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Social Mobilization: How to *Encourage Action* on Climate Change

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EXECUTIVE SUMMARY

Humans have increased their rates of greenhouse gas emissions dramatically since 1970, despite a growing number of climate mitigation policies. Although most people are aware of climate change, and many are concerned about it, this concern does not always translate into action. In this white paper, we focus on why people in western industrialized society take climate action and how to implement programs that encourage action. This report finds those answers through the review of four decades of environmental psychological research evaluating the effectiveness of climate action information strategies.

Four broad categories of psychological theories explain motivations for engagement or avoidance of climate action: (i) rational choice theories postulate that human behaviour is mostly driven by self-interest and reasoned choices (weighing costs and benefits); (ii) theories of altruism propose that people engage in climate action because of their personal values, and they are sometimes willing to give up personal benefits for the sake of the environment; (iii) theories of multiple motivations suggest that climate action may sometimes be driven by self-interest, and sometimes by altruism; and that (iv) people would engage in more climate action if they were not impeded by psychological or structural barriers. Psychological barriers are somewhat related to rational choice and a lack of altruism, and can prevent action through a variety of pathways, including lack of knowledge, cognitive biases, perceived risks, and social pressure, among others.

This psychological research spanning four decades provides strong empirical support for a number of strategies that encourage behaviour change. Providing tailored information, soliciting commitment (i.e., pledges), recruiting leaders from within social networks, giving feedback and using a variety of other social influence strategies can effectively increase climate-friendly behaviour.

Utility companies, governments and others have, at times, integrated these strategies into large-scale programs that can effectively reduce greenhouse gas (GHG) emissions. Usually these psychology-based strategies are combined with traditional programs, such as rebates, incentives, pricing strategies and policies to increase consumer energy savings. The most effective programs often also deliver personalized feedback to residential utility customers (in the form of home energy reports or real-time feedback devices), or use other engagement tools such as competitions, training programs, home energy audits for homes or businesses, or targeted community-based programs.

This analysis shows that by applying tailored programs with proven behaviour-change strategies, program administrators can more effectively succeed in goals such as reducing energy consumption and encouraging low-carbon lifestyles. We recommend that programmers work with environmental psychologists or other social scientists to design behaviour change programs that target specific behaviours within specific populations. Strategies should try to match the motivations, demographics, culture and values of their target audience. Importantly, programs should be designed with long-term behavioural persistence and program evaluation in mind. This means encouraging intrinsic motivation for behaviour change (e.g., personal satisfaction) in addition to extrinsic motivation (e.g., saving money). This report discusses several successful large-scale programs that were previously implemented that can serve as exemplars.

Overall, insights from psychological research can be used to make a significant impact on energy consumption and carbon footprints. This report highlights this work in ways that allow policy makers and program administrators to easily apply the research to design programs, implement carbon reduction campaigns, and mobilize climate action.

1. INTRODUCTION

Anthropogenic GHG emissions have risen dramatically since 1970, with larger absolute increases occurring between 2000–2010, despite a growing number of climate mitigation policies.¹

Although most people are aware of climate change, and many are concerned about it,² this concern does not always translate into action, even though individual actions can have a significant effect. One BC Hydro survey from 2008 indicates that residential energy consumption could be reduced by 11% through behaviour change.³ Yet, it can be difficult to encourage environmentally friendly behaviours, and approaches aimed at doing so have had mixed success and uptake.^{4,5} Psychological research can provide useful insight into some of these barriers to behaviour change. More broadly, understanding the role of beliefs, perceptions, decision biases, and social processes that shape our day-to-day behaviours is an essential part of climate change mitigation strategies.

This paper, which complements the 2015 Synthesis of *PICS-Funded Social Mobilization Research report*,⁶ is designed as a practical guide for policy makers and others interested in motivating climate action. It will examine the human dimensions of climate change and ask the important question: how can people be mobilised and encouraged to engage in climate action?

2. THEORIES OF ENVIRONMENTAL BEHAVIOUR AND BARRIERS TO CHANGE

Three main categories of psychological theories can explain motivations for pro-environmental behaviours: rational-choice theories, theories of altruism, and theories emphasising multiple motivations for behaviour change. A fourth category, theories of psychological barriers to change, can explain why people do not make enough pro-environmental choices.

