Flex Appeal: Emerging Best Practices for Communications to Recruit Households into Load Flexibility Programs

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ABSTRACT

Residential load flexibility (LF), including programs that automate end uses to reduce or shift demand and virtual power plants (VPPs) that leverage household solar and battery storage to support the grid, is an important strategy for maintaining grid stability while leveraging more renewable energy resources. This research explores how residential LF program administrators are communicating with potential participants during recruitment via a content analysis of 51 (predominantly US) program websites. Systematic coding and textual analysis grounded in social science focused on quantifying the prevalence of types of content and language and identifying potential best practices for participant education and motivation. In terms of education, some program webpages address the general concepts of LF, VPP, or similar (20%); provide background information (e.g., about peak demand: 92%) on the rationale for LF; and use creative visual elements such as videos to clarify these general topics or how the specific program works (29%). These practices build consumer familiarity and knowledge that might support present and future program participation as well as empower further independent learning and spur social diffusion. Regarding participant motivation, all program webpages highlight household financial benefits, and some also tap into prosocial motivations, social normative influence, and collective efficacy by emphasizing the collective and local nature of LF participation (22%) and impacts (57%). Future research should empirically test the effectiveness of these practices and elaborate more specific and differentiated recommendations for different types of LF programs and market segments.

Introduction

Advances in automation and communication technologies have created new opportunities to leverage load flexibility (LF)–managing energy dynamically in response to grid conditions to decrease peak demand and increase usage of distributed energy resources (DERs). The resulting flexible grid promises cleaner, more reliable, and more affordable electricity service by relieving grid congestion, making better use of existing renewable generation capacity, and avoiding new peaker plants. A variety of end uses (e.g., space conditioning and water heating) and DERs (e.g., solar photovoltaics with battery storage, EV chargers) are capable of LF; the former can be controlled to automatically curtail or shift consumption while the latter can export energy to subsidize the grid during high demand.

Researchers at Lawrence Berkeley National Laboratory identified 78 residential LF programs, excluding managed EV charging programs, from 2022 data that largely reflected 2021 programs (Murphy et al. 2024). More recently, virtual power plants (VPPs), which aggregate and coordinate LF across a decentralized network of residential and/or commercial/industrial DERs, have gained policy popularity and are probably the fastest-growing type of LF program (Department of Energy n.d.; Martucci 2025). The Clean Energy States Alliance (CESA) estimates that VPP programs are now available to battery storage owners (or lessees) in approximately half the states in the US (CESA 2026).

Since residential LF programs are voluntary, their success depends on effective participant recruitment. In this research, we explore current trends in communication strategies used by program administrators in their recruitment materials. Specifically, we conducted a content analysis of 51 residential LF program websites. Analysis and interpretation aimed at identifying emerging best practices for program webpages to educate and motivate residential energy consumers to participate in LF.

Theoretical Framework

When considering the role of recruitment communications, we adopt as a framework the intrapersonal innovation-decision process from Diffusion of Innovations theory (Rogers 2003), which proposes that individuals go through five stages in the journey to adopt a new technology (including an idea like LF): Knowledge, Persuasion, Decision, Implementation, and Confirmation. We are mainly concerned with the two stages preceding the decision to participate in an LF program: (1) Knowledge, which refers to initial exposure to an innovation and growing understanding of it; and (2) Persuasion, which refers to the formation of positive or negative attitudes about an innovation.

We argue that recruitment communications can have two major functions related to these stages: education and motivation. For education, recruitment efforts can impart knowledge to potential participants about the idea and context of LF generally and the details of how a specific LF program works, laying the groundwork for attitude formation. Communications can motivate participation by extolling the benefits of LF for households or broader social and environmental benefits that may align with prospective participants' values, and by providing risk reassurance to reduce uncertainty and apprehension about concerns.

Literature Review

The education function of LF program recruitment communications is challenging because LF is more complex than other types of residential energy programs (e.g., efficiency and curtailment, including behavioral demand response). This could compound the challenge for residential energy programs generally that consumers can feel that they do not understand energy technologies well enough to participate or may underestimate their eligibility for a program (Ashby 2020). Past research also warns that technical jargon and scientific terms in the communication of energy science and technology can alienate or confuse laypersons; understandable terminology, a ninth or tenth grade reading level, narrative, and visual aids are recommended for a general audience (Engel-Cox and Jeromin 2024; Schwartz et al. 2015).

