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Lawrence Berkeley National Laboratory

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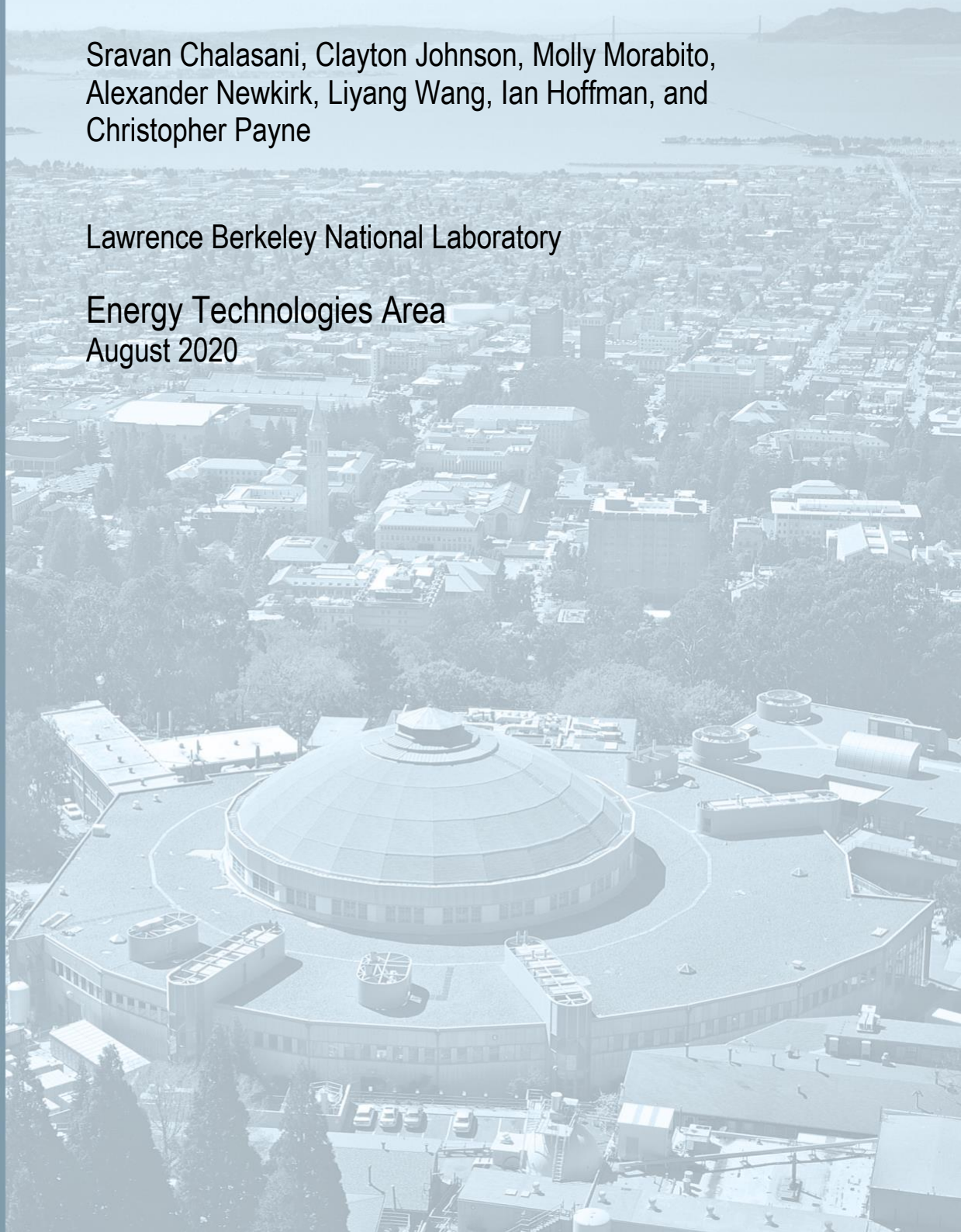

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Messaging for Impact: Behavioral Science-Based Communication Strategies to Advance Energy Efficiency

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ABSTRACT

Currently, five legal authorities require U.S. federal agencies to purchase energy-efficient products. However, compliance with these requirements has consistently been low (~55%). Recent surveys indicate that energy efficiency requirements are not communicated properly within federal agencies and energy-efficiency is not a top priority.

In the constantly evolving energy industry, with many solutions for a clean energy future, effective communication methods are vital for widespread adoption of energy efficiency. We have been conducting experiments within the U.S. federal sector that test the effectiveness of messaging strategies developed by using behavioral science principles like loss aversion, framing, and herd behavior. This will identify effective communications methods that encourage energy efficiency adoption.

