
1
3

report

Six behaviors policymakers should promote to mitigate climate change

Kate Heller, Michael Berger, Antonius Gagern, Abdurakhim Rakhimov, John Thomas, & Erik Thulin

abstract

Policymakers have a crucial role to play in averting climate catastrophe. Policies that rely on behavioral science principles to encourage individuals to reduce emissions of carbon dioxide and other greenhouse gases can be an effective complement to broader top-down policies, such as charging for carbon emissions—provided that the behavior-based policies focus on actions with the highest potential to reduce emissions. We conducted an analysis to identify behaviors that have the greatest practical potential to reduce emissions in the United States and modeled the effects of their uptake. Our analysis identified six behaviors to prioritize: If adopted by 5%–10% of the U.S. population, these actions can collectively lower current national emissions by 464 million metric tons of carbon dioxide equivalent per year, or 7% overall annually. We identify behavioral mechanisms that can inform policy design for promoting each of these behaviors.

Heller, K., Berger, M., Gagern, A., Rakhimov, A., Thomas, J., & Thulin, E. (2021). Six behaviors policymakers should promote to mitigate climate change. *Behavioral Science & Policy, 7*(2), 63–73.

Climate change is projected to cause crop failures, extreme weather, rising seas, and heat-driven mortality.[1] Policies that promote reducing or eliminating emissions of carbon dioxide and other greenhouse gases are crucial for mitigating these effects. In the United States, broad policies that would have a substantial impact, such as placing a price on carbon emissions, currently face significant political opposition, making them unlikely to have the near-term effects on emissions needed to prevent the worst consequences of inaction. Policies that use behavioral science principles to encourage individual action while preserving choice have been shown to be effective for shifting behavior and present a complementary path for policymakers.[2,3] However, before developing policies that will encourage individuals to modify their behaviors, it is critical that policymakers identify—and prioritize—the behaviors that have the most potential for reducing emissions.[4]

To that end, we conducted an analysis that identified a short list of six individual and household behaviors that have the greatest practical potential to reduce emissions in the United States. Our analysis, based on computer modeling, indicates that if these six behaviors were adopted by 5% or 10% (depending on the behavior) of their respective addressable markets in the United States, they could collectively lower current national emissions by an estimated 464 million metric tons of carbon dioxide equivalent ($MtCO_2e$) per year, or 7% overall annually—an amount that would bring the United States about three-quarters of the way to meeting the 2025 emissions-reduction target set in the 2015 Paris Agreement (see Figure 1). Considering that U.S. emissions are projected to remain relatively flat through 2030, a 7% reduction through individual and household behaviors alone represents a nontrivial decrease.[5] An *addressable market* is the individuals or households that are in a position to adopt a certain behavior but have not yet done so. *Carbon dioxide equivalent* is a measure of the global warming potential of a gas, represented in terms of how much carbon dioxide would be needed to generate the same amount of warming.

In addition to identifying the target behaviors that policymakers should prioritize and quantifying their potential effects on global warming, we share examples of behavioral mechanisms