Rational choice theories postulate that people make reasoned choices, weighing the costs and benefits and then choosing what is most beneficial for them personally. For example, the theory of planned behaviour,⁷ suggests that choices and behaviours are influenced by how individuals think and feel about those choices and behaviours' (e.g., "It's good," or "Doing it makes me feel happy"), as well as perceived social norms about the behaviour ("Are other people doing it?"), and perceived control over the behaviour ("How easy is it to do?"). Thus, according to that rational choice theory, programs that target attitudes, perceived social norms, or perceived behavioural control, may successfully change behaviour. High-cost behaviours (in terms of time, effort and financial considerations), such as car use, may be best explained by rational choice theories.

Theories of altruism however, suggest that climate action is not entirely driven by self-interest. Instead, their values and beliefs direct individuals to give up personal benefits for the sake of external factors such as the environment or future generations. According to these theories, programs that encourage pro-environmental values from an early age might successfully change behaviour in the long term. Low-cost behaviours, such as recycling, may be best explained by altruistic theories.

Theories of multiple motivations explain that behaviour results from several internal drivers. For example, goal framing theory⁸ states that human behaviour is goal-directed, and goals determine which alternative behaviours are considered in any given situation. Sometimes actions are motivated by hedonic goals ("To feel better right now") and sometimes they are motivated by gain goals ("To guard and improve one's resources"). When individuals are in the frame of mind to act morally or ethically (to do the "right thing"), they are said to be pursuing *normative goals*, and during these times, they are most likely to take climate action.⁹ Therefore, incorporating those

goals within key environmental decisions may encourage environmentally friendly choices and actions.

Theories of psychological barriers to climate action describe reasons why people do not act rather than why they *do* act. One prominent theory outlines seven categories of barriers with many sub-barriers.¹⁰ These include limited thinking about the problem, perceived risks, ideologies, discredence and mistrust (among others). This theory combines and reframes elements from altruistic and rational-choice theories to answer the question “Why do people fail to engage in climate actions?” According to this theory, programs that breakdown the psychological barriers to action will successfully change behaviour.

3. THEORY-BASED STRATEGIES TO ENCOURAGE BEHAVIOUR CHANGE

Interventions to promote environmentally friendly behaviours can be divided into two categories.¹¹ *Informational strategies* are aimed at changing knowledge, awareness, norms, and attitudes (e.g., information campaigns). *Structural strategies* are aimed at changing the circumstances in which behavioural decisions are made (e.g., technologies, incentives and policies). A combination of informational and structural strategies is generally needed to effectively reduce climate change impacts.

For example, although technological innovations are indeed important for reducing emissions, they may not always be used as intended. Human behaviour can counteract planned efficiency gains associated with technological innovations. As a simple example, US homes with older programmable thermostats (i.e., not newer “smart” thermostats, such as the Nest) sometimes use more energy than homes with manual thermostats because residents have difficulty understanding and using them.¹² The interplay between informational and structural strategies is important. Psychological research has predominantly focused on evaluating the effectiveness of information strategies, which will be the topic of this paper. For more reviews of intervention strategies and theories see Appendix A.

3.1 Information

Information campaigns are among the most widely used approaches to encourage behaviour changes. They have their roots in the so-called knowledge-deficit model. The underlying assumption is that people do not know about a specific environmental problem, or that they do not know what to do about it.¹³ Information provision aims to overcome this knowledge deficit by increasing awareness, which may increase concern and encourage individuals to change their behaviour. Information campaigns have the advantage that they are not particularly complicated to implement and can reach large numbers of people. However, although campaigns may increase awareness, and prime individuals for change, information alone does not always effectively change behaviour.^{14,15}

3.2. Tailored information and message framing

Environmental psychologists have identified several ways to increase the effectiveness of “traditional” information provision. Tailored information is designed to reach a specific person or group based on characteristics unique to those individuals.¹⁶ Climate deniers, for example, tend to agree with the status quo (actively “justifying” the system), and therefore are often best persuaded by patriotic messages that support this worldview, such as those depicted in Figure 1.¹⁷