In this study, we measure the effectiveness of different communication strategies by monitoring the web traffic of hyperlinks placed within our digital communications and outreach materials. To determine effective strategies that influence federal buyer behavior, the web traffic from subjects that received the behavioral science-based messaging (treatment group) is compared to that from subjects that received regular messaging (control group) for each of the strategies.

This paper provides an overview of the behavioral science principles that we applied, data collection methods, and results of our analysis. Since the lack of effective communication of energy-efficiency policies is also a common problem in the private sector, the messaging strategies developed in this study can be applicable to other large private sector institutions.

Introduction

Energy efficiency offers a valuable opportunity to save money, reduce energy consumption, and energy-related emissions. As the single largest purchaser of energy-consuming products in the United States, the federal government has a great potential and a need for increased energy efficiency at all of its facilities. As a result, the federal government has promulgated regulations and executive orders over the years that require agencies to procure energy-efficient products based on the lowest life cycle cost (Energy Policy Act 2005; E.O. 13834 2018). These regulations mandate the Department of Energy's (DOE) Federal Energy Management Program (FEMP) to provide guidance on energy-efficient product procurement.

The regulations also specify that whenever new energy-consuming products are purchased, all federal agencies shall purchase products designated as energy efficient by ENERGY STAR or FEMP.

The purchase and use of ENERGY STAR/FEMP designated products at various federal facilities in the United States can lead to significant operational energy, cost and greenhouse gas (GHG) savings. This helps federal agencies achieve their goals related to energy intensity reduction and GHG reduction. It has been shown that in 2017, the U.S federal government saved $74-$148 million ($2017) in operational energy costs by using energy efficient products (Chalasani and Payne forthcoming). This translates to GHG reduction of 0.47-0.93 million tons of CO_2 eq (U.S. tons) in 2017. This is equivalent to the GHG emissions associated with 56,400 – 111,560 U.S. households in a given year. There are still huge potential savings that remain unrealized. In 2017 alone, replacing the total stock of energy-consuming products in the federal government with the best energy efficient products available in the market could have resulted in total energy cost savings of about $570 million and GHG savings of 3.5 million tons of CO_2 eq (Chalasani and Payne forthcoming).

Over the past few years, researchers at Lawrence Berkeley National Laboratory (Berkeley Lab) have been tracking federal compliance related to energy efficient product purchasing requirements. Relevant federal solicitations or Requests for Proposals/Quotes (RFPs/RFQs) that are posted on Federal Business Opportunities (FBO) webpage[1] are reviewed each year to check for the inclusion of a specific contract clause (FAR 52.223-13). All the solicitations that include this contract clause are designated "FAR Compliant" (Wang and Payne, 2018). If a solicitation has included the appropriate energy efficient standards (either ENERGY STAR or FEMP designated) in its technical specifications and if energy efficiency is mentioned as a priority in the Scope of Work and Project Description sections of the solicitation, then it is designated as "Effective Compliant." A project solicitation that is Effective Compliant has a greater chance of resulting in the purchase and use of energy efficient products than a solicitation that is just FAR Compliant. In Fiscal Year 2015 (FY2015), 49% of the solicitations reviewed were found to be FAR Compliant. This number gradually increased to 57% in FY2018. During the same period, Effective Compliance increased from 30% to 42% (Payne et al., Memo, Dec 2019).

Federal Procurement Context

Researchers at the Berkeley Lab previously surveyed members of the federal procurement community to assess the extent to which energy-efficiency requirements were considered during the federal procurement process. For the purposes of the survey, the 'federal procurement community' is defined as any federal employee who is somehow involved in the procurement process. This includes top-level management, who approve expenditures and allocate resources for purchasing products and services; mid-level management (e.g., facilities managers, energy and sustainability managers, and program managers), who specify the types of equipment and services they need and which product or vendor attributes must be prioritized in the selection process; and procurement staff (e.g., contract specialists and procurement officers) who carry out the purchases and ensure that contracts meet the necessary legal requirements for federal purchasing. The survey focused mainly on this latter category of federal procurement staff -- contract specialists and procurement officers. The survey revealed that a majority of

[1] As of 2/26/2020, fbo.gov is replaced by beta.sam.gov

respondents in this sample prioritize other attributes such as lowest initial cost over life-cycle cost when selecting and purchasing products or services (Morabito et al. forthcoming). Several respondents also reported that they were not aware of energy efficiency requirements or the supporting resources provided by the FEMP to increase energy-efficiency purchasing amongst federal agencies (Morabito et al., forthcoming).