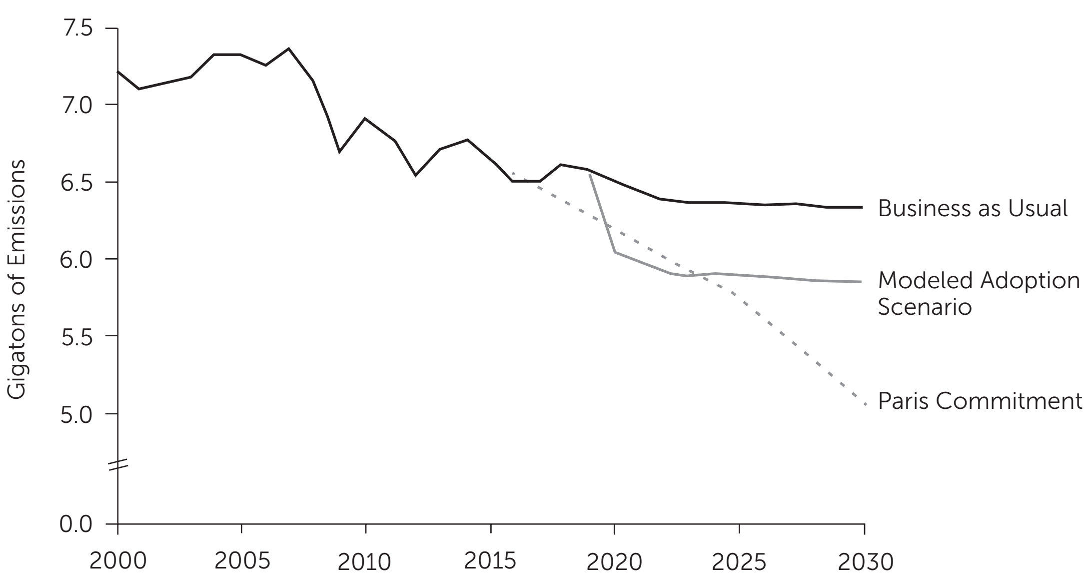
Core Findings

What is the issue?
Policymakers face political gridlock when introducing interventions designed to address climate change. However, interventions that use behavioral science principles to encourage individual action while preserving choice have been shown to be effective. Six behaviors to prioritize include (a) purchasing an electric vehicle, (b) reducing air travel, (c) eating a plant-rich diet, (d) purchasing carbon offsets, (e) reducing food waste, and (f) purchasing green energy.

How can you act?
Selected recommendations include:
1) Invest in testing behavioral policies prompting these high impact behaviors
2) Adopt effective behavioral policies, such as assigning utility customers to a green energy provider unless they opt out

Who should take the lead?
Policymakers, regulators, and business leaders

Figure 1. U.S. emissions reductions achieved by the adoption of six recommended behaviors



Note. The modeled adoption scenario assumes all behaviors listed in Table 1 are adopted as described in the main text of this article.

that the research literature indicates could inform successful policy design, and we offer examples of interventions that could target those mechanisms. Understanding these mechanisms should be a first step in policy development.

"We ended with six behaviors that are highly relevant in the context of the United States"

Method

Developing a Short List

We reviewed several publications that estimated the carbon emissions impact of various climate friendly actions to generate a list of 55 behaviors for potential intervention.[6–8] (See the Supplemental Material for a full list of sources.) Recognizing that many of the recommendations identified in the literature were appropriate only for specific locations, we focused on those that would be applicable to the United States. We concentrated on the United States for a couple of reasons. First, it is the second highest carbon-emitting country in the world, as well as one of the highest per capita emitters. Second, behaviorally informed policies could well enable the United States to make progress toward climate-change goals even though the current political gridlock means that national mandates intended to mitigate climate change are likely to meet great resistance.

We used two criteria to identify priority behaviors to target in the United States. We first ranked each behavior's emissions-reduction potential as high, medium, or low. These rankings corresponded to annual reductions of greater than 500 million $MtCO_2e$, 100–500 million $MtCO_2e$, or less than 100 million $MtCO_2e$, respectively. We then conducted an initial literature review for the behaviors to understand the relevance of each in the United States. We assessed relevance on the basis of whether the behavior was (a) culturally feasible, (b) ecologically applicable, and (c) not disincentivized by existing regulatory frameworks or infrastructure. (Rankings are available in the Supplemental Material.) We considered a behavior culturally infeasible if we found it conflicted with the prevailing values and social mores of the majority of U.S. residents. To be ecologically applicable, the behavior had to pertain to U.S. habitats; certain habitats, such as tropical forests, do not exist in the United States and therefore could not be considered for intervention. Finally, the behavior was excluded if current laws or regulations would actively undermine its promotion. We filtered for behaviors with medium or high emissions impact that met all three criteria for U.S. relevance, and we arrived at a list of eight possible interventions to consider further.

Next, we assessed the underlying social and psychological mechanisms driving those behaviors and the applicability of various behavior-change techniques. We examined these aspects by conducting a behavior-specific literature review and interviewing 20 subject matter experts selected for their expertise in the eight short-listed behaviors. Our research indicated that the three behaviors in our short list related to energy use at home involved similar actions and effects on emissions, so we bundled and modeled them as a single behavior. Thus, we ended with six behaviors that are highly relevant in the context of the United States and that have high or moderately high emissions-reduction potential. These should be at the top of policymakers' agendas (see Table 1). We list them below and describe them more fully later in the article.

- Purchase an electric vehicle (EV).
- Reduce air travel.
- Eat a plant-rich diet.
- Purchase carbon offsets.
- Reduce food waste.
- Purchase green energy.