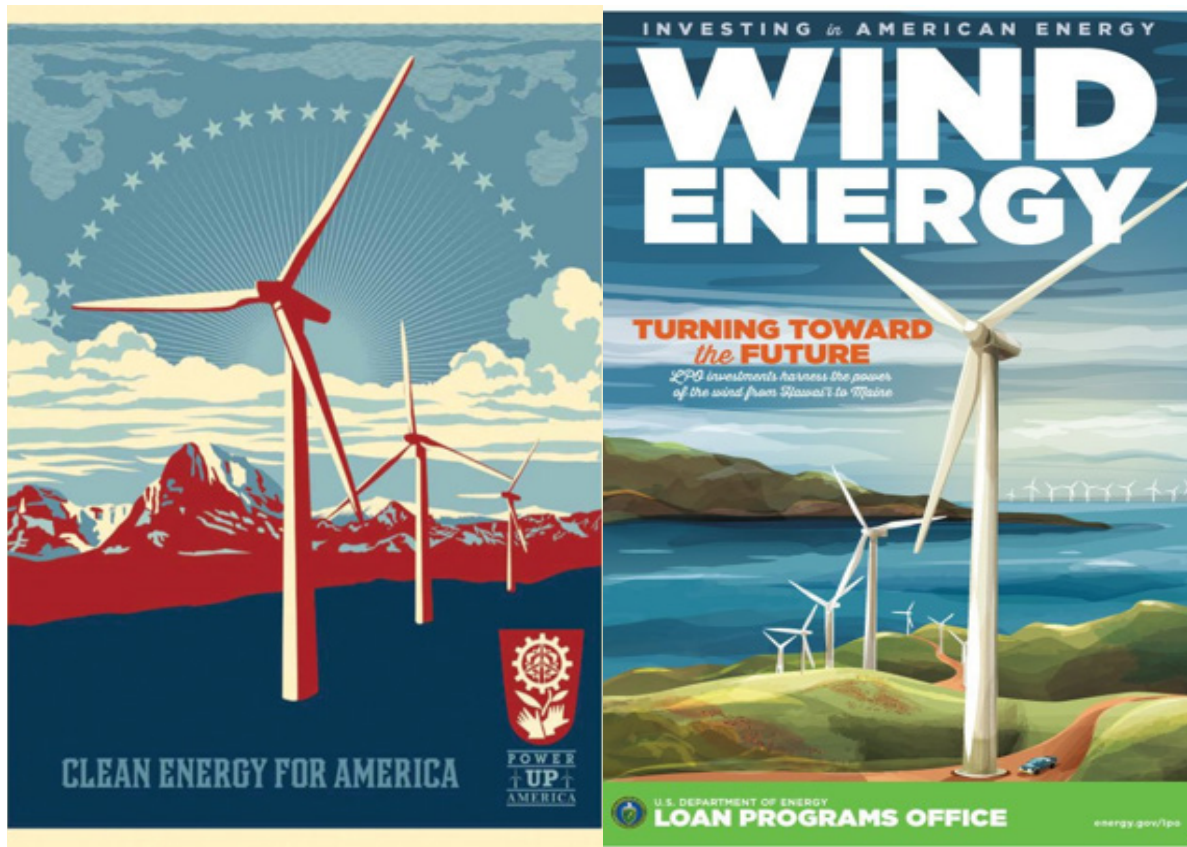


Figure 1. Patriotic posters can encourage climate action.
Photo credit: left, poster by Shepard Fairey (MoveOn.org); right, U.S. Department of Energy

Similarly, conservatives are more likely to respond to messages about “wasted energy”¹⁸ or “climate change”¹⁹ than “global warming”. Indeed, some of the most impactful behaviours are engaged in for non-environmental reasons, such as improving health or saving money.²⁰ Tailored information can be very effective for encouraging behaviour change.^{21,22,23}

Program designers may increase participation or action by making other subtle changes to their messages as well. For example, messages should focus on local, immediate impacts of climate change (that people can relate to) instead of global, future impacts, and they should also be connected to other concerns, such as health and economics when possible.²⁴ For additional research on message framing, see Appendix A.