In order to increase awareness of existing tools, and increase regulatory compliance, FEMP and Berkeley Lab are conducting outreach and communications campaigns that target the federal procurement community. This outreach includes providing a new series of educational webinars, providing training workshops at federal conferences, and sending out monthly newsletters to contracting officers with resources on energy efficiency requirements for purchasing. The goal of these outreach efforts is to increase the number of FAR and Effective Compliance of relevant contracts. While high touch outreach methods like training have robust best practices literature, mass communications outreach to an audience of federal procurement officers is not well understood. Berkeley Lab has conducted extensive research into sustainable institutional change within the federal procurement community; however, there have been limited efforts to apply or test this research through outreach efforts or behavior change interventions. By identifying and testing effective behavior change interventions, we hope that our research will increase the effectiveness of outreach efforts targeting federal contracting officers and the federal procurement community in general.

Literature Review of Energy Efficiency Messaging

The use of principles of behavioral science for effective messaging (i.e., messaging that motivates new behavior or new levels of demonstrable engagement on a given topic) have been studied in the fields of public health (Noar 2006), climate change communication (Bostrom, Böhm, and O'Connor 2013), and sustainable consumption (White, Habib, and Hardisty 2019; Demarque et al. 2015). Studies show that attempts to encourage energy efficiency and change energy use-related habits can benefit from different theories of human behavior as well (Farrow, Grolleau, and Mzoughi 2018). The provision of information regarding various energy saving technologies and the benefits of energy efficiency has been a common strategy to promote energy saving behavior among the target population. Such strategies involving information provision are based on the rational choice theory of human behavior, which assumes that providing information can make the target audience make informed choices about their energy use. But, evidence shows that while information provision can lead to an increase of knowledge among the target population, it alone is not a very effective strategy (Abrahamse et al. 2005).

The framing of energy efficiency related messages can have a significant effect on the energy use and pro-environment behavior of the audience. Steinhorst, Klockner, and Matthies (2015) find that subjects provided with energy efficiency related messages with monetary framing (e.g., savings in Euros) and environmental framing (e.g., savings in CO2 emissions) both showed greater intentions of saving electricity. However, positive spillover on other climate friendly intentions (say reduced meat consumptions) was only observed in the subjects that received messages with an environmental framing. In another context, Asensio and Delmas (2015) find that energy efficiency messages that communicate the environment and health related benefits lead to more energy conserving behavior than messages expressed purely in monetary savings.

There have been a few recent studies that show how messages that have too many reasons to adopt a certain pro social behavior are less persuasive than messages that have fewer but stronger arguments (Weaver, Hock, and Garcia 2016). The effectiveness of different messaging strategies that encourage pro-environmental behavior (say encouraging energy efficiency) can be attributed to the underlying psychological processes of the target audience. Recent evidence shows that information provided in messaging campaigns is processed through automatic cognition or System 1 thinking rather than deliberate cognition or System 2 thinking (Kahneman 2011; Farrow, Grolleau, and Mzoughi 2018). Understanding the difference between the two cognitive processes and how information is processed through these processes can help in the design of effective messaging strategies that encourage pro-environmental behavior.

There have been a good number of studies that looked at the effectiveness of different messaging strategies to encourage energy efficiency (White, Habib, and Hardisty 2019). Some of these studies looked at different psychological factors and their effect in persuading the target audience to buy energy efficient products in mock online shopping environments (Demarque et al. 2015; Ungemach et al. 2017). Other studies have tested the effects of different psychological factors in real world shopping environments (Kallbekken, Sælen, and Hermansen 2013). While these studies yielded insight into the impact of different messaging strategies to increase energy efficiency, most focus on energy use and purchase behavior of individual households and student populations.

Besides the survey of the federal procurement community conducted by the Berkeley Lab (Morabito et al. forthcoming), the authors are not aware of any peer-reviewed literature that looked at the predisposition of the federal procurement community towards energy efficiency and the impact of leveraging different behavioral science principles on their level of engagement associated with the purchase of energy efficient products. By selecting federal procurement officers as our target audience, we decided to test the effectiveness of energy efficiency outreach messages based on two different principles of behavioral science, namely dynamic norms and collective efficacy. The next section will briefly overview the characteristics and hypothesized response dynamics of these messaging strategies.

