cues amplify opinion polarization about climate mitigation policies, *Commun. Res.* 39 (6) (2012) 701–723.
- [44] Z. Kunda, The case for motivated reasoning, *Psychol. Bull.* 108 (3) (1990) 480.
- [45] G. Dixon, J. Hmielowski, Y. Ma, Improving climate change acceptance among US conservatives through value-based message targeting, *Sci. Commun.* 39 (4) (2017) 520–534.
- [46] G.L. Cohen, Party over policy: the dominating impact of group influence on political beliefs, *J. Pers. Soc. Psychol.* 85 (5) (2003) 808.
- [47] M.J. Brandt, A.M. Evans, J.T. Crawford, The unthinking or confident extremist? Political extremists are more likely than moderates to reject experimenter-generated anchors, *Psychol. Sci.* 26 (2) (2015) 189–202.
- [48] J. Lammers, A. Koch, P. Conway, M.J. Brandt, The political domain appears simpler to the politically extreme than to political moderates, *Soc. Psychol. Personal. Sci.* 8 (6) (2017) 612–622.
- [49] K. Toner, M.R. Leary, M.W. Asher, K.P. Jongman-Sereno, Feeling superior is a bipartisan issue: extremity (not direction) of political views predicts perceived belief superiority, *Psychol. Sci.* 24 (12) (2013) 2454–2462, <https://doi.org/10.1177/0956797613494848>.
- [50] K.T. Raimi, M.R. Leary, Belief superiority in the environmental domain: Attitude extremity and reactions to fracking, *J. Environ. Psychol.* 40 (2014) 76–85, <https://doi.org/10.1016/j.jenvp.2014.05.005>.
- [51] A.M. McCright, R.E. Dunlap, Cool dudes: the denial of climate change among conservative white males in the United States, *Global Environ. Change* 21 (4) (2011) 1163–1172.
- [52] S.H. Werfel, Household behaviour crowds out support for climate change policy when sufficient progress is perceived, *Nat. Clim. Change* 7 (7) (2017) 512–515.
- [53] D. Haggmann, E.H. Ho, G. Loewenstein, Nudging out support for a carbon tax, *Nat. Clim. Change* 9 (6) (2019) 484–489.
- [54] R. Palm, T. Bolsen, J.T. Kingsland, ‘Don’t Tell Me What to Do’: Resistance to Climate Change Messages Suggesting Behavior Changes, *Weather Clim. Soc.* (2020) 1–29.
- [55] A. Maki, A.R. Carrico, K.T. Raimi, H.B. Truelove, B. Araujo, K.L. Yeung, Meta-analysis of pro-environmental behaviour spillover, *Nat. Sustain.* 2 (4) (2019) 307–315.
- [56] H.B. Truelove, A.R. Carrico, E.U. Weber, K.T. Raimi, M.P. Vandenbergh, Positive and negative spillover of pro-environmental behavior: An integrative review and theoretical framework, *Global Environ. Change* 29 (2014) 127–138.
- [57] V. Campbell-Arva, P.S. Hart, K.T. Raimi, K.S. Wolske, The influence of learning about carbon dioxide removal (CDR) on support for mitigation policies, *Clim. Change* 143 (3–4) (2017) 321–336.
- [58] K.T. Raimi, A. Maki, D. Dana, M.P. Vandenbergh, Framing of geoengineering affects support for climate change mitigation, *Environ. Commun.* 13 (3) (2019) 300–319.

- [59] C. Merk, G. Pönitzsch, K. Rehdanz, Knowledge about aerosol injection does not reduce individual mitigation efforts, *Environ. Res. Lett.* 11 (5) (2016), 054009.
- [60] M. Fairbrother, Trust and public support for environmental protection in diverse national contexts, *Sociol. Sci.* 3 (2016) 359–382.
- [61] N. Malhotra, B. Monin, M. Tomz, Does private regulation preempt public regulation? *Am. Polit. Sci. Rev.* 113 (1) (2019) 19–37.
- [62] D.A. Dana, J. Nadler, Regulation, public attitudes, and private governance, *J. Empir. Legal Stud.* 16 (1) (2019) 69–93.
- [63] Leiserowitz, A., Maibach, E., Rosenthal, S., Kotcher, J., Ballew, M., Bergquist, P., Gustafson, A., Goldberg, M., & Wang, X. (2020). *Politics & Global Warming*, April 2020. Yale University and George Mason University. New Haven, CT: Yale Program on Climate Change Communication.
- [64] Buhrmester, M., Kwang, T., & Gosling, S. D. (2016). Amazon's Mechanical Turk: A new source of inexpensive, yet high-quality data?.
- [65] Humes, K. R., Jones, N. A., & Ramirez, R. R. (2011). *Overview of race and Hispanic origin: 2010*.
- [66] Proctor, B. D., Semega, J. L., & Kollar, M. A. (2016). *Income and poverty in the United States: 2015*. US Census Bureau, Current Population Reports, P60-256.
- [67] Ryan, C. L., & Bauman, K. (2016). *Educational attainment in the United States: 2015*.
- [68] L.L.C. Qualtrics, *Qualtrics survey platform*, Provo, UT, USA, 2015.
- [69] A.F. Hayes, *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*, Guilford publications, 2017.
- [70] D. Muller, C.M. Judd, V.Y. Yzerbyt, When moderation is mediated and mediation is moderated, *J. Pers. Soc. Psychol.* 89 (6) (2005) 852.
- [71] K. Babiak, S. Trendafilova, CSR and environmental responsibility: motives and pressures to adopt green management practices, *Corp. Soc. Responsib. Environ. Manage.* 18 (1) (2011) 11–24.
- [72] H. Wahba, Does the market value corporate environmental responsibility? An empirical examination, *Corp. Soc. Responsib. Environ. Manage.* 15 (2) (2008) 89–99.
- [73] P. Bansal, K. Roth, Why companies go green: a model of ecological responsiveness, *Acad. Manage. J.* 43 (4) (2000) 717–736.
- [74] J.S. Coley, D.J. Hess, Green energy laws and Republican legislators in the United States, *Energy Policy* 48 (2012) 576–583.
- [75] D.J. Hess, K.P. Brown, Green tea: clean-energy conservatism as a countermovement, *Environ. Sociol.* 3 (1) (2017) 64–75.
- [76] P. Kardos, B. Leidner, L. Zsolnai, E. Castano, The effect of the belief in free market ideology on redressing corporate injustice, *Eur. J. Soc. Psychol.* 46 (6) (2016) 672–686.
- [77] V. Denicolò, A signaling model of environmental overcompliance, *J. Econ. Behav. Organ.* 68 (1) (2008) 293–303.
- [78] Vandenbergh, M. P., & Raimi, K. T. (2015). Climate change: Leveraging legacy. *Ecology LQ.* 42, 139.
- [79] USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018.
- [80] T. Hale, “All hands on deck”: the Paris agreement and nonstate climate action, *Global Environ. Polit.* 16 (3) (2016) 12–22.
- [81] Hsu, A., Cheng, Y., Xu, K., Weinfurter, A., Yick, C., Ivanenko, M., ... & Rosengarten, C. (2015). *Assessing the Wider World of Non-State and Sub-National Climate Action*. December 10, 2015. Yale Data Driven Environmental Solutions Group, New Haven, CT.