3.3. Commitment making (pledges)

Commitment making or pledging is generally defined as the binding of an individual to a certain opinion or behaviour.²⁵ When people are asked to make pledges, such as to save energy or recycle, they are more likely to follow through with their planned actions, especially if the pledges are public.²⁶ In one university competition to save energy (Campus Conservation Nationals), for example, participants made pledges using software that would automatically post the pledges to their Facebook profiles.²⁷ For additional research on pledges and commitment making, see Appendix A.

3.4 Goal setting and implementation intentions

Goal setting theory asserts that behaviour is goal-directed and that the anticipation of reaching an attractive goal motivates behaviour changes necessary to attain it.²⁸ Goal setting is most effective when goals are high, but realistic, and the procedure works best when combined with other intervention strategies such as feedback.²⁹ Moreover, goals should be clearly formulated and achievable within a short period of time. They can also be more readily achieved when people make concrete, step-by-step plans.³⁰

3.5 Feedback

Feedback consists of giving individuals information about their performance; such as how much energy they saved. According to this theory, feedback increases climate-friendly behaviour because it gives insight into the links between certain outcomes (e.g., saving energy and therefore reducing power bills) and the behaviour changes necessary to reach that outcome (e.g., switching off lights).³¹ The more frequently personalized feedback is given, the more effective it tends to be.³² In-home energy displays providing continuous real-time feedback are more effective than less frequent (monthly) feedback.³³ Similar studies have also been conducted with appliance-integrated feedback.³⁴

3.6 Social influence approaches

Social influence refers to the ways in which behaviour is affected by what others do or think.³⁵ By comparing themselves to others, people learn what is possible, normal and approved of. These observations are internalized as social norms, and when norms supporting climate action are brought to individuals' attention, they behave more pro-environmentally.³⁶

Block leaders, energy champions and social networks can be leveraged to encourage climate action. Block leaders and energy champions are volunteers who help inform others in their social network (virtual or physical), community, or business about a certain issue or idea. The approach is based on the assumption that information provision will be more effective when it is conveyed by someone from within the same social network than from an external organization.³⁷ One meta-analysis found this strategy to be the single most effective intervention strategy for encouraging pro-environmental behaviour.³⁸ Consequently, many behaviour-change programs, such as competitions and strategic energy management programs (described later), include energy champions or individuals within the group to drive change.

3.7 The potential of gamification

Gamification is a relatively recent development that employs the features of games with the aim of meeting a real-world climate action goal. Such games may take place in the real world, in a virtual world, or in a combination of these, and may be one-player or multi-player in nature. Gamification combines several effective behaviour-changing elements including feedback, social comparison, extrinsic motivation (prizes) and intrinsic motivation (fun!). Simply competing, even without the prospect of a reward,³⁹ may motivate participants because the activity is fun or challenging, and they do not want to lose.⁴⁰ Although the effectiveness of games for reducing energy use or GHGs has not often been demonstrated in peer-reviewed publications, they are an important part of human culture. Therefore, well-designed action-oriented games would seem to have important potential.

One danger of the gamification approach is habituation and the eventual cessation of participation. Successful games in this context, disrupt habits in favour of new ones, allow participants to

frequently repeat desired actions, change behaviour triggers (reminders and prompts), and provide *intrinsic* rewards such as satisfaction, a sense of higher purpose, or pride. Competitions and games that change behaviour solely through *extrinsic* rewards are unlikely to cause lasting behaviour change (although this hypothesis requires more research). As noted in one review, “Maybe the best way to think about gamified energy efficiency solutions is to see them as training wheels, a way to introduce people to the intrinsic satisfaction of gliding along on their own two wheels after the game’s apparatus is removed.”⁴¹ That is, once the game helps people to establish new sustainability habits, its job is done, but the behaviour may well persist if the game is well-designed.

4. BEHAVIOUR-CHANGE PROGRAMS IN THE REAL WORLD

This section examines the design and outcomes of real-world carbon-reducing programs that have been primarily implemented by utility companies in the United States.