Though it may be challenging, education is necessary because participants' understanding of how an LF program works has implications for program effectiveness and participant experience, which in turn has implications for program retention (Sanguinetti et al. 2024; Sanguinetti, Alston-Stepnitz, and Outcault 2025). For example, participants may have device controls to enable LF, set parameters, or override, and misunderstandings about these user interactions can result in accidental overrides or missed opportunities for greater flexibility.

Participants can also experience confusion or stress (and resort to overriding LF) if they notice changes in equipment operation (e.g., thermostat setpoints; equipment noise at unusual times) or impacts on energy services (e.g., thermal comfort impacts) that they do not understand. Details about LF program operation are sometimes provided in additional onboarding materials or orientation methods after initial recruitment, but these communications can be unnoticed, ignored, or forgotten (email communications more so than phone or in person).

Relevant to the motivation function, studies suggest that financial incentives (household benefits) and maintaining comfort and control during LF events (risk reassurance) are crucial for engaging and sustaining participation (Xu et al. 2018; Jia et al. 2022; Winzer and Zhang 2023; Outcault et al., forthcoming). Thus, highlighting these aspects in LF program recruitment materials might motivate participation. Similarly, a systematic review of residential consumer motivations for demand response enrollment found that financial benefits (bill savings in particular) were typically given the most importance (Parrish et al. 2020).

Parrish et al. (2020) found that environmental and social benefits were also important motivators for residential demand response enrollment. LF programs–particularly VPPs–have a unique opportunity to highlight collective benefits given the aggregated and coordinated nature of technology operations and grid impacts. Framing benefits by aggregating across potential collective action (i.e., if x people do y, then z will be achieved) motivates participation by increasing outcome efficacy–the belief that one's actions will have a meaningful impact (Camilleri and Larrick 2019). Simply stating that many people in a community are participating in a program (a descriptive norm) can be a powerful motivator (i.e., normative influence: Cialdini and Jacobson 2021; Cialdini et al. 2006). The localization of collective action and community benefits (e.g., reliable local energy grid, less local air pollution, lower energy prices for utility territory) in LF programs can be motivating by tapping into place attachment and community identification (Carrus et al. 2014).

Research Aims

This study aimed to explore and characterize residential LF program recruitment websites in terms of content and strategies for educating and motivating prospective participants. In addition to general exploration, we had two research questions of particular interest:

1. Given the complexity of the concepts of LF and VPP, how (and how much) are program administrators attempting to educate potential participants?
2. Given the more explicit collective nature of LF, and especially VPP, compared to other kinds of residential energy programs, how (and how often) are program administrators framing participation and benefits as collective?

Methodology

We identified residential LF programs via two channels. One was a convenience sample gathered through word-of-mouth from our research team's colleagues and unsystematic web searches. We also drew from a list of all VPP programs involving battery storage in the US maintained by the Clean Energy States Alliance (CESA), a US coalition of state energy agencies (CESA 2026). The aim was to compile a diverse and non-exhaustive list of residential LF programs in English-speaking regions of the world.

We applied the following inclusion and exclusion criteria to the initial program list. Any programs targeting residential consumers were included, even if they targeted other types of consumers as well; programs targeting only commercial and/or industrial consumers were excluded. Included programs also had to involve automation of at least one end use to achieve load reduction, load shifting, and/or exporting energy to the grid. Programs based on behavioral demand response were excluded unless they also had options for participating in automated DR/LF. Any programs focused only on energy rate/tariff changes were excluded, though being on a certain rate plan was a prerequisite for some programs and several involved both automated LF and a move to a new rate plan.

There were also inclusion and exclusion criteria related specifically to the program webpage, which was the unit of analysis in this study. Programs were only included if a program webpage was identified that clearly targeted potential participants as a main audience *and* had a direct pathway to recruitment (e.g., "Click here to enroll/get a quote", or a notice that enrollment was discontinued or forthcoming). For CESA-listed programs that did not include a webpage link or had a broken link or one to a page without a direct recruitment pathway, an online search was conducted and if an acceptable webpage was easily found it was included. Programs were excluded if no appropriate webpage was located. When we found multiple appropriate webpages for a single program (e.g., one hosted by the utility and others by technology manufacturers or providers partnering in program administration, or multiple webpages for the same program being administered in different states or utility territories), we used only the first acceptable page we found (e.g., the one listed in the CESA database). In cases where administrators ran multiple distinct LF programs (e.g., three programs from the same utility, each focused on a different end-use) and each had its own main webpage, all were included despite similar messaging; exceptions were if the programs were also packaged under an umbrella program with its own clear branding and webpage that met the inclusion criteria. CESA-listed programs were limited to the US, but no geographical boundary was imposed in the convenience sample; however, programs with webpages in languages other than English were excluded. Applying the inclusion and exclusion criteria yielded 51 programs, including 28 from the first convenience sample and 23 from the CESA database, 49 in the US (from 22 states) and 2 in the UK.