Modeling the Behaviors of Interest

To estimate the annual effect on greenhouse gas emissions of change in each of the listed behaviors, we built a model that compares business-as-usual trajectories with behavior-change scenarios. Business-as-usual scenarios are based on linear extrapolations of historic trends (such as from 1990 to 2018), and

Table 1. Six priority behaviors to target

Behavior	Illustrative policy	Behavioral principle
	Commute and travel	
Purchase an electric vehicle.	Provide discounts at the point of sale or that expire within a set time.	Leverage *hyperbolic discounting,* a cognitive process that undervalues costs or savings in the future relative to those incurred today.
Reduce air travel.	Require airlines to highlight the environmental consequences of air travel through labeling, such as by informing ticket buyers of the environmental effects of their flights.	Increasing the *salience* of the effects of one's decisions can prompt active consideration of a factor that might otherwise have been ignored.
	Lifestyle	
Eat a plant-rich diet.	Mandate adding emissions information to food labels.	*Information provision* can influence behavior when it contradicts preconceived beliefs and is consistent with existing values.
Purchase carbon offsets.	Require emitters to have customers explicitly choose whether to pay for carbon offsets.	When people are required to make an *active choice*—to explicitly decide on something rather than absentmindedly continue with the status quo—they are more likely to shift from the status quo.
	Waste reduction and management	
Reduce food waste.	Regulate expiration dates on food labels, which are currently set by manufacturers and result in the unnecessary disposal of still-edible foods.	*Information provision* can influence behavior when it allows people to more effectively express their already established preferences.
	Residential energy use	
Purchase green energy.	Default utility customers to a green energy provider.	People often go along with the default option presented to them rather than giving the choice active consideration.

behavior-change scenarios assume immediate adoption of carbon-footprint-reducing activities. Because we made assumptions and because the model does not account for any potential indirect effects of adopting climate friendly behaviors, our results are best interpreted as indicative rather than predictive.

We modeled adoption levels (that is, the number of individuals who change their behavior) with a two-step approach. First, we estimated the addressable market for each behavior. (See the Supplemental Material for more details on addressable markets.) Second, we assumed that a given percentage of this addressable market would adopt the behavior. Past meta-analyses, which combine data from multiple studies, have found that behavioral science–based interventions vary in effectiveness, yielding behavior-change levels ranging from 1.4% for minimal, nudge-style interventions (which modify the decision context without changing incentives); to 18.1% for broad social marketing campaigns and to 27.2% for interventions that change the default consequence of inaction.[9–11]

For five of the six desired behaviors, we assumed a 10% adoption rate. For purchasing carbon offsets, we assumed a 5% adoption rate, because offset markets are not yet mature enough to absorb the demand that would result from a 10% adoption rate. As is indicated by the wide range of adoption rates found in the meta-analyses, the ultimate adoption rate of any behavior will depend on the specific intervention chosen. Therefore, the adoption rates we selected should be considered illustrative. If a designer has a particular estimated adoption rate for a given intervention and context, the designer can use our model to estimate its impact by linearly adjusting our estimated emissions impact of adopting that behavior. We modeled each behavior using the assumptions described next.

Purchase an EV. We calculated the vehicle miles traveled in EVs when the share of passenger vehicular travel completed in EVs increased by 10%. For modeling purposes, we projected that the efficiency of electricity production by the U.S. electricity grid would increase linearly after 2017 based on a 10-year average, although future technology and policy shifts may significantly alter this trajectory. This linear assumption makes modeling easier to interpret and acknowledges that the grid's efficiency (and thus its rate of emissions) is likely to change over time, but future researchers may refine these projections to account for more nuanced projections of grid efficiency. Emissions released in the course of producing gasoline and running gasoline-using vehicles (that is, from "wells to wheels") were assumed to remain static, although we also assumed that the fuel efficiency of passenger vehicles would increase. We based our fuel economy projections on data from the U.S. Energy Information Administration's *Annual Energy Outlook* and the Bureau of Transportation Statistics.[12,13]

Reduce Air Travel. We defined *frequent fliers* as U.S. residents who take round-trip flights five or more times per year (13% of Americans)[14] and assumed that these individuals took one fewer round-trip transnational or transatlantic flight per year than usual. (That is, we deducted 0.9 $MtCO_2e$ from their annual travel, roughly the amount of their share of emissions from one round-trip transatlantic flight).[15] Our business-as-usual scenario assumed an industrywide increase in fuel efficiency.