Historically, governments, utilities and other organizations interested in encouraging pro-environmental behaviours have relied on financial or policy-based strategies to change behaviour. Using the principles of reward and punishment, these approaches increase or decrease target behaviours through traditional theories of learning. For example, utility companies may offer financial incentives for energy efficient home upgrades or reduced prices for off-peak electricity use. Conversely, policy changes may punish anti-environmental behaviour, such as creating legal consequences for polluting.

These traditional approaches can be highly effective, but because they are *extrinsically motivating*, the behaviour change they produce can be short-lived if the reinforcement or punishment is removed.⁴² Therefore, traditional behaviour-change programs should be complemented by intrinsically motivating programs.

Recently, governments and businesses have turned to non-traditional social science based methods to change behaviour. Colloquially called “nudging,” these approaches apply the theories and principles described in this report to encourage behaviour change without necessarily employing economic or policy-based methods. Instead, these programs rely on social comparison, feedback, commitment or other strategies to increase climate action. These programs are less likely to erode intrinsic motivation than traditional approaches, but they may produce smaller effects than financial or policy-based approaches (although no formal comparison has yet been conducted to support this hypothesis).

4.1 Large-scale programs that work

Energy-use feedback and comparison strategies are the most popular option used in large scale programs implemented by utility companies. The most common behaviour change program in North America is the Home Energy Report (HER) program; often implemented by Opower company⁴³ –a cloud-based “customer engagement and energy efficiency service provider”. The program (which reached over 8.9 million homes in the US in 2013) involves sending HERs to residents (independently from their regular bills) each month (or, in some cases, bi-monthly or quarterly) information about their energy use compared to 100 similar homes.⁴⁴ The reports typically also include energy saving tips and information about other energy efficiency programs (e.g., appliance recycling or home retrofit incentives). Utility companies typically automatically enrol customers in the program and find that they reduce electricity use by 1% to 2% by the end of their second year of receiving reports.⁴⁵ This may seem like a modest amount, but the program’s opt-out design (whereby customers are automatically enrolled) results in higher savings overall because more

people receive the feedback and social comparison information.⁴⁶ In the eight years that Opower has produced these home energy reports, it claims to have saved over 11 terawatt-hours of electricity (equivalent to more than \$1.1 billion for customers), which is enough to power over 1 million U.S. homes for a full year.⁴⁷

Real-time energy feedback and “smart technology” programs are also being implemented more frequently. Utility and government programs have pilot tested the energy savings from installing these devices for customers. The Honeywell connected thermostat (a “smart” thermostat that can be controlled remotely) saves approximately 6.6% in space heating and cooling energy use (2-3% of home energy use) and \$116 in annual energy costs per home with average weather (among 1,769 US. participants).⁴⁸ Google’s Nest thermostat reduces energy consumption by roughly twice as much as older programmable thermostats.⁴⁹ Smart thermostats, smart power strips (power strips that automatically sense when devices are off and “unplugs” them so that they cannot use phantom power), devices that automatically throttle air-conditioning use during peak heat event days, and similar tools are “control-based” devices; they automatically adjust energy use, without much human interaction.

Some utility companies provide customers with in-home displays or smartphone apps that show their real-time energy consumption. This works best to reduce consumption when the display is combined with additional strategies, such as incentives.⁵⁰ Savings from information-based and control-based devices range broadly from about 1% to about 17% of energy consumption.⁵¹ For peak demand reduction on particularly hot days, devices controlled by the utilities that automatically reduce air conditioner (AC) use are more effective than in-home displays (note: customers can override the device if they so choose).^{52,53}

Competitions and games are another go-to strategy for behaviour change in the real world. At least 53 such games and competitions based on gamification theory have been developed in North America to encourage energy saving and pro-environmental behaviour in residential, commercial, workplace, and campus settings.⁵⁴ Examples include Power House (a single-player computer game),⁵⁵ CALS Green Energy (an intra-building competition in California),⁵⁶ and Energy Star’s Top Cities Challenge (a US-wide inter-city competition).⁵⁷ Program implementers usually find that these types of competitions reduce real life electricity use by 5% or less, but sometimes they save as much as 14% to 30%.⁵⁸ Importantly, however, these programs are not as robustly evaluated as HER or other feedback programs (they do not use experimental designs with large samples), and participants must choose to participate (unlike HER programs, in which they are automatically enrolled).