Dynamic Norm

Proper framing of a message regarding a pro-environmental behavior that is practiced by a minority of the population can convince the target audience to adopt that minority behavior. Demarque et al (2015) argue that messages that draw attention to the year to year increase in a pro environmental behavior can be effective in inducing that behavior in the target audience, even though that behavior may not be that prevalent among the target audience. Sparkman and Walton (2017) have shown that messaging that demonstrates a growing trend towards greater adoption of a desired set of pro-environmental behaviors has resulted in greater adoption of those behaviors among a target audience. Sparkman and Walton (2017) found that messages that appealed to dynamic norms were effective in motivating both counter normative (defined as a behavior that is considered to be outside of what is accepted as normal) and normative behavior (defined as a behavior that is accepted as normal but may not yet be achieving the desired outcome). Two rationales for the effectiveness of dynamic messaging arose from Sparkman and

Walton's (2017) experiments. The first being that people may anticipate a trend in a certain behavior as likely to continue on its current trajectory, and therefore adopt or change their opinion about said behavior in order to be an early adopter. The second rationale is that people may interpret a behavior trend as evidence that previously perceived barriers to adopting said behavior have been eliminated or are not as onerous as previously assumed. The low compliance rates for federal EEPP requirements coupled with a gradually increasing compliance rate over the past few years is very similar to the trend of other pro-environment behaviors discussed in Demarque et al (2015) and Sparkman and Walton (2017). Therefore, we chose to test the effectiveness of dynamic norm messaging in our study.

Collective Efficacy

Increasing the purchase of energy-efficient products in the federal sector requires large-scale adoption of new practices in federal acquisitions. Achieving energy and cost savings to the full extent possible requires collective efforts across the federal government. While this collective action begins with individual behavior, motivating individuals to engage in pro-environmental action (in this case, greater prioritization on energy-efficiency during purchasing) may require greater emphasis on *collective efficacy*. According to Bandura (2000), collective efficacy refers to the shared belief among individuals that they can achieve desired results acting as a group and self efficacy is the belief that an individual is capable of achieving a desired change by acting alone. Several studies (Homburg and Stolberg 2006; Chen 2015) suggest that collective efficacy beliefs are more likely to lead to pro-environmental behavior than self-efficacy beliefs. However, Jugert et al. (2016) proposes that collective efficacy best exerts its positive effect on motivating pro-environmental behavior change by raising perceptions of self-efficacy. Therefore, self and collective efficacy may be connected. According to the authors, individuals can derive feelings of capability and control from their belonging in social groups (Fritsche et al. 2013) and in fact, when people feel powerless or deprived of personal control, they will turn to more powerful ingroups to regain a sense of control (Fritsche, Jonas, and Kessler 2011). This builds on previous studies which demonstrate that the use of normative messages (communications that emphasize the behavior of others within one's social group) can be powerful motivators for individual behavior change (Nolan et al. 2008; Shultz et al. 2008). In fact, it is particularly effective among people who have a low motivation level (McKenzie-Mohr and Schultz, 2014). These studies suggest that messaging to encourage pro-environmental behavior in individuals can benefit from referencing the collective power of a social group to adopt a new norm. Given the low priority of energy efficiency among federal procurement staff, indicating a low motivation to change, it seemed that the federal procurement audience would be a good target for messages that emphasize collective efficacy to motivate new pro-environmental behavior (in this case, a greater consideration of energy efficiency during purchasing).

Methods

Participants

We decided to test the above mentioned principles of behavioral science through email outreach messages. This email outreach was for a webinar series related to the purchase of energy efficient products in the federal sector. The recipients of these emails include federal contracting officers (COs) who are involved in the procurement of different categories of

products/services for the federal government each year. The contact information of about 5,204 COs was obtained from the Federal Business Opportunities (FBO) web portal. In addition to the contact information, we also had information related the agency affiliation and the type of products (energy-consuming/non-energy-consuming products) purchased by the COs in the past.

Since we decided to test two treatments, we divided our list of COs into three groups namely control group (n=1749), group 1 (n=1762), and group 2 (n=1693). We used a pseudorandom number generating algorithm to assign values to each contact in our list, then rank ordered those values. This rank order was used to assign the contacts into one of the three groups. Since our study involved humans as research subjects, the Human Subjects Committee (HSC) at the Berkeley Lab reviewed and approved our study. We took measures to ensure the identity of subjects that participated in our study remains anonymous. It should be noted that the FBO webpage, where we sourced the email contact information, only contains information for federal procurement officers involved in contracts worth $25,000 or more, which misses all of the purchases of energy-consuming products by federal procurement officers for less than that amount.

Procedure

Each group received an email message that had some information regarding the federal procurement of energy efficient products, some information about the webinar, a webinar registration link and links to a couple of web pages that have energy efficient procurement related resources (see Appendix).

The control group received an email with a generic subject line and generic content in the body of the email. Group 1 received an email which included dynamic norm messaging. The subject line and the first sentence of the email was intended to draw attention to the gradually increasing compliance with federal EEPP requirements (see Appendix). Group 2 received an email based on the principle of collective efficacy, but also included elements related to the self-efficacy principle based on the hypothesis by Jugert et al. (2016) that self and collective efficacy may be connected. The subject line and first paragraph of the email message was adapted to appeal to the recipients' sense of belonging to the federal procurement community and make them feel that their individual actions were made even more effective because they were working as part of a collective whole (see Appendix).