For each LF program webpage, we reviewed all content, including text and images, on the main page and within expandable sections but not on additional linked pages. The aim was to capture the most salient information that LF/VPP program administrators were communicating when trying to recruit participants. We developed a set of codes iteratively based on the study research questions and an initial review of a subset of the webpages. Codes described program characteristics (e.g., location, administrator, and eligible technologies) and content related to participant education and motivation. Regarding education, we coded whether program webpages named the general concept of LF, VPP, or similar, and what related terms they used; background topics they covered in explaining the rationale for LF (e.g., grid strain, energy prices, considerations for leveraging renewables on the grid); and creative visualizations of this information. Regarding motivation, we coded all program benefits claimed (for households, the grid, the community, or society and the environment at large) and whether any were framed as collective (i.e., naming a collective beneficiary such as a geographically defined community or even "everyone"); as well as whether the collective nature of participation was mentioned (specifically noting that more people, not just devices, are contributing). We also recorded text excerpts of program descriptions, including any definitions of LF, VPP, and related concepts, as well as language describing the collective nature of program participation and impacts.

Programs Overview

Programs were located in 22 US states and 2 in the UK. Administrators included a range of utilities (public, private, and co-op; large and small; 78% of programs) and technology providers/third party companies. Among 80% of programs, multiple entities were involved in program administration.

Due to the focus of the CESA list, battery storage and solar/renewable generation were the most represented eligible technologies (27 programs), including 5 that also involved additional eligible end uses. Space conditioning technologies (i.e., smart thermostats, air conditioner units, heat pump space heaters) were also common (21 programs), including 18 programs that focused solely on space conditioning. Six programs included electric vehicles/chargers (three exclusively), and five included water heaters (four exclusively).

Results

Education

Most webpages describe programs only relatively strictly in terms of impacts on home equipment operations; for example, "The [program] allows [the utility] to make brief changes to your central air conditioner setting by a few degrees." Only 20% also name and/or define the broader underlying concept of LF, VPP, or similar. Specifically, the term "demand response" is used on four program webpages, "load management" on two, and "automated response", "virtual power plant", "load shifting", "load control" and "flexible loads" are each used on one webpage.

When referencing the broader concepts, some webpages include these terms only within the program name (e.g., "Flexible Load Program"), whereas others define them. For example, one webpage includes a section with a definition of load shifting and reference to the concept of demand response: "Load shifting is when you shift some of your electricity use to times when electricity demand on the grid is lower and renewable energy is more plentiful, such as during the daytime, to help reduce pressure on the power grid. Load shifting is a form of demand response." The only program webpage that uses the term VPP is a smart thermostat program: "If enough people band together to reduce energy during these peaks they can become a virtual power plant."

All program webpages except one provide some background information to establish "the why" (a rationale for LF). Most often, they reference grid strain or peak demand (92%). Some also provide background information on other topics, including energy prices (31%) and the composition of energy sources powering the grid (29%). Some program webpages manage to cover all three topics succinctly, e.g.: "Energy prices can vary depending on the time of day– these are called 'time-of-use' rates... How clean the energy is on your local grid changes too. Weather can reduce output from clean sources like wind and solar farms. Or, at times of extreme demand, energy providers may have to turn on additional fossil fuel power plants."

The language and depth of information on these background topics vary widely across program webpages. For example, on the topic of grid strain, one webpage includes a metaphor: "The grid is a physical network that can get overwhelmed by demand, just like a highway at rush hour." Many webpages just reference "times/periods of peak/high demand" without further explanation. Others relate grid strain to weather, e.g., "In extreme temperatures – high or low – electricity demand increases and can cause strain on the grid."