Energy audits involve experts who examine buildings for areas of inefficiency or energy loss, and then provide recommendations for increasing efficiency. Many utilities and public utility commissions have offered reduced-cost (or free) residential or commercial energy audits for many years (e.g., RunItRight by Enbridge Gas in Ontario). These programs usually come with free low-cost or no-cost upgrades (e.g., faucet aerators or energy-efficient light bulbs) in addition to recommendations for other investments in retrofits and upgrades. The programs earn large-scale savings if they successfully persuade customers to invest in additional major energy-saving products. To this end, energy auditors that do more than simply provide information about which products and rebates are most effective; their personal attention is also vital. A review of energy advisor (auditor) programs,⁵⁹ concluded that advisors should guide customers through three types of barriers: *information barriers* (providing knowledge about actions that can save energy and associated rebate programs), *decision-making barriers* (e.g., reviewing results with the customer), and *transactional barriers* (e.g., scheduling and paper work).

Community-based programs target groups of individuals in residential neighbourhoods or in commercial businesses. These programs usually combine a number of behavioural strategies to encourage change within the target group. For example, AEP Ohio's *Community Energy Savers* program incorporated goal-setting, feedback, and peer-to-peer interactions as well as outreach strategies such as door-to-door canvassing, attending local events, and hanging posters in local businesses, among others. Communities that met their participation goals also received a cash reward from the company. The program successfully increased energy savings, awareness of, and participation in, other energy efficiency programs. AEP Ohio attributed 662,704kWh of energy savings to the program, which enrolled 1,164 participants.⁶⁰

In the Netherlands, a combination of tailored information, goal setting and tailored feedback was effective for increasing knowledge, changing behaviour and encouraging energy conservation.⁶¹ Other PICS-funded social mobilization studies typically fall into this category.⁶²

One effective behaviour-change strategy is to design a *community-based social marketing* (CBSM) program. This involves (1) identifying a specific behaviour to change, (2) identifying barriers and benefits of change within the target population, (3) selecting behaviour-change strategies and developing an intervention, (4) implementing the program, and (5) evaluating the program.⁶³ The method is effective because it allows for tailored messages and targeted interventions, while also systematically evaluating success. In one recent example, it increased the purchase of energy efficient LED light bulbs by 896% in two stores in North Carolina.⁶⁴

Training and education programs in schools or businesses specifically target carbon emissions reductions. Environmental and energy education programs in K-12 schools can increase concern about climate change,⁶⁵ which may lead to pro-environmental action later in life. However, the short-term effectiveness of these programs is difficult to quantify in terms of carbon emissions reductions.

Commercial and industrial energy-efficiency training (sometimes called *Strategic Energy Management*), on the other hand, is relatively well-evaluated and has demonstrated electricity and gas savings of up to 23%.⁶⁶ BC Hydro, for example, offered a Continuous Optimization for Commercial Buildings program that is cost-effective, has been implemented by 115 customers at 442 sites, and saves an average of approximately 7% electricity and 11% gas.^a The program incorporates training for in-house experts at each commercial building, as well as regular energy audits to help set and monitor energy savings goals. This program requires training, recruiting, and rewarding energy champions or energy managers at host institutions, and thus combines the strategies of goal setting, education, incentives, block leaders and others to reduce energy consumption in commercial buildings.

4.2 How “sticky” are these strategies?

How long do energy savings from these programs last? The answer depends partly on the types of behaviours that are changed. Programs targeting “curtailment behaviours” (small frequently repeated behaviours) will only create persistent energy reduction if they change participants’ habits relatively permanently.⁶⁷ Programs targeting “efficiency behaviours” (one time investments in energy efficiency upgrades) will usually save energy for the entire life of the product in which they

^a (For a summary of this program and other Canadian programs, http://www.exec.gov.nl.ca/exec/ccce/publications/canadian_energy_efficiency_programs_part_b.pdf).

invested.⁶⁸ Thus, home energy audit programs and strategic energy management programs (with heavy audit-and-upgrade components) likely have long energy savings persistence, but the long-term savings of other programs is less clear.