We tracked the number of email opens, webinar registrations, and the number of click-throughs (for web links placed within the message) for all three groups. The multiple streams of response allowed us to more thoroughly gauge the performance of different messages. The email marketing platform, Constant Contact, was utilized for email tracking and data collection. Constant Contact allowed for message segmentation through the creation of contact lists, one for each group. The platform also allowed for data to be tracked at the individual and aggregate level for each group including the opens, webinar registrations, clicks, and bounces (unsuccessful email deliveries). These capabilities allowed us to analyze and determine the effectiveness of the different messaging approaches. Additionally, Constant Contact allowed for individual contacts to be assigned certain attributes, such as the agency they are affiliated with or whether they purchased energy-consuming products in the past. This made it possible to further assess the effectiveness of different messages among subsets of the total target audience. The emails to the

three groups were sent on a weekday and we waited for a week before collecting all the required data through Constant Contact.

The data associated with this study, namely the type of email messages sent (control, dynamic norm, collective efficacy) or the kinds of responses gathered for each of these messages (number of opens, registrations, click through rates) or the attributes of the subjects (their agency affiliation, procurement history) are all categorical data. Therefore we used chi-square test (VanPool and Leonard 2011) to analyze the data and looked for association between the responses, the type of email messages sent and the subjects' attributes. When the responses were too low Fisher's exact test was used (VanPool and Leonard 2011). Both the chi-square test and Fisher's exact test were performed on the data using statistical packages in Python 3.7. A level of significance of 5% was used, which means that a p-value of less than 0.05 indicates significant association between the variables being tested.

Based on the literature cited earlier, we hypothesized that messages that were designed based on principles of dynamic norm messaging and collective efficacy would be more effective (in terms of higher opens, webinar registrations and click through rates) compared to the control message. We also wanted to see if the results hold true regardless of the agency affiliation or the procurement history of the target audience. Therefore, we checked whether the effect of the different messages (control, dynamic norm and collective efficacy) would vary based on the department with which different contracting officers are associated with. We also checked if the effectiveness of the message would vary based on the procurement history of the contracting officer.

Results

A chi-square test was performed to see whether there are any significant differences in the number of email opens for the control, dynamic norm and collective efficacy messages. The number of opens was found to be similar for the three groups ($\chi 2(2) = 1.0$, $p = 0.6$, Table 1). Around 13% of people who received the control email actually opened the email. The open rate was around 11% for the dynamic norm email recipients and 12% for the collective efficacy email recipients (Table 1). A considerable number of email messages in each group were bounced back. These were removed from our analysis.

Table 1 The number of opens for the three different kinds of messages

Type of Email Message	Number of Opens	Number of Non Opens	Number of Bounces
Control (n=1749)	147	1025	577
Dynamic Norm (n=1762)	137	1084	541
Collective Efficacy (n=1693)	141	1056	496

Assuming no other factors affect the intention of the target audience to open the email, Table 1 shows that the changes in the subject line of the message did not result in significantly different open rates for the emails. For the observed number of opens for each of the three messages, the number of webinar registrations were very low (Figure 1). Only one subject that opened the control email and one subject that opened the collective efficacy email actually

registered for the webinar. Hence, we decided not to use the webinar registration data to ascertain the effectiveness of different messages. The subject line and the content for each of the emails seem to have little effect on the subjects' intention to register for the webinar.