Less than one-third of program webpages (29%) use creative visuals to aid in the explanation of program concepts, operations, and/or background information. This content predominantly includes videos (11 webpages). The videos range in length and production style, from short marketing features to near-hour-long webinars geared toward a more technical audience. In addition, four webpages include images of app interfaces for flexible technologies (e.g., smart thermostats, EV chargers) providing hypothetical information and feedback about program participation (Figure 1). One webpage provides an infographic with several icons to communicate how a battery storage program works (Figure 2).

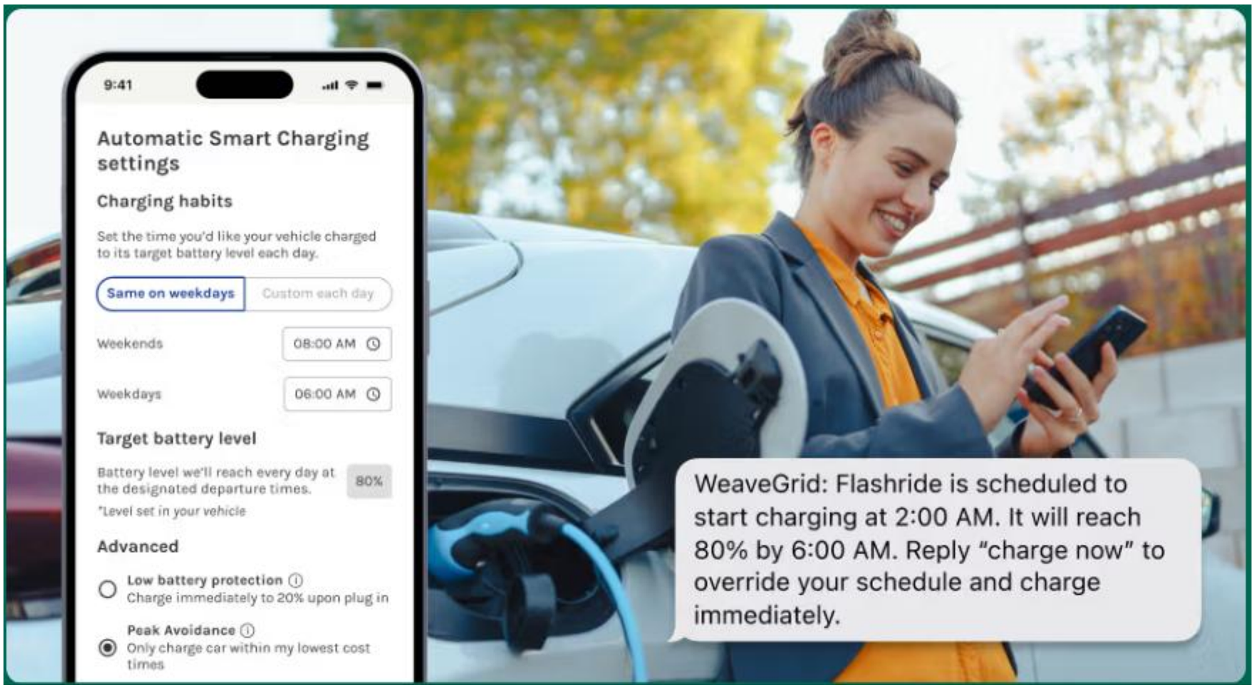

Figure 1. Image of EV charging app interface and notification in Southern California Edison [investor-owned utility] Charge Smart Program. *Source*: https://charge.weavegrid.com/sce/.