Home Energy Report programs, with their strong evaluation methods, offer some evidence of persistence. Savings from these programs ramps up over the first two years and appears to last for at least five years, as long as consumers continue receiving reports (little is known about HER programs beyond five years).^{69,70} Furthermore, participants engage in a pattern of “action and backsliding” as they respond to reports, suggesting that the majority of savings come from habits that are developing over the first two years.⁷¹ Once the two-year mark is reached, program administrators can expect savings from discontinued programs to last for at least another two years, with about a 20% reduction in savings each year.⁷²

5. RECOMMENDATIONS

All of the programs and strategies outlined in this report can reduce energy consumption and GHG emissions. We recommend that program administrators choose to implement programs and strategies that best match the motivations, demographics and values of their target audience. For example, programs that target a community or business might consider a community-based program with volunteer energy champions. A program that targets household residential behaviours might be better served with in-home feedback devices or home energy reports. Programs which target tight-knit social groups that enjoy competition such as university students, might include a game or competition to save energy. The most effective programs weave together strategies such as goal setting, tailored information, public commitment, and social comparison.

5.1 More information? Maybe not

Knowledge of the causes and effects of climate change, or of the costs and benefits of action are important but sometimes not enough to encourage action. Failure to act is not always a result of knowledge deficits. In one review of pro-environmental behaviour change strategies, providing instructions was, on average, the least effective. In many cases individuals are aware of the problem and of what they can do to solve it, but they have conflicting goals, believe that the behaviour is too difficult, or that the action is not socially supported.⁷⁵ Therefore, strategies that tackle these other psychological barriers may sometimes be more effective than those that simply inform the public about the issues.

5.2 Methods of evaluation

Many large-scale behaviour change programs share a key shortcoming – lack of well-designed evaluation. We recommend that program implementers build effective evaluation into their programs from inception. Specifically, they should consider (1) which specific behaviour they will target, and (2) how they will measure increases or decreases in that behaviour.

Community-based social marketing offers a structured step-by-step solution for developing such a program. It starts with identifying a target behaviour within a specific target population and then choosing the appropriate behavioural tools for instigating change (see Appendix A for more information about CBSM and other intervention strategies). Prior to implementing a large-scale program, we recommend pilot-testing the intervention with one or more groups.

Ideally, evaluation would include direct observation of the behaviour or tracking usage with meters (rather than self-reported intentions or actions) within a large representative sample of the

population, using a comparison group. This would allow the greatest confidence that the intervention is causing a change in behaviour, rather than some other external factor causing the change (such as the weather, participants' pre-existing motivations, etc.).

The least preferable study design is a simple pre-post study, in which behaviour is observed in a single group before and after the intervention. This design poorly controls external factors such as participants' pre-existing motivations or their natural tendency to change over time. The most preferable design is a randomized control trial with a large and representative sample, in which participants are randomly assigned to control or intervention groups. This design controls for known and unknown factors, but it is often impractical (for example, one cannot easily assign groups to purchase an electric versus internal combustion engine vehicle). Alternatively, programs may be evaluated using quasi-experimental methods such as recruit-and-delay (sometimes called "waitlist controls"). These methods involve comparing outcomes from participants who receive the intervention with the outcomes for those who were recruited, but are on a waitlist for the intervention. This study design controls many (but not all) external factors. The best studies combine a variety of qualitative and quantitative methods, such as in-depth case studies and analysis of large data sets. See Appendix A for more resources on evaluation methodology.

Changing defaults is an effective behavioural strategy for increasing participation rates in programs, but it can also disguise energy savings. Opt-in programs will usually boast higher percent savings (relative to the number of participants) than opt-out programs (where people are automatically enrolled) because consumers are highly motivated to participate. However, the opt-in programs might not necessarily save more energy in an absolute sense because fewer people participate. Furthermore, unless the program is evaluated using a strong experimental or quasi-experimental design, the success of opt-in programs may be attributed to the pre-existing motivations of participants rather than the intervention. Therefore, we recommend that program administrators look at more than percent savings when they decide between program types.