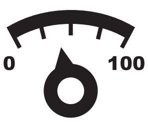
Eat a Plant-Rich Diet. Meat production generates higher emissions than vegetable production does.[16] We split U.S. residents into five quintiles of increasing levels of meat consumption, with people in the fifth quintile consuming the most meat and thus being responsible for the most greenhouse gas emissions. We assumed that 10% of people across all but the first quintile switched to the diet of the next lower meat-consumption quintile. To calculate greenhouse gas emissions reductions, we used the midpoint emissions level of each quintile.

"For five of the six desired behaviors, we assumed a 10% adoption rate"

Purchase Carbon Offsets. Our model assumed that purchasing certified offsets, which fund projects that have been verified to reduce carbon emissions by a set amount, is equivalent to eliminating emissions (see note A). It also assumed that individuals who buy offsets would opt to offset their entire annual carbon footprint and that their footprint was the U.S. average emission level of 16 $MtCO_2e$ (a value that is based on data from the World Bank).[17] As stated earlier, we assumed that only 5% of U.S. residents offset their emissions.

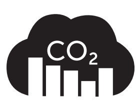
Reduce Food Waste. Evidence suggests that interventions such as shrinking plate sizes can reduce food waste by approximately 20%.[18] We therefore modeled emissions reductions associated with a 20% reduction in per-person household food waste in 10% of U.S. households. We further assumed that the change in consumption would create a change in demand, such that emissions are reduced throughout the food supply chain (encompassing production, transport, storage, and so on).

Purchase Green Energy. We assumed that 10% of U.S. households consumed fully carbon-neutral energy by installing rooftop solar panels, buying green energy (such as that generated by wind turbines) from their utility for the rest of their energy needs, and meeting all water-heating needs with solar power. Our model assumed that the decision to install rooftop solar panels was made independently of the decision to buy green energy—that is, the people who adopted rooftop solar installations were not presumed to be more likely than others to buy renewable energy from their utility. We calculated residential emissions on the basis of energy consumed for space heating and cooling, lighting, water heating, cooking, and appliance use. Our business-as-usual scenario assumed normal improved efficiency of residential energy use, in accordance with the International Energy Conservation Code for new buildings. Our model held constant (through 2040) the share of buildings eligible for rooftop solar installations (75%) and the proportion of per-household energy consumption that each solar installation displaces.



The reported range of effectiveness across behavioral science intervention types is 1.4% – 27.2%

13% of Americans are frequent fliers



The average emission level in the US is 16 $MtCO_2e$

The model's source data are mainly drawn from studies that observed peoples' behavior or from administrative records. However, we derived information about diet composition, flying, and green energy purchases from nationally representative surveys, which should be interpreted with the understanding that these self-reports can be biased. See the Supplemental Material for the data sources and calculations used in our modeling.

Results & Policy Opportunities for Accelerating Behavior Change

Our model indicates that a 5% increase in certified carbon offset purchases and a 10% increase in each of the other five recommended behaviors in their respective addressable markets would together reduce U.S. emissions by 464 million $MtCO_2e$ annually and thereby meet 76% of the emissions reduction that the United States targeted for 2025 in the Paris Agreement. Having this size of an impact on emissions at the national level through individual and household behavior changes alone would be a great achievement, and behaviorally informed policies have a key role to play in enabling those shifts.

As has been recognized by the more than 100 governments and institutions that have commissioned behavioral insights teams, behaviorally informed policy has incredible potential to efficiently drive behavior adoption.[19,20] In the following sections, for each of the behaviors we have identified as a priority, we provide the potential for emissions mitigation according to our modeled adoption rate, the cost society avoids with that emissions reduction, and examples of the ways that specific behavioral principles could inform the design of policies meant to achieve adoption of that behavior.[2] See note B for details on how we calculated the avoided costs to society, a monetary figure reflecting the mitigation's societal value, such as the savings realized by paying out less than currently anticipated for property damage resulting from climate change. Of course, the rate of adoption of a given policy in practice will depend on its design and implementation.

Behavior: Purchase an EV

Change modeled: 10% of new car purchases are EVs

Emissions mitigation impact: 65 million $MtCO_2e$ annually

Avoided cost to society: $2.9 to $33.4 billion per year[21,22]

Illustrative applications of behavioral principles to policy:

Because people tend to overvalue the present relative to the future—a phenomenon known as hyperbolic discounting[23]*—provide discounts at the point of sale or set them to expire within a set time.* Many current policies intended to increase EV adoption rely on tax credits, which do not deliver a benefit to the buyer until after taxes are filed. Hyperbolic discounting would render incentives delivered at the time of purchase more effective than tax breaks—even if the cash value of the incentives were lower than the tax credit would ultimately be. One intervention that might avoid hyperbolic discounting while supporting EV markets would be providing vouchers that would have to be used within one to two years to subsidize a consumer's purchase or lease of an EV.