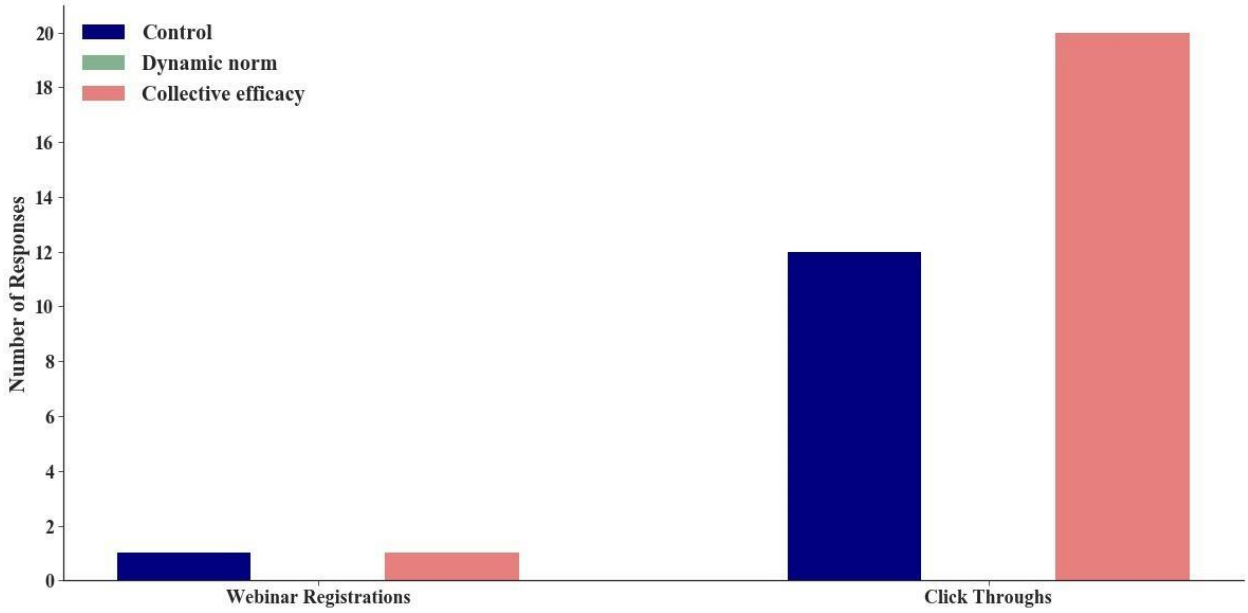

Figure 1 The number of webinar registrations and link click-throughs for the three different kinds of messages

Since the number of click throughs was low (less than 20), Fischer's exact test was used to check whether the number of click throughs were the same for the three different kinds of messages. We found a significant association between the type of message and the number of click throughs for the links placed within the email message ($p < 0.001$, Figure 1). The click through rates (percentage of subjects that opened an email message and clicked the web links placed within the email) were 8% and 14% for the control and collective efficacy messages respectively. There were no click throughs from the subjects that opened the dynamic norm messaging emails. There can be other factors that are responsible for a subject's decision to register (or not to register) for a webinar and click through the links placed in the email message. However, it is reasonable to assume that the framing of a message (either through dynamic norm messaging or through promoting collective efficacy) had little to no effect on the number of opens and webinar registrations. But, framing might have contributed to the higher rates of click throughs in the collective efficacy message compared to the generic control message.

We also hypothesized that there would be differences in the responses (number of opens, webinar registrations and clicks) to the three kinds of emails based on the department to which different subjects are affiliated to. This was based on the assumption that differences in compliance rates between agencies reflected differences in culture or process that would manifest in different responses to our messages by members of those agencies. We divided our list of COs in each of our groups into three sub-groups namely, the Department of Defense (DoD), Department of Veteran Affairs (VA), and All Other Departments/Agencies based on the department or agency associated with each CO. We chose DoD and VA because between FY15-FY19, around 56% of the energy product/services related solicitations were from DoD and 17%

were from the VA. The remaining were from all other agencies and departments (Payne et al., Memo, Dec 2019). During the same time period, DoD had a compliance rate of about 56% for the EEPP requirements. The VA had a 46% compliance rate and all other agencies/departments had a cumulative compliance rate of 56% (Payne et al., Memo, Dec 2019)

Since the number of responses disaggregated by the agency affiliation of the subjects is less than 20 in many cases, Fisher's exact test was used to determine associations between the responses and agency affiliation. Despite the differences in compliance rates, we did not find any association between the number of opens for the three different kinds of messages and the department affiliation of different subjects ($p = 0.76$). Around 4% of the subjects who opened the control email were from DoD, 1% were from the VA and the remaining 95% were from all the other agencies/departments. These distributions were more or less similar for the dynamic norm and collective efficacy emails (Table 2).

Table 2 The distribution of the number of email opens for the three different kinds of messages based on the department affiliation of the contracting officers

	Affiliation of the Subject		
Type of Email Message	Department of Defense	Department of Veteran Affairs	All Other Departments/Agencies
Control (n=147)	6	2	139
Dynamic Norm (n=137)	7	4	126
Collective Efficacy (n=141)	9	4	128

Similarly, Fisher's exact test revealed that there is no association between the department affiliation of the subjects and the number of click throughs ($p=0.43$) for the three different kinds of messages. Due to lack of enough webinar registrations, no analysis was done to find association between the department affiliation of the subjects and the number of registrations.