5.3 Work with experts

Utilities and government regulators that are familiar with traditional program implementation strategies (e.g., rebates or incentives) may be tempted to create and administer behaviour change programs on their own. We caution against this because traditional programs differ in important ways from social science-based behaviour programs. Many elements of behaviour change programs involve challenges that social scientists have experience addressing, such as recruiting participants, administering surveys and designing evaluations. Field experiments of large scale programs can be difficult to implement and, therefore, we recommend working with experienced social science researchers when designing behaviour change programs (see Appendix A).

6. CONCLUSIONS

The human dimensions of climate change are important to consider when designing a program to encourage climate action. This report presents evidence-based solutions, derived from environmental psychology research spanning four decades, about a variety of strategies and programs, each with strengths and weaknesses. The research shows that providing tailored information, soliciting commitment (i.e., pledges), recruiting leaders from within social networks, giving feedback and using a variety of other social influence strategies can effectively increase climate-friendly behaviour. The long-term persistence of behaviour change derived by these programs should be the subject of future research.

APPENDIX A. ADDITIONAL RESOURCES

Behaviour Change Interventions and Theories for Climate Action

- Abrahamse, W., Steg, L., Vlek, C., & Rothengatter, T. (2005). A review of intervention studies aimed at household energy conservation. *Journal of Environmental Psychology, 25*, 273-291.
- Dwyer, W. O., Leeming, F. C., Cobern, M. K., & Porter, B. E. (1993). Critical review of behavioral interventions to preserve the environment: Research since 1980. *Environment and Behavior, 25*, 275-321.
- Schultz, P. W. (2014). Strategies for promoting proenvironmental behavior: Lots of tools but few instructions. *European Psychologist, 19*(2), 107-117.
- McKenzie-Mohr, D., & Smith, W. A. (1999). *Fostering sustainable behavior: An introduction to community-based social marketing*. Gabriola Island, BC: New Society Publications.

Strategies for Message Framing

- Moser, S. & Dilling, L. (2007). *Creating a climate for change: Communicating climate change and facilitating social change*. New York: Cambridge University Press.

Pledge and Commitment Strategies

- Lokhorst, A. M., Werner, C., Staats, H., van Dijk, E., & Gale, J. L. (2011). Commitment and behavior change: A meta-analysis and critical review of commitment-making strategies in environmental research. *Environment and Behavior, 45*(1), 3-34.

Large Scale Behaviour Change Programs for Reducing Energy Use

- Sussman, R., & Chikumbo, M. (2016). *Behavior change programs: Status and impact*. Washington, DC: American Council for an Energy-Efficient Economy.

Evaluation Strategies

- Gifford, R. (Ed.) (2016). *Research methods for environmental psychology*. Hoboken, NJ: Wiley-Blackwell.
- Illume Advising, Indicia Consulting, & Vine, E. (2015). Energy efficiency behavioral programs: Literature review, benchmarking analysis, and evaluation guidelines. Retrieved on September 21, 2016, from: <http://mn.gov/commerce-stat/pdfs/card-report-energy-efficiency-behavioral-prog.pdf>

Where to Find Applied Social Science Research Experts

- Environmental Psychology Division of the Canadian Psychological Association. Visit the website to post a job, or contact the executive team for suggestions in your area. <https://cpaenvironmentalpsychologysection.wordpress.com/>
- Behavioral Science & Policy Association. Recruit applicants by visiting the website to post a request for a behavioral science consultant. <https://behavioralpolicy.org/jobs-and-calls/#job-posting>
- Global Directory of Environmental Psychologists. Browse for researchers in your geographical area or with your specific research interest. <http://web.uvic.ca/-epcensus>
- Environmental Psychology Division (Division 34) of the American Psychological Association. Visit the website to post a request for a social science consultant, or contact the executive team for suggestions in your area. You can also browse the international list of universities with

Environmental Psychology graduate programs to identify and contact one near you. <http://www.apadivisions.org/division-34/>

Behavior, Energy and Climate Change (BECC) LinkedIn group. Many social science consultants and researchers are active in this group. Post a job or request for assistance for the group to respond to. <https://www.linkedin.com/groups/3794406>

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