People are more likely to complete simple processes than complex ones, so simplify EV purchases. Having to deal with complexity requires cognitive resources; that is, it adds to the cognitive costs of making a decision or enrolling in a program. Simplifying enrollment processes can increase interest and participation in voluntary programs.[24] Yet taking advantage of incentives for buying EVs is often difficult, with offers varying depending on multiple factors, like consumer income or engine size.[25] This complexity allows policymakers to target incentives to specific audiences, but it also taxes the cognitive energy of dealers and potential purchasers. Simpler schemes would remove the friction created by such calculations for both dealers and buyers and therefore would likely increase EV purchases. For example, providing a single standardized incentive for all EVs rather than one that depends on the properties of a particular car would reduce the cognitive costs involved in both purchasing and selling EVs.

Behavior: Reduce Air Travel

Change modeled: 10% of frequent fliers drop one long-haul round-trip flight per year
Emissions mitigation impact: 4 million $MtCO_2e$ annually
Avoided cost to society: $0.2 to $2.1 billion per year
Illustrative application of behavioral principles to policy:
Given that people tend to place particular weight on factors that are most salient—that draw their attention most[26]—highlight the environmental consequences of air travel. The environmental consequences of air travel are rarely salient when an individual decides to fly. Government policymakers can prompt that salience by, for instance, mandating that airlines include emotionally compelling labeling at the point of purchase informing fliers about flying's effects on pollution (similar to the cigarette labeling that has successfully reduced smoking) or establishing the peer norms around decreased flying.[27] A different tack is suggested by the U.S. government's requirement that all federally funded travel be on a U.S. airline, which demonstrates the government's willingness to direct flying behavior. To try to reduce air travel, federal and state governments could require people who pay for flights using federal or state funds to justify for their supervisor's approval why an alternative such as video conferencing is an inadequate substitute for the trip and why less carbon-intensive travel modes such as rail are infeasible. Requiring justification does not prohibit flying, but it prompts consideration of alternatives, likely increasing their uptake.

> "our analysis suggests a way to focus interventions so that behavior change reduces U.S. emissions as efficiently as possible"

Behavior: Eat a Plant-Rich Diet

Change modeled: 10% of meat eaters drop down one consumption quintile
Emissions mitigation impact: 25 million $MtCO_2e$ annually
Avoided cost to society: $1.1 to $12.7 billion per year
Illustrative application of behavioral principles to policy:
Because providing information that contradicts people's preconceived beliefs but is consistent with their existing values can shift behavior,[28] mandate the addition of emissions information to food labels. Consumers have been shown to substantially underestimate the effects that their food choices, particularly the decision to consume meat, have on the climate.[29] Although U.S. policymakers exert significant power over food labeling, they have used this power primarily to provide health-related information. This is a missed opportunity: When other countries have added labels conveying foods' emissions impact, the labels have driven a reduction in the purchase of foods associated with high emissions.[30] Mandating the inclusion of such labels would help consumers make more informed decisions while reducing meat consumption. This strategy has already been incorporated into Denmark's plan to become carbon neutral by 2050.[31]

Behavior: Offset Carbon

Change modeled: 5% of U.S. residents offset their emissions
Emissions mitigation impact: 276 million $MtCO_2e$ annually

Avoided cost to society: \$12.4 to \$142.6 billion per year

Illustrative application of behavioral principles to policy:

People tend to absentmindedly stick with the status quo or accept a preset default,[11] *but requiring them to make an active choice increases their likelihood of shifting away from the original condition,*[32] *so mandate that companies selling products that cause large emissions have their customers explicitly choose whether to pay for carbon offsets.* Presently, purchasing carbon offsets is generally an opt-in decision: To buy offsets, consumers must actively seek them out. A policy that required consumer-facing emitters, such as airlines, to have customers say yes or no to purchasing carbon offsets would let customers know the choice exists and would prompt active consideration of the climate friendly option. For example, policy could mandate the inclusion of a step in the online checkout process that says, "Your portion of this flight is responsible for X tons of carbon dioxide pollution. Do you authorize paying Y dollars to offset this impact?" and then requires the customer to click *Yes* or *No.* Alternatively, a policy could go one step beyond active choice by mandating that offsets be a default charge and requiring consumers to choose to opt out if they want to avoid the charge—an approach that has been shown to increase offset purchasing while still preserving choice.[33]