We also hypothesized that there will be differences in the responses (number of opens, webinar registrations and clicks) to the three kinds of emails based on the subjects' past procurement behavior. This is based on the assumption that subjects (in this case, COs) who were previously involved in the procurement of energy related products and services for the federal government would be more receptive to information related to energy efficiency. But we noticed that there is no effect of the type of message on the number of opens, even within the subjects that have procured energy related products/services in the past ($\chi2(2) = 0.41$, $p = 0.81$, Table 3)

Table 3 The number of opens for the three different kinds of messages associated with subjects that were involved in the procurement of energy related products and services in the past

Type of Email Message	Number of Opens	Number of Non Opens
Control (n=686)	26	303
Dynamic Norm(n=708)	24	336
Collective Efficacy(n=659)	27	330

There were virtually no webinar registrations or click throughs recorded for the subjects that had an energy product/service related procurement history. All the registrations and click throughs came from the subjects that did not have energy product/service related procurement history. Even for the subjects that had an energy product/service related procurement history, Fisher's exact test revealed no association between the number of opens for the three different kinds of messages and agency affiliation of the subjects ($p=0.74$).

Discussion

Despite the differences in the subject lines of the three messages, there was no statistically significant effect on the subject's intent to open the message. This holds true regardless of the agency/department affiliation of the subject and the subject's past procurement behavior. In our experiment, subject line manipulation has no meaningful effect on whether federal officials will open an outreach email. Since the number of webinar registrations was very low (only two registrants among the three groups of subjects), it is not possible to draw any conclusions based on the number of registrations. However, since there is a more significant number of click throughs for the messages sent, it is possible to draw some insights into the effectiveness of the dynamic norm and the collective efficacy messages from differences in click through rates between the three message types.

The dynamic norm message had little effect in driving engagement among our target audience of federal actors. Recipients of this message opened the email at slightly lower rates than those who received the control or collective efficacy emails (Table 1) and none clicked the links placed in the message or registered for the webinar. Both the subject line ("Federal buying of energy-saving products is on the rise") and the first sentence ("Federal agency procurement of energy-efficient products has increased by as much as 7% in recent years") were drafted with the intention that this information will convey to the federal contracting officers that some of the barriers to purchasing energy efficient products are being eliminated slowly. One possible explanation for the lower than expected effect of the dynamic norm message might be that, although the compliance has increased gradually over the years as reported by Wang and Payne (2018), the 7% compliance increase mentioned in the message might have been perceived too meager to indicate an evolving behavioral norm. In this case, a possible solution to this problem would be reframing the steady increase in compliance. Instead of saying "… as much as 7% in recent years", using positive polarity verbal quantifiers (for e.g., "more than 5%") may lead to higher responses for the dynamic norm message. There have been studies in the past that used positive polarity quantifiers (Goldstein, Cialdini, and Griskevicius 2008; Schultz, Khazian, and Zaleski 2008; Demarque et al. 2015). Teigen, Halberg, and Fostervold (2007) also reported on the benefits of using positive polarity quantifiers in several contexts. A future study could rephrase the text in the email body to include a positive polarity quantifier and see if there is any difference in the responses.

The collective efficacy message (which also included elements appealing to self efficacy) proved to be marginally more effective than the control or dynamic norm messages. These findings provide some evidence that appealing to an individual's sense of community and reiterating that their individual actions can be impactful when acting as part of a larger whole may be effective in motivating higher levels of engagement, particularly among groups with low motivation. This also provides some evidence to Jugert et al's (2016) assertion that self and collective efficacy may be connected. While it is important to remember the small sample size and overall low levels of engagement with this message type, these findings do at least offer

evidence that future study should investigate the use of collective efficacy as a messaging tactic for pro-environmental behavior, and particularly how it intersects with general self-efficacy messaging. Future efforts could split self-efficacy and collective efficacy in two separate messages, and then one combined message to see if there are compounding or interfering effects.

It has been shown that dividing the target audience into various subgroups based on certain characteristics, and using tailored and targeted messages for these subgroups can be effective in climate change communications (Bostrom, Böhm, and O'Connor 2013; Hine et al. 2014). Message framing based on different audience segments can be effective in promoting other pro-environmental behaviors like recycling (White, Habib, and Hardisty 2019). In this study, we looked at two attributes of federal contracting officers (agency affiliation, procurement history) to see if different groups of target audience are more receptive to certain kinds of messages. We have found no association between the attributes of our target audience and different messages that we sent. More research is needed to ascertain the benefits of audience segmentation for effective messaging among federal contracting officers.

Limitations and Conclusion

A few limitations qualify the results of this study. First, the low overall level of response (i.e., number of recipients who opened, clicked through, and/or registered for the webinar out of the total number of participants emailed) is a point of concern. Second, while several steps were taken to reduce the number of confounding factors, it was impossible to completely eradicate them. For example, participants were contacted from an existing mailing list. We cannot eliminate any preexisting sentiments towards the institution (Berkeley Lab) in our experimental population. Finally, our population size was constrained. For security reasons, several federal agencies (particularly prevalent with Defense agencies) use firewalls to prevent emails from external sources. As a result we could not successfully deliver a lot of email messages to contracting officers who had these firewalls. Another limitation is due to the slightly closed-off nature of the federal procurement community. While we were able to obtain 5,204 contact emails, this represents only a fraction of those involved in procurement within the federal government. As previously mentioned, FBO only contains contact information for federal procurement officers involved in contracts worth $25,000 or more, which misses all of the purchases of energy-consuming products by federal procurement officers for less than that amount.