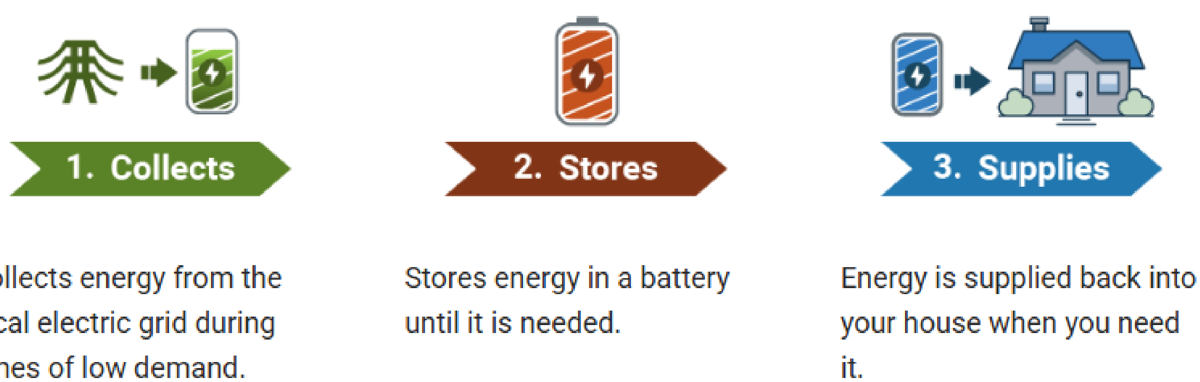

Figure 2. Infographic illustrating Evergy’s [investor-owned utility in Kansas/Missouri) Home Battery Storage Pilot. *Source*: https://www.evergy.com/ways-to-save/programs-link/battery-storage-program.

Motivation

All program webpages mention financial benefits for participating households, including energy bill savings; rewards or credits; or equipment rebates, discounts, or special financing. Few program webpages claim any other benefits to households specifically. A couple mention personal carbon footprint reduction. Webpages for battery programs that include acquisition (rental or purchase) mention the general benefit of energy independence associated with the technology itself rather than LF per se; one for a space conditioning program promises a free air conditioner checkup. Several webpages for programs that involve solar and batteries highlight the benefit of getting the most out of these investments through strategic energy management.

In addition to describing household benefits, some program webpages provide information for risk reassurance related to potential participant concerns (that could be demotivating). For example, two-thirds (67%) highlight participants' ability to maintain control (e.g., by overriding LF operations, opting out, or retaining some level of battery storage in case they need it). Maintaining comfort is mentioned on most webpages for programs involving space conditioning. Many also note that information (e.g., notifications; 22%) or feedback (8%) will be provided and mention technology ease of use or program simplicity (29%).

Most program webpages (84%) also highlight social or environmental benefits of LF, including grid reliability/fewer blackouts (67%), increased use of renewable energy/decreased fossil fuel use (43%), and lower electricity costs (33%). Less common mentions are lower grid costs (a benefit to energy suppliers; 17%) and cleaner air/less pollution (10%). Despite a large majority touching on at least one collective impact, only a small majority (57%) frame these impacts as collective by naming the collective beneficiary. For example, this is the difference between, regarding grid reliability: "reduce stress on the power grid" versus "you'll be benefiting your community by helping keep the electric power grid reliable and resilient"; regarding cleaner air: "create a healthier environment" versus "that means cleaner air for all of us".

Fewer program webpages (22%) framed participation as collective (potentially leveraging social normative influence and prosocial motivation). Examples of this language include, "You're not just a participant; you're a partner in our collective effort towards a greener future… Let's work together to power Hawaii forward towards a sustainable goal of 100% clean energy by 2045." And more specific to the technical operations of a VPP: "Joining [program] adds your stored energy to that of hundreds of other customers, which helps offset what's needed to meet power demand during those critical times." A couple webpages implied collective action, but only mentioned devices rather than people; e.g., "The combined energy from connected devices like batteries and thermostats…"; "The program aggregates all the participating batteries…".

Discussion

Limitations and Future Research

The sample of programs for which we analyzed webpages is large relative to estimates of the population of programs in the US and UK (there are extremely few LF programs in the UK). However, there is likely a systematic bias in both our convenience sample and the CESA list that resulted in nearly all the webpages being owned by utilities, since many of the programs involve other partners who sometimes have their own program webpage where participants can enroll.

Nonetheless, this research provides a solid start at exploring best practices for residential LF program recruitment webpages.

It is also important to acknowledge related topics outside the scope of this research. For example, LF program websites have additional functions besides educating and motivating potential participants: they should also be user-friendly (i.e., adhering to usability principles) and engaging (i.e., interesting to look at and read in terms of design, style, and tone). There are also other program recruitment and communication methods that could be valuable for LF programs that this research does not illuminate. For example, personal communications (e.g., in-person or phone calls) for recruitment, orientation, and/or follow-up could be useful for LF programs to ensure adequate participant understanding of complex technology operations (Sanguinetti et al. 2024). Community-based social marketing, which emphasizes in-person, neighbor-to-neighbor communication, could be well-suited to LF programs and could harness the motivational levers of normative influence, collective efficacy, and community attachment much better than a utility webpage.