Behavior: Reduce Food Waste

Change modeled: 10% of households reduce food waste by 20%

Emissions mitigation impact: 13 million $MtCO_2e$ annually

Avoided cost to society: \$0.6 to \$5.3 billion per year

Illustrative application of behavioral principles to policy:

Inform consumers of the true expiration dates of food by regulating the expiration dates that food sellers place on their products. People's beliefs, particularly concerning their health and safety, can substantially influence their choices.[34] Providing information can inform these beliefs and, by extension, their behavior. Consumers report that concern over foodborne illness is their primary reason for discarding food.[35] Ninety-one percent of Americans say they pay attention to date labels (which use language such as "best by," "use by," and "sell by"), yet a majority do not realize that these labels are not federally regulated—a misperception that could lead to overreliance on the accuracy and relevance of the labels.[36] Whether or not labels are deliberately designed to misinform consumers, the present labeling regime creates much unnecessary food waste. Recognizing that consumers pay close attention to date labels gives policymakers an opportunity to provide guidance for and regulation of such labels, rather than relying on food suppliers, who have mixed incentives, to provide accurate information.[37]

Behavior: Purchase Green Energy

Change modeled: A 10% increase in households using 100% green energy from a combination of rooftop solar panels, green energy bought from a utility, and solar water heating

Emissions mitigation impact: 82 million $MtCO_2e$ annually

Avoided cost to society: \$4 to \$42 billion per year

Illustrative applications of behavioral principles to policy:

Simplify the purchase of green energy. Because adding complexity to a decision increases its cognitive cost, consumers often simply prefer to make no choice at all.[38] In the case of rooftop solar panels, choosing not to choose effectively preserves the status quo of relying on grid-based energy. A major barrier to purchasing rooftop solar panels is complexity, much of which stems from policies relating to permits, inspection, and interconnection to put energy back into the grid.[39] Policy reform could lessen this friction through various streamlining tactics, such as providing access to a web-based permitting system.

Leverage the power of defaults by assigning utility customers to a green energy provider unless they opt out. Changing the default option is particularly effective when people are not paying significant attention to their options, such as when consumers select an energy provider from a utility. Policy that defaults utility customers to a green energy provider and requires them to actively opt out if they want a non–green energy provider has been successful at switching customers into green energy, driving adoption rates as high as 94%.[40]

The Path Forward

Policymakers who want to help constituents reduce emissions have a host of potential target behaviors to choose from and limited time to act. By identifying the six behaviors likely to have the greatest effect in the United States, our analysis suggests a way to focus interventions so that behavior change reduces U.S. emissions as efficiently as possible. It is important to recognize that the varied interests and capacities of different U.S. populations may make certain behaviors less or more for a given group. We encourage policymakers to view these behaviors and the illustrative behavioral insights we have provided as starting points from which to conduct analyses specific to their own contexts. Such analysis would typically include a combination of qualitative and quantitative research to identify which of the behaviors may be most suitable for that population and what behaviorally informed policies might most effectively motivate adoption. This design process should involve dialogue among multiple stakeholders and include active participation by community members as well as behavioral and policy experts. Behaviorally informed policies targeting high-impact behaviors could provide a much-needed boost to the adoption of emissions-reducing activities by individuals and households and could be key to achieving critical near-term emission reductions that will mitigate global climate change.

end notes

A. Although certified carbon offsets are verified by third parties as having a stated additional reduction in emissions over what would have happened without the funds provided by the offsets, it is possible that not all offsets make their stated impact. Further, whether the emissions reductions we project are truly equivalent to actual greenhouse gas reductions can be debated for different interventions. If someone applying this model wishes to assume a different level of effectiveness, they can adjust our estimates by multiplying the impact by project-specific expected effectiveness.