Opportunity for Future Study

In addition to measuring the number of opens, webinar registrations, and click throughs, a future study could record the actual purchasing behavior of the subjects that received the different kinds of messages. Similar to studies done by Demarque et al (2015) and Ungemach et al (2017), a future study could look into how different messages affect the actual purchasing behavior of the federal procurement community in a fictional or real shopping environment and the study could survey them regarding how different messages affected their opinions about sustainable and energy efficient products. Future studies may benefit from a wider sample size that includes a broader representation of the federal procurement community (i.e., top-level and mid-level management roles in addition to contracting specialists and procurement staff). This would likely require broader and more targeted outreach, as the contact information for federal

employees in these roles is not as publicly available. Including additional members of the federal procurement community could lead to a wider variation in terms of open, click through and engagement rates. This allows for a more robust statistical analysis.

Future research can also look into principles of behavioral science other than the ones tested in the current paper. One can look at how different kinds of framing can make the messaging more effective. For instance, clearly stating the federal requirements regarding the purchase of energy efficient products and explicitly using the words “compliance” in the email messages may make the messages more effective. It can also be interesting to look at how different principles of behavioral science interact with one another. Similar to the methods described in this paper, one can come up with individual messages that blend multiple principles of behavioral science and try to analyze how effective these blended messages are. Any insights into the way multiple principles of behavioral science compound or interfere with one another allows for better, more effective education materials for a federal audience. This paper sheds some light into the effectiveness of using behavioral science principles for designing effective outreach strategies for the federal procurement community.

Appendix

Control

Subject: Sign up for Berkeley Lab's New Webinar Series on Energy-Efficient Product Procurement

Berkeley Lab is kicking off 2020 with the Contracting for Efficiency Webinar Series. This three-part training will equip participants with an increased awareness of energy-efficient product procurement (EEPP) requirements and new ways to help ensure federal agencies achieve significant savings from the adoption of energy-efficient products.

Please register by clicking the sign up button below.
Sign Up Here!

The first webinar -- Introduction to Energy Efficient Product Procurement -- will be held on April 8, 2020 at 1:00 PM ET. It will focus on the requirements for purchasing energy-efficient products and the Federal Energy Management Program’s (FEMP's) EEPP program and resources. The webinar will also cover the benefits of energy-efficient product procurement -- including cost savings, emissions reductions, and market transformation potential. Feel free to learn more or familiarize yourself with FEMP’s existing resources on contracting for energy efficiency and FEMP-designated energy-efficient products prior to the webinar.

We look forward to your participation!
Best regards,

Group 1 - Dynamic Norm Messaging

Subject: Federal buying of energy-saving products is on the rise. Sign up for Berkeley Lab's webinar series to learn more!

Federal agency procurement of energy-efficient products has increased by as much as 7% in recent years, according to new Berkeley Lab analysis. To continue this trend, Berkeley Lab is kicking off 2020 with a new Contracting for Efficiency Webinar Series. This three-part training will equip participants with an increased awareness of energy-efficient product procurement (EEPP) requirements and new ways to help ensure federal agencies achieve significant savings from the adoption of energy-efficient products.

Please register by clicking the sign up button below.
Sign Up Here!

The first webinar -- Introduction to Energy Efficient Product Procurement -- will be held on April 8, 2020 at 1:00 PM ET. It will focus on the requirements for purchasing energy-efficient products and the Federal Energy Management Program's (FEMP's) EEPP program and resources. The webinar will also cover the benefits of energy-efficient product procurement -- including cost savings, emissions reductions, and market transformation potential. Feel free to learn more or familiarize yourself with FEMP's existing resources on contracting for energy efficiency and FEMP-designated energy-efficient products prior to the webinar.

We look forward to your participation!
Best regards,

Group 2 - Collective Efficacy Messaging

Subject: Federal purchasing power has massive implications for federal energy cost savings. Sign up for Berkeley Lab's webinar series to learn more!

The U.S. government is the nation's largest buyer of energy-consuming products, with $10 billion worth of lighting, PCs, heating/cooling systems and more purchased every year. By prioritizing energy-saving products, federal procurement officers can leverage this collective buying power to achieve huge cost savings and emissions reductions across the federal sector -- as much as $500 million in taxpayer dollars and 3.5 million tons of CO2eq saved!

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Best regards,

Acknowledgment

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