A more comprehensive analysis of program web recruitment materials could include content on linked pages; evaluate usability and engagement; and better represent non-utility webpages. Differences in recruitment messaging between different types of program administrators (and partners) could be investigated. For example, it is possible that load-flexible technology manufacturers, energy coalitions, and advocates may often have more accessible messaging than utilities. Future research could also focus on identifying best practices for different types of LF programs (e.g., different end uses or DERs) or market segments. Finally, A/B testing of messaging strategies could validate and further specify emerging best practices.

Findings Summary and Interpretation

A large majority of program webpages (80%) do not name or define the general underlying concepts of these programs (e.g., LF, VPP, DR). Administrators may be following the advice of prior research to avoid jargon for fear of alienating potential participants (Schwartz et al. 2015), but the best solution is probably not to avoid the topics altogether. Educating people on these topics can build familiarity and knowledge that might support enrollment across current and future LF programs.

Program webpages that do name or discuss the general concepts typically use the terms demand/automated response or load shifting/management/control. Only one uses the term VPP (a smart thermostat program) and none use LF (or demand flexibility), even though these are currently the most widely used terms in the energy space (e.g., CESA refers to their dataset as VPP programs). Although many of the programs analyzed involve relatively time-limited automated control of end uses, which has been associated with the concept of automated DR rather than the more highly dynamic (and currently more idealized than practiced) type of control emphasized in the concept of LF, program administrators might want to start socializing the term LF if it aligns with future goals. Moreover, we should determine which terms to describe these phenomena are most intuitive, accessible, and *acceptable* to consumers and start to use them consistently in communications with all audiences. Shared language can empower consumers to learn more about the topic independently (they will have the right search terms).

Program webpages often provide background information on the topic of grid strain (92%) but less than one-third discuss energy prices (31%) and the nature of renewable energy sources on the grid (29%), which are important elements of the rationale for LF. Some webpages demonstrated that it is feasible to cover all these topics clearly and succinctly. To the degree to which program communications can build energy literacy on these topics, LF and other energy programs and policies may gain consumer acceptance, though future research could investigate the degree to which program participants want or need to understand the bigger picture before they enroll (having the knowledge could also impact program retention).

LF program administrators universally have "gotten the memo" that financial benefits are important to prospective participants: all webpages highlight bill savings, credits, rebates, or other financial incentives. Most also touch on social or environmental benefits, but these are often vague or general. Nearly half (43%) miss the opportunity to leverage prosocial motivation by using collective framing for program benefits (i.e., referencing a collective "we" as beneficiary). Of those that do use collective framing, some are vague (e.g., "lower costs for everyone") rather than explicitly naming a community with which participants identify. Even more (78%) miss the opportunity to frame participation as collective, which could inspire participation through increased efficacy.

Most program webpages also provide prospective participants with reassurance about potential risks–emphasizing that they will maintain comfort (when space conditioning is involved) and control (with the ability to override, opt out, or maintain battery reserve). This practice is recommended based on recent research demonstrating how the parameters of load control related to comfort (i.e., timing and magnitude of setpoint adjustments) interact with financial incentives to influence residential consumers' willingness to participate in LF programs (Outcault et al., forthcoming). Less attention is given to programs' potential demands on participant time and energy, with only 29% highlighting simplicity or ease of program participation. The literature is not clear on whether or not such reassurance is necessary, but given the technological complexity of LF it seems prudent to emphasize that household participation at least is simple.

Conclusion

We investigated residential LF program recruitment messaging via a content analysis of 51 program websites, including a substantial proportion of current programs in the US and UK (there are very few in the UK) and representing the range of program types. Through coding and textual analysis grounded in social science theories, we quantified the prevalence of types of content and language and identified potential opportunities for improving participant education and motivation. Many of the insights generalize to other types of recruitment and communication methods.

Potential best practices for participant education include naming and explaining the general concept of the program (the field needs to converge on the favored terminology to use consistently) in addition to describing how the specific program works; providing "the why" (i.e., a rationale for LF; e.g., including the topics of peak demand, balancing renewable energy on the grid, and dynamic energy prices); and using visual aids such as videos, simulated device interfaces, and infographics to illustrate the information. Potential best practices for motivation include highlighting collective benefits (and framing them as such) in addition to household financial benefits; and emphasizing the local and collective nature of program participation. Further research, such as focus groups and A/B testing, could empirically validate and hone these strategies to help establish best practices for LF program communications that motivate consumer enrollment and foster informed participation for maximum program effectiveness.

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