B. We calculated avoided cost to society using estimates of the social cost of carbon from the Environmental Protection Agency[21] for the low end and from Ricke et al.[22] for the high end.

author affiliation

Heller: Rare Center for Behavior & the Environment. Berger and Gagern: California Environmental Associates. Rakhimov: Rare Center for Behavior & the Environment. Thomas: California Environmental Associates. Thulin: Rare Center for Behavior & the Environment. Corresponding author's e-mail: ethulin@rare.org.

author note

We thank Adam S. Levine, Lucia Reisch, and Erez Yoeli for their insightful comments and policy recommendations.

supplemental material

- https://behavioralpolicy.org/publications/
- Method & Analysis

references

1. Intergovernmental Panel on Climate Change. (2018). *Global warming of 1.5°C: An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. https://www.ipcc.ch/sr15
2. Sunstein, C. R. (2016). *The ethics of influence: Government in the age of behavioral science*. Cambridge University Press. https://doi.org/10.1017/CBo9781316493021
3. Sunstein, C. R. (2016). Do people like nudges? *Administrative Law Review*, *68*(2), 177–232.
4. Kingdon, J. W. (1984). *Agendas, alternatives, and public policies*. Little, Brown. DOI: https://doi.org/10.2139/ssrn.2604084
5. Climate Analytics & NewClimate Institute. (2021, July 1). *USA*. Climate Action Tracker. https://climateactiontracker.org/countries/usa/
6. Dietz, T., Gardner, G. T., Gilligan, J., Stern, P. C., & Vandenbergh, M. P. (2009). Household actions can provide a behavioral wedge to rapidly reduce US carbon emissions. *Proceedings of the National Academy of Sciences, USA*, *106*(44), 18452–18456. https://doi.org/10.1073/pnas.0908738106
7. Wynes, S., & Nicholas, K. A. (2017). The climate mitigation gap: Education and government recommendations miss the most effective individual actions. *Environmental Research Letters*, *12*(7), Article 074024. https://doi.org/10.1088/1748-9326/aa7541
8. Project Drawdown. (n.d.). *Table of solutions*. https://www.drawdown.org/solutions/table-of-solutions
9. DellaVigna, S., & Linos, E. (2020). *RCTs to scale: Comprehensive evidence from two nudge units* [Working paper]. University of California, Berkeley. https://eml.berkeley.edu/~sdellavi/wp/NudgeToScale2020-03-20.pdf
10. Green, K. M., Crawford, B. A., Williamson, K. A., & DeWan, A. A. (2019). A meta-analysis of social marketing campaigns to improve global conservation outcomes. *Social Marketing Quarterly*, *25*(1), 69–87. https://doi.org/10.1177/1524500418824258
11. Jachimowicz, J. M., Duncan, S., Weber, E. U., & Johnson, E. J. (2019). When and why defaults influence decisions: A meta-analysis of default effects. *Behavioural Public Policy*, *3*(2), 159–186. https://doi.org/10.1017/bpp.2018.43
12. U.S. Energy Information Administration. (2018). *Annual energy outlook 2018: With projections to 2050*. Internet Archive. https://web.archive.org/web/20210116162938/https://www.eia.gov/outlooks/aeo/pdf/AEO2018.pdf
13. Bureau of Transportation Statistics. (n.d.). *Average fuel efficiency of U.S. light duty vehicles*. U.S. Department of Transportation. https://www.bts.gov/content/average-fuel-efficiency-us-light-duty-vehicles
14. Heimlich, J. P., & Jackson, C. (2018). *Air travelers in America: Findings of a survey conducted by Ipsos* [PowerPoint presentation]. Airlines for America. http://airlines.org/wp-content/uploads/2018/02/A4A-AirTravelSurvey-20Feb2018-FINAL.pdf
15. Schlossberg, T. (2017, July 27). Flying is bad for the planet. You can help make it better. *The New York Times*. https://www.nytimes.com/2017/07/27/climate/airplane-pollution-global-warming.html
16. Heller, M. C., Willits-Smith, A., Meyer, R., Keoleian, G. A., & Rose, D. (2018). Greenhouse gas emissions and energy use associated with production of individual self-selected US diets. *Environmental Research Letters*, *13*(4), Article 044004. https://doi.org/10.1088/1748-9326/aab0ac
17. The World Bank. (2020). *CO2 emissions (metric tons per capita).* https://data.worldbank.org/indicator/en.atm.co2e.pc
18. Behavioral Evidence Hub. (n.d.). *Smaller plate, less waste*. http://www.bhub.org/project/smaller-plate-less-waste/
19. Policymakers around the world are embracing behavioural science. (2017). *The Economist*. https://www.economist.com/international/2017/05/18/policymakers-around-the-world-are-embracing-behavioural-science
20. Organisation for Economic Cooperation and Development. (2017). *Behavioural insights and public policy: Lessons from around the world*. https://doi.org/10.1787/9789264270480-en
21. Environmental Protection Agency. (n.d.). *The social cost of carbon: Estimating the benefits of reducing greenhouse gas emissions*. https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html
22. Ricke, K., Drouet, L., Caldeira, K., & Tavoni, M. (2018). Country-level social cost of carbon. *Nature Climate Change*, *8*(10), 895–900. https://doi.org/10.1038/s41558-018-0282-y
23. Laibson, D. (1997). Golden eggs and hyperbolic discounting. *The Quarterly Journal of Economics*, *112*(2), 443–478. https://doi.org/10.1162/003355397555253
24. Sunstein, C. R. (2014). Nudging: A very short guide. *Journal of Consumer Policy*, *37*(4), 583–588. https://doi.org/10.1007/s10603-014-9273-1
25. Yang, Z., Slowik, P., Lutsey, N., & Searle, S. (2016). *Principles for effective electric vehicle incentive design* [White paper]. International Council on Clean Transportation. https://theicct.org/sites/default/files/publications/ICCT_IZEV-incentives-comp_201606.pdf
26. Taylor, S. E. (1982). The availability bias in social perception and interaction. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 190–200). Cambridge University Press. https://doi.org/10.1017/CBO9780511809477.014
27. Azagba, S., & Sharaf, M. F. (2013). The effect of graphic cigarette warning labels on smoking behavior: Evidence from the Canadian experience. *Nicotine & Tobacco Research*, *15*(3), 708–717. https://doi.org/10.1093/ntr/nts194
28. Michie, S., van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, *6*, Article 42. https://doi.org/10.1186/1748-5908-6-42
29. Hartmann, C., & Siegrist, M. (2017). Consumer perception and behaviour regarding sustainable protein consumption: A systematic review. *Trends in Food Science & Technology, 61*, 11–25. https://doi.org/10.1016/j.tifs.2016.12.006
30. Camilleri, A. R., Larrick, R. P., Hossain, S., & Patino-Echeverri, D. (2019). Consumers underestimate the emissions associated with food but are aided by labels. *Nature Climate Change*, *9*(1), 53–58. https://doi.org/10.1038/s41558-018-0354-z
31. *Denmark to label food according to effect on climate*. (2018, October 8). The Local. https://www.thelocal.dk/20181008/denmark-to-mark-food-according-to-effect-on-climate
32. Keller, P. A., Harlam, B., Loewenstein, G., & Volpp, K. G. (2011). Enhanced active choice: A new method to motivate behavior change. *Journal of Consumer*

Psychology, *21*(4), 376–383. https://doi.org/10.1016/j.jcps.2011.06.003

33. Székely, N., Weinmann, M., & vom Brocke, J. (2016). *Nudging people to pay CO2 offsets - The effect of anchors in flight booking processes* (Research-in-Progress Paper 62). Association for Information Systems. https://aisel.aisnet.org/ecis2016_rip/62

34. Thaler, R. H., & Sunstein, C. R. (2009). *Nudge: Improving decisions about health, wealth, and happiness*. Penguin.

35. Neff, R. A., Spiker, M. L., & Truant, P. L. (2015). Wasted food: US consumers' reported awareness, attitudes, and behaviors. *PLOS ONE*, *10*(6), Article e0127881. https://doi.org/10.1371/journal.pone.0127881

36. Neff, R. A., Spiker, M., Rice, C., Schklair, A., Greenberg, S., & Leib, E. B. (2019). Misunderstood food date labels and reported food discards: A survey of US consumer attitudes and behaviors. *Waste Management*, *86*, 123–132. https://doi.org/10.1016/j.wasman.2019.01.023

37. ReFED. (n.d.). *Food waste is a solvable problem—Here's how to do it*. https://www.refed.com/solutions/standardized-date-labeling/

38. Iyengar, S. S., & Lepper, M. R. (2000). When choice is demotivating: Can one desire too much of a good thing? *Journal of Personality and Social Psychology*, *79*(6), 995–1006. https://doi.org/10.1037/0022-3514.79.6.995

39. National Conference of State Legislatures & National Association of State Energy Officials. (2018). *Solar policy toolkit*. https://www.ncsl.org/research/energy/solar-policy-toolbox.aspx

40. Sunstein, C. R., & Reisch, L. A. (2014). Automatically green: Behavioral economics and environmental protection. *Harvard Environmental Law Review*, *38*(1), 127–158. https://dash.harvard.edu/handle/1